National ITS Architecture Logical Architecture – Volume II Process Specification

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1.1.1.1 Process Traffic Sensor Data

Input Flows:

f_other_rw_fc_control_to_traffic_sensor
f_other_rw_ic_control_to_traffic_sensor
fmmc-crossing_close_duration
fmmc-crossing_close_time
fp-pedestrian_data
fp-pedestrian_images
fre-physical_conditions
From_Vehicle_Characteristics
ftrf-traffic_data
ftrf-traffic_images
sensor_configuration_data
vehicle_occupants_detected

Output Flows:

dynamic_lane_sensor_data
dynamic_lane_sensor_data_to_roadway
hov_lane_data_input
hov_sensor_data
hov_sensor_equip_status_for_m_and_c
hov_sensor_status
incident_analysis_data
local_sensor_data_for_highways
local_sensor_data_for_roads
local_sensor_data_for_warning
multimodal_crossing_sensor_data
multimodal_crossing_sensor_equip_status_for_m_and_c
multimodal_crossing_sensor_status
pedestrian_sensor_data
pedestrian_sensor_equip_status_for_m_and_c
pedestrian_sensor_status
reversible_lane_sensor_data
reversible_lane_sensor_equip_status_for_m_and_c
reversible_lane_sensor_status
speed_data_for_m_and_c_speed_monitoring
speed_data_for_traffic_speed_monitoring
t_other_rw_pedestrian_sensor_data
t_other_rw_sensor_to_fc
t_other_rw_sensor_to_ic
traffic_data_for_vehicle_sensors
traffic_sensor_data
traffic_sensor_data_archive_input
traffic_sensor_data_for_automated_lane_changing
traffic_sensor_data_for_variable_speed_limits
traffic_sensor_equip_status_for_m_and_c
traffic_sensor_status
traffic_sensor_status_for_archive_manager
traffic_video_image
traffic_video_image_for_display

Description:

This process shall be responsible for collecting traffic sensor data. This data shall include traffic parameters such as speed, volume, and occupancy, as well as video images of the traffic. The process shall collect pedestrian images and pedestrian sensor data. The process shall collect reversible lane, multimodal crossing and high occupancy vehicle (HOV)/high occupancy toll (HOT) lane sensor data. Where any of the data is provided in analog form, the process shall be responsible for converting it into digital form and calibrating. The converted data shall be sent to other processes for distribution, further analysis and storage. The process shall accept inputs to control the sensors and return operational status (state of the sensor device, configuration, and fault data) to the controlling process.

User Service Requirements:

1.0
1.6
1.6.0
1.6.2
1.6.2.1
1.6.2.1.1
1.6.2.2
1.6.2.2.1
1.6.2.3
1.6.2.3.1
1.6.2.4
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(a)
1.8
1.8.0
1.8.3
1.8.3.1
1.8.3.1(b)
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.1
8.1.3.1.3.1(a)
8.1.3.1.3.1(b)
8.1.3.1.3.1(c)
8.1.3.1.3.1(d)
8.1.3.1.3.1(e)
8.1.3.1.3.1(f)

1.1.1.2 Collect Infrastructure Sensor Data

Input Flows:
fre-roadway_infrastructure_characteristics
infrastructure_sensor_control_from_m_and_c
infrastructure_sensor_control_from_mcv

Output Flows:
infrastructure_sensor_data_for_m_and_c
infrastructure_sensor_data_for_mcv
infrastructure_sensor_equip_status_for_m_and_c
infrastructure_sensor_status_for_m_and_c
infrastructure_sensor_status_for_mcv

Description:
This process shall use roadside sensors to monitor the condition of pavement, bridges, tunnels, culverts, signs, and other transportation-related infrastructure and report the results to the center and vehicle in the Manage Maintenance and Construction function. This process shall also receive sensor control data from both the center and vehicle and return operational status (state of the sensor device, configuration, and fault data) to another process for inventory update and repair if deemed necessary.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.1.1.3 Process Environmental Sensor Data

Input Flows:

env_sensor_control_by_auto_treat_device
env_sensor_control_to_roadway
environmental_sensor_control_for_roadway
environmental_sensor_control_for_roadway_sensors
environmental_sensor_data_for_roadway
f_other_rw_env_sensor_control_by_auto_treat_device
fre-environmental_conditions
fstws-roadway_env_sensor_control
fws-roadway_env_sensor_control

Output Flows:

env_sensor_data_for_auto_treat_device
env_sensor_data_for_speed_enforcement
env_sensor_data_for_variable_speed_limits
environment_sensor_data
environmental_sensor_data_archive_input
environmental_sensor_data_from_roadway
environmental_sensor_data_from_roadway_sensors
environmental_sensor_equip_status_for_m_and_c
environmental_sensor_status
environmental_sensor_status_for_archive_manager
environmental_sensor_status_from_roadway
environmental_sensor_status_from_roadway_sensors
local_env_data_for_warning
t_other_rw_env_sensor_data
tstws-roadway_env_sensor_data
tstws-roadway_env_sensor_status
tws-roadway_env_sensor_data
tws-roadway_env_sensor_status

Description:

This process shall be responsible for collecting and monitoring data obtained from environmental sensors. Where any of the data is provided in analog form, the process shall be responsible for converting it into digital form and calibrating. In addition to the data collected directly from the environment, this process shall also collect environmental sensor data from the Manage Environmental Information function including data coming from mobile assets like maintenance vehicles equipped with environmental sensors. This process shall aggregate the data received directly from the environment with any data collected from mobile sensors. The converted/aggregated data shall be sent to other processes for distribution, further analysis and storage. The process shall accept inputs to control the environmental sensors and return operational status (state of the sensor device, configuration, and fault data) to the controlling process.

User Service Requirements:

1.0
1.2
1.2.0
1.2.3
1.2.3.2
1.2.3.2.3
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(b)
1.7.1.2
1.7.1.2.1
1.7.1.2.1(b)
1.8
1.8.0
1.8.2
1.8.2.1
1.8.2.1(e)

1.1.1.4 Manage Data Collection and Monitoring

Input Flows:

data_collection_device_control
environmental_sensor_data_archive_input
environmental_sensor_status_for_archive_manager
roadside_archive_control
roadside_data_archive
traffic_sensor_data_archive_input
traffic_sensor_status_for_archive_manager

Output Flows:

data_collection_device_status
roadside_archive_data
roadside_data_archive

Description:

This process shall collect and monitor sensor data from the roadside. The process shall collect the sensor data including operational status (state of the device, configuration, and fault data) from roadside equipment and distribute it to the Manage Archive Data function. The process shall run when a request for data is received from an external source. The process shall accept inputs to control the data collection and monitoring devices and return operational status (state of the sensor device, configuration, and fault data) to the controlling process. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data.

User Service Requirements:

7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.1
7.1.3.1.1(a)
7.1.3.1.1(c)
7.1.3.1.3
7.1.3.1.3(e)
7.1.3.1.7
7.1.3.1.7(a)
7.1.3.1.9
7.1.3.1.9(c)

1.1.1.5 Provide Sensor Interface to Other Roadway Devices

Input Flows:

fors-sensor_control
t_other_rw_env_sensor_data
t_other_rw_individual_vehicle_speed_to_dms
t_other_rw_individual_vehicle_speed_to_signage
t_other_rw_pedestrian_sensor_data
t_other_rw_road_user_protection_warning
t_other_rw_sensor_to_fc
t_other_rw_sensor_to_ic
t_other_rw_speed_warning_to_dms
t_other_rw_speed_warning_to_signage
t_other_rw_variable_speed_limit_data
t_other_rw_variable_speed_limit_data_to_signage
t_other_rw_work_zone_intrusion_detection

Output Flows:

environmental_data_for_vehicle_sensors
f_other_rw_env_sensor_control_by_auto_treat_device
f_other_rw_fc_control_to_traffic_sensor
f_other_rw_ic_control_to_traffic_sensor
tors-roadway_info_data_from_sensors
tors-sensor_data
tors-sensor_status

Description:

This process shall provide the interface between roadway sensors and other roadway devices (considered to be contained in the Other Roadway terminator) for the exchange of data, status, and control. The other roadway devices can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The data input to this process shall include sensor data from the sensors such as the following- traffic, environmental, and work zone intrusion detection. Additionally status and fault indications from the sensors shall be input to the process and passed along to the Other Roadway terminator. Control data shall come from the Other Roadway terminator into the process that shall output the control information to the correct sensor process. This process supports the collection of data locally on surface streets or freeways that might be needed to update nearby dynamic message signs with, for example, messages regarding road conditions or individual vehicle speed. This process and its companion process, Provide Device Interface to Other Roadway Devices, support autonomous traffic information dissemination without the need for direct control from a Manage Traffic function.

User Service Requirements:

1.0
1.2
1.2.0
1.2.3
1.2.3.2
1.2.3.2.3
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(a)
1.7.1.1.1(b)
1.7.1.1.1(g)
1.7.1.2
1.7.1.2.1
1.7.1.2.1(b)
1.8
1.8.0
1.8.2
1.8.2.1
1.8.2.1(e)

1.1.1.6 Collect Vehicle Roadside Safety Data

Input Flows:

environmental_data_for_vehicle_sensors
traffic_data_for_vehicle_sensors
vehicle_roadside_safety_data

Output Flows:

vehicle_safety_input_data

Description:

This process shall collect safety related information from passing vehicles via short range communications. This safety data may include information specific to the vehicle - braking, speed, direction, engine status, etc. This safety data may also include information about the environment around the vehicle including the presence of precipitation, obstacles, other vehicles. This process shall provide the collected safety data to other processes within Manage Traffic for relay to other equipped vehicles in the vicinity.

User Service Requirements:

1.0
1.2
1.2.0
1.2.3
1.2.3.2
1.2.3.2.3
1.6
1.6.0
1.6.2
1.6.2.1
6.0
6.3
6.3.0
6.3.1
6.3.1.1

1.1.1.7 Process Road User Protection

Input Flows:
f_other_rw_road_user_protection_warning
fp-pedestrian_presence
From_Vehicle_Characteristics
road_user_protection_device_configuration

Output Flows:
road_user_dynamic_warning
road_user_protection_data_for_traffic
road_user_protection_device_status
road_user_protection_video_for_traffic
road_user_protection_warning_for_display
road_user_protection_warning_for_vehicle
road_user_warning_speed_conditions
t_other_rw_road_user_protection_warning

Description:
This process collects data using sensors alongside the roadway to detect vehicles in close proximity to other road users such as pedestrians and bicyclists. Data concerning the presence of non-vehicle users is input to this process from the Process Traffic Sensor Data. In some cases this may include the manual press of a pedestrian call button at a cross walk or it could include the automatic detection of such users near the roadway. When this process determines that non-vehicle users are too close to vehicles in the roadway this process generates warning data that is used to generate speed restriction requests or warnings either directly at the roadside or to a function residing at a traffic management center.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.1
1.6.2.2
1.6.2.2.1
1.6.2.4
1.6.2.4.1
1.6.2.6
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(a)
1.8
1.8.0
1.8.3
1.8.3.1
1.8.3.1(b)
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.1
8.1.3.1.3.1(a)
8.1.3.1.3.1(b)
8.1.3.1.3.1(e)
8.1.3.3
8.1.3.4
8.1.3.5

1.1.2.1 Process Traffic Data for Storage

Input Flows:

calculated_incident_times
current_data
current_dms_data_displayed
current_highway_network_data
current_incident_data
current_ramp_state
current_road_network_data
current_road_network_use
dynamic_parking_information_for_traffic
environment_sensor_output_data
hov_lane_data
indicator_control_storage_data_for_highways
indicator_control_storage_data_for_roads
indicator_input_storage_data_for_highways
indicator_input_storage_data_for_roads
link_data_from_probes
long_term_data
parking_lot_current_state
planned_event_data
processed_roadway_env_data
processed_traffic_data
selected_strategy
speed_data_for_traffic_status
traffic_sensor_output_data
transportation_information_for_traffic_operations
wide_area_pollution_data

Output Flows:

current_data
current_data_for_exchange
current_data_for_output
long_term_data
parking_lot_dynamic_information_request_by_traffic

Description:

This process shall receive data from other processes and store the data into the long term and current data stores. The data shall comprise sensor data, both smoothed and unsmoothed: processed sensor surveillance data, data sent to control indicators (output devices e.g. intersection controllers, pedestrian controllers, ramp metering equipment), parking lot management data and other street equipment, the status data received from the indicators, plus current traffic conditions, planned events, current incidents, calculated incident response and clearance times, parking lot states, freeway ramp states, link travel times, traffic conditions provided by vehicle probes and from other centers, and selected traffic control strategy. The data stored by the process in the current data store shall be the values collected over a relatively short period of time. The data stored in the long term data store shall be retained for a longer period. The data retained in the long term data store may be aggregated so as to reduce the storage requirements for long historical records, the amount of aggregation to be an implementation decision.

User Service Requirements:

1.0
1.6
1.6.0
1.6.2
1.6.2.5
1.6.2.5.1
1.8
1.8.0
1.8.1
1.8.1.6
1.8.1.6(f)
1.8.2
1.8.2.1
1.8.2.1(b)
1.8.2.10
1.8.2.10(c)

1.1.2.2 Process Traffic Data

Input Flows:

dynamic_lane_data
hov_sensor_data
hri_sensor_data
multimodal_crossing_sensor_data
pedestrian_sensor_data
reversible_lane_data
road_user_protection_data_for_traffic
roadway_maint_status_for_traffic
static_data_for_sensor_processing
traffic_sensor_data
traffic_video_image

Output Flows:

parking_lot_input_data
processed_traffic_data
ramp_data
strategy_data_for_dynamic_lane_management
strategy_data_for_highways
strategy_data_for_roads
traffic_sensor_output_data
traffic_surveillance_data
unusual_data

Description:

This process shall receive and process data from sensors at the roadway. This data includes sensor and video data coming from traffic sensors as well as inputs for pedestrians, multimodal crossings, parking facilities, highway rail intersections, high-occupancy vehicle (HOV) / high-occupancy toll (HOT) and reversible lanes. The process distributes data to Provide Device Control processes that are responsible for freeway, highway rail intersections, parking lot, and surface street management. It also sends the data to another Provide Traffic Surveillance process for loading into the stores of current and long term data. Information about the various sensors to aid in this processing and distribution of data is accessed from the data store static_data_for_sensor_processing.

User Service Requirements:

1.0
1.10
1.10.0
1.6
1.6.0
1.6.2
1.6.2.2
1.6.2.2.1
1.6.2.3
1.6.2.3.2
1.6.2.4
1.6.2.4.1
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(a)
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(a)
1.8.2
1.8.2.3
1.8.2.3(a)
1.8.2.3(d)

1.1.2.3 Update Data Source Static Data

Input Flows:
link_data_update
new_sensor_static_data
request_sensor_static_data

Output Flows:
existing_sensor_static_data
link_details
static_data_for_sensor_processing

Description:
This process shall be responsible for the maintenance of the store of static data used in the processing of sensor data. This sensor data shall be used to provide traffic surveillance information for use by other processes within the Manage Traffic function. The store shall contain data showing the relationship between sensors and the freeways, surface street and rural roadways, i.e. where they are located, to which part(s) of the network their data applies, the type of data, etc. It shall also hold information about the ownership of each link (that is, the agency or entity responsible for collecting and storing surveillance of the link) in the network which shall be used by processes involved in exchanging surveillance information (and optionally control) with other Manage Traffic functions.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.4
1.6.2.4.1

1.1.2.4 Monitor HOV lane use

Input Flows:
hov_lane_data_input
hov_lane_restriction_data_for_enforcement
static_data_for_sensor_processing

Output Flows:
hov_lane_data
hov_lane_violation

Description:
This process shall be responsible for monitoring the use of High Occupancy Vehicle (HOV) lanes and detecting vehicles that do not have the required number of occupants. The process also provides data on HOV lane usage for storage in the stores of current and long term data.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.4
1.6.3.4(d)
1.7
1.7.0
1.7.4
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(b)
1.8.1.3
1.8.1.3(b)
1.8.2
1.8.2.11
1.8.2.11(b)
1.8.2.4
1.8.2.4(b)

1.1.2.5 Process Traffic Probe Data

Input Flows:
link_time_calculation_store
static_data_for_sensor_processing
toll_probe_data_for_traffic
traffic_probe_info_from_isp_for_traffic
transit_probe_data_for_traffic
vehicle_traffic_probe_data_for_traffic

Output Flows:
link_data_from_probes
link_time_calculation_store
probe_data_for_strategy

Description:
This process shall be responsible for processing traffic probe data. This process shall calculate vehicle speed per network link based upon the probe data input. The probe data could be obtained from a process that measures the presence of vehicles at locations along the network (e.g. using a vehicle tag), or directly from traffic sensors onboard vehicles that measure vehicle speed and other parameters. The probe data could also be obtained from a fleet of vehicles that are using an automated vehicle location function to track the location of the vehicles (e.g. a transit fleet). Finally, the probe data could be obtained from an analysis of toll transaction records. Based upon probe data inputs received, this process shall calculate the travel time for the links for which probe data has been provided. In the case of direct measurement of vehicle location (e.g. the tag and reader approach) this shall be achieved by noting the successive times at which the tag data is received and calculating the travel time from the difference. The process shall maintain a data store that contains the average travel time for each link in the freeways, surface streets, and rural roadways that is calculated from one of the above forms of probe data. Calculation of the actual average values shall employ some type of aggregation processing (e.g., smoothing or similar technique) and be stored for differing time categories (e.g., times of day, day of week, holidays) in periodic increments. The current delay time for a link shall be the difference between current travel time value and the aggregate processed (e.g., average) value for that time category.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.2
1.6.2.4
1.6.2.4.1
1.6.2.5
1.6.2.5.1

1.1.2.6 Process Collected Vehicle Safety Data

Input Flows:
vehicle_env_probe_input_data
vehicle_safety_input_data

Output Flows:
vehicle_safety_data_indication

Description:
This process shall be responsible for the processing of vehicle safety and environmental probe data. The process shall receive data from vehicles and local sensors. Then, this process shall estimate type and level of roadway conditions and hazards. The process shall send the road condition and hazard estimates to the Provide Device Control facility for output to future passing vehicles.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.2
1.6.2.3
1.6.2.3.1
1.6.2.3.2
1.6.2.4
1.6.2.5
1.8
1.8.0
1.8.2
1.8.2.10
1.8.2.10(b)
1.9
1.9.0
1.9.2
1.9.2.1
1.9.2.1.3

1.1.2.7 Monitor Reversible Lanes

Input Flows:
reversible_lane_sensor_data
reversible_lane_status
reversible_lane_video_images
static_data_for_sensor_processing

Output Flows:
reversible_lane_data
wrong_way_vehicle
wrong_way_vehicle_detection

Description:
This process shall be responsible for monitoring the use of reversible lanes and detecting wrong-way vehicles in reversible lanes. The process shall monitor sensor data and video images from the reversible lanes, and use this information along with the lane status (which direction it is currently operating) to identify when a vehicle is traveling in the wrong direction on the reversible lane.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(a)
1.7.4
5.0
5.3
5.3.0
5.3.11
5.3.11.10
5.3.11.10.1

1.1.2.8 Process Roadway Environmental Data

Input Flows:
env_sensor_control_by_traffic_operator
env_sensor_control_from_other_center
env_sensor_status_from_other_center
environment_sensor_data
environment_sensor_data_for_traffic
environmental_sensor_status
fstws-env_sensor_data_for_traffic
fws-env_sensor_data_for_traffic
fws-traffic_environment_sensor_data_status

Output Flows:
env_sensor_control_to_other_center
env_sensor_control_to_roadway
env_sensor_data_for_traffic_speed_monitoring
env_sensor_status_for_traffic_operator
env_sensor_status_to_other_center
environment_sensor_data_for_maint
environment_sensor_output_data
environmental_data_for_incidents
environmental_data_for_signage
processed_roadway_env_data

Description:
This process shall receive and process data from environmental sensors at the roadway and from weather service providers. It sends the data to another process for loading into the stores of current and long term data. This process distributes environmental sensor data to other processes in Manage Traffic as well as the process that is responsible for monitoring vehicle speed. The process shall receive quality check information from weather service providers to assist in identifying where environmental sensors are not providing quality data. The process shall also support remote control of environmental sensors by other traffic management centers in neighboring jurisdictions, as well as control of another jurisdiction's environmental sensors by the local center.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(b)
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(a)

1.1.2.9 Monitor Dynamic Lanes

Input Flows:
dynamic_lane_sensor_data
dynamic_lane_status
dynamic_lane_video_image
lane_violation_notification_for_traffic
shoulder_violation_notification_for_traffic
static_data_for_sensor_processing

Output Flows:
dynamic_lane_data
tea-lane_violation_notification
tea-request_lane_enforcement
tea-request_shoulder_enforcement
tea-shoulder_violation_notification

Description:
This process shall remotely control the system that is used to dynamically manage specific lanes and shoulders. The process uses lane sensor data received from another process and determines, using an optimization algorithm, when intersections and/or interchanges should be reconfigured, when the shoulders should be used for travel (as a lane), when lanes should be designated for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. and/or when types of vehicles should be prohibited or restricted from using particular lane. Based on this determination, this process shall provide configuration and control commands to the dynamic lane management field equipment. In addition, this process shall pass control parameters from traffic operations personnel for autonomous operation by field equipment.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.1.4.1
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4(a)
1.6.3.4(b)
1.6.3.4(c)
1.6.3.4.1
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.1.2.10 Provide Dynamic Lane Management

Input Flows:
dynamic_lane_mgmt_control_from_operator
dynamic_lane_mgmt_control_from_other_traffic
fbis-lane_management_inputs
fifd-intermodal_freight_event_lane_information
fmmc-lane_management_inputs
lane_management_status
selected_dynamic_lane_strategy
shoulder_management_status
strategy_data_for_dynamic_lane_management

Output Flows:
dynamic_lane_mgmt_control_to_other_traffic
dynamic_lane_status_to_operator
lane_management_control
shoulder_management_control

Description:
This process shall remotely control the system that is used to dynamically manage specific lanes and shoulders. The process uses lane sensor data received from another process and determines, using an optimization algorithm, when intersections and/or interchanges should be reconfigured, when the shoulders should be used for travel (as a lane), when lanes should be designated for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. and/or when types of vehicles should be prohibited or restricted from using particular lane. Based on this determination, this process shall provide configuration and control commands to the dynamic lane management field equipment. In addition, this process shall pass control parameters from traffic operations personnel for autonomous operation by field equipment.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.1.4.1
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4(a)
1.6.3.4(b)
1.6.3.4(c)
1.6.3.4.1
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.1.2.11 Control Dynamic Lanes

Input Flows:
dynamic_lane_sensor_data_to_roadway
From_Vehicle_Characteristics
lane_management_control
shoulder_management_control
vehicle_characteristics_for_roadway

Output Flows:
lane_management_device_status
lane_management_equip_status_for_m_and_c
lane_management_status
lane_violation_notification_for_traffic
shoulder_management_device_status
shoulder_management_equip_status_for_m_and_c
shoulder_management_status
shoulder_violation_notification_for_traffic
td-dynamic_lane_control
tea-lane_violation_notification_from_roadway
tea-shoulder_violation_notification_from_roadway

Description:
This process shall activate lane management field equipment that is used to dynamically manage specific lanes and shoulders upon receiving configuration and control commands from another process. This process shall also accept parameters for autonomously monitoring traffic conditions and traffic demand data and determine how to change the lane and shoulder controls to respond to current conditions. Lane and shoulder controls can be used to change the lane configuration of the roadway, reconfigure intersections and/or interchanges, allow use of shoulders for travel (as a lane), designate lanes for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. and/or prohibit or restrict vehicles from using particular lanes. In addition, this process shall notify the enforcement agency of violators of the lane controls. The process shall accept inputs to control the dynamic lane and shoulder management devices and return operational status (state of the device, configuration, and fault data) to the controlling process.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.1.4.1
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4(a)
1.6.3.4(b)
1.6.3.4(c)
1.6.3.4.1
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.1.3 Generate Predictive Traffic Model

Input Flows:
current_incident_data
fws-weather_forecasts
long_term_data_for_prediction
other_traffic_center_data
planned_events
predictive_model_data
rail_schedules_for_prediction
route_segment_use_prediction
selected_strategy

Output Flows:
prediction_data
predictive_model_data
traffic_model_data_for_incident_calcs
unusual_congestion

Description:
This process shall be responsible for continually producing and updating a predictive model of the traffic flow conditions in the road or freeway network served by the Manage Traffic function that an instance of this process is allocated to. The prediction shall be based on current surveillance, historic traffic data and surveillance, current incidents, planned events, current traffic control strategy, data received from other Manage Traffic functions serving other geographic and/or jurisdictional areas, and current and predicted weather conditions. The predictive model of traffic flow produced by this process shall be used by processes in the Manage Traffic function and other ITS functions.

User Service Requirements:
1.0
1.2
1.2.0
1.2.3
1.2.3.2
1.2.3.2.3
1.6
1.6.0
1.6.2
1.6.2.5
1.6.2.5.2

1.1.4.1 Retrieve Traffic Data

Input Flows:

current_data_for_output
hov_lane_restriction_data
long_term_data_for_output
network_and_device_inventory
predictive_model_data
request_traffic_operations_data
reversible_lane_restriction_data
roadway_detours_and_closures_for_traffic
traffic_archive_data_product
traffic_data_demand_request
traffic_data_deployment_request

Output Flows:

current_highway_network_state
current_incidents_data_for_transit
current_road_network_state
disaster_network_status_from_traffic_to_m_and_c
environmental_sensor_data_from_traffic_management
network_status_from_traffic_for_disaster
network_status_from_traffic_for_evacuation
operator_log_for_traffic_data
retrieved_traffic_media_data
retrieved_traffic_operations_data
road_network_info_from_traffic
roadway_info_traffic_data
tifd-traffic_data_for_intermodal_freight
traffic_archive_data_product_request
traffic_data_for_demand
traffic_data_for_deployment
traffic_data_for_em_response
traffic_data_for_emergency_services
traffic_data_for_isp
traffic_data_for_strategy
traffic_data_for_transit
traffic_incident_data_for_isp
traffic_performance_measures
traffic_road_weather_data_for_isp
traffic_video_for_isp
traffic_video_for_mcm
traffic_video_for_transit
tstws-env_sensor_data_from_traffic
tws-env_sensor_data_from_traffic

Description:

This process shall distribute traffic data, roadway network data, and environmental sensor data to other functions within ITS and to other terminators on the boundary of the architecture. The process shall retrieve data from the data stores managed by other processes in the Provide Traffic Surveillance facility of the Manage Traffic function. The process shall respond to requests for data that originate from traffic operations personnel, the Manage Transit function, the Manage Emergency Services function, the Manage Demand facility within the Manage Traffic function, and the Provide Driver and Traveler Services function. Upon request from the operator, this process shall request data from the Manage Archived Data function to support the operational needs of the Manage Traffic function. When received, this archive data product shall be forwarded to the operator and to other functions within Manage Traffic, including Manage Travel Demand and Provide Device Control. The process shall provide environmental sensor data to the Manage Maintenance and Construction function as well as the Weather Service and Surface Transportation Weather Service terminators. The process shall also generate traffic data for output by other processes to in-vehicle signage functions.

User Service Requirements:

1.0
1.6
1.6.0
1.6.3
1.6.3.4
1.6.3.4.1
1.6.4
1.6.4(a)
1.6.4(b)
1.6.4(c)
1.6.4(d)
5.0
5.3
5.3.0
5.3.2
5.3.2.2
5.3.2.2(c)
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)

1.1.4.2 Provide Traffic Operations Personnel Traffic Data Interface

Input Flows:

asset_restrictions_for_traffic
barrier_system_status_to_operator
device_control_request_from_other_center
dynamic_lane_status_to_operator
env_sensor_status_for_traffic_operator
ftop-barrier_safeguard_control_parameters
ftop-device_control_request_to_other_center
ftop-dynamic_lane_mgmt_control
ftop-env_sensor_control
ftop-hov_control_parameters
ftop-lighting_system_control_parameters
ftop-reversible_lane_restriction_data
ftop-roadway_info_input
ftop-roadway_warning_system_control
ftop-traffic_data_parameter_updates
ftop-traffic_information_requests
ftop-variable_speed_limit_control_parameters
ftop-vehicle_signage_input
ftop-vehicle_speed_sensor_control
ftop-weather_request_information
lighting_system_status_to_operator
map_data_for_traffic_display
operator_log_for_traffic_data
retrieved_traffic_operations_data
roadway_info_operator_status
roadway_warning_system_status_to_operator
safeguard_system_status_to_operator
speed_data_for_traffic_display
traffic_video_image_for_display
vehicle_signage_operator_status
weather_service_information

Output Flows:

barrier_system_activation_request_from_operator
device_control_request_to_other_center
dynamic_lane_mgmt_control_from_operator
env_sensor_control_by_traffic_operator
hov_lane_restriction_data
hov_lane_restriction_data_for_enforcement
lighting_system_activation_request_from_operator
operator_log_for_traffic_data
request_traffic_map_display_update
request_traffic_operations_data
reversible_lane_restriction_data
road_user_protection_device_configuration
roadway_info_operator_input
roadway_warning_system_control_from_operator
safeguard_system_activation_request_from_operator
sensor_configuration_data
speed_sensor_control_from_traffic_personnel
traffic_data_media_parameters
tstws-trans_weather_info_request
ttop-barrier_safeguard_status
ttop-device_control_request_from_other_center
ttop-dynamic_lane_status
ttop-env_sensor_status
ttop-lighting_system_status
ttop-roadway_info_status
ttop-roadway_warning_system_status
ttop-traffic_control_information_display
ttop-vehicle_signage_status
ttop-vehicle_speed_sensor_data
ttop-video_image_output
ttop-weather_information
variable_speed_limit_control_from_traffic_personnel
vehicle_signage_operator_input
weather_service_information_request

Description:

This process shall provide the interface through which traffic operations personnel can obtain access to traffic data, traffic video images, and weather information, and control the activation and configuration of field equipment such as dynamic message signs, highway advisory radio (HAR), in-vehicle signage, sensor equipment, barriers, safeguard systems, lighting systems, etc. The personnel can request remote control of field equipment belonging to traffic management centers in other jurisdictions, and receive requests from those other centers to control local field equipment. The personnel can access data stored by other processes in the Provide Traffic Surveillance facility of the Manage Traffic function. The personnel can set up the parameters that govern the data that is available to non-traffic operations people via a separate process to the media. This stored data shall comprise current and long term (historic) data on traffic conditions, weather conditions and roadside equipment activity, plus prediction estimates of traffic conditions. The data shall apply to some or all of the freeways, surface street, and rural roadways served by the specific instance of the Manage Traffic function. Where appropriate and/or requested by the traffic operations personnel, the process shall provide the data output in the form of an overlay onto a map of the relevant part(s) of the freeways, surface street and rural roadways served by the instance of the function. The process shall obtain the map from a local data store, which it shall enable the traffic operations personnel to update as and when required.

User Service Requirements:

1.0	1.6.3	5.1.3
1.6	1.6.3.4	5.1.3.5
1.6.0	1.6.3.4(e)	5.1.3.5.2
1.6.1	5.0	5.1.3.5.3
1.6.1.7	5.1	
1.6.1.7(a)	5.1.0	

1.1.4.3 Provide Direct Media Traffic Data Interface

Input Flows:
map_data_for_traffic_display
retrieved_traffic_media_data
traffic_data_media_parameters

Output Flows:
tm-traffic_data
tm-traffic_video_images

Description:
This process shall be responsible for providing the interface between the media and the process responsible for obtaining data from the stores of traffic data maintained by other processes within the Provide Traffic Surveillance facility of the Manage Traffic function. The process shall enable the media to be provided with current, long term (historic) and predicted traffic data. The data may be provided in one or more formats: as a data stream, as processed and displayed to Traffic Operations Personnel (e.g. graphical summaries of link speeds), or as a display (with data included on a map of relevant part(s) of the road and freeway served by the Manage Traffic function. The media shall only be able to see displayed that data that the traffic operations personnel have made available, through the use of the definition in the traffic data media parameters.

User Service Requirements:
1.0
1.6
1.6.0
1.6.1
1.6.1.7
1.6.1.7(a)
1.7
1.7.0
1.7.3
1.7.3.3

1.1.4.4 Update Traffic Display Map Data

Input Flows:
fmup-traffic_display_update
request_traffic_map_display_update

Output Flows:
map_data_for_traffic_display
tmup-request_traffic_display_update

Description:
This process shall provide updates to a store of digitized map data when a request is received from traffic operations personnel via their interface process. The map data shall be for use as the background for displays of traffic data requested by traffic operations personnel and the media through their respective interface processes. This process shall obtain the new map data from either a specialized data supplier or some other appropriate data source.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.4
1.6.3.4(e)
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.9
7.1.3.1.9(e)

1.1.4.5 Manage Traffic Archive Data

Input Flows:
avo_operational_data
barrier_system_data_for_archive
ftop-archive_command
safeguard_system_data_for_archive
static_data_for_archive
traffic_data_archive
traffic_data_for_deployment
traffic_management_archive_request
traffic_management_archive_status

Output Flows:
traffic_data_archive
traffic_data_deployment_request
traffic_management_archive_data
ttop-archive_status

Description:
This process shall collect traffic data, automatic vehicle operational data, and event logs to distribute to the Manage Archive Data function. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the traffic data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data is received from an external source, or when fresh data is received.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.1
7.1.3.1.1(a)
7.1.3.1.1(b)
7.1.3.1.1(c)
7.1.3.1.1(d)
7.1.3.1.1(e)
7.1.3.1.2
7.1.3.1.3
7.1.3.1.3(e)
7.1.3.1.5
7.1.3.1.5(e)
7.1.3.1.5(g)
7.1.3.1.8
7.1.3.1.8(b)
7.1.3.1.9
7.1.3.1.9(a)

1.1.5 Exchange Data with Other Traffic Centers

Input Flows:

control_data_for_highways
control_data_for_roads
current_data_for_exchange
cv_incidents_for_other_TMC
device_control_request_to_other_center
disaster_traffic_data_for_other_traffic_management
dynamic_lane_mgmt_control_to_other_traffic
emergency_data_for_other_TMC
env_sensor_control_to_other_center
env_sensor_status_to_other_center
evacuation_traffic_data_for_other_traffic_management
fotm-current_event_data
fotm-device_control_request
fotm-device_data
fotm-device_inventory
fotm-device_status
fotm-disaster_network_status
fotm-evacuation_information
fotm-network_status_for_evacuation
fotm-permit_coordination_for_traffic
fotm-planned_event_data
fotm-road_network_inventory_and_status
fotm-road_weather_data
fotm-roadway_detours_and_closures
fotm-traffic_control_strategy_for_disaster_or_evacuation
fotm-traffic_data
fotm-traffic_image_data
incident_response_log_for_other_traffic_mgmt
link_details
long_term_data_for_exchange
other_roadway_information_status
other_status_for_highways
other_status_for_roads
planned_events_local_data
request_other_current_incidents_data
request_other_planned_events_data
request_other_TMC_data
roadway_information_data
signal_override_status
traffic_detour_control_for_other_traffic
traffic_detour_info_for_other_traffic
video_device_status_to_other_center
video_image_control_to_other_center

Output Flows:

device_control_request_from_other_center
disaster_traffic_data_from_other_traffic_management
dynamic_lane_mgmt_control_from_other_traffic
env_sensor_control_from_other_center
env_sensor_status_from_other_center
evacuation_traffic_data_from_other_traffic_management
incident_response_log_from_other_traffic_mgmt
other_control_data_for_highways
other_control_data_for_roads
other_current_incidents
other_planned_events
other_roadway_information_data
other_TMC_cv_incidents
other_TMC_emergency_data
other_TMC_strategy_data
other_traffic_center_data
request_local_current_incidents_data
request_local_planned_events_data
roadway_information_status
status_data_for_highways
status_data_for_roads
totm-current_event_data
totm-device_control_request
totm-device_data
totm-device_inventory
totm-device_status
totm-disaster_network_status
totm-evacuation_information
totm-network_status_for_evacuation
totm-permit_coordination_for_traffic
totm-planned_event_data
totm-road_network_inventory_and_status
totm-road_weather_data
totm-roadway_detours_and_closures
totm-traffic_control_strategy_for_disaster_or_evacuation
totm-traffic_data
totm-traffic_image_data
traffic_detour_control_from_other_traffic
traffic_detour_info_from_other_traffic
video_device_status_from_other_center
video_image_control_from_other_center

Description:

This process shall exchange data with the Other Traffic Management terminator. This represents the exchange of data between peer Manage Traffic functions (e.g. between peer Traffic Management Centers (TMCs)). The other TMC can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The exchange of data may be triggered by a request to (or from) the Other Traffic Management terminator or the exchange of data may be initiated without a specific request. This data shall include both traffic information and traffic control data. Some examples of these exchanges are: traffic control preemption for vehicle routes which pass through the local network but have a destination in an area served by another remote TMC; data about an incident

that has an impact on the traffic conditions in the network served by a remote TMC; control data for the Manage Traffic function to control video cameras or environmental sensors under the jurisdiction of another traffic management organization; or requests for control of the other center's field equipment. The data received from remote TMCs could be used to vary the current traffic control strategy to give signal preemption to emergency vehicles or enable the passage of commercial vehicles with unusual loads, or as input to the local traffic predictive model estimation process.

User Service Requirements:

1.0
1.6
1.6.0
1.6.2
1.6.2.5
1.6.2.5.2
1.6.3
1.6.3.6
1.6.4
1.6.4(a)
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.9
7.1.3.1.9(d)

1.1.6 Collect Vehicle Traffic Probe Data

Input Flows:
vehicle_guidance_probe_data
vehicle_guidance_probe_data_for_archive
vehicle_traffic_probe_data
vehicle_traffic_probe_data_for_archive

Output Flows:
tmup-traffic_probe_data
traffic_probe_data_from_vehicles_archive_data
vehicle_traffic_probe_configuration
vehicle_traffic_probe_data_for_isp
vehicle_traffic_probe_data_for_traffic
vehicle_traffic_probe_equip_status
vehicle_traffic_probe_equip_status_for_m_and_c
vehicle_traffic_probe_status_for_isp

Description:
This process shall collect traffic probe data from passing vehicles that are equipped with a tag or a short range communications device. This could be as simple as reading a toll tag from which the link time may be calculated, or could involve communications with equipment onboard the vehicle that provides the vehicle's average speed, road conditions, and other information that may be used to determine traffic conditions. The field equipment represented by this process collects the information and sends it to a center for processing and distribution. The process may also send the information to the Map Update Provider. In all of these roadside systems, the tag or vehicle ID is read and translated into a unique but anonymous ID that is not traceable in any way to the tag or vehicle owner. The process shall return operational status (state of the device, configuration, and fault data) of the vehicle traffic probe roadside equipment to another process for repair. The process shall provide traffic probe data to the archival process.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.2
1.6.2.4
1.6.2.4.1
1.6.2.5
1.6.2.5.1

1.1.7 Collect Vehicle Environmental Probe Data

Input Flows:
vehicle_env_probe_data

Output Flows:
tstws-vehicle_env_probe_data
tstws-vehicle_env_probe_status
tws-vehicle_env_probe_data
tws-vehicle_env_probe_status
vehicle_env_probe_data_for_infrastructure_maint
vehicle_env_probe_data_for_isp
vehicle_env_probe_data_for_maint
vehicle_env_probe_equip_status_for_m_and_c
vehicle_env_probe_input_data
vehicle_env_probe_status_for_isp
vehicle_env_probe_status_for_maint

Description:
This process shall collect environmental probe data from passing vehicles that are equipped with a short range communications device. This communications with equipment onboard the vehicle provides vehicle sensor data such as measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, ALB status, and other collected vehicle system status and sensor information that may be used to determine environmental conditions. Both current data and snapshots of recent events (e.g., traction control or anti-lock brake system activations) may be reported. The field equipment represented by this process collects the information and sends it to a center for processing and distribution. In all of these roadside systems, the vehicle ID is read and translated into a unique but anonymous ID that is not traceable in any way to the vehicle owner. The process shall return operational status (state of the device, configuration, and fault data) of the vehicle environmental probe roadside equipment to the Manage Maintenance and Construction function to arrange for repair.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.2
1.6.2.3
1.6.2.3.1
1.6.2.3.2
1.6.2.4
1.6.2.5

1.2.1 Select Strategy

Input Flows:

current_road_network_use
cv_incident_override
demand_overrides
emergency_traffic_control_request
ftop-strategy_override
ftop-time_dependent_operations_input
ftop-video_camera_strategy_change
incident_strategy_override
indicator_fault_state
indicator_input_state_for_highways
indicator_input_state_for_roads
other_TMC_cv_incidents
other_TMC_emergency_data
other_TMC_strategy_data
probe_data_for_strategy
signal_preemption_override
signal_priority_override
special_vehicle_priority_routing
static_data_for_strategy
traffic_data_for_strategy

Output Flows:

cv_incidents_for_other_TMC
emergency_data_for_other_TMC
emergency_traffic_control_response
request_other_TMC_data
selected_dynamic_lane_strategy
selected_highway_control_strategy
selected_hri_control_strategy
selected_parking_lot_control_strategy
selected_ramp_control_strategy
selected_road_control_strategy
selected_strategy
signal_override_status
signal_system_configuration
signal_system_timing_plan
video_camera_control_strategy

Description:

This process shall select the appropriate traffic control strategy to be implemented over a road and/or freeway section served by the specific instance of the Manage Traffic function. The strategy shall be selected by the process from a number that are available, e.g., adaptive control, fixed time control, local operations. The selected strategy shall be passed by the process to the actual control processes for implementation according to the part of the network to which it is to be applied, i.e., surface roads, freeways (i.e., limited access roads), ramps and/or parking lots. The definition of strategy can be extended to include a strategy for the operations of sensors such as video cameras used to provide traffic surveillance data. Initial strategies, based on the time of day, may be input by the traffic operations personnel. The process shall make it possible for the current strategy selection to be modified to accommodate the effects of such things as archived and predicted traffic usage, incidents, emergency vehicle preemption, the passage of commercial vehicles with unusual loads, equipment faults and overrides from the traffic operations personnel. The strategy for control of freeways and parking lots is through use of DMS signs and lane indicators. The strategy for control of ramps is through the timing plans for ramp meters. The selected strategy shall be sent to the process within the Provide Traffic Surveillance facility responsible for maintaining the store of long term data.

User Service Requirements:

1.0
1.6
1.6.0
1.6.3
1.6.3.5
1.6.3.6

1.2.2.1 Determine Indicator State for Freeway Management

Input Flows:
coordination_data_roads_to_freeways
prediction_data
selected_highway_control_strategy
static_data_for_highways
strategy_data_for_highways
transit_highway_overall_priority

Output Flows:
coordination_data_freeways_to_roads
current_highway_network_data
highway_closures
indicator_highway_requested_state
reversible_lane_signal_state_for_freeways
transit_highway_priority_given

Description:
This process shall implement selected traffic control strategies and transit vehicle overall priority on some or all of the indicators covering the freeway network served by the Manage Traffic function. It shall implement the traffic control strategies only using the indicators (e.g., reversible lane signals) specified in the implementation request and shall coordinate its actions with those of the process that controls the road network. The process shall also be capable of monitoring the extra inputs that will arise where tunnels are involved, including the detection of fire and the consequent requirement to re-route traffic.

User Service Requirements:
1.0
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.1.2
1.6.1.1.3
1.6.1.1.4
1.6.1.1.5
1.6.1.2
1.6.1.2.1
1.6.1.2.2
1.6.1.2.3
1.6.1.3
1.6.1.4
1.6.1.4.1
1.6.1.5
1.6.1.6
1.6.1.7
1.6.1.7(b)
1.6.3
1.6.3.1
1.6.3.2
1.6.3.2.1
1.6.3.2.2
1.6.3.2.2(a)
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
5.0
5.2
5.2.0
5.2.3
5.2.3.1
5.2.3.2

1.2.2.2 Determine Indicator State for Road Management

Input Flows:
coordination_data_freeways_to_roads
coordination_data_ramps_to_roads
prediction_data
selected_hri_control_strategy
selected_road_control_strategy
static_data_for_roads
strategy_data_for_roads
transit_road_overall_priority

Output Flows:
coordination_data_roads_to_freeways
coordination_data_roads_to_ramps
current_road_network_data
indicator_road_requested_state
reversible_lane_signal_state_for_roads
roadway_closures
transit_road_priority_given

Description:
This process shall implement selected traffic control strategies and transit priority on some or all of the indicators covering the road (surface street) network served by the Manage Traffic function. It shall implement the strategies only using the indicators (intersection and pedestrian controllers, reversible lane signals, etc.) that are specified in the implementation request and shall coordinate its actions with those of the processes that control the freeway network and the ramps that give access to the freeway network.

User Service Requirements:
1.0
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.1.2
1.6.1.1.3
1.6.1.1.4
1.6.1.1.5
1.6.1.2
1.6.1.2.1
1.6.1.2.2
1.6.1.2.3
1.6.1.3
1.6.1.4
1.6.1.4.1
1.6.1.5
1.6.1.6
1.6.1.7
1.6.1.7(b)
1.6.3
1.6.3.1
1.6.3.2
1.6.3.2.1
1.6.3.2.2
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
5.0
5.2
5.2.0
5.2.3
5.2.3.1
5.2.3.2
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.9
7.1.3.1.9(a)

1.2.3 Determine Ramp State

Input Flows:
coordination_data_roads_to_ramps
ramp_data
selected_ramp_control_strategy
static_data_for_ramps
transit_ramp_overall_priority

Output Flows:
coordination_data_ramps_to_roads
current_ramp_state
ramp_signal_state
roadway_info_traffic_metering_data
traffic_metering_data_for_signage
transit_ramp_priority_given

Description:
This process shall implement the selected traffic control strategies on some or all of the entry ramps in the network served by the Manage Traffic function. It shall implement the strategies only using the ramps that are specified in the implementation request and shall coordinate its actions with those of the process that controls the road network. The process shall base its ramp metering decisions on the data from sensors and ramp meters monitoring traffic conditions upstream and downstream of the ramps. Data from sensors on the ramp used to detect flow past the meter, extent of queues on the ramp, and the presence of vehicles will also be used as the basis for the ramp metering decisions. The decision making process shall use an algorithm to determine the ramp's state based on the ramp control strategy and the sensor input data received. The process shall coordinate its activities with the process responsible for controlling the road (surface street) network.

User Service Requirements:
1.0
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.2
1.6.1.2
1.6.1.2.1
1.6.1.2.3

1.2.4.1 Output Control Data for Roads

Input Flows:
indicator_input_data_from_signals
indicator_road_requested_state
other_control_data_for_roads
roadway_control_request_for_detours
static_data_for_road_control
status_data_for_roads

Output Flows:
control_data_for_roads
indicator_control_configuration_data_for_signal_control
indicator_control_data_for_signal_control
indicator_control_storage_data_for_roads
indicator_input_state_for_roads
indicator_input_storage_data_for_roads
indicator_status_for_roads_from_center
other_status_for_roads
reversible_lane_control_for_roads
roadway_control_response_for_detours
vehicle_sign_data_for_roads

Description:
This process shall transfer data to processes responsible for controlling equipment located at the roadside within the road (surface street) network served by the Manage Traffic function to support traffic control. This process shall also control the reversible lane facilities equipment required to change the direction of traffic flow along surface streets. Data for use by in-vehicle signage equipment shall be sent to another process for output to roadside processes. All data shall be sent to this process by processes within the Manage Traffic function. This process shall also be responsible for the monitoring of input data showing the way in which the indicators are responding to the data that they are being sent, and the reporting of any errors in their responses as faults. The reported data shall include the operational status (state of the device and configuration) from the indicator device. All output and input data shall be sent by the process to another process in the Manage Traffic function to be loaded into the store of long term data.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.3
1.10.3.3.5
1.10.5
1.10.5.2
1.10.5.2.6
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4(a)
1.6.3.4.1
5.0
5.3
5.3.0
5.3.11
5.3.11.10

1.2.4.2 Output Control Data for Freeways

Input Flows:
freeway_control_request_for_detours
indicator_highway_requested_state
indicator_input_data_from_traffic_meters
other_control_data_for_highways
ramp_signal_state
static_data_for_highway_control
status_data_for_highways

Output Flows:
control_data_for_highways
freeway_control_response_for_detours
indicator_control_data_for_traffic_metering
indicator_control_monitoring_data_for_traffic_metering
indicator_control_storage_data_for_highways
indicator_input_state_for_highways
indicator_input_storage_data_for_highways
indicator_status_for_highways_from_center
other_status_for_highways
reversible_lane_control_for_highways
vehicle_sign_data_for_highways

Description:
This process shall transfer data to processes responsible for controlling equipment located at the roadside within the freeway network served by the Manage Traffic function. The traffic metering devices remotely controlled by this process could include ramp, interchange, and mainline meters, HOV lane usage signals, HOV lane control systems, and reversible lane facilities equipment required to change the direction of traffic flow along a freeway system. Data for use by in-vehicle signage equipment shall be sent to another process for output to roadside processes. This process shall also be responsible for the monitoring of input data showing the way in which the indicators are responding to the data that they are being sent, and the reporting of any errors in their responses as faults. The reported data shall include the operational status (state of the device and configuration) from the indicator device. All output and input data shall be sent by the process to another process in the Manage Traffic function to be loaded into the store of long term data.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4.1

1.2.4.3 Output In-vehicle Signage Data

Input Flows:
environmental_data_for_signage
roadway_info_for_signage
static_data_for_vehicle_signage
traffic_metering_data_for_signage
variable_speed_limit_data_for_signage
vehicle_sign_data_for_highways
vehicle_sign_data_for_roads
vehicle_sign_status
vehicle_signage_operator_input

Output Flows:
vehicle_sign_data
vehicle_signage_operator_status

Description:
This process shall format and output data for use by roadside processes in creating in-vehicle signage. The process shall be capable of outputting any information that would typically be output on a dynamic message sign (e.g., current incidents, planned events, wide area alerts, evacuation information, shelters, road closures, highway rail intersection status), traffic indicator outputs, fixed signage (e.g., Stop signs, yield signs), and local conditions warnings identified by local environmental sensors. The data shall be structured by this process so that it can be output by each roadside process to vehicles for use by in-vehicle signage equipment.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.1
1.2
1.2.0
1.2.3
1.2.3.2
1.2.3.2.3
1.6
1.6.0
1.6.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4.1
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4

1.2.4.4 Output Roadway Information Data

Input Flows:

dms_status
har_status
hri_guidance_for_roadway_info
other_roadway_information_data
parking_information_for_dissemination
planned_event_data_for_roadway_information
roadway_info_alert_data
roadway_info_barrier_activated_from_traffic
roadway_info_operator_input
roadway_info_safeguard_activated_from_traffic
roadway_info_traffic_data
roadway_info_traffic_metering_data
roadway_info_variable_speed_limit_data
roadway_information_data_to_traffic
roadway_information_evacuation_data
roadway_information_incident_updates
roadway_information_status
static_data_for_dms_allocation

Output Flows:

current_dms_data_displayed
dms_control_data
dms_data
dms_traffic_metering_data
dms_variable_speed_limit_data
dms_wide_area_alert_information
har_data
har_wide_area_alert_information
indicator_sign_control_data_for_hri
other_roadway_information_status
roadway_info_for_signage
roadway_info_operator_status
roadway_information_data
roadway_information_status_from_traffic

Description:

This process shall transfer data to processes responsible for controlling roadway information devices such as dynamic message signs (DMS) and highway advisory radio (HAR) located at the roadside. This process shall receive inputs from other functions within ITS to control the content and manner in which DMS and HAR data is defined. The process shall be capable of outputting some or all of the following advisory data: link state data, current incidents, planned events (including multimodal crossing events), environmental conditions, wide area alerts, traffic signal indicator data, evacuation information, shelters, road closures, and highway rail intersection status. The data contains outputs used to control and monitor the status of DMS and HAR. This process shall also be responsible for the monitoring of input data showing the way in which the roadway information devices are responding to the data that they are being sent, and the reporting of any errors in their responses as faults to the Collect and Process Indicator Fault Data facility within the Manage Traffic function. This process also sends displayed messages to another process for wider dissemination. This process is also responsible for defining messages for DMS and HAR and sending configuration changes (i.e. blanking sign).

User Service Requirements:

1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.2
1.6.3.4
1.6.3.4(c)
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4

1.2.4.5 Manage Barrier Systems

Input Flows:
barrier_system_activation_request_for_detours
barrier_system_activation_request_from_emerg
barrier_system_activation_request_from_operator
barrier_system_status

Output Flows:
barrier_system_control
barrier_system_data_for_archive
barrier_system_status_for_detours
barrier_system_status_to_emerg
barrier_system_status_to_operator
roadway_info_barrier_activated_from_traffic

Description:
This process shall remotely monitor and manage barrier systems, such as gates, barriers, and other automated or remotely controlled systems used to manage entry to roadways. The process also outputs data to dynamic message signs (DMS) used to inform travelers of barrier activation. Activation requests shall be accepted from other processes including a process that manages emergency response, a process that handles detours, and the center personnel interface process. Operational status (state of the device, configuration, and fault data) about the barrier system equipment shall be collected and forwarded to the processes that requested activation. The information will also be forwarded to another process for archival.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.3.4.3(a)
5.1.3.5
5.1.3.5.2
5.1.3.5.3
5.1.3.5.4

1.2.4.6 Manage Lighting System

Input Flows:
lighting_system_activation_request_from_operator
lighting_system_status

Output Flows:
lighting_system_control
lighting_system_status_to_operator

Description:
This process shall remotely monitor and manage electrical lighting systems along the roadside. Activation requests shall be accepted from the center personnel interface process. Operational status (state of the device, configuration, and fault data) about the lighting system equipment shall be collected and forwarded to the process that requested activation.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.11

1.2.4.7 Manage Roadway Warning System

Input Flows:
roadway_warning_system_control_from_operator
roadway_warning_system_status

Output Flows:
roadway_warning_system_control
roadway_warning_system_status_to_operator

Description:
This process shall remotely monitor and control the roadway warning systems that detect potential roadway hazards (e.g., roadway weather conditions, road surface conditions, traffic congestion and queues, obstacles in the roadway) and provide warnings to drivers, bicyclists, and pedestrians. This process shall pass configuration and control parameters from traffic operations personnel for autonomous operation by field equipment. In addition, this process shall pass traffic images and processed traffic information from the roadway to another process where it is presented to traffic operations personnel. Upon receipt of direction from traffic operations personnel, this process shall pass control information to roadway warning systems to activate warning signals.f

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.1.4.1
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4(a)
1.6.3.4(b)
1.6.3.4(c)
1.6.3.4.1
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.2.5.1 Provide Parking Lot Static Data

Input Flows:
other_parking_lot_static_data
parking_lot_static_data_operator_input
parking_lot_static_information_request_by_isp
parking_lot_static_information_request_by_traffic
parking_lot_static_information_request_by_transit
static_data_for_parking_lots

Output Flows:
parking_lot_static_data
parking_lot_static_data_for_archive
parking_lot_static_data_for_coordination
parking_lot_static_data_operator_update
static_parking_data_for_drivers
static_parking_information_for_isp
static_parking_information_for_traffic
static_parking_information_for_transit

Description:
This process shall maintain and distribute static information about individual parking lots. This information includes hours of operation, rates, lot location, lot entrance locations, lot capacity (number of spaces), lot type (Open Lot, Covered Garage, Permit Parking, Contract Parking, Free Parking - include P+R lot, Paid Parking, other), lot constraints (heights, type of vehicles, etc.), and handicap accessibility features.

User Service Requirements:
1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.6
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(c)
1.5.2.2(d)
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(a)
1.8.1.4
1.8.1.4(c)
1.8.2
1.8.2.1
1.8.2.1(c)
1.8.2.10
1.8.2.11
1.8.2.11(a)
1.8.3
1.8.3.1
1.8.3.1(a)

1.2.5.2 Coordinate Other Parking Data

Input Flows:
dynamic_parking_information_for_coordination
fop-parking_coordination_data
other_parking_lot_price_data
parking_lot_static_data_for_coordination

Output Flows:
other_parking_lot_dynamic_data
other_parking_lot_price_data_request
other_parking_lot_static_data
top-parking_coordination_data

Description:
This process shall continuously communicate and exchange data with parking operators and systems. The exchange of data shall be triggered by either a request from a remote Parking Management facility for data from the operators or systems to which the Provide Electronic Payment function belongs, or because data needs to be sent from the local Parking Management facility to another remote Parking Management facility. This data shall include both static and dynamic parking lot data.

User Service Requirements:
1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.6
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(c)
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(a)
1.8.1.4
1.8.1.4(c)
1.8.2
1.8.2.1
1.8.2.1(c)
1.8.2.10
1.8.2.11
1.8.2.11(a)
1.8.3
1.8.3.1
1.8.3.1(a)

1.2.5.3 Provide Parking Lot Operator Interface

Input Flows:
fpo-current_lot_state
fpo-lot_occupancy
fpo-parking_lot_hours_of_operation
parking_information_device_status
parking_lot_dynamic_data_operator_update
parking_lot_static_data_operator_update
parking_sensor_status

Output Flows:
parking_information_device_control
parking_lot_dynamic_data_operator_input
parking_lot_static_data_operator_input
tpo-change_lot_state
tpo-parking_lot_status

Description:
This process shall provide the interface to a local parking lot operator that controls the use of the lot. The operator shall provide inputs of occupancy and/or the current lot state to this process. This process shall provide the operator with outputs that request a change to the lot state, which the operator shall implement by activating local dynamic message signs (DMS) and controlling the use of entry/exit barriers, and data about transit services that provide a park and ride operation to be output through local DMS. This process shall receive inputs from the parking lot sensors and information devices to provide the operator with a picture of the status of the system.

User Service Requirements:
1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.6
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(c)
1.5.2.2(d)
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(a)
1.8.1.4
1.8.1.4(c)
1.8.2
1.8.2.1
1.8.2.1(c)
1.8.2.10
1.8.2.11
1.8.2.11(a)
1.8.3
1.8.3.1
1.8.3.1(a)

1.2.5.4 Determine Dynamic Parking Lot State

Input Flows:
other_parking_lot_dynamic_data
parking_lot_dynamic_data_operator_input
parking_lot_dynamic_information_request_by_isp
parking_lot_dynamic_information_request_by_traffic
parking_lot_dynamic_information_request_by_transit
parking_lot_input_data
parking_lot_static_data
parking_lot_vehicle_detection_data
selected_parking_lot_control_strategy

Output Flows:
dynamic_parking_data_for_drivers
dynamic_parking_information_for_coordination
dynamic_parking_information_for_isp
dynamic_parking_information_for_traffic
dynamic_parking_information_for_transit
parking_information_for_dissemination
parking_lot_current_state
parking_lot_dynamic_data_operator_update
parking_lot_state_for_archive

Description:
This process shall determine and distribute the dynamic status of individual parking lots. This dynamic status includes the current state of the lot (Open, Closed, Near Capacity) and number of available spaces. The process shall also calculate from sensor information the arrival rate (or number of arrivals in a given time period) as well as the departure rate (or the number of departures in a given time period). The parking lot state shall be capable of being determined from locally managed sensors, or from sensor information provided by traffic management.

User Service Requirements:
1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.6
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(c)
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(a)
1.8.1.4
1.8.1.4(c)
1.8.2
1.8.2.1
1.8.2.1(c)
1.8.2.10
1.8.2.11
1.8.2.11(a)
1.8.3
1.8.3.1
1.8.3.1(a)

1.2.5.5 Manage Parking Archive Data

Input Flows:
fpo-archive_commands
parking_archive_request
parking_archive_status
parking_charge_response_for_archive
parking_data_archive
parking_lot_state_for_archive
parking_lot_static_data_for_archive

Output Flows:
parking_archive_data
parking_charge_request_for_archive
parking_data_archive
tpo-archive_status

Description:
This process shall obtain parking lot information - both dynamic; e.g. availability and charge data, as well as static data; e.g. hours of operation, spaces, constraints, etc.. This process shall then distribute it to the Manage Archive Data function. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the parking data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data is received from an external source.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.10
7.1.3.1.8
7.1.3.1.8(e)
7.1.3.1.9
7.1.3.1.9(e)

1.2.5.6 Detect Vehicles in Parking Lot

Input Flows:
From_Vehicle_Characteristics

Output Flows:
parking_lot_vehicle_detection_data
parking_sensor_status

Description:
This process shall detect, count, and optionally classify vehicles at designated locations within a parking facility, including entries and exits, transition points between parking areas (e.g., ramps between garage levels), or in individual parking spaces. The process shall provide sensor status back to the parking operator.

User Service Requirements:
1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.6
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(c)

1.2.5.7 Output Parking Lot Information to Drivers

Input Flows:
dynamic_parking_data_for_drivers
parking_information_device_control
static_parking_data_for_drivers

Output Flows:
parking_information_device_status
parking_to_vehicle_local_parking_data
td-parking_information

Description:
This process shall present parking information to drivers via information devices such as dynamic message signs or short-range communications transmitters (e.g. in-vehicle signing) that are located in and managed by parking facilities. The information presented shall include parking facility features (e.g. height restrictions), status, parking availability, locations of available spaces, current parking rates, and guidance to entrances and exits. The process shall accept information to be output from other processes, accept control commands from the parking operator, and provide device status back to the parking operator.

User Service Requirements:
1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.6
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(c)

1.2.6.1 Maintain Traffic and Sensor Static Data

Input Flows:
current_incident_static_data
existing_sensor_static_data
ftop-roadway_characteristics
ftop-static_data
request_static_data_for_traffic_control
static_data_for_traffic_control
static_parking_information_for_traffic

Output Flows:
link_data_for_guidance
link_data_update
new_sensor_static_data
parking_lot_static_information_request_by_traffic
request_sensor_static_data
static_data_for_traffic_control
static_data_for_traffic_control_output
static_data_store_updated
supply_incident_static_data

Description:
This process shall maintain the store of static and link data (including static parking data) used by other processes within the Manage Traffic function. The process shall also maintain the store of signal timing plans. From the data sent to this process by the Traffic Operations Personnel, the process creates the link data that is placed in the data store of static data for traffic control. Link data shall then be sent to the Provide Driver and Traveler Services function to enable it to obtain data about links that are not in the geographic area which it serves.

User Service Requirements:
1.0
1.6
1.6.0
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(a)
1.8.2
1.8.2.13
1.8.2.13(a)
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.9
7.1.3.1.9(a)

1.2.6.2 Provide Static Data Store Output Interface

Input Flows:
static_data_for_traffic_control_output
static_data_store_updated

Output Flows:
network_and_device_inventory
request_static_data_for_traffic_control
static_data_for_archive
static_data_for_dms_allocation
static_data_for_highway_control
static_data_for_highways
static_data_for_parking_lots
static_data_for_ramps
static_data_for_road_control
static_data_for_roads
static_data_for_strategy
static_data_for_vehicle_signage
tmup-map_static_data

Description:
This process shall provide updates of static data to other processes in the Provide Traffic Control facility of the Manage Traffic function. An update of the data shall only be provided when this process has been notified by another process that the contents of the store of static data has been changed. This process shall provide updates to the map update provider about changes to the static data of a particular region. This process shall provide roadway network data (data that defines the links and intersections) to other functions.

User Service Requirements:
1.0
1.6
1.6.0
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.9
7.1.3.1.9(a)

1.2.7.1 Process Indicator Output Data for Roads

Input Flows:
f_other_ic_collision_data
f_other_rw_ic_to_ic
f_other_rw_sensor_to_ic
fmmc-crossing_status_for_roads
hri_device_control
indicator_control_data_for_signal_control
indicator_override_for_roads
indicator_priority_for_roads
local_sensor_data_for_roads
reversible_lane_control_for_roads
signal_system_configuration
signal_system_timing_plan
train_sense_data

Output Flows:
hri_device_sense
indicator_input_data_from_signals
indicator_response_data_for_roads
intersection_state_data
reversible_lane_control_device_status_from_roads
t_other_rw_ic_control_to_traffic_sensor
t_other_rw_ic_to_ic
td-lane_use_indication_for_roads
td-signal_indication
tmmc-crossing_clear_at_roads
tmmc-road_equipment_status
tmmc-stop_alternate_mode_at_roads
tp-cross_request_received
tp-cross_road

Description:
This process shall implement the indicator output data generated by other processes within the Manage Traffic function for use on the roads (surface streets) served by the function. It shall perform the functions needed to provide traffic control at intersections or pedestrian crossings, or provide the interface for data to be sent to the units (or systems) that manage reversible lanes, multimodal crossings or highway-rail intersections. This process shall monitor the status of the indicator equipment and provide data to the Manage Maintenance and Construction function to help that process determine whether the indicator is operating correctly or a repair is needed.

User Service Requirements:

1.0	1.10.5	1.6.3.3
1.10	1.10.5.1	1.6.3.3.1
1.10.0	1.10.5.2	1.6.3.3.2
1.10.3	1.10.5.2.2	1.6.3.3.4
1.10.3.1	1.5	1.6.3.4
1.10.3.3	1.5.0	1.6.3.4(a)
1.10.3.3.2	1.5.2	8.0
1.10.3.3.3	1.5.2.5	8.1
1.10.4	1.5.2.5(a)	8.1.0
1.10.4.1	1.6	8.1.2
1.10.4.2	1.6.0	8.1.2.1
1.10.4.2.1	1.6.3	8.1.2.1(e)

1.2.7.2 Monitor Roadside Equipment Operation for Faults

Input Flows:
field_management_station_status
indicator_control_configuration_data_for_signal_control
indicator_control_monitoring_data_for_traffic_metering
indicator_monitoring_suspend
indicator_monitoring_suspend_for_priority
indicator_response_data_for_highways
indicator_response_data_for_roads

Output Flows:
indicator_equip_status_from_highways_for_m_and_c
indicator_equip_status_from_roads_for_m_and_c
indicator_faults_from_signals
indicator_status_from_signals
indicator_status_from_traffic_meters

Description:
This process shall monitor the operation of the indicators in the road (surface street) and freeway network. It shall report any instances where the indicator response does not match that expected from the contents of the indicator control data it is receiving, and is verified against known indicator preemptions. A report shall be output by this process if equipment failure is detected and sent to another process in the Manage Traffic and Manage Maintenance and Construction functions to arrange for repair. The report shall also include the operational status (state of the device and configuration) from the indicator device.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4

1.2.7.3 Manage Local Signal Preemption Requests

Input Flows:
emergency_vehicle_preemptions

Output Flows:
indicator_monitoring_suspend
indicator_override_for_highways
indicator_override_for_roads
signal_preemption_override

Description:
This process shall receive indicator (e.g., signal) preemption requests from other functions within ITS. These requests shall enable the process to give selected vehicles (e.g., those that belong to Emergency Services) signal preemption at intersections, pedestrian crossings, and multimodal crossings in the freeways, surface streets and rural roadways served by the Manage Traffic function. Sending of the preemption request output shall also generate an output to the monitoring process to suspend its activities while the preemption request is being served. An output indicating preemption has been granted shall be sent to another process to help that process determine whether a fault detected at the signal is a true malfunction or due to a signal override.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.8
1.8.2.8(a)
1.8.2.8(b)
1.8.2.8(c)
1.8.3
1.8.3.1
1.8.3.1(c)
5.0
5.2
5.2.3
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.2.7.4 Process In-vehicle Signage Data

Input Flows:
f_other_rw_data_for_signage
hri_data_for_signage_from_roadway
individual_vehicle_speed_for_signage
road_user_protection_warning_for_vehicle
signage_barrier_activated_from_roadway
signage_roadway_warning_from_roadway
signage_traffic_metering_data_from_roadway
signage_variable_speed_data_from_roadway
speed_warning_for_signage
vehicle_sign_data

Output Flows:
vehicle_sign_equip_status_for_m_and_c
vehicle_sign_status
vehicle_signage_data

Description:
This process shall output data for use by in-vehicle signage equipment on vehicles traveling along the road (surface street) and freeway network served by the Manage Traffic function. This data shall be able to provide information from any of the types of indicators that are supported by the function (e.g., intersection controller, pedestrian controller, dynamic message sign (DMS), fixed signage data (e.g., stop sign, curve warning, guide signs, service signs, and directional signs), and dynamic information (e.g., local conditions warnings identified by local environmental sensors, variable speed limits, lane controls, roadway warnings). The process shall be responsible for its own fault monitoring, which shall check that output data is being sent and that it is an accurate representation of the input data. The process shall return operational status (state of the device, configuration, and fault data) to the Manage Traffic and Manage Maintenance and Construction processes which are responsible for the monitoring of roadside equipment faults.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4
5.0
5.1
5.1.0
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.2.7.5 Process Indicator Output Data for Freeways

Input Flows:
f_other_rw_fc_to_fc
f_other_rw_sensor_to_fc
fmmc-crossing_status_for_highways
indicator_control_data_for_traffic_metering
indicator_override_for_highways
indicator_priority_for_highways
local_sensor_data_for_highways
reversible_lane_control_for_highways

Output Flows:
dms_traffic_metering_data_from_roadway
indicator_input_data_from_traffic_meters
indicator_response_data_for_highways
reversible_lane_control_device_status_from_highways
signage_traffic_metering_data_from_roadway
t_other_rw_dms_traffic_metering_data_from_roadway
t_other_rw_fc_control_to_traffic_sensor
t_other_rw_fc_to_fc
t_other_rw_signage_traffic_metering_data_from_roadway
td-lane_use_indication_for_highways
td-ramp_state_indication
tmmc-crossing_clear_at_highways
tmmc-highway_equipment_status
tmmc-stop_alternate_mode_at_highways

Description:
This process shall implement the indicator output data generated by other processes within the Manage Traffic function for use on freeways served by the function. It shall perform the functions needed to output control data to traffic meters and lane use indicators including those used for ramp, interchange, and mainline metering, reversible lanes, high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes. This process shall provide the interface for data to be sent to the units (or systems) that manage multimodal crossings. This process shall monitor the status of the indicator equipment and provide data to the Manage Maintenance and Construction function to help that process determine whether the indicator is operating correctly or a repair is needed.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.2
1.6.3.3.3
1.6.3.4
1.6.3.4(b)
1.6.3.4(c)
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.2.7.6 Provide Intersection Collision Avoidance Data

Input Flows:
f_other_rw_data_for_intersection
intersection_state_data
local_sensor_data_for_roads
vehicle_status_for_intersection

Output Flows:
intersection_collision_avoidance_data
intersection_status_data_for_vehicle
t_other_rw_ic_collision_data
td-intersection_safety_data

Description:
This process shall provide collision avoidance data to vehicles that are approaching intersections served by the Manage Traffic function. The process shall use the data available from traffic sensors to determine any vehicle position conflict(s) that will arise if no action is taken. This process shall output data giving the direction from which the potential collision hazard will arise to the vehicle(s) that is(are) likely to receive the impact. This process shall, where possible, provide controls to the intersection controller and other nearby traffic control devices to avoid or minimize a crash.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.2
5.0
5.2
5.2.0
5.2.3

1.2.7.7 Process Vehicle Safety and Environmental Data for Output

Input Flows:
vehicle_safety_data_indication

Output Flows:
roadside_safety_data_to_vehicle
vehicle_env_probe_data_output

Description:
This process shall output data about the conditions on roads and freeways based on inputs from environmental probes and safety systems in vehicles in addition to local sensor data. The data shall be processed, formatted, and output by the process for reception by those vehicles that are passing the deployed instance of this process (e.g. by short range communications).

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.2
1.6.2.3
1.6.2.3.1
1.6.2.3.2
1.6.2.4
1.6.2.4.1
1.6.2.5
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.2.7.8 Provide Device Interface to Other Roadway Devices

Input Flows:
fors-device_control
fors-device_status
fors-roadway_info_data_from_devices
fors-roadway_info_data_from_sensors
fors-sensor_data
fors-sensor_status
t_other_rw_dms_auto_treat_data_from_roadway
t_other_rw_dms_barrier_activated_from_roadway
t_other_rw_dms_safeguard_activated_from_roadway
t_other_rw_dms_traffic_metering_data_from_roadway
t_other_rw_env_sensor_control_by_auto_treat_device
t_other_rw_fc_control_to_traffic_sensor
t_other_rw_fc_to_fc
t_other_rw_ic_control_to_traffic_sensor
t_other_rw_ic_collision_data
t_other_rw_roadway_warning_from_roadway
t_other_rw_signage_traffic_metering_data_from_roadway
vehicle_emissions_message

Output Flows:
dms_auto_treat_status_to_maint
f_other_ic_collision_data
f_other_rw_data_for_intersection
f_other_rw_data_for_signage
f_other_rw_env_sensor_data_for_auto_treat_device
f_other_rw_fc_to_fc
f_other_rw_road_user_protection_warning
f_other_rw_roadway_info_data
f_other_rw_sensor_to_fc
f_other_rw_sensor_to_ic
f_other_rw_variable_speed_limit_data
f_other_rw_work_zone_intrusion_detection
tors-device_control
tors-device_status
tors-roadway_info_data_from_devices
tors-sensor_control

Description:
This process shall provide the interface between roadway devices and other roadway devices (considered to be contained in the Other Roadway terminator) for the exchange of data, status, and control. The Other Roadway can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The devices described by ITS processes that will send data and status to the Other Roadway terminator (and receive control signals from the Other Roadway terminator) include controllers (arterial or freeway), roadway information systems (e.g. dynamic message signs), roadway auto-treatment systems, barrier and safeguard systems, emissions or pollution systems, and work zone intrusion alert systems. This process supports autonomous traffic information dissemination without the need for direct control from a Manage Traffic function.

User Service Requirements:

1.0	1.5.2.5(a)	1.6.3.3.2	5.0	5.1.3.5.4
1.5	1.6	1.6.3.3.3	5.1	
1.5.0	1.6.0	1.6.3.4	5.1.0	
1.5.2	1.6.3	1.6.3.4(b)	5.1.3	
1.5.2.5	1.6.3.3	1.6.3.4(c)	5.1.3.5	

1.2.7.9 Process Roadway Information Data

Input Flows:

dms_auto_treat_data_from_maint
dms_auto_treat_data_from_roadway
dms_barrier_activated_from_roadway
dms_control_data
dms_data
dms_data_from_m_and_c
dms_data_from_mcv
dms_roadway_warning_from_roadway
dms_safeguard_activated_from_roadway
dms_traffic_metering_data
dms_traffic_metering_data_from_roadway
dms_variable_speed_data_from_roadway
dms_variable_speed_limit_data
dms_wide_area_alert_information
f_other_rw_roadway_info_data
har_data
har_data_from_m_and_c
har_wide_area_alert_information
individual_vehicle_speed_for_display
road_user_protection_warning_for_display
speed_warning_for_display
work_zone_info_for_display

Output Flows:

dms_equip_status_for_m_and_c
dms_status
dms_status_for_m_and_c
dms_status_for_mcv
har_equip_status_for_m_and_c
har_status
har_status_for_m_and_c
tbv-har_broadcast
td-dms_indication
tp-dms_indication

Description:

This process shall implement the presentation of roadway information data to drivers on the roads (surface streets) and highways served by the function. It shall generate the output for dynamic message signs (DMS) and highway advisory radios (HAR). The DMS may be either those that display variable text messages, (e.g., local conditions warning identified by local environmental sensors, variable speed limits, lane controls, roadway warnings) or those that have fixed format display(s) (e.g. vehicle restrictions, or lane open/close). The process shall accept inputs to control the DMS and HAR devices and return operational status (state of the sensor device, configuration, and fault data) to the controlling process.

User Service Requirements:

1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.2
1.6.3.4
1.6.3.4(c)
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.3
8.1.3.3(a)
8.1.3.3(b)
8.1.3.3(c)
8.1.3.3(d)

1.2.7.10 Control Barrier Systems

Input Flows:
barrier_system_control
barrier_system_control_from_emerg_veh
barrier_system_control_from_m_and_c
barrier_system_control_from_mcv
vehicle_barrier_access_request

Output Flows:
barrier_system_device_status
barrier_system_equip_status_for_m_and_c
barrier_system_status
barrier_system_status_to_emerg_veh
barrier_system_status_to_m_and_c
barrier_system_status_to_mcv
dms_barrier_activated_from_roadway
signage_barrier_activated_from_roadway
t_other_rw_dms_barrier_activated_from_roadway
vehicle_barrier_access_status

Description:
This process shall automatically activate barrier systems, such as gates, barriers, and other automated or remotely controlled systems used to manage entry to roadways upon receiving configuration and control commands from other processes. The process shall accept inputs to control the barrier systems and return operational status (state of the sensor device, configuration, and fault data) to the controlling process as well as to a Manage Maintenance and Construction process for repair. This process shall support access requests to open a barrier or gate. This process shall maintain the necessary authentication configuration data pertaining to the field devices being controlled. Once access is granted or denied this process shall notify the requesting process. This process shall send activation information to another function for roadway information device (e.g. dynamic message sign, in-vehicle signage) display to drivers.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.4
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.1
5.1.3.5.1(a)
5.1.3.5.2
5.1.3.5.3
5.1.3.5.4

1.2.7.11 Control Lighting System

Input Flows:
lighting_system_control

Output Flows:
lighting_system_device_status
lighting_system_equip_status_for_m_and_c
lighting_system_status

Description:
This process shall automatically activate electrical lighting systems upon receiving configuration and control commands from other processes. The process shall accept inputs to control the lighting systems and return operational status (state of the device, configuration, and fault data) to the controlling process as well as to a Management Maintenance and Construction process for repair.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.11

1.2.7.12 Control Roadway Warning System

Input Flows:
From_Potential_Obstacles
ftrf-vehicle_presence
local_env_data_for_warning
local_sensor_data_for_warning
road_user_dynamic_warning
roadway_warning_system_control

Output Flows:
dms_roadway_warning_from_roadway
roadway_warning_device_status
roadway_warning_equip_status_for_m_and_c
roadway_warning_system_status
signage_roadway_warning_from_roadway
t_other_rw_roadway_warning_from_roadway
td-roadway_warning

Description:
This process shall detect potential roadway hazards (e.g., roadway weather conditions, road surface conditions, traffic congestion and queues, obstacles in the roadway) and provide warnings to drivers, bicyclists, and pedestrians. This process shall accept configuration and control parameters from another process for monitoring these conditions, assessing the potential hazard, and autonomously activating warning lights. The process may send warnings to other roadside processes for display to a driver via a dynamic message sign (DMS) or in-vehicle signage. The process shall accept inputs to control the roadway warning system devices and return operational status (state of the device, configuration, and fault data) to the controlling process.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(a)
1.6
1.6.0
1.6.1
1.6.1.1
1.6.1.1.1
1.6.1.2
1.6.1.2.1
1.6.1.4
1.6.1.4.1
1.6.2
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.3
1.6.3.3.4
1.6.3.4
1.6.3.4(a)
1.6.3.4(b)
1.6.3.4(c)
1.6.3.4.1
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.2.7.13 Provide Device Interface for Field Management Stations

Input Flows:
fors-signal_control
fors-signal_fault
fors-signal_status
t_other_rw_ic_to_ic

Output Flows:
f_other_rw_ic_to_ic
field_management_station_fault_indication
field_management_station_status
tors-signal_control
tors-signal_fault
tors-signal_status

Description:
This process shall provide the interface between roadway devices and other signal systems or Field Manage Stations (considered to be contained in the Other Roadway terminator) for the exchange of data, status, fault indications, and control. The Other Roadway can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. This process supports the interconnection of traffic signal controllers in peer or hierarchical arrangements, and may also be used to exchange information between a Signal Systems Master (SSM) and Signal System Local (SSL) equipment.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.1
1.6.3.3.2
1.6.3.3.4
1.6.3.4
1.6.3.4(a)

1.2.7.14 Manage Local Signal Priority Requests

Input Flows:
transit_vehicle_roadway_priorities

Output Flows:
indicator_monitoring_suspend_for_priority
indicator_priority_for_highways
indicator_priority_for_roads
signal_priority_override

Description:
This process shall receive indicator (e.g., signal) priority requests from other functions within ITS. These requests shall enable the process to give selected vehicles (e.g., those that belong to Transit Authorities) signal priority at intersections, pedestrian crossings, and multimodal crossings in the freeways, surface streets and rural roadways served by the Manage Traffic function. Sending of the priority request output shall also generate an output to the monitoring process to suspend its activities while the priority request is being served. An output indicating priority has been granted shall be sent to another process to help that process determine whether a fault detected at the signal is a true malfunction or due to a signal override. Fault indicators shall be sent to the Collect Traffic Field Equipment Fault Data.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.8
1.8.2.8(a)
1.8.2.8(b)
1.8.2.8(c)
1.8.3
1.8.3.1
1.8.3.1(c)
2.0
2.1
2.1.0
2.1.1
2.1.1.2
2.1.1.2.3

1.2.8 Collect Traffic Field Equipment Fault Data

Input Flows:

avo_device_status
dms_status
environmental_sensor_status
field_equip_maint_status
field_management_station_fault_indication
ftop-field_equip_fault_data_input
ftop-field_equip_fault_data_request
har_status
hov_sensor_status
hri_status
indicator_faults_from_signals
indicator_status_for_highways_from_center
indicator_status_for_roads_from_center
indicator_status_from_signals
indicator_status_from_traffic_meters
lane_management_device_status
lighting_system_device_status
multimodal_crossing_sensor_status
pedestrian_sensor_status
reversible_lane_control_device_status_from_highways
reversible_lane_control_device_status_from_roads
reversible_lane_sensor_status
road_user_protection_device_status
roadway_warning_device_status
safeguard_system_device_status
shoulder_management_device_status
speed_sensor_status
traffic_field_equipment_fault_data
traffic_sensor_status
variable_speed_limit_statusbarrier_system_device_status
vehicle_sign_status
vehicle_traffic_probe_equip_status
video_device_status

Output Flows:

field_equipment_status_from_traffic
indicator_fault_state
traffic_field_equipment_fault_data
ttop-current_field_equip_fault_data

Description:

This process shall collect and store the operational status of field equipment (state of the devices, configuration, and fault data) based on input from those devices, updates from traffic operations personnel, and repair updates from the Manage Maintenance and Construction function. The process shall output a complete report of the operational status of the field equipment to the traffic operations personnel upon request, and to the Manage Maintenance and Construction function to arrange for repair. The information can include data on sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, vehicle traffic probe field equipment, security surveillance equipment, lighting systems, short range communications equipment, vehicle signage field equipment, etc.).

User Service Requirements:

1.0
1.7
1.7.0
1.7.4
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(a)
1.8.1.5
1.8.2
1.8.2.13
1.8.3
1.8.3.1
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

1.3.1.1 Analyze Traffic Data for Incidents

Input Flows:
current_road_network_use
hri_incident_data
incident_analysis_data
static_data_for_incident_management
traffic_image_data
unusual_data
work_zone_images_for_traffic

Output Flows:
dynamic_lane_status
possible_detected_incidents
reversible_lane_status

Description:
This process shall analyze traffic sensor data, vehicle probe data, or video images for anomalies that could indicate occurrence of an incident, including video images at work zones. The data may be collected from roads (surface street) and/or highways served by the Manage Traffic function. The process shall pass on any anomalies that it detects to another process in the Manage Incidents facility as possible detected incidents.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.2
1.7.1.2.1
1.7.1.2.1(e)
8.0
8.1
8.1.0
8.1.3
8.1.3.2
8.1.3.2.4
8.1.3.2.4(e)

1.3.1.2 Maintain Static Data for Incident Management

Input Flows:
static_data_for_incident_management
supply_incident_static_data

Output Flows:
current_incident_static_data
static_data_for_incident_management

Description:
This process shall maintain the store of static data (data about the location and features of the road or highway links in the transportation network). This data store is used by another process within the Manage Incidents facility to identify and locate incidents. The static data shall be input to this process from another process and it shall be possible for that process to request a copy of the current static data.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.2
1.7.1.1.2(d)
1.7.1.1.3
1.7.1.2
1.7.1.2.2
1.7.1.2.2(d)
1.7.1.2.3

1.3.1.3 Process Traffic Images

Input Flows:
ftrf-traffic_images
incident_video_image_control
video_control_from_m_and_c

Output Flows:
dynamic_lane_video_image
incident_video_image
reversible_lane_video_images
traffic_image_data
video_device_equip_status_for_m_and_c
video_device_status
video_device_status_for_m_and_c
work_zone_images
work_zone_intrusion_video_image

Description:
This process shall process raw traffic image data received from devices located on the road (surface street) and freeway network served by the Manage Traffic function. The process shall transform the raw data into images that can be sent to another process for incident or work zone intrusion detection. It shall also act as the control interface through which the images of traffic conditions can be changed by the traffic operations personnel and maintenance and construction center personnel, who shall also be supplied with images for viewing. This process shall also provide operational status (state of the device, configuration, and fault data) to other processes in the Manage Traffic and Manage Maintenance and Construction functions that are monitoring the health of field equipment so that repairs can be scheduled by those other processes if deemed necessary.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.2
1.7.1.2.2
1.7.1.2.2(a)
8.0
8.1
8.1.0
8.1.3
8.1.3.2
8.1.3.2.4
8.1.3.2.4(e)

1.3.2.1 Store Possible Incident Data

Input Flows:
environmental_data_for_incidents
fbis-actual_border_wait_time_for_traffic
fbis-border_traffic_incident
fbis-current_border_wait_time_for_traffic
fbis-predicted_border_wait_time_for_traffic
fevp-event_information
fifd-intermodal_freight_event
fstws-surface_trans_weather_forecasts
fstws-surface_trans_weather_observations
fws-current_weather_observations
fws-weather_forecasts
incident_info_for_traffic
logged_special_vehicle_route
m_and_c_work_plans_for_traffic
media_incident_data_updates
pollution_incident
possible_detected_incidents
road_weather_info_for_traffic
work_zone_info_for_traffic

Output Flows:
possible_incident_data_update
possible_incidents

Description:
This process shall receive data on possible incidents from other processes within the Manage Incidents function and from other ITS functions. The process shall receive observation and forecast data from the Weather Service and Surface Transportation Weather Services terminators. The process shall receive incident/event information from the Event Promoter, Border Inspection Systems, and Intermodal Freight Depot terminators. The process shall load all data that it receives into the store of possible incidents. Types of incidents that could be received include special vehicle routes, work zone activity, road weather information, pollution incidents, intermodal freight traffic as well as traffic incidents. As part of the loading activity, the process shall enter the data into the relevant parts of the standard format for incident data, and shall assign a level of confidence (e.g. related to the source of the data or time of its detection) to that data. Once data is loaded into the store an update notification is sent to another process to review and classify the possible incidents.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(b)
1.7.1.1.2
1.7.1.1.2(a)
1.7.1.1.2(b)
1.7.1.1.2(c)
1.7.1.1.2(d)
1.7.1.1.2(e)
1.7.1.1.3
1.7.1.2
1.7.1.2.1
1.7.1.2.1(e)
1.7.1.2.1(g)
1.7.1.2.2
1.7.1.2.3
1.7.2
1.7.2.1
8.0
8.1
8.1.0
8.1.4
8.1.4.2
8.1.4.3
8.1.4.3(d)

1.3.2.2 Review and Classify Possible Incidents

Input Flows:

disaster_transportation_system_status_for_traffic
evacuation_transportation_system_status_for_traffic
fmmc-crossing_closure_schedule
incident_details
infrastructure_integrity_status_for_traffic
m_and_c_status_assessment_for_traffic
operations_incident_data_updates
possible_incident_data_update
possible_incidents
request_possible_incidents_data
threat_info_for_traffic

Output Flows:

current_incidents_new_data
incident_data_update
m_and_c_plan_feedback_from_traffic
planned_event_data
planned_events
planned_events_for_em_response
planned_events_for_maint
planned_events_new_data
possible_incidents_data_output
tevp-event_confirmation
tifd-intermodal_freight_event_confirmation

Description:

This process shall review input data about possible incidents and provide verification of the incident. The process shall have the capability of using algorithms to automatically identify and verify an incident. The process shall have the capability to classify an incident as a current incident or a planned event (such as a multimodal crossing) and shall output that potential incident data to another process for storage. The process shall report any incidents that it is unable to verify or classify to the traffic operations personnel for manual verification and classification. The process shall allow the traffic operations personnel to request all possible incidents and carry out the verification and classification process manually. This process shall provide feedback on proposed maintenance and construction work plans and proposed event plans as well as upcoming intermodal freight traffic.

User Service Requirements:

1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(a)
1.7.1.1.1(b)
1.7.1.1.1(c)
1.7.1.1.1(d)
1.7.1.1.1(e)
1.7.1.1.1(f)
1.7.1.1.1(g)
1.7.1.1.1(h)
1.7.1.2
1.7.1.2.1
1.7.1.2.1(a)
1.7.1.2.1(b)
1.7.1.2.1(c)
1.7.1.2.1(d)
1.7.1.2.1(e)
1.7.1.2.1(f)
1.7.1.2.1(g)
1.7.1.2.2
1.7.1.2.2(a)
1.7.1.2.2(b)
1.7.1.2.2(c)
1.7.4
8.0
8.1
8.1.0
8.1.4
8.1.4.1
8.1.4.3
8.1.4.3(d)

1.3.2.3 Review and Classify Planned Events

Input Flows:
current_incidents_data
current_incidents_request
incident_data_update
incident_response_status
planned_events_data
reclassify_incidents

Output Flows:
current_incident_data
current_incidents
current_incidents_data_output
current_incidents_data_request
current_incidents_data_update
planned_event_data_for_roadway_information
request_planned_events_data

Description:
This process shall receive updates of planned events and review the complete list of them to determine when an incident should be reclassified from planned event to current incident. It shall carry out the re-classification process automatically either upon receiving notice that the store of planned events has been updated, or at some periodic rate. The criteria for reclassifying an incident could be that the planned start time of the event has passed. The process shall request details of planned events from the process that manages their data store and shall send details of any new (re-classified) current incidents to the process that manages their data store. It shall also provide updates of planned events and current incidents to other ITS functions, and details of any new planned events to the process responsible for the output of data to travelers via DMS, HAR, or in-vehicle signage functions.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.2
1.7.1.2.2
1.7.1.2.2(a)
1.7.1.2.2(b)
1.7.4

1.3.2.4 Provide Planned Events Store Interface

Input Flows:
other_planned_events
planned_events_new_data
planned_events_store
request_local_planned_events_data
request_planned_events_data

Output Flows:
planned_events_data
planned_events_data_output
planned_events_local_data
planned_events_store
request_other_planned_events_data

Description:
This process shall provide the interface to, and manage the use of the store containing details of planned events. The process shall enter details of all new planned events into the store, retrieve details on request, and delete details of an incident when it has been re-classified as a current incident. The process shall be able to receive details of planned events from within the local Manage Incidents facility, and from similar facilities in other Traffic Management Centers (TMCs). When requested, the process shall also be able to provide details of its planned events to the Manage Incidents facilities in other TMCs.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4

1.3.2.5 Provide Current Incidents Store Interface

Input Flows:
current_incidents_data_request
current_incidents_data_update
current_incidents_new_data
current_incidents_store
incidents_data_request_for_routing
other_current_incidents
request_local_current_incidents_data

Output Flows:
current_incidents_data
current_incidents_store
incidents_for_routing
request_other_current_incidents_data

Description:
This process shall provide the interface to, and manage the use of the store of current incident details. The process shall enter the details of all new current incidents into the store, retrieve details on request, and delete details of incidents when they cease to be current. The process shall be able to receive details of current incidents from within the local Manage Incidents facility, and from similar facilities in other Traffic Management Centers (TMCs). When requested, the process shall also be able to provide details of its current incidents to the Manage Incidents facilities in other TMCs.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4

1.3.2.6 Manage Traffic Routing

Input Flows:
barrier_system_status_for_detours
emergency_route_request
emergency_transit_schedule_information_for_traffic
freeway_control_response_for_detours
highway_closures
incidents_for_routing
predetermined_incident_response_data
roadway_closure_from_emergency
roadway_closures
roadway_control_response_for_detours
safeguard_system_status_for_detours
traffic_detour_control_from_other_traffic
traffic_detour_info_from_other_traffic

Output Flows:
barrier_system_activation_request_for_detours
emergency_route_response
freeway_control_request_for_detours
incidents_data_request_for_routing
request_predetermined_incident_response_data
roadway_control_request_for_detours
roadway_detours_and_closures_for_em
roadway_detours_and_closures_for_em_response
roadway_detours_and_closures_for_isp
roadway_detours_and_closures_for_m_and_c
roadway_detours_and_closures_for_traffic
roadway_detours_and_closures_for_transit
traffic_detour_control_for_other_traffic
traffic_detour_info_for_other_traffic

Description:
This process develops and provides detours, route restrictions, and other routing information based on current traffic, incident, emergency, and roadway conditions. The process may also request the initiation of control functions on the transportation network, including freeway, arterial, and other roadways as needed. Routes and detours developed can be for short of long term durations, and may limit usage to specific types of vehicles (e.g. emergency vehicles).

User Service Requirements:
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.3.4.3(a)
5.1.3.4.3(b)
5.3
5.3.0
5.3.11
5.3.11.4
5.3.11.4(f)
5.3.11.4(g)
5.3.2
5.3.2.2
5.3.2.2(a)
5.3.5
5.3.5.1
5.3.5.2
5.3.7
5.3.7.1
5.3.7.1(c)
5.3.7.1(d)

1.3.3 Respond to Current Incidents

Input Flows:
current_incidents_data_output
defined_responses
evacuation_plan_activation
fbis-border_lane_management
incident_response_log
traffic_model_data_for_incident_calcs

Output Flows:
calculated_incident_times
current_traffic_incident_response
cv_incident_override
defined_responses_data_request
hri_strategy_override
incident_alert_details
incident_info_from_traffic
incident_response_clear
incident_response_log
incident_response_log_for_other_traffic_mgmt
incident_response_log_for_transit
incident_response_log_output
incident_strategy_override
roadway_information_incident_updates
tbis-traffic_border_incident
undefined_incident_response

Description:
This process shall provide responses, including roadside advisories, signal timing strategy changes, and notification of other agencies (Emergency Management, Maintenance and Construction, and Border Inspection Systems), to incidents that become current, i.e. active. Four general strategies for response to incidents can be supported by the process in conjunction with the Manage Incident Response Planning process: 1) Operator enters a response (there is no set of predetermined responses), 2) the operator selects a response from a set of predetermined responses (possibly modifying the response), 3) the process automatically accesses and implements a response from a set of predetermined responses (while informing the operator of the actions taken), and 4) the process receives a signal to activate an evacuation plan.
The process shall output the predetermined responses to an incident when it receives notification from another process in the Manage Incidents function that a new current incident has occurred. At the same time it shall also output the incident data to the process responsible for providing broadcast data to roadside processes (e.g., DMS/HAR) and to the Manage Maintenance and Construction process for coordination with its activities. The other process in the Manage Incidents function shall also provide details of incidents that have ceased to be current (terminated) so that this process can send out data to clear the actions requested and broadcast such information to the roadside. This process shall provide the Manage Emergency Services function with updates to the responses to the current traffic incidents, including any changes to traffic control strategies (e.g., signal timing plans, ramp metering, interchange control, lane control), commercial vehicle restrictions, HRI overrides, or evacuation procedures.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.2
1.7.1.2.3
1.7.2
1.7.2.2
1.7.2.3
1.7.2.4
1.7.2.5
1.7.3
1.7.3.1
1.7.3.1(a)
1.7.3.2
1.7.3.3
1.7.4
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(b)

1.3.4.1 Retrieve Incident Data

Input Flows:
current_incidents
map_data_for_incident_display
planned_events_data_output
possible_incidents_data_output
request_incident_operations_data

Output Flows:
current_incidents_request
request_possible_incidents_data
retrieved_incident_media_data
retrieved_incident_operations_data

Description:
This process shall retrieve incident data from the stores of planned events and current incidents that are managed by other processes in the Manage Incidents facility of the Manage Traffic function. The process shall retrieve data as the result of a request from traffic operations personnel.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.2
1.7.1.2.1
1.7.1.2.1(c)
1.7.1.2.1(d)
1.7.1.2.1(f)
1.7.1.2.2
1.7.1.2.2(d)
1.7.4

1.3.4.2 Provide Traffic Operations Personnel Incident Data Interface

Input Flows:

deactivate_traveler_information_restrictions_for_traffic
defined_incident_response_data
faas-alerts_and_advisories_for_traffic
ftop-alert_notification_status
ftop-decision_support_parameters
ftop-defined_incident_response_data_request
ftop-defined_incident_response_data_update
ftop-incident_camera_action_request
ftop-incident_data_amendment
ftop-incident_information_requests
ftop-output_possible_defined_responses
ftop-request_possible_incidents_data
ftop-resource_request
ftop-roadway_incident_input
ftop-update_defined_incident_responses
incident_video_image_for_traffic_operator
operator_log_for_incidents_data
possible_defined_responses_output
retrieved_incident_operations_data
traffic_operations_resource_response
traveler_information_restrictions_for_traffic
undefined_incident_response
video_device_status_for_traffic_operator
wide_area_alert_notification_for_traffic
wrong_way_vehicle

Output Flows:

alert_notification_status_from_traffic
decision_support_parameters
defined_incident_response_data_request
defined_incident_response_update_request
defined_incident_response_updates
incident_video_image_control_by_traffic_operator
operations_incident_data_updates
operator_log_for_incidents_data
possible_defined_responses_output_request
reclassify_incidents
request_incident_map_display_update
request_incident_operations_data
roadway_info_alert_data
traffic_operations_resource_request
ttop-deactivate_information_restrictions
ttop-defined_incident_responses_data
ttop-incident_information_display
ttop-incident_video_image_output
ttop-possible_defined_response_output
ttop-possible_incidents_data
ttop-resource_response
ttop-roadway_incident_status
ttop-traveler_information_restrictions
ttop-undefined_response_details
ttop-video_device_status
ttop-wide_area_alert_notification
ttop-wrong_way_detection

Description:

This process shall provide the interface between the traffic operations personnel and the Manage Incidents facility of the Manage Traffic function. It shall enable the personnel to request and amend details of current incidents, planned events, wide area alerts, and predetermined incident responses. The process shall provide an interface to a decision support process that identifies the potential regional impact of recommended courses of action to traffic operations personnel, and shall accept control parameters from personnel. This process shall allow personnel to manually reclassify incidents as possible or current or a planned event. It shall also output to the traffic operations personnel incident details to which no predetermined response currently exists. The process shall support inputs from and outputs to the traffic operations personnel. Where appropriate and/or requested by the traffic operations personnel, the process shall provide the output 'display' in a form incorporating a map of the relevant part(s) of the freeways, surface street and rural roadways served by the function. The process shall obtain the map from a local data store, which it shall request to be updated by another process as and when required. This process shall also receive advisory data from outside of ITS via the Alerting and Advisory Systems terminator. Advisories may cause the response plans to be established and activated based on the type or timing of the advisory.

User Service Requirements:

1.0
1.7
1.7.0
1.7.2
1.7.2.1
1.7.3
1.7.3.2
1.7.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4

1.3.4.3 Provide Media Incident Data Interface

Input Flows:
fm-incident_information
retrieved_incident_media_data

Output Flows:
media_incident_data_updates
tm-incident_data

Description:
This process shall provide the interface between the Media and the Manage Incidents facility. It shall allow transmission of incident information to the media. The media shall also provide raw input data on possible incidents. The process shall enable the output to incorporate a map of the area to which the incidents relate.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(d)
1.7.4

1.3.4.4 Update Incident Display Map Data

Input Flows:
fmup-incident_display_update
request_incident_map_display_update

Output Flows:
map_data_for_incident_display
tmup-request_incident_display_update

Description:
This process shall provide updates to the store of digitized map data used with displays of incident data produced by processes in the Manage Incidents facility of the Manage Traffic function. The process shall obtain the new data from a map provider or other appropriate data source, on receiving an update request from the traffic operations personnel interface process within the Manage Incidents facility.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4

1.3.4.5 Manage Resources for Incidents

Input Flows:
em_resource_response_to_traffic
m_and_c_resource_response_to_traffic
resource_request
traffic_operations_resource_request

Output Flows:
em_resource_request_from_traffic
m_and_c_resource_request_from_traffic
operator_log_for_incidents_data
resource_deployment_status
roadway_maint_action_req_from_traffic
traffic_operations_resource_response
traffic_resources_for_disaster
traffic_resources_for_evacuation
winter_maint_action_req_from_traffic

Description:
This process shall provide the capability for the Manage Traffic function to generate and receive requests for resources in responding to incidents. The process shall provide the capability for traffic operations personnel to request resources from the Manage Maintenance and Construction and Manage Emergency Services functions to provide equipment and support for incident response and clean up. The process shall be able to receive resource requests from the Manage Emergency function and respond with the status of the response by Maintenance and Construction, Emergency Services, or the traffic operations personnel.

User Service Requirements:
1.0
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(c)
1.7.1.2
1.7.1.2.2
1.7.1.2.2(e)
1.7.3
1.7.3.1
1.7.3.1(b)
4.0
4.5
4.5.0
4.5.4
4.5.4.3
4.5.4.3.7
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(c)
8.1.4
8.1.4.1
8.1.4.2
8.1.4.3
8.1.4.3(a)
8.1.4.3(b)
8.1.4.3(d)

1.3.4.6 Process Video Data

Input Flows:
fbis-border_remote_video_control
incident_video_image
incident_video_image_control_by_traffic_operator
remote_video_image_control
video_camera_control_strategy
video_device_status
video_device_status_from_other_center
video_image_control_from_other_center

Output Flows:
incident_video_for_emergency_services
incident_video_image_control
incident_video_image_for_traffic_operator
tbis-traffic_border_incident_video
video_device_status_for_traffic_operator
video_device_status_to_other_center
video_image_control_to_other_center

Description:
This process shall allow the traffic operations personnel to obtain and control incident video image data. This process shall respond to requests for control and output of traffic video images from the Manage Emergency function and the Border Inspection System terminator. The process shall also support remote control of video camera equipment by other traffic management centers in neighboring jurisdictions, as well as control of another jurisdiction's video camera equipment by the local center.

User Service Requirements:
1.0
1.6
1.6.2
1.6.2.2
1.6.2.2.1
1.7
1.7.0
1.7.1
1.7.1.2
1.7.1.2.2
1.7.1.2.2(a)

1.3.5 Manage Incident Response Planning

Input Flows:
decision_support_parameters
defined_incident_response_data_request
defined_incident_response_update_request
defined_incident_response_updates
defined_responses_data
defined_responses_data_request
demand_forecast
imbalance_warning
incident_response_log_from_other_traffic_mgmt
incident_response_log_output
possible_defined_responses
possible_defined_responses_output_request
request_predefined_traffic_disaster_plan
request_predefined_traffic_evacuation_plan
request_predetermined_incident_response_data
traffic_performance_measures

Output Flows:
defined_incident_response_data
defined_responses
defined_responses_data
possible_defined_responses
possible_defined_responses_output
predefined_traffic_disaster_plan
predefined_traffic_evacuation_plan
predetermined_incident_response_data

Description:
This process shall manage the planning for incident management - what strategies to employ for a given situation. The process shall provide decision support for corridor-wide operations by recommending courses of action to another process that provides an interface with the traffic operations personnel based on predetermined response plans. As a decision support tool, the impact of potential courses of action are determined by the process. To assess the impact and create recommendations, this process shall analyze data received from a variety of sources, including network imbalances calculated by another process, network performance measures, demand forecasts based on current and historical data, predictive traffic models, and from the log of incident responses. Recommendations for courses of action will be controlled by decision support parameters from traffic operations personnel. Possible predetermined incident responses shall be identified based on the data and shall be stored (possible_defined_responses). This process shall enable retrieval of the data from this store for presentation to traffic operations personnel and its possible transfer to the store of predetermined incident responses (defined_responses_data). The operator shall have the capability to view, modify, or override the predetermined response (defined_responses_data). If the process cannot find a predetermined response for a particular incident, it shall send the details of the incident to the traffic operations personnel so that they can provide an update to this store.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4

1.3.6 Traffic Disaster Response Control

Input Flows:
disaster_response_plan_coordination_to_traffic
disaster_traffic_data_from_other_traffic_management
ftop-disaster_response_plan_input
predefined_traffic_disaster_plan
traffic_resources_for_disaster

Output Flows:
disaster_response_plan_coordination_from_traffic
disaster_traffic_data_for_other_traffic_management
request_predefined_traffic_disaster_plan
ttop-disaster_response_plan_input_request

Description:
This process allows for the coordination and support of disaster response and recovery plans between local traffic management centers, other traffic management centers, and emergency management. It interacts with the store of predetermined incident responses to select and modify a response to a particular incident, disaster, or other emergency.

User Service Requirements:
5.0
5.3
5.3.0
5.3.2
5.3.2.2
5.3.2.2(g)
5.3.5
5.3.5.4
5.3.5.5
5.3.7
5.3.7.1
5.3.7.1(c)

1.3.7 Traffic Evacuation Control

Input Flows:
evacuation_information_for_traffic_management
evacuation_plan_coordination_to_traffic
evacuation_traffic_data_from_other_traffic_management
evacuation_transit_schedule_information_for_traffic
ftop-evacuation_plan_input
predefined_traffic_evacuation_plan
traffic_evacuation_resource_request
traffic_resources_for_evacuation

Output Flows:
evacuation_plan_activation
evacuation_plan_coordination_from_traffic
evacuation_traffic_data_for_other_traffic_management
request_predefined_traffic_evacuation_plan
roadway_information_evacuation_data
traffic_evacuation_status
ttop-evacuation_plan_input_request

Description:
This process allows for the coordination and support of evacuation plans between traffic management centers, other traffic management centers, and emergency management. It interacts with the store of predetermined responses to select and modify a response to a particular evacuation scenario. Once an evacuation is declared this process shall send the area to be evacuated, the schedule, and the updated signal strategy to be used for the evacuation to the Respond to Current Incidents process.

User Service Requirements:
5.0
5.3
5.3.0
5.3.11
5.3.11.12
5.3.11.3
5.3.11.3.1
5.3.11.4
5.3.11.4(a)
5.3.11.4(b)
5.3.11.4(c)
5.3.11.4(d)
5.3.11.4(e)
5.3.11.4(f)
5.3.11.4(g)
5.3.11.4(h)
5.3.11.4(j)

1.4.1 Provide Traffic Operations Personnel Demand Interface

Input Flows:
demand_forecast_data
demand_forecast_result
demand_input_data
demand_management_result
demand_policy_data
ftop-demand_data_request
ftop-demand_data_update_request
ftop-demand_forecast_request
ftop-demand_policy_activation
ftop-demand_policy_information_request
ftop-demand_policy_updates
ftop-imbalance_parameters
map_data_for_demand_display

Output Flows:
demand_data_update_request
demand_forecast_request
demand_management_activate
demand_policy_data
imbalance_threshold_configuration
request_demand_display_update
ttop-demand_data
ttop-demand_forecast_data
ttop-demand_forecast_result
ttop-demand_policy_activation_result
ttop-demand_policy_information

Description:
This process shall provide the interface between the traffic operations personnel and the processes and data stores used within the Manage Demand facility of the Manage Traffic function. It shall enable the traffic operations personnel to access the data used as input by the demand forecasting process and the results of that process, to request that the input data be updated, set the policies used as input to the Calculate Forecast Demand process, to request that the demand forecasting process runs, to run the process that implements the results, and to set threshold parameters for detecting imbalances in the corridor network. Where appropriate and/or requested by the traffic operations personnel, the process shall provide the output in a form that includes a map of the relevant part(s) of the road and freeway network served by the Manage Travel Demand function. The process shall obtain the map from a local data store, which it shall request to be updated by another process when required.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.1

1.4.2 Collect Demand Forecast Data

Input Flows:

current_other_routes_use
current_transit_routes_use
demand_data_update_request
fws-current_weather_observations
fws-weather_forecasts
hri_status_for_traffic_demand
parking_lot_charge_details
parking_lot_charge_direct_details
pollution_state_data
toll_price_details
toll_price_direct_details
traffic_data_for_demand
transit_fare_details
transit_fare_direct_details
transit_running_data_for_demand
transit_services_for_demand
unusual_congestion
weather_service_information_request

Output Flows:

demand_input_data
parking_lot_charge_direct_request
pollution_state_data_request
toll_price_direct_request
traffic_data_demand_request
transit_conditions_demand_request
transit_fare_direct_request
transit_services_demand_request
weather_service_information

Description:

This process shall collect data from other ITS functions for use as input to the demand forecasting process within the Manage Demand facility of the Manage Traffic function. The process shall collect data from the Weather Service terminator to support demand forecasting. The process shall support data retrieval from other functions on request from the traffic operations personnel and through the receipt of unsolicited data from ITS functions. It shall load all the data that it receives in a consistent format into the input store used by the demand forecasting process.

User Service Requirements:

1.0
1.8
1.8.0
1.8.1
1.8.1.1
1.8.1.2
1.8.1.2(e)
1.8.1.2(f)
1.8.1.3
1.8.1.3(e)
1.8.1.3(f)
1.8.1.4
1.8.1.5
1.8.1.5(a)
1.8.1.5(c)
1.8.2
1.8.2.1
1.8.2.1(a)
1.8.2.10
1.8.2.11
1.8.2.12
1.8.2.13
1.8.2.14
1.8.2.2
1.8.2.3
1.8.2.4
1.8.2.4(f)
1.8.2.5
1.8.2.5(a)
1.8.2.5(b)
1.8.2.5(c)
1.8.2.5(d)
1.8.2.5(e)
1.8.2.6
1.8.2.7
1.8.2.7(a)
1.8.2.7(b)
1.8.2.7(c)
1.8.2.8
1.8.2.8(a)
1.8.2.9
1.8.2.9(a)
1.8.2.9(b)
1.8.2.9(c)
1.8.3
3.0
3.1
3.1.0
3.1.5
3.1.5.1
3.1.5.1.1
3.1.5.2
3.1.5.3

1.4.3 Update Demand Display Map Data

Input Flows:
fmup-demand_display_update
request_demand_display_update

Output Flows:
map_data_for_demand_display
tmup-request_demand_display_update

Description:
This process shall provide updates to the store of map data used for displays of forecast traffic and travel demand produced by processes in the Manage Travel Demand facility of the Manage Traffic function. The process shall obtain the new data from a specialist map data supplier or some other appropriate source, on receiving an update request from the traffic operations personnel interface process within the Manage Travel Demand facility.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.1

1.4.4 Implement Demand Management Policy

Input Flows:

demand_forecast_data
demand_management_activate
parking_lot_charge_change_response
toll_price_changes_response
transit_services_changes_response

Output Flows:

avo_control_data
demand_management_result
demand_overrides
parking_lot_charge_change_request
toll_price_changes_request
transit_services_changes_request

Description:

This process shall implement the traffic and travel demand forecast data produced by the demand forecasting process in the Manage Travel Demand facility of the Manage Traffic function. The new demand forecast data shall be implemented in such a way that it can influence the demand from travelers for various types of services provided by ITS functions. The process shall when required, request changes to transit services, and/or the charges for tolls, and/or the use of parking lot spaces (as per the locally determined demand policy). It shall communicate the results of its policy implementation to the process that provides the interface to the traffic operations personnel.

User Service Requirements:

1.0
1.8
1.8.0
1.8.1
1.8.1.1
1.8.1.2
1.8.1.2(e)
1.8.1.2(f)
1.8.1.3
1.8.1.3(e)
1.8.1.3(f)
1.8.1.4
1.8.1.5
1.8.1.5(a)
1.8.1.5(b)
1.8.1.6
1.8.1.6(d)
1.8.2
1.8.2.1
1.8.2.10
1.8.2.11
1.8.2.12
1.8.2.13
1.8.2.14
1.8.2.14(a)
1.8.2.14(b)
1.8.2.14(c)
1.8.2.2
1.8.2.3
1.8.2.3(a)
1.8.2.3(b)
1.8.2.3(c)
1.8.2.3(d)
1.8.2.4
1.8.2.4(f)
1.8.2.5
1.8.2.5(a)
1.8.2.5(b)
1.8.2.5(c)
1.8.2.5(d)
1.8.2.5(e)
1.8.2.6
1.8.2.7
1.8.2.7(a)
1.8.2.7(b)
1.8.2.7(c)
1.8.2.8
1.8.2.8(a)
1.8.2.9
1.8.2.9(a)
1.8.2.9(b)
1.8.2.9(c)
1.8.3
3.0
3.1
3.1.0
3.1.5
3.1.5.1
3.1.5.1.1
3.1.5.2
3.1.5.3

1.4.5 Calculate Forecast Demand

Input Flows:
demand_forecast_request
demand_input_data
demand_policy_data
imbalance_threshold_configuration

Output Flows:
demand_forecast
demand_forecast_data
demand_forecast_result
imbalance_warning

Description:
This process shall provide a forecast of traffic and travel demand in the geographic area served by the Manage Traffic function to which this instance of the Manage Travel Demand facility belongs. The process shall base its forecast on the current and predicted traffic levels, traveler demand patterns obtained from an analysis of data obtained from elsewhere within the Manage Traffic function and from other ITS functions as well as locally determined demand policy. The process shall produce a demand forecast that changes the way that services are provided by ITS functions according to locally determined demand policy. The process shall monitor corridor performance and issue a warning if an imbalance is detected.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.1
1.8.1.2
1.8.1.3
1.8.1.4
1.8.1.5
1.8.1.5(b)
1.8.2
1.8.2.1
1.8.2.1(f)
1.8.2.10
1.8.2.11
1.8.2.12
1.8.2.13
1.8.2.14
1.8.2.2
1.8.2.3
1.8.2.3(a)
1.8.2.4
1.8.2.5
1.8.2.5(a)
1.8.2.5(b)
1.8.2.5(c)
1.8.2.5(d)
1.8.2.5(e)
1.8.2.6
1.8.2.7
1.8.2.7(a)
1.8.2.7(b)
1.8.2.7(c)
1.8.2.8
1.8.2.8(a)
1.8.2.9
1.8.2.9(a)
1.8.2.9(b)
1.8.2.9(c)
1.8.3
3.0
3.1
3.1.0
3.1.5
3.1.5.1
3.1.5.1.1
3.1.5.2
3.1.5.3

1.5.1 Provide Emissions Operations Personnel Interface

Input Flows:
emissions_reference_data_output
emissions_state_data_output
femo-emissions_and_pollution_data_information_request
femo-emissions_and_pollution_parameter_updates
fws-current_weather_observations
fws-weather_forecasts
map_data_for_pollution_display
pollution_reference_data_output
pollution_sensor_status_for_operator
pollution_state_data_output
vehicle_emissions_sensor_status_for_operator

Output Flows:
emissions_reference_data_request
emissions_reference_data_update
emissions_state_data_output_request
pollution_reference_data_request
pollution_reference_data_update
pollution_sensor_control_parameters
pollution_state_data_output_request
request_pollution_map_display_update
temo-pollution_data_display
temo-vehicle_emissions_data
vehicle_emissions_sensor_control_parameters

Description:
This process shall provide the interface between the emissions operations personnel and the processes and data stores used within the Manage Emissions facility of the Manage Traffic function. The process shall enable the personnel to access and update the pollution and emissions reference data used by other processes within the facility, and to access the pollution and emissions state data provided by those processes. The process shall support inputs from the emissions operations personnel. The process shall support requests by personnel to control pollution and emissions sensors, and operational status of those sensors shall be returned to the personnel. Where appropriate and/or requested by the emissions operations personnel, the process shall incorporate map data of the relevant part(s) of the freeways, surface street and rural roadways served by the Manage Traffic function. The process shall obtain the map from a local data store, which it shall request to be updated by another process as and when required.

User Service Requirements:

1.0	1.9.0
1.8	1.9.1
1.8.0	1.9.1.2
1.8.2	1.9.1.2.1
1.8.2.2	1.9.1.2.2
1.8.2.2(a)	1.9.2
1.8.2.2(b)	1.9.2.2
1.8.2.2(c)	1.9.2.2.1
1.9	1.9.2.2.3

1.5.2 Process Pollution Data

Input Flows:
pollution_sensor_control_parameters
pollution_sensor_data
pollution_sensor_status
pollution_state_static_acceptance_criteria

Output Flows:
archive_pollution_data
current_traffic_pollution_data
pollution_incident
pollution_sensor_control
pollution_sensor_status_for_operator
pollution_state_static_collection
tm-pollution_data
wide_area_pollution_data

Description:
This process shall process the pollution data being collected from sensors in the geographic area being served by the Manage Traffic function. The process shall integrate data from distributed sensors, whether located at the roadside and/or from sensors looking at the general (wide area) environment. The data shall be checked by the process against the pollution levels that have been set up as reference points. If the process finds that the detected levels of pollution exceed the reference levels it shall generate pollution warnings. The process shall send these warnings to other processes in the Manage Traffic function for output to drivers and travelers. This process shall process the emissions data being collected from sensors in the geographic area being served by the Manage Traffic function and check the data against emissions levels that have been set up as reference points. The process shall provide pollution sensor control and collect operational status (state of the sensor device, configuration, and fault data).

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(d)
1.9
1.9.0
1.9.1
1.9.1.1
1.9.1.1.1
1.9.1.1.2
1.9.1.1.3
1.9.1.2
1.9.1.2.1
1.9.1.2.2
1.9.2
1.9.2.1
1.9.2.1.2
1.9.2.2
1.9.2.2.1

1.5.3 Update Pollution Display Map Data

Input Flows:
fmup-pollution_display_update
request_pollution_map_display_update

Output Flows:
map_data_for_pollution_display
tmup-request_pollution_display_update

Description:
This process shall provide updates to the map data used in displays of pollution data produced by processes in the Manage Emissions facility of the Manage Traffic function. The process shall obtain the map data from a specialist map data supplier or some other appropriate data source, on receiving an update request from the emissions operations personnel interface process within the Manage Emissions facility.

User Service Requirements:
1.0
1.9
1.9.0
1.9.1
1.9.1.2
1.9.1.2.1
1.9.1.2.2
1.9.2
1.9.2.2
1.9.2.2.1

1.5.4 Manage Pollution State Data Store

Input Flows:
pollution_state
pollution_state_data_output_request
pollution_state_data_request
pollution_state_static_collection

Output Flows:
archive_pollution_state_data
pollution_state
pollution_state_data
pollution_state_data_output

Description:
This process shall manage the store of pollution state data in the Manage Emissions facility of the Manage Traffic function. The data in the store shall be that which has been received by the process from other processes within the facility. The process shall manage the data in the store to enable its contents to be available to other processes within the Manage Traffic function, and to emissions operations personnel, via an interface process within the Manage Emissions facility.

User Service Requirements:
1.0
1.9
1.9.0
1.9.1
1.9.1.2
1.9.1.2.1
1.9.2
1.9.2.2
1.9.2.2.1

1.5.5 Detect Vehicle Emissions Levels

Input Flows:
From_Vehicle_Characteristics
ftrf-vehicle_pollutant_levels
vehicle_emissions_sensor_control
vehicle_status_details_for_emissions

Output Flows:
vehicle_emissions_alert
vehicle_emissions_message
vehicle_emissions_sensor_data
vehicle_emissions_sensor_status
vehicle_signage_emissions_testing_results

Description:
This process shall obtain emissions data about individual vehicles and analyze it against reference data obtained from another process within the Manage Emissions facility of the Manage Traffic function. The process shall use this reference data to determine whether or not a vehicle is possibly violating the acceptable levels of emissions output. When the process determines that a possible violation has occurred, it shall send the detected emissions levels and the vehicle identity to the process responsible for law enforcement in the Manage Emergency Services function for action. This process shall provide a test results message to other processes within the roadway to generate outputs to the driver. This process may also send results directly to the in-vehicle units that can store and process the results for display to the drivers also. The process shall accept inputs to control the emissions sensors and return operational status (state of the sensor device, configuration, and fault data) to the controlling process.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(b)
1.8.2
1.8.2.13
1.8.2.13(b)
1.8.3
1.8.3.1
1.8.3.1(d)
1.9
1.9.0
1.9.2
1.9.2.1
1.9.2.1.1
1.9.2.1.2
1.9.2.1.4
1.9.2.1.5
1.9.2.2
1.9.2.2.1
1.9.2.2.2
1.9.2.2.3

1.5.6 Detect Pollution Levels

Input Flows:
fe-pollutant_levels
pollution_sensor_control

Output Flows:
pollution_sensor_data
pollution_sensor_status

Description:
This process represents pollution sensor equipment that measures the levels of pollution at the roadside within the geographic area as well as levels of pollutants that are not due to any particular sources such as road traffic. The process shall pass the data on to another process within the Manage Emissions facility for integration with wide area pollution data including vehicular emissions and comparison with thresholds for pollution incidents. The process shall accept inputs to control the pollution sensors and return operational status (state of the sensor device, configuration, and fault data) to the controlling process.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(d)
1.9
1.9.0
1.9.1
1.9.1.1
1.9.1.1.1
1.9.1.1.2
1.9.1.1.3
1.9.1.2
1.9.1.2.1
1.9.2
1.9.2.1
1.9.2.1.2
1.9.2.2
1.9.2.2.1

1.5.7 Process Vehicle Emissions Data

Input Flows:
vehicle_emissions_sensor_control_parameters
vehicle_emissions_sensor_data
vehicle_emissions_sensor_status
vehicle_emissions_state_acceptance_criteria

Output Flows:
archive_emissions_data
vehicle_emissions_sensor_control
vehicle_emissions_sensor_status_for_operator
vehicle_emissions_state_collection

Description:
This process shall process the emissions data being collected from sensors in the geographic area being served by the Manage Traffic function and check the data against emissions levels that have been set up as reference points. The process shall provide emissions sensor control and collect operational status (state of the sensor device, configuration, and fault data).

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.4
1.8.1.4(b)
1.8.2
1.8.2.13
1.8.2.13(b)
1.8.3
1.8.3.1
1.8.3.1(d)
1.9
1.9.0
1.9.2
1.9.2.1
1.9.2.1.2
1.9.2.2
1.9.2.2.1
1.9.2.2.3

1.5.8 Manage Emissions and Pollution Reference Data Stores

Input Flows:
emissions_reference_data
emissions_reference_data_archive_request
emissions_reference_data_request
emissions_reference_data_update
pollution_reference_data
pollution_reference_data_archive_request
pollution_reference_data_request
pollution_reference_data_update

Output Flows:
archive_emissions_reference_data
archive_pollution_reference_data
emissions_reference_data
emissions_reference_data_output
pollution_reference_data
pollution_reference_data_output
pollution_state_static_acceptance_criteria
vehicle_emissions_state_acceptance_criteria

Description:
This process shall manage the store of pollution and emissions reference data within the Manage Emissions facility of the Manage Traffic function. It shall make the contents of the store available to other processes within the facility that are responsible for emissions management, and on request to the emissions operations personnel interface process. The process shall accept updates to the stored data from the emissions operations personnel interface process.

User Service Requirements:
1.0
1.9
1.9.0
1.9.1
1.9.1.1
1.9.1.1.2
1.9.1.2
1.9.1.2.1
1.9.1.2.2
1.9.2
1.9.2.2
1.9.2.2.1
1.9.2.2.3

1.5.9 Manage Emissions Archive Data

Input Flows:
archive_emissions_data
archive_emissions_reference_data
archive_emissions_state_data
archive_pollution_data
archive_pollution_reference_data
archive_pollution_state_data
emissions_archive_request
emissions_archive_status
emissions_data_archive

Output Flows:
emissions_archive_data
emissions_data_archive
emissions_reference_data_archive_request
pollution_reference_data_archive_request

Description:
This process shall collect and store the pollution and emissions data being collected from sensors in the geographic area being served by the Manage Traffic function. The process shall integrate emissions data from distributed roadside sensors with that obtained directly from sensors looking at the general (wide area) environment. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the emissions/pollution data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data is received from an external source.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.7
7.1.3.1.7(a)

1.5.10 Manage Emissions State Data Store

Input Flows:
emissions_state
emissions_state_data_output_request
vehicle_emissions_state_collection

Output Flows:
archive_emissions_state_data
emissions_state
emissions_state_data_output

Description:
This process shall manage the store of emissions state data in the Manage Emissions facility of the Manage Traffic function. The data in the store shall be that which has been received by the process from other processes within the facility. The process shall manage the data in the store to enable its contents to be available to other processes within the Manage Traffic function, and to emissions operations personnel, via an interface process within the Manage Emissions facility.

User Service Requirements:
1.0
1.9
1.9.0
1.9.2
1.9.2.2
1.9.2.2.1

1.6.1.1 Detect Roadway Events

Input Flows:
approaching_train_data
device_control_state
hri_device_sense
hri_status
hri_traffic_surveillance
indicator_sign_control_data_for_hri

Output Flows:
current_hri_state
event_notice
roadway_status
train_sense_data

Description:
This process is responsible for monitoring local sensor data obtained from traffic surveillance and then determining and reporting the current state of all traffic in the HRI vicinity. The process provides triggers for other processes within Manage HRI Traffic Volume. It also monitors the device controls as they are initiated by the Activate HRI Device Controls process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.7
1.10.2
1.10.2.1
1.10.2.1.1
1.10.3
1.10.3.3
1.10.3.3.3
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(d)
1.3.1.2.1(d).1

1.6.1.2.1 Control HRI Traffic Signals

Input Flows:
hri_control_message

Output Flows:
barrier_control_request
hsr_control_request
ssr_control_request
traffic_device_control
traffic_device_control_state

Description:
This process is responsible for interpreting the hri_control message and safely directing the activation of the appropriate devices. This process will both directly command devices at the HRI and will disseminate necessary control information to the Process Indicator Output Data for Roads function to allow integrated control of adjacent traffic signals. Data will also be sent to SSR and/or HSR Device Control functions to control these specialized devices at the crossing. When sensor data indicates an approaching train this process notifies the Process Indicator Output Data for Roads function to allow the signal timing to be adjusted and dynamic message signs, if available, to be updated. This allows the traffic signals in the area adjacent to an HRI to be used to clear the Storage Area in advance of an approaching train and to manage traffic around the intersection.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.7
1.10.3
1.10.3.1
1.10.3.2
1.10.3.3
1.10.3.3.1

1.6.1.2.2 Control HRI Warnings and Barriers

Input Flows:
barrier_control_request

Output Flows:
barrier_device_control
barrier_device_control_state

Description:
This process is responsible for initiating the activation of HRI barriers at active vehicular and pedestrian grade crossings. When a request is sent to activate the HRI barriers perhaps because of a detection of an oncoming train, this process sends the device control signal to the Manage Device Controls process to activate the barriers. This process also returns state information to the Maintain Device State process concerning the commands that have been initiated by this process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.3
1.10.3.3.2

1.6.1.2.3 Provide SSR Device Controls

Input Flows:
ssr_control_request

Output Flows:
ssr_device_control
ssr_device_control_state

Description:
This process is responsible for initiating the activation of HRI Standard Speed Rail control devices at active vehicular and pedestrian grade crossings. This process responds to requests sent by the Control HRI Traffic Signals process based on detection of an oncoming train. This process sends command information to the Manage Device Control containing control signals and commands that are unique to the SSR functions. State information is also sent to the Maintain Device State process to monitor the last known state of the controls commands being processed.

User Service Requirements:
1.0
1.10
1.10.0
1.10.4
1.10.4.1

1.6.1.2.4 Provide HSR Device Controls

Input Flows:
hsr_control_request

Output Flows:
hsr_device_control
hsr_device_control_state

Description:
This process is responsible for initiating the activation of HRI devices, barriers and other special safety features for High Speed Rail at active vehicular and pedestrian grade crossings. This process responds to requests sent by the Control HRI Traffic Signals process based on detection of an oncoming train. This process sends command information to the Manage Device Control containing control signals and commands that are unique to the HSR functions, such as trapped vehicle detection. State information is also sent to the Maintain Device State process to monitor the last known state of the controls commands being processed.

User Service Requirements:
1.0
1.10
1.10.0
1.10.5
1.10.5.1
1.10.5.2
1.10.5.2.2

1.6.1.2.5 Manage Device Control

Input Flows:
barrier_device_control
hsr_device_control
ssr_device_control
traffic_device_control

Output Flows:
hri_device_control

Description:
This process is responsible for managing and selecting the appropriate device control messages. This process gathers the control signals from the other Activate HRI Device Control processes and forwards them as needed to the Process Indicator Output Data for Roads process within Provide Device Control. These control signals are used to activate all of the HRI unique roadside devices such as gates or other barriers, lights, adjacent traffic signals, message signs or short range communications equipment that supports in-vehicle signage.

User Service Requirements:
1.0
1.10
1.10.0
1.10.4
1.10.4.1

1.6.1.2.6 Maintain Device State

Input Flows:
barrier_device_control_state
hsr_device_control_state
ssr_device_control_state
traffic_device_control_state

Output Flows:
device_control_state

Description:
This process is responsible for managing and selecting the appropriate device control state messages. This process collects the device state messages that are produced by the other Activate HRI Device Controls processes and forwards the appropriate signals to the Detect Roadway Events process that monitors the status of the HRI commands being processed. This information is also used in the equipment diagnostic monitoring and testing.

User Service Requirements:
1.0
1.10
1.10.0
1.10.4
1.10.4.1

1.6.1.3 Perform Equipment Self-Test

Input Flows:
hri_device_sense
near_term_status

Output Flows:
hri_device_status

Description:
This process is responsible for performing real-time equipment checks and reporting the status of the equipment associated with an active grade crossing. Based on receipt of the sensor data of the surrounding highway and rail traffic and receipt of any near term events this process can execute a real-time check of the equipment and determine the relative health and status of the active grade crossing equipment. The output is sent onto the Monitor HRI Status process for further processing with other diagnostic data.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.3
1.10.3.3.4

1.6.1.4.1 Generate Alerts and Advisories

Input Flows:
hazard_condition

Output Flows:
hri_advisory
hri_alert

Description:
This process is responsible for generating the messages to advise and protect motorists, travelers and train crews approaching and crossing railroad grade crossings. Based on the severity of the hazard condition sent by the Detect HRI Hazards process this process will either send an hri_advisory command for non-time critical data or an hri_alert command for time critical data to the Report Alerts and Advisories. These users that will receive these messages include drivers, bicyclists, and pedestrians.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.5

1.6.1.4.2 Provide Closure Parameters

Input Flows:
hazard_condition

Output Flows:
time_to_closing

Description:
This process is responsible for providing the HRI predicted time to closure to be used in broadcast message alerts to approaching vehicles. This time is calculated from data provided by the Detect HRI Hazards process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.2
1.10.2.2.4

1.6.1.4.3 Report Alerts and Advisories

Input Flows:
hri_advisory
hri_alert

Output Flows:
approach_warning
train_message

Description:
This process is responsible for reporting real-time HRI traffic volume advisories and real-time highway traffic alerts. Depending on the input received from the Generate Alerts and Advisories process, this process sends alerts or advisories to a train to describe the operational status of the intersection and alerts about any hazards. This process also sends the commands to Report HRI Status on Approach process that will send data for broadcast using dynamic message signs or short range communications equipment in the area of an HRI to display the appropriate alert or advisory.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.3
1.10.3.3.5

1.6.1.4.4 Report HRI Status on Approach

Input Flows:
approach_warning
hazard_condition
time_to_closing

Output Flows:
hri_data_for_signage_from_roadway
hri_guidance_for_roadway_info

Description:
This process is responsible for providing real-time HRI status to vehicles as they approach an HRI. It must discriminate between vehicles near, but not approaching, the HRI (e.g. on parallel side streets, etc.). This process develops the message to be broadcast to nearby vehicles by receiving time_to_closing data and the hazard_condition signal and calculating the appropriate window of time to display the message. The message is built from the approach_warning data received from the Report Alerts and Advisories process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.5
1.10.5.2
1.10.5.2.6

1.6.1.5 Detect HRI Hazards

Input Flows:
hri_hazard

Output Flows:
hazard_condition
intersection_blocked
strategy_preemption

Description:
This process is responsible for detecting real-time HRI blockages or collisions in the vicinity of an HRI that create a blockage or other hazard at the HRI. Based upon information received from the Provide Advance Warnings process this process can send a request to the Control Traffic Volume at Active HRI that the local signal strategy be preempted. A hazard condition message can also be sent to the Generate Alerts and Advisories process for further action or the Provide Closures Parameters process to possibly adjust the time to closing.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.3
1.10.3.3.3
1.10.6

1.6.1.6.1 Close HRI on Detection

Input Flows:
current_hri_state
hri_predicted_collision
local_control_plan
rail_operations_advisories

Output Flows:
hri_blockage
hri_hazard
near_term_status
predicted_hri_state
rail_operations_message

Description:
This process is responsible for protecting highway vehicles approaching and crossing railroad grade crossings by initiating the closure up to 3 minutes before train arrival. This process receives the near term status of the crossing including any approaching trains or trapped vehicles. With this information along with the local control plan data the predicted HRI state is computed and sent to the Detect Imminent Vehicle/Train Collision process. If a HRI_predicted_collision message is returned then this process sends out an hri_hazard message to the Detect HRI Hazard which will in turn result in a change to the device control strategy. This process also receives rail operations advisories for processing along with the state and control plan data. As needed this process will output any rail_operations_message data to the Interact with Rail Operations process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.4
1.10.5
1.10.5.2
1.10.5.2.1

1.6.1.6.2 Detect Imminent Vehicle/Train Collision

Input Flows:
predicted_hri_state

Output Flows:
hri_predicted_collision

Description:
This process is responsible for detecting imminent collisions between vehicles and trains at railroad grade crossings. Using the data contained in the predicted_hri_state message this process performs the necessary calculations to determine whether a collision is imminent. If so, this process returns a hri_predicted_collision message to the "Close HRI on Detection" process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.1

1.6.1.7.1 Control Traffic Volume at Active HRI

Input Flows:
event_notice
hri_traffic_surveillance
preemption_command
strategy_preemption

Output Flows:
close_hri
hri_traffic_data
local_control_plan
traffic_management_request

Description:
This process is responsible for controlling vehicular traffic at an active HRI by controlling the operation of traffic control devices in accordance with a predetermined local control plan. The local control plan is communicated to the Close HRI on Detection process. This local control plan can be preempted by a strategy preemption message from the Detect HRI Hazards process or by such inputs as an event notice from the Detect Roadway Events process or HRI traffic surveillance data. The outputs of this process include the command messages to close the HRI, requests for information from the Manage Traffic function, and information about the current HRI traffic data.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3

1.6.1.7.2 Close HRI on Command

Input Flows:
close_hri
rail_operations_device_command

Output Flows:
hri_control_message

Description:
This process is responsible for closing the HRI to vehicular traffic, either on command from the Control Traffic Volume at Active HRI process, or from direct command from rail operations (as an override). Upon receipt of the inputs to close the HRI or from rail operations this process shall send an HRI control message to close the intersection.

User Service Requirements:
1.0
1.10
1.10.0
1.10.4
1.10.4.1
1.10.5
1.10.5.2
1.10.5.2.1

1.6.2.1 Exchange Data with Rail Operations

Input Flows:
fro-incident_notification
fro-maintenance_schedules
fro-train_schedules
hri_priority_message
rail_operations_message

Output Flows:
rail_operations_device_command
rail_operations_priority_data
rail_operations_requests
rail_operations_update
rail_schedules_for_prediction
tro-equipment_status
tro-event_schedules
tro-incident_notification

Description:
This process is responsible for exchanging routine data with rail operations. Such data being sent to the rail operators includes event schedules, requests for information from the Rail Operators, incident notification based on rail operations messages received from the "Close HRI on Detection" process and hri_priority_message data received from the Manage Alerts and Advisories process. This process receives maintenance schedules, train schedules, and incident notifications from the rail operators. This information is used to develop the rail operations update data that is passed onto the Manage Rail Traffic Control Data process and the rail operations priority data that is sent to the Manage Alerts and Advisories process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.1

1.6.2.2 Manage Alerts and Advisories

Input Flows:
hri_blockage
hri_status
rail_operations_data
rail_operations_priority_data

Output Flows:
hri_priority_message
rail_operations_advisories
rail_operations_query

Description:
This process is responsible for acquiring HRI advisory or alert data from rail operations and for providing HRI status to rail operations. The data managed by this process may be time critical, as in the case of alerts or priority messages, or not time critical, as in the case of advisories.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.2
1.10.2.2.1
1.10.5
1.10.5.2
1.10.5.2.4

1.6.2.3 Manage Rail Traffic Control Data

Input Flows:
rail_operations_query
rail_operations_update
rail_traffic_control_data
request_rail_schedules_data

Output Flows:
rail_operations_data
rail_schedules_data
rail_traffic_control_data

Description:
This process is responsible for providing and maintaining a current store of rail operations data. The data is assembled from the rail_operations_update information sent by the Exchange Data with Rail Operations process. Queries for this information are received from the Manage Alerts and Advisories process and the Interact with Traffic Volume Management processes.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.2
1.10.2.2.2

1.6.3.1 Interact with Wayside Systems

Input Flows:
ats_alert
fwe-approaching_train_announcement
fwe-train_data
fwe-wayside_equipment_status
hri_reporting_data

Output Flows:
approaching_train_announcement
approaching_train_data
ats_status
twe-hri_status
twe-stop_highway_indication
twe-stop_train_indication
wayside_status

Description:
This process is responsible for interfacing to railroad owned and maintained wayside equipment, such as Wayside Interface Units, Crossing Gate Controllers, etc. All these devices are expected to provide real-time information to the HRI about approaching trains and their own health. In addition, advanced implementations will make use of a communications path back to approaching trains provided by the railroad's equipment.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.1
1.10.1.2
1.10.1.3
1.10.1.6
1.10.1.7
1.10.2
1.10.2.2

1.6.3.2 Advise and Protect Train Crews

Input Flows:
approaching_train_announcement
ats_warning_notification
hri_status
train_message

Output Flows:
ats_advisory
hri_reporting_data

Description:
This process is responsible for generating advisories/ alerts that are routed to the wayside equipment for transmission to the train crews. If the intersection is blocked, or there is an incident at the intersection this information will be passed to the Interact with Wayside Systems process for routing to the wayside equipment. The wayside equipment can then route the information directly to the train crews, or to rail operations.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.6

1.6.3.3 Provide ATS Alerts

Input Flows:
ats_advisory
ats_status

Output Flows:
ats_alert
ats_warning_notification
hri_rail_alert

Description:
This process is responsible for automatically protecting commuter, intercity, transit and freight trains as they approach and cross grade crossings. It also reports HRI rail traffic advisories to traffic management and rail operations. It is responsible for verifying and reporting overall HRI status to approaching trains so that crews can act within safe service braking distances. It provides for notification of Automatic Train Stop systems (ATS, PTS, etc) with sufficient advance warning to allow emergency brake application time to stop a train before it encounters an HRI hazard. Finally, it provides automatic status indications about the HRI to the crews of approaching trains.

User Service Requirements:
1.0
1.10
1.10.0
1.10.1
1.10.1.2
1.10.1.3
1.10.3
1.10.3.3
1.10.3.3.5
1.10.5
1.10.5.2
1.10.5.2.3
1.10.5.2.5

1.6.4.1 Manage HRI Closures

Input Flows:
hri_strategy_override
hri_traffic_data
train_ops_plan

Output Flows:
closure_event_data
hri_incident_data

Description:
This process is responsible for coordination and managing of HRI closures at the Traffic management Center. It interfaces with Manage Incidents process to provide incident information and to receive strategy overrides as required by the larger incident management function.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.1
1.10.2.1.3

1.6.4.2 Exchange Data with Traffic Management

Input Flows:
closure_event_data
hri_status
intersection_blocked
rail_schedules_data
traffic_management_request
traffic_surveillance_data

Output Flows:
hri_sensor_data
hri_status_for_traffic_demand
hri_traffic_surveillance
request_rail_schedules_data
tms_requests
train_ops_plan

Description:
This process is responsible for interacting with traffic management processes. It collects data from processes that are within the HRI elements located at the roadside and forwards the data as needed to other processes within traffic management. It also acts as the interface between rail operations and traffic management processes through its interface with the Interact with Rail Operations process.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.1
1.10.2.1.2
1.10.2.2
1.10.2.2.4

1.6.5.1 Provide Interactive Interface

Input Flows:
hri_closure_data_response
hri_state
rail_operations_requests
tms_requests

Output Flows:
hri_equip_status_for_m_and_c
hri_status
request_hri_closure_data

Description:
This process is responsible for initiating reports of the health status of the HRI to both Traffic Management and Rail Operations. In addition the process initiates reporting of the health status of the HRI to the wayside interface equipment (and ultimately to the train when the advanced HRI functionality is in place). The process shall return operational status (state of the sensor device, configuration, and fault data) of the HRI equipment to the Manage Traffic and Manage Maintenance and Construction functions to arrange for repair if deemed necessary.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.2
1.10.2.2.1
1.10.2.2.2
1.10.2.2.3

1.6.5.2 Determine HRI Status

Input Flows:
hri_device_status
hri_rail_alert
roadway_status
wayside_status

Output Flows:
hri_state
preemption_command

Description:
This process is responsible for monitoring critical HRI functions and merging them into a single coherent picture of the state of the HRI. It also is responsible for assuring that the HRI always reverts to the safest possible operating condition in the event of any operational malfunctions.

User Service Requirements:
1.0
1.10
1.10.0
1.10.3
1.10.3.1

1.6.5.3 Maintain HRI Closure Data

Input Flows:
hri_closure_data
hri_state
request_hri_closure_data

Output Flows:
hri_closure_data
hri_closure_data_response

Description:
This process is responsible for managing a log of the HRI operation for use in strategy planning, demand management and traffic management.

User Service Requirements:
1.0
1.10
1.10.0
1.10.2
1.10.2.1
1.10.2.1.3

2.1.1.1 Manage Commercial Fleet Electronic Credentials and Tax Filing

Input Flows:
cf_enrollment_information
cf_enrollment_payment_confirmation
cf_manager_activity_report_request
cf_manager_enrollment_payment_request
cf_manager_enrollment_request
cf_manager_storage_request
cf_periodic_activity_report
cf_retained_data
cf_roadside_activity_report
cf_tag_data
commercial_vehicle_permit_information
cvo_accident_data_for_fleet
cvo_citation
cvo_credential_status
cvo_credentials_status_for_fms
cvo_driver_record_info
cvo_safety_status

Output Flows:
cf_enrollment_request
cf_manager_activity_report
cf_manager_enrollment_information
cf_manager_enrollment_payment_confirmation
cf_retained_data
cf_tag_initialization_data
cf_tax_data
cvo_audit_data
vehicle_permit_request

Description:
This process shall be responsible for providing the commercial vehicle fleet manager with the ability to manage the activities of commercial vehicles. The process shall enable the manager to enroll commercial vehicles for electronic clearance at roadside check station facilities, to process and pay for electronic credential and tax filing, and to send tag data to the Provide Commercial Vehicle On-board Data facility. Periodically it shall also send reports about taxes that have been paid to the Administer Commercial Vehicles facility. This process tracks commercial carrier credential and safety status and related citation and accident information. The process shall enable the manager to obtain commercial vehicle activity reports from the logs provided by roadside check station facilities. These reports shall be obtained at periodic intervals.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.1
4.4
4.4.0
4.4.1
4.4.1(a)
4.4.1(b)
4.4.1(c)
4.4.1(d)
4.4.1(e)
4.4.1(f)
4.4.1(g)
4.6
4.6.1

2.1.1.2 Manage Commercial Vehicle Routes

Input Flows:
cf_manager_route_request
cf_route
cf_route_details
cf_static_route_data
cvo_advanced_toll_confirmation
cvo_advanced_toll_payment_information
cvo_request_freight_route
cvo_route_data_request
cvo_toll_price
incident_data_for_cvo
toll_price_for_cvo
traffic_data_for_cvo

Output Flows:
cf_driver_route
cf_manager_freight_route_information
cf_manager_route_data
cf_route_details
cf_route_request
cf_static_route_request
cv_assignment_data
cvo_advanced_payments_request
cvo_advanced_toll_request
cvo_route_data_for_tracking
cvo_route_for_freight
cvo_toll_price_request
cvo_vehicle_route
hazmat_vehicle_route

Description:
This process shall be responsible for providing the ability to obtain and manage commercial vehicle routes. Routes shall be generated by the static route selection process or by the Provide Driver and Traveler Services function for a dynamic route (i.e. one that takes into account current and future traffic conditions). This process shall receive traffic information to aid in the route planning. This process shall assign a commercial vehicle to a route and provide this information to the monitor assignment identities process. This process shall support the payment of tolls, including advanced toll payments for commercial vehicles. HAZMAT vehicle routes shall be provided to the HAZMAT incident support process. This process shall respond to request for commercial vehicle route data in support of the route monitoring process.

User Service Requirements:
4.0
4.5
4.5.0
4.5.4
4.5.4.1
4.5.4.1.2
4.6
4.6.0
4.6.1
4.6.1.1
4.6.3
4.6.3.1
4.6.3.2

2.1.1.3 Provide Commercial Fleet Static Route

Input Flows:
cf_static_route_request
map_data_for_fleet_managers

Output Flows:
cf_static_route_data

Description:
This process shall be responsible for providing a static commercial vehicle route using data provided by the fleet manager. A static route is one which is based on geographic data and therefore takes no account of current or predicted traffic conditions, incidents, etc. The process shall provide the route using its own route generation algorithms and data from its own store of digitized map information.

User Service Requirements:
4.0
4.5
4.5.0
4.5.4
4.5.4.1
4.5.4.1.4
4.6
4.6.0
4.6.3
4.6.3.1

2.1.1.4 Provide HAZMAT Incident Support

Input Flows:
cf_hazmat_request
cvo_request_hazmat_info
hazmat_vehicle_route

Output Flows:
cf_hazmat_route_information
cf_hazmat_vehicle_information
hazmat_vehicle_information

Description:
On receipt of a cvo_request_hazmat_info, from the process managing CVO incidents, the process shall respond with information about the hazmat vehicle involved in the incident. This information includes the vehicle equipment and cargo manifest. On receipt of a similar request cf_hazmat_request from an emergency management function, the process shall respond similarly with cf_hazmat_vehicle_information about the vehicle equipment and its hazmat cargo, and cf_hazmat_route_information about the vehicles expected route.

User Service Requirements:
4.0
4.5
4.5.0
4.5.1
4.5.1.2
4.5.1.2(c)
4.5.2
4.5.2.3

2.1.1.5 Manage Commercial Vehicle Fleet Map Data

Input Flows:
cv_route_restrictions
fleet_map_data
fmup-fleet_map_update

Output Flows:
fleet_map_data
geofence_data_for_tracking
map_data_for_fleet_managers
tmup-fleet_map_update_request

Description:
This process shall manage the digitized map data used for routing maps and monitoring of commercial vehicle and freight equipment locations. The process shall obtain the new data from a specialist data supplier or other appropriate data source. The process shall be able to request a map update from a specialist data supplier or some other appropriate data source. The process shall obtain route restrictions that are unique to commercial vehicles (i.e. HAZMAT vehicle restrictions). This process shall manage the store of fleet map data.

User Service Requirements:
4.0
4.5
4.5.0
4.5.4
4.5.4.1
4.5.4.1.4
4.6
4.6.0
4.6.3
4.6.3.1

2.1.1.6 Monitor Commercial Vehicle Route

Input Flows:
cf_manager_vehicle_monitoring_parameters
cvo_route_data_for_tracking
cvo_tracking_data
geofence_data_for_tracking

Output Flows:
cf_manager_route_status
cvo_route_data_request
cvo_route_warning

Description:
This process shall monitor a commercial vehicles location and compare it against the known route. Known routes shall be received from the Manage Commercial Vehicles Routes process. This function shall receive route monitoring parameters that define the allowable deviation limits, which includes time and distance. (i.e. less then one-mile from known route, greater then one hour behind schedule). This process shall generate a warning if a commercial vehicle exceeds the allowable deviation limits. This process shall provide a commercial vehicle fleet manager periodic route status.

User Service Requirements:
4.0
4.5
4.5.0
4.5.4
4.5.4.1
4.5.4.1.1
4.5.4.1.3
4.5.4.1.5
4.6
4.6.0
4.6.1
4.6.1.3
4.6.1.3(a)
4.6.1.3(c)
4.6.3
4.6.3.3

2.1.1.7 Monitor Assignment Identities

Input Flows:
assignment_data
cv_assignment_data
cv_identities
cvo_driver_assignment_data
fdic-driver_info
freight_assignment_data

Output Flows:
assignment_data
assignment_mismatch_warning
cv_assignment_info

Description:
This process shall monitor the identity of a driver and compare it with the planned driver for a commercial vehicle. If the vehicle is to move freight, the process shall monitor and compare the freight equipment identity with the planned vehicle assignment. This process shall generate a warning if the tracked identities do not match the planned assignments. This process shall receive and store the planned assignments for a specific route from the Manage Commercial Vehicle Routes, Manage Driver Instruction Store and Manage Freight Equipment Fleet processes.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.2
4.3.3.2.6
4.3.3.2.7
4.5
4.5.0
4.5.4
4.5.4.3
4.5.4.3.6
4.5.4.3.7

2.1.2 Provide Commercial Vehicle Fleet Manager Interface

Input Flows:

cf_admin_data
cf_driver_route_instructions_output
cf_incident_alert
cf_manager_activity_report
cf_manager_enrollment_information
cf_manager_enrollment_payment_confirmation
cf_manager_freight_route_information
cf_manager_route_data
cf_manager_route_status
cf_vehicle_data
cv_maintenance_schedule
fffm-enrollment_payment_request
fffm-enrollment_request
fffm-incident_response
fffm-other_data_input
fffm-preclearance_data
fffm-request_driver_route_instructions
fffm-request_on_board_vehicle_data
fffm-roadside_activity_report_request
fffm-route_data
fffm-route_function_request
fffm-update_driver_route_instructions

Output Flows:

cf_driver_instructions_request
cf_driver_load_data
cf_incident_response
cf_manager_activity_report_request
cf_manager_enrollment_payment_request
cf_manager_enrollment_request
cf_manager_instructions
cf_manager_route_request
cf_manager_storage_request
cf_manager_vehicle_monitoring_parameters
cv_maintenance_request
tffm-data_input_request
tffm-driver_route_instructions
tffm-enrollment_confirmation
tffm-enrollment_payment_confirmation
tffm-incident_alert
tffm-other_data_request
tffm-preclearance_results
tffm-roadside_activity_report
tffm-route_data

Description:

This process shall be responsible for providing an interface for the commercial vehicle fleet manager. The process shall enable this interface to provide the manager with facilities for the input of data used to set up commercial vehicle routes, to pay the necessary taxes and duties so that a commercial vehicle can be enrolled for a particular route, to exchange general information messages with a driver in a vehicle, and to set up instructions for a driver to take a vehicle on a particular route. It shall be possible for the driver's route instructions input by the manager to include details of the cargo to be picked up and/or dropped off at each point along the route. The enrollment activity supported by the process shall enable a commercial vehicle to pass through the roadside check stations along its route without stopping, unless safety checks are required. The process shall execute the manager's response to a commercial vehicle security incident to the Manage Commercial Vehicle Incidents process. The process shall support inputs from the commercial vehicle fleet manager in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:

4.0
4.3
4.3.0
4.3.2
4.3.2.4
4.3.2.4.3
4.3.2.5
4.3.2.5.1
4.3.2.5.2
4.3.2.5.2(a)
4.3.2.5.2(b)
4.3.2.5.2(c)
4.3.2.5.2(d)
4.3.2.5.2(e)
4.3.2.5.2(f)
4.5
4.5.0
4.5.4
4.5.4.1
4.5.4.1.1
4.6
4.6.0
4.6.1
4.6.1.1
4.6.1.2
4.6.1.2(b)
4.6.3
4.6.3.4
4.6.3.5

2.1.3 Provide Fleet Manager Commercial Vehicle Communications

Input Flows:
cf_enforcement_trigger_areas
cf_enforcement_trigger_notification
cf_manager_instructions
cf_on_board_driver_log
cf_on_board_vehicle_data
cf_retrieved_vehicle_data
cvo_on_board_safety_data
cvo_trip_log_data

Output Flows:
cf_admin_data
cf_driver_log_update
cf_driver_logs_for_admin
cf_inspection_data
cf_manager_route_monitoring_parameters
cf_retrieved_vehicle_data
cf_safety_data
cf_trigger_area
cf_trigger_area_notification
cf_vehicle_data
cv_maintenance_data
cvo_general_message
cvo_on_board_vehicle_data_request
cvo_tracking_data
cvo_trip_log_data_request

Description:
This process shall be responsible for providing the communications interface and data storage facility for data that is exchanged between the commercial vehicle fleet manager and commercial vehicle drivers in their vehicles. The process shall support the receipt of data from the vehicle consisting of that processed from input received by sensors on board the vehicle and text data used to exchange general information with the driver. Only the output to the vehicle of the data that contains the general text message shall be supported by the process. The process shall enable access to the store of received data by the manager through the manager's interface process.

User Service Requirements:
4.0
4.3
4.3.0
4.3.2
4.3.2.5
4.3.2.5.1
4.3.2.5.2
4.3.2.5.2(a)
4.3.2.5.2(b)
4.3.2.5.2(c)
4.3.2.5.2(d)
4.3.2.5.2(e)
4.3.2.5.2(f)
4.6
4.6.0
4.6.1
4.6.1.1
4.6.1.2
4.6.1.2(a)
4.6.1.2(b)
4.6.1.3
4.6.1.3(a)
4.6.1.3(b)
4.6.1.3(d)
4.6.1.3(e)

2.1.4 Provide Commercial Vehicle Driver Routing Interface

Input Flows:
cf_driver_route_instructions
fcvd-request_routing_instructions

Output Flows:
cf_driver_route_instructions_request
tcvd-routing_instructions

Description:
This process shall be responsible for providing the communications interface through which a commercial vehicle driver can obtain details of the vehicle route that has been provided by the commercial vehicle fleet manager. The process shall enable the output of the route instructions in audio and/or visual form. It shall be possible for the visual form to be either hardcopy output, or in the form of a display. The process shall retain the data for a particular route internally, so that successive requests for details of the same route do not require use of the communications network.

User Service Requirements:
4.0
4.6
4.6.0
4.6.1
4.6.1.1
4.6.1.2
4.6.1.2(a)
4.6.1.2(b)
4.6.1.2(c)

2.1.5 Manage Driver Instruction Store

Input Flows:
cf_driver_instructions
cf_driver_instructions_request
cf_driver_load_data
cf_driver_route
cf_driver_route_instructions_request

Output Flows:
cf_driver_instructions
cf_driver_route_instructions
cf_driver_route_instructions_output
cv_driver_assignment
cvo_driver_assignment_data

Description:
This process shall be responsible for managing the store of driver route instructions to be used by the commercial vehicle driver. The data shall be loaded by other processes in the Manage Commercial Vehicle Fleet Operations facility of the Manage Commercial Vehicles function. The data shall be comprised of vehicle route data and vehicle load information, including the points along the route at which identified cargo is to be picked up and/or dropped off. The process shall support the retrieval of this data by the commercial vehicle driver through the driver's interface process.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.1
4.6
4.6.0
4.6.1
4.6.1.1
4.6.1.2
4.6.1.2(a)

2.1.6 Manage Commercial Vehicle Incidents

Input Flows:
assignment_mismatch_warning
cf_incident_response
cv_driver_response
cv_route_warning
cvo_route_warning
cvo_security_alarm
disable_commercial_vehicle
faas-alerts_and_advisories_for_cvo
hazmat_vehicle_information

Output Flows:
cf_incident_alert
cv_disable
cvo_alarm
cvo_request_hazmat_info
taas-threat_info_from_cvo

Description:
This process shall be responsible for receiving commercial vehicle security warnings and determining a response plan, which may include notifying Emergency Services or disabling of a commercial vehicle. The process shall receive commercial vehicle security warnings, which includes route deviations, driver/commercial vehicle/freight equipment assignment mismatches and breach or tamper warnings. The process shall evaluate the warning utilizing current alerts and advisories. The evaluation results shall be sent to the Provide Commercial Vehicle Fleet Manager Interface process. This process shall receive and execute the commercial vehicle fleet manager's response to a warning. This process shall be capable of sending commercial vehicle warnings to Manage Emergency Services function. The process shall be capable of sending a disable command to a commercial vehicle in response to a request from Manage Emergency Services function or from the Provide Commercial Vehicle Fleet Manager Interface process. All threat information shall be sent to Alerting and Advisory Systems for further analysis.

User Service Requirements:
4.0
4.3
4.3.0
4.3.2
4.3.2.4
4.3.2.4.3
4.3.3
4.3.3.2
4.3.3.2.7
4.5
4.5.0
4.5.4
4.5.4.1
4.5.4.1.6
4.5.4.1.7
4.5.4.3
4.5.4.3.6
4.5.4.3.7
4.6
4.6.0
4.6.3
4.6.3.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3

2.1.7 Schedule Commercial Vehicle Servicing

Input Flows:
cv_fleet_maintenance_data
cv_maintenance_data
cv_maintenance_request

Output Flows:
cv_fleet_maintenance_data
cv_maintenance_schedule
cvo_repair_information

Description:
This process shall collect the vehicle condition diagnostics information from commercial vehicles and support the scheduling of preventive and corrective vehicle maintenance. This process shall receive data from on-board sensors including diagnostic data about system status (e.g. status of brake system, oil pressure, etc.), engine temperature, mileage, tire wear, brake wear, belt wear, etc. The data is stored to support planning activities across the fleet for future maintenance activities. When requested by the manager interface this process shall provide data from its store along with recommendations on maintenance actions for the fleet of vehicles. Status of vehicles currently being serviced shall be provided to support planning activities.

User Service Requirements:
4.0
4.3
4.3.0
4.3.2
4.3.2.5
4.3.2.5.1
4.3.2.5.2
4.3.2.5.2(a)
4.3.2.5.2(b)
4.3.2.5.2(c)
4.3.2.5.2(d)
4.3.2.5.2(e)
4.3.2.5.2(f)

2.2.1 Manage CV Electronic Credential and Tax Filing Interface

Input Flows:
cv_driver_enrollment_payment_request
cv_driver_enrollment_request
cv_driver_route_request
cv_driver_storage_request
cv_enrollment_information
cv_enrollment_payment_confirmation
cv_route
cv_route_details
cv_static_route_data

Output Flows:
cv_driver_enrollment_information
cv_driver_enrollment_payment_confirmation
cv_driver_route_data
cv_enrollment_request
cv_route_details
cv_route_request
cv_static_route_request

Description:
This process shall be responsible for providing the commercial vehicle driver with the ability to manage the activities of a commercial vehicle. In this instance the driver is assumed to be acting in the role of a commercial vehicle fleet manager, and is therefore probably the owner/driver of the vehicle. The process shall provide the capability for the driver to obtain commercial vehicle routes, to enroll commercial vehicles for electronic clearance at roadside check station facilities, and to process and pay for electronic credential and tax filing.

User Service Requirements:
4.0
4.4
4.4.0
4.4.1
4.6
4.6.0
4.6.1
4.6.1.1

2.2.2 Provide Vehicle Static Route

Input Flows:
cv_static_route_request
map_data_for_cv_drivers

Output Flows:
cv_static_route_data
map_data_for_cv_drivers

Description:
This process shall be responsible for providing a static commercial vehicle route using data provided by the commercial vehicle driver. A static route is one which is based on geographic data and therefore takes no account of current or predicted traffic conditions, incidents, etc. The process shall provide the route using its own route generation algorithms and data from its own store of digitized map information. In this instance the driver is assumed to be acting in the role of a commercial vehicle fleet manager, and is therefore likely to be the owner/driver of the vehicle.

User Service Requirements:
4.0
4.4
4.4.0
4.4.1

2.2.3 Provide CV Driver Electronic Credential and Tax Filing Interface

Input Flows:
cv_driver_credit_identity
cv_driver_enrollment_information
cv_driver_enrollment_payment_confirmation
cv_driver_route_data
cv_vehicle_data
fcvd-activity_request
fcvd-enrollment_payment_request
fcvd-enrollment_request
fcvd-other_data_input
fcvd-route_data
fcvd-route_request

Output Flows:
cv_driver_enrollment_cost
cv_driver_enrollment_payment_request
cv_driver_enrollment_request
cv_driver_route_request
cv_driver_storage_request
cv_request_vehicle_data
tcvd-data_request
tcvd-enrollment_confirmation
tcvd-enrollment_payment_confirmation
tcvd-other_data_request
tcvd-route_data

Description:
This process shall be responsible for providing an interface for the commercial vehicle fleet manager. In this instance the driver is assumed to be acting in the role of a commercial vehicle fleet manager, and is therefore likely to be the owner/driver of the vehicle. The process shall enable this interface to provide the driver with facilities for the input of data used to set up commercial vehicle routes, to pay all the necessary taxes and duties so that a commercial vehicle can be enrolled for a particular route, and to obtain a copy of the data collected by processes on-board the vehicle. The enrollment activity supported by the process shall enable a commercial vehicle to pass through the roadside checkstations along its route without stopping, unless safety checks are required. The process shall support inputs from the commercial vehicle driver in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.3
4.3.0
4.3.2
4.3.2.1
4.4.
4.4.0
4.4.1
4.4.2
4.4.3
4.4.3.1
4.4.3.2
4.4.3.2(a)
4.4.3.2(b)
4.4.3.2(c)
4.4.3.2(d)
4.4.3.2(e)
4.6
4.6.0
4.6.1
4.6.1.1

2.2.4 Provide Commercial Vehicle Driver Communications

Input Flows:
cv_on_board_vehicle_data
cv_received_vehicle_data
cv_request_vehicle_data

Output Flows:
cv_received_vehicle_data
cv_request_on_board_vehicle_data
cv_vehicle_data

Description:
This process shall be responsible for providing communications between the commercial vehicle driver and the commercial vehicle. In this instance the driver is acting in the role of vehicle fleet manager, and is therefore likely to be the owner/driver of the vehicle. The process shall support the receipt of data from the vehicle consisting of that processed from input received by sensors on board the vehicle The process shall enable access to the store of received data by the driver through the driver's interface process.

User Service Requirements:
4.0
4.6
4.6.0
4.6.1
4.6.1.1
4.6.1.2
4.6.1.2(a)
4.6.1.2(b)
4.6.1.2(c)

2.3.1 Produce Commercial Vehicle Driver Message at Roadside

Input Flows:
cv_border_pull_in_output
cv_general_pull_in_output
cv_safety_pull_in_output
cv_screening_pull_in_output

Output Flows:
cv_on_board_pull_in_output
tcvd-border_pull_in_output
tcvd-clearance_pull_in_output
tcvd-general_pull_in_output
tcvd-safety_pull_in_output

Description:
This process shall be responsible for the output of pull-in or pass messages to commercial vehicle drivers as they approach the commercial vehicle roadside checkstation or border crossing facilities. The process shall support the use of roadside equipment such as dynamic message signs (DMS), or simple red-green lights, flashing orange lights, etc. to provide the output. These output messages shall be received by the process from other processes responsible for roadside facilities within the Manage Commercial Vehicles function. The process shall support pull-in messages that are the result of checks on a commercial vehicle's electronic credentials, safety and border crossing data, the result of the vehicle's tag not being properly read, or the result of a general pull-in decision for all vehicles being issued by inspectors at the roadside facility. The process shall also generate a message to be sent to the vehicle so that an indication can be output directly to the driver at the same time as it appears on the roadside equipment.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.4
4.1.2
4.1.2.2
4.3
4.3.0
4.3.1
4.3.1.2
4.3.1.7

2.3.2.1 Administer Commercial Vehicle Roadside Credentials Database

Input Flows:
cv_credentials_data_request
cv_credentials_database_update
cv_credentials_information_response
cv_roadside_credentials_database
faas-alerts_and_advisories_for_screening
fea-violator_information

Output Flows:
cv_credentials_data_output
cv_roadside_credentials_database

Description:
This process shall be responsible for receiving the electronic credentials sent to the roadside checkstation facility as part of a commercial vehicle's enrollment process. The process shall store the data for use by another process and shall also enable the inspector in the roadside facility to obtain a copy of the data in the store. This process shall also receive violator information from enforcement agencies and store the data for use by another process.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.8

2.3.2.2 Process Screening Transactions

Input Flows:
cv_roadside_credentials_database
cv_screening_data
cv_screening_override

Output Flows:
cv_hazmat_alarm
cv_on_board_screening_record
cv_screening_decision
cv_screening_pull_in_output
cv_screening_record

Description:
This process shall be responsible for checking commercial vehicle credentials against those held in a store maintained by another process in the roadside check station facility. The process shall send the result of each check to the roadside inspector interface process so that an override input can be generated if required. The process shall send a request for the commercial vehicle to pull-in if the vehicle's credentials do not match those in the store or if the credentials don't permit a measured vehicle characteristic (weight or dimension) or a roadside detected hazmat characteristic. The process shall also send a record of each decision to the process that maintains the commercial vehicle roadside check station facility log. It shall in addition notify emergency management (e.g. police) if the credentials don't permit a roadside detected security sensitive hazmat characteristic.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.4
4.1.1.5
4.1.1.7
4.1.1.8
4.5
4.5.0
4.5.4
4.5.4.2
4.5.4.2.3
4.5.4.2.4
4.5.4.2.5

2.3.3.1 Provide Commercial Vehicle Checkstation Communications

Input Flows:
cv_disable_info
cv_get_on_board_data
cv_inspection_data
cv_on_board_data
cv_roadside_inspection_configuration
cv_roadside_inspection_control
cvo_driver_log
fdic-driver_information
freight_info_for_inspection
stored_driver_identity_characteristics

Output Flows:
cv_inspection_data_output
cv_roadside_collected_data
cv_roadside_driver_logs_for_admin
cv_roadside_safety_data_for_admin
cv_trigger_area_notification

Description:
This process shall be responsible for providing an interface through which a commercial vehicles roadside checkstation facility can communicate with a passing commercial vehicle. To process on-board data or driver log information, the process collect the data from an identified commercial vehicle or all vehicles in the vicinity as they enter a trigger area for wireless roadside inspection (WRI). The data received by the process from the vehicle shall be stored in the store of collected data for use by the roadside inspection process. This process shall receive configuration data to manage the inspection process. This process shall react to control commands provided by the commercial vehicle administrative functions when to start and end inspection activies.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.1.1.4
4.1.1.7
4.2
4.2.0
4.2.1
4.2.1.1
4.2.1.7
4.2.1.7(a)
4.2.1.7(b)
4.2.1.7(c)
4.2.1.7(d)
4.3
4.3.0
4.3.1
4.3.1.1
4.3.1.3
4.3.1.4
4.3.1.6
4.3.1.7

2.3.3.2 Provide Commercial Vehicle Inspector Handheld Terminal Interface

Input Flows:
cv_inspection_results
fci-inspection_data_input
fci-start_inspection

Output Flows:
cv_inspector_safety_data_input
cv_start_inspection
tci-inspection_report

Description:
This process shall be responsible for providing an interface for a hand held terminal which can be used by a commercial vehicle inspector. The process shall enable the inspector to start a commercial vehicle roadside inspection, to review the results, and to add comments to the results data. The process shall support inputs from the inspectors in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the form of the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.2
4.2.0
4.2.1
4.2.1.3

2.3.3.3 Administer Commercial Vehicle Roadside Safety Database

Input Flows:
cv_carrier_participation_report_to_roadside
cv_roadside_safety_database
cv_roadside_safety_database_update
cv_safety_data_request
cv_safety_database_update
cv_safety_information_response
cvo_accident_report
cvo_citation_info
cvo_credentials_info
cvo_credentials_status
cvo_driver_record_to_roadside
faas-alerts_and_advisories_for_inspection

Output Flows:
cv_roadside_safety_database
cv_safety_data_response

Description:
This process shall be responsible for maintaining in the commercial vehicle roadside checkstation facility a database of credentials for commercial vehicles with safety problems. This process shall store the data about these vehicles received from the commercial vehicle administration facility. It shall enable this data to be used by another process and shall also enable the inspector in the roadside facility to obtain a copy of the data in the store.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.2
4.2.0
4.2.1
4.2.1.4
4.2.1.6

2.3.3.4 Carry-out Commercial Vehicle Roadside Safety Screening

Input Flows:
cv_roadside_safety_database
cv_safety_data
cv_safety_override

Output Flows:
cv_archived_safety_data
cv_safety_decision
cv_safety_pull_in_output

Description:
This process shall be responsible for checking commercial vehicle credentials against the list of those known to have safety problems held in a store maintained by another process in the roadside checkstation facility. The process shall send the result of each check to the roadside inspector interface process so that an override input can be generated if required. The process shall send a request for the commercial vehicle to pull-in if the vehicle's credentials are in the list of those with safety problems, and shall also send a record of each decision to the process that maintains the commercial vehicle roadside checkstation facility log.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.1.1.3
4.1.1.4
4.1.1.6
4.1.1.8
4.2
4.2.0
4.2.1
4.2.1.6
4.3
4.3.0
4.3.1
4.3.1.1
4.3.1.1(a)
4.3.1.1(b)
4.3.1.3
4.3.1.4
4.4
4.4.2

2.3.3.5 Carry-out Commercial Vehicle Roadside Inspection

Input Flows:
cv_inspector_safety_data_input
cv_roadside_collected_data
cv_start_inspection

Output Flows:
cv_archived_inspection_data
cv_get_on_board_data
cv_inspection_data
cv_inspection_results
cv_roadside_safety_database_update
cvo_citation_data
cvo_violation
tcvd-inspection_results
tea-cvo_violation

Description:
This process shall be responsible for carrying out roadside safety inspections at the request of the roadside facility inspector. The result of the inspection, which includes violation and citation data, shall be sent by the process to the inspector, the commercial vehicle driver, the roadside checkstation facility log, and the commercial vehicle itself. The process shall enable the inspector to add comments to the result of the inspection before it is sent to the above outputs. These comments shall be received by the process in the form of data input from the inspector's hand held terminal interface.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.2
4.2.0
4.2.1
4.2.1.1
4.2.1.2
4.2.1.3
4.2.1.6
4.2.1.7
4.2.1.7(a)

2.3.4 Detect and Classify Commercial Vehicles and Freight Equipment

Input Flows:

bypass_violation
cv_electronic_clearance_data
cv_electronic_screening_data
cv_general_override
cv_manual_pull-in
cv_security_alarm
cvo_border_clearance_data
cvo_onboard_safety_data
cvo_safety_inspection
cvo_tag_data
fbcv-vehicle_characteristics
fbcv-vehicle_identification
ffe-freight_breach
ffe-freight_equipment_info
ffe-sensed_hazmat
freight_breach_for_rs
freight_equipment_info

Output Flows:

cv_border_data
cv_general_decision
cv_general_pull_in_output
cv_request_electronic_clearance_data
cv_request_electronic_screening_data
cv_safety_data
cv_screening_data
cvo_border_clearance_request
cvo_request_tag_data
cvo_safety_inspection_request

Description:

This process shall be responsible for detecting the presence of commercial vehicles and freight equipment with sensors that can differentiate between the different types of vehicle. The process shall use the sensors to determine the number of axles, gross vehicle weight, weight per axle and presence of security sensitive hazardous material for use by inspectors at the roadside check station facilities. When a commercial vehicle is detected, the process shall transmit a request for its on-board tag data, which when received shall be passed to other processes within the roadside facility. If no tag data is received, or the data cannot be interpreted correctly, the process shall send a request for the vehicle to pull-in to be output by another process in the roadside check station facility. When a freight breach or commercial vehicle security alarm is received, the process shall send a request for the vehicle carrying the freight to pull-in to be output by another process in the commercial vehicle roadside facility. The detained vehicle can be interrogated for additional information regarding the specific nature of the freight breach or security alarm. If a vehicle fails to pull-in and attempts to bypass the check facility, this process shall generate a notification to be sent to the CVO Inspector that a vehicle has violated a pull-in message.

User Service Requirements:

4.0
4.1
4.1.0
4.1.1
4.1.1.7
4.1.2
4.1.2.2
4.1.2.3
4.2
4.2.0
4.2.2
4.2.2.2
4.2.2.5
4.3
4.3.0
4.3.1
4.3.1.7
4.3.3
4.3.3.1
4.3.3.1.3
4.5
4.5.0
4.5.4
4.5.4.2
4.5.4.2.1
4.5.4.2.2

2.3.5 Provide Commercial Vehicle Roadside Operator Interface

Input Flows:

cv_border_decision
cv_credentials_data_output
cv_general_decision
cv_roadside_operator_output
cv_safety_data_response
cv_safety_decision
cv_screening_decision
fci-credentials_data_request
fci-pull-in_action
fci-request_log_report
fci-safety_data_request

Output Flows:

bypass_violation
cv_border_override
cv_credentials_data_request
cv_general_override
cv_manual_pull-in
cv_roadside_operator_data_request
cv_safety_data_request
cv_safety_override
cv_screening_override
tci-credentials_data_output
tci-output_log_report
tci-pull-in_information
tci-safety_data_output

Description:

This process shall be responsible for providing the commercial vehicle inspector interface at the roadside checkstation facility. The process shall provide an interface which enables the inspector to monitor and if necessary override the pull-in decisions made by those of the border crossing, credentials and safety data checking processes that are present in the facility. The process shall also make it possible for the inspector to issue a manual general pull-in request for all commercial vehicles to pull into the roadside checkstation facility, to have access the contents of the facility's log, and to obtain credentials or safety data on a selected combination of carrier, driver, and vehicle. The process shall support inputs from the traffic operations personnel in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:

4.0
4.1
4.1.0
4.1.1
4.1.1.4
4.1.1.4(a)
4.1.1.4(b)
4.1.1.4(c)
4.1.1.5
4.2
4.2.0
4.2.1
4.2.1.1
4.2.1.2
4.2.1.3
4.2.1.3(a)
4.2.1.3(b)
4.2.1.3(c)
4.2.1.4
4.2.1.6
4.3
4.3.0
4.3.1
4.3.1.5

2.3.6 Provide Commercial Vehicle Reports

Input Flows:
cv_archived_inspection_data
cv_archived_safety_data
cv_border_record
cv_roadside_facility_log
cv_roadside_operator_data_request
cv_screening_record

Output Flows:
cv_roadside_daily_log
cv_roadside_data_collected
cv_roadside_facility_log
cv_roadside_operator_output
cvo_accident_data
cvo_border_clearance
cvo_safety_inspection_data

Description:
This process shall be responsible for collecting data from those of the border crossing, credential and safety checking processes that are present in a commercial vehicle roadside checkstation facility. The data shall be stored by the process in a roadside facility log, to which the roadside inspector interface process shall have access. Once a day the process shall make a copy of the roadside facility log and send it to the commercial vehicle administration facility for further processing.

User Service Requirements:
4.0
4.2
4.2.0
4.2.1
4.2.1.4
4.3
4.3.0
4.3.1
4.3.1.3
4.4
4.4.0
4.4.2
4.4.2(b)

2.3.7 Produce Commercial Vehicle Driver Message on Vehicle

Input Flows:
cv_on_board_pull_in_output

Output Flows:
tcvd-on_board_pull_in_output

Description:
This process shall be responsible for the output of the pull-in or pass messages to commercial vehicle drivers directly in their vehicles as they approach a commercial vehicle roadside checkstation facility. These messages shall be generated by other processes within the facility that are responsible for checking the commercial vehicle's credentials (including those for border crossing) and safety, or may be the result of the vehicle's tag not being properly read, or may be the result of a general pull-in decision for all vehicles being issued by inspectors at the roadside checkstation facility.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.4
4.3
4.3.0
4.3.1
4.3.1.2
4.3.1.7

2.3.8 Provide Commercial Vehicle Border Screening

Input Flows:
cv_border_data
cv_border_database_update
cv_border_override
cv_roadside_border_database
cvo_border_agency_clearance_results
cvo_transportation_border_clearance
fbis-border_crossing_inspection_results

Output Flows:
cv_border_decision
cv_border_pull_in_output
cv_border_record
cv_on_board_border_record
cv_roadside_border_database

Description:
This process shall be responsible for checking a commercial vehicle and its cargo through a border crossing point. The checks carried out by the process shall comprise a comparison of the trip identity and other border clearance assessments already provided by the commercial vehicle administration processes, and held in a local data store. This process shall also receive the results of any inspections performed by the border inspection system once the vehicle has been cleared to pass through the border agencies' area. A check shall also be made by the process to see if the lock tag attached to the vehicle's cargo has been changed. If either of these checks produce negative results then the process shall request the vehicle to pull-in, otherwise the vehicle shall be allowed to pass. The process shall send its decision to the process that provides the roadside inspectors' interface, to enable an override to be applied if required. The decision of the process (with the override if it is applied) shall be sent to the message output process and is written back to the vehicle's on-board tag.

User Service Requirements:
4.0
4.1
4.1.0
4.1.2
4.1.2.2
4.4
4.4.0
4.4.3
4.4.3.1
4.4.3.1(a)
4.4.3.1(b)
4.4.3.1(c)
4.4.3.2
4.4.3.2(a)
4.4.3.2(b)
4.4.3.2(c)
4.4.3.2(d)
4.4.3.2(e)
4.4.3.2(f)
4.4.3.2(g)
4.4.3.2(h)

2.4.1 Communicate Commercial Vehicle On-board Data to Roadside

Input Flows:
cv_inspection_data_output
cv_on_board_data_current_copy
cv_trigger_area_notification

Output Flows:
cv_disable_info
cv_inspection_data_update
cv_on_board_data
cv_on_board_data_needed
cvo_driver_log
cvo_onboard_driver_log_for_admin
cvo_onboard_safety_data
cvo_onboard_safety_data_for_admin
freight_info_for_inspection
stored_driver_identity_characteristics

Description:
This process shall be responsible for providing the commercial vehicle end of the communications link between itself and a commercial vehicle roadside checkstation facility. The process shall enable an inspector at the facility or elsewhere to have access to the data accumulated on-board the vehicle for use in a vehicle inspection, including the vehicle driver log. It shall also enable the inspector to send back data about the result of the inspection for storage on-board the vehicle. This process shall accept notification from roadside communicatinos devices that it has entered an area where wireless roadside inspection (WRI) is in effect. Within this trigger area this process shall provide the requested safety and log data to the roadside devices.

User Service Requirements:
4.0
4.2
4.2.0
4.2.2
4.2.2.3
4.2.2.7
4.3
4.3.0
4.3.1
4.3.1.6
4.3.2
4.3.2.3

2.4.2 Collect On-board Commercial Vehicle Sensor Data

Input Flows:
fbcv-brake_condition
fbcv-distance_traveled
fbcv-driver_safety_status
fbcv-driver_status
fbcv-vehicle_identity
fbcv-vehicle_safety_status
fbcv-vehicle_security_status
fbcv-weight
ffe-breach_warning_for_cv
ffe-cargo_info_for_cv
ffe-integrity_data_for_cv
ffe-location_data_for_cv
ffe-maintenance_data_for_cv
ffe-operational_data_for_cv
From_Location_Data_Source

Output Flows:
cvo_on_board_sensor_data

Description:
This process shall be responsible for continuously monitoring the conditions on-board a commercial vehicle. These inputs shall be processed by sensors, and if required converted from analog into a digital form. The process shall load all collected into an on-board vehicle data store for use by other processes in the vehicle.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.6
4.1.1.6(a)
4.1.1.6(c)
4.1.2
4.1.2.1
4.1.2.3
4.2
4.2.0
4.2.2
4.2.2.1
4.2.2.2
4.2.2.3
4.2.2.4
4.2.2.5
4.2.2.6
4.3
4.3.0
4.3.1
4.3.1.2
4.3.2
4.3.2.1
4.3.2.4
4.3.2.4.2
4.3.3
4.3.3.2
4.3.3.2.4
4.3.3.2.5

2.4.3 Analyze Commercial Vehicle On-board Data

Input Flows:
cargo_data_request
cv_disable
cv_driver_authentication_status
cv_driver_data_input
cv_provide_credentials_data_for_inspections
cvo_stored_on_board_sensor_data

Output Flows:
cv_critical_problem
cv_driver_data_output
cv_on_board_data_update
cv_security_alarm
cvo_hazmat_spill_data
cvo_security_alarm
processed_cargo_data
tbcv-disable_vehicle

Description:
This process shall be responsible for analyzing the data collected on-board a commercial vehicle, and sending it to another process for loading into a store on-board the vehicle. If the analysis of the data carried out by the process shows that there is a critical safety, security or hazmat problem, the process shall send data to the driver's interface process for output to the driver. In addition, for a hazmat or other cargo related emergencies, data is also sent to other processes in order to alert the appropriate authorities. The process shall also accept input of data from the commercial vehicle driver via the interface process and load it into the same store. The process shall safely disable the vehicle and notify fleet management. Also, if the process receives cv_disable data flow from the fleet and freight management function, then the process shall similarly safely disable the vehicle.

User Service Requirements:
4.0
4.2
4.2.0
4.2.2
4.2.2.1
4.2.2.2
4.2.2.4
4.2.2.5
4.3
4.3.0
4.3.2
4.3.2.1
4.3.2.1(a)
4.3.2.1(b)
4.3.2.1(c)
4.3.2.1(d)
4.3.2.1(e)
4.3.2.2
4.3.2.4
4.3.2.4.1
4.3.2.4.2
4.4
4.4.0
4.4.3
4.4.3.2
4.4.3.2(a)
4.4.3.2(c)
4.5
4.5.0
4.5.1
4.5.1.1
4.5.1.2
4.5.1.2(a)
4.5.1.2(b)
4.5.1.2(c)
4.5.4
4.5.4.3
4.5.4.3.3
4.5.4.3.4
4.5.4.3.5

2.4.4 Provide Commercial Vehicle Driver Interface

Input Flows:
cv_critical_problem
cv_driver_data_output
cv_general_input_message
cv_route_warning_for_driver
fcvd-driver_characteristics
fcvd-driver_data_input
fcvd-driver_general_message
fcvd-driver_input_type
fcvd-driver_response
fdic-driver_cred_info

Output Flows:
cv_driver_data_input
cv_driver_identity_characteristics
cv_driver_output_message
cv_output_on_board_vehicle_data
tcvd-critical_safety_problem
tcvd-critical_security_problem
tcvd-data_input_request
tcvd-output_data
tcvd-type_input_request

Description:
This process shall be responsible for providing the interface between the commercial vehicle driver and processes on-board the commercial vehicle. The process shall provide interfaces to the processes responsible for collecting, analyzing and storing data about the vehicle, its cargo, the driver, etc., and for the exchange of data with the commercial vehicle fleet manager. The process shall support inputs from the driver in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.6
4.1.1.6(a)
4.1.1.6(b)
4.1.1.6(c)
4.1.1.6(d)
4.1.1.6(e)
4.3
4.3.0
4.3.2
4.3.2.1
4.3.2.4
4.3.2.4.3
4.4
4.4.0
4.4.1
4.4.2
4.4.3
4.4.3.1
4.4.3.1(a)
4.4.3.1(b)
4.4.3.1(c)
4.4.3.2
4.4.3.2(a)
4.4.3.2(b)
4.4.3.2(c)
4.4.3.2(d)
4.4.3.2(e)
4.4.3.2(f)
4.4.3.2(g)
4.4.3.2(h)
4.6
4.6.0
4.6.1
4.6.1.1

2.4.5 Communicate Commercial Vehicle On-board Data to Vehicle Manager

Input Flows:
cf_trigger_area
cf_trigger_area_notification
cv_driver_output_message
cv_on_board_data_output
cv_output_on_board_vehicle_data
cv_request_on_board_vehicle_data
cvo_general_message
cvo_on_board_vehicle_data_request
cvo_trip_log_data_request

Output Flows:
cf_on_board_driver_log
cf_on_board_vehicle_data
cv_driver_response
cv_general_input_message
cv_on_board_data_required
cv_on_board_vehicle_data
cvo_on_board_safety_data
cvo_trip_log_data

Description:
This process shall be responsible for providing the communications interface through which the commercial vehicle fleet manager (or commercial vehicle driver acting in the role of the manager) can access the data stored on-board a commercial vehicle (including safety data, trip log data, etc.). The process shall also support the exchange of unformatted messages between the commercial vehicle fleet manager and driver, and the ability of the driver to send the on-board data to the manager as an unsolicited data flow.

User Service Requirements:
4.0
4.2
4.2.0
4.2.2
4.2.2.1
4.2.2.2
4.2.2.4
4.2.2.5
4.3
4.3.0
4.3.2
4.3.2.1
4.3.2.2
4.4
4.4.0
4.4.3
4.4.3.2

2.4.6 Provide Commercial Vehicle On-board Data Store Interface

Input Flows:
cf_driver_log_update
cf_inspection_data
cv_admin_inspection_data
cv_inspection_data_update
cv_on_board_data_needed
cv_on_board_data_required
cv_on_board_data_update
cv_on_board_stored_data

Output Flows:
cv_on_board_data_current_copy
cv_on_board_data_output
cv_on_board_stored_data

Description:
This process shall be responsible for providing the interface through which data can be written to and read from the store of data that is held on-board a commercial vehicle. The data shall be provided by and on request from other processes within the Manage Commercial Vehicles function that are on-board the vehicle.

User Service Requirements:
4.0
4.2
4.2.0
4.2.2
4.2.2.1
4.2.2.2
4.2.2.4
4.2.2.5
4.3
4.3.0
4.3.2
4.3.2.1
4.3.2.2
4.4
4.4.0
4.4.3
4.4.3.2

2.4.7 Manage CV On-board Data

Input Flows:
cv_on_board_driver_data
cv_on_board_stored_sensor_data
cvo_on_board_sensor_data

Output Flows:
cv_cargo_information
cv_freight_breach
cv_freight_integrity
cv_freight_location
cv_freight_maintenance
cv_freight_operations
cv_identities
cv_location
cv_on_board_stored_sensor_data
cvo_stored_on_board_sensor_data
freight_breach_for_rs
freight_equipment_info

Description:
This process shall manage and maintain a data store of on-board sensor data from a commercial vehicle. In addition to commercial vehicles data, the process shall manage the sensor data from the attached freight equipment.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.6
4.1.1.6(a)
4.1.1.6(c)
4.1.2
4.1.2.1
4.1.2.3
4.2
4.2.0
4.2.2
4.2.2.1
4.2.2.2
4.2.2.3
4.2.2.4
4.2.2.5
4.2.2.6
4.3
4.3.0
4.3.1
4.3.1.2
4.3.2
4.3.2.1
4.3.2.4
4.3.2.4.2
4.3.3
4.3.3.2
4.3.3.2.4
4.3.3.2.5
4.5
4.5.0
4.5.4
4.5.4.3
4.5.4.3.6
4.5.4.3.7

2.4.8 Correlate Commercial Vehicle Route

Input Flows:
cf_manager_route_monitoring_parameters
cv_location
cvo_vehicle_route

Output Flows:
cv_route_warning
cv_route_warning_for_driver

Description:
This process is responsible for comparing a commercial vehicles location to its planned route. The planned route and allowable deviations limits shall be provided by the Manage Commercial Vehicle Fleet Operations function. This process shall generate a warning to the driver and Manage Commercial Vehicle Fleet Operations function if a commercial vehicle deviates from its intended route.

User Service Requirements:
4.0
4.6
4.6.0
4.6.3
4.6.3.3

2.4.9 Authenticate Commercial Vehicle Driver

Input Flows:
cv_driver_assignment
cv_driver_identity_characteristics

Output Flows:
cv_driver_authentication_status
cv_on_board_driver_data

Description:
This process shall receive and store driver assignments and associated driver identity characteristic keys. On receipt of driver identity characteristics, the process shall compare the driver characteristics with the stored identity characteristic keys, and determine if the individual is an authentic driver as per the assignments. The driver authentication status shall be issued as an output. The declared identity of the driver will be also issued as an output.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.3
4.5
4.5.0
4.5.4
4.5.4.3
4.5.4.3.1
4.5.4.3.2

2.5.1 Manage Commercial Vehicle Trips and Clearances

Input Flows:
cf_enrollment_request
cf_tax_data
cv_check_credentials_response
cv_confirmed_enrollment
cv_enrollment_request
cv_remote_enrollment_confirmation
cv_request_enrollment_data
cv_tax_and_credential_fees
cv_update_new_credentials_response
cvo_audit_data
vehicle_permit_request

Output Flows:
cf_enrollment_information
cf_enrollment_payment_confirmation
commercial_vehicle_permit_information
cv_check_credentials_request
cv_enrollment_information
cv_enrollment_list
cv_enrollment_payment_confirmation
cv_provide_enrollment_data
cv_remote_enrollment_request
cv_tax_and_credential_fees
cv_update_new_credentials_request

Description:
This process shall be responsible for the advance acquisition of electronic credentials and tax filing for commercial vehicles. The process will support the payment of the necessary taxes and duties that will enable a vehicle to be cleared through the credentials checks at the roadside checkstation facilities along its route, including those at border crossings. For this activity the process uses information about the vehicle's route provided by the fleet manager, or by the driver acting in that role when the vehicle is owned and operated by the driver. The actual payment activity and the subsequent notification of the roadside facilities along the route is carried out by other processes. Where the roadside facilities are outside the area served by the local ITS functions, the process requests that the necessary vehicle data is passed to the similar processes serving the appropriate areas.

User Service Requirements:
4.0
4.4
4.4.0
4.4.1
4.4.1(g)
4.4.2
4.4.2(d)
4.6
4.6.0
4.6.1
4.6.1.1

2.5.2 Obtain Electronic Credential and Tax Filing Payment

Input Flows:
cv_enrollment_list
financial_response

Output Flows:
cv_confirmed_enrollment
financial_request

Description:
This process shall be responsible for making payment for electronic credential and tax filing. The data on which the payment is based shall be that for a commercial vehicle's route as provided by the commercial vehicle fleet manager or the commercial vehicle driver who is also the owner of the vehicle. The actual payment activity will be carried out by another process in the Provide Electronic Payment Services function.

User Service Requirements:
4.0
4.6
4.6.0
4.6.1
4.6.1.1

2.5.3.1 Communicate with Border Inspection

Input Flows:
cvo_border_status_for_trade
cvo_domestic_transportation_info_for_trade
fbia-border_client_request
fbia-border_prearrival_notice
fbis-border_arrival_notice

Output Flows:
cvo_declaration_info
cvo_domestic_transportation_info_from_trade
tbia-border_client_information
tbia-border_screening_results

Description:
This process shall be responsible for communicating with Border Inspection and Border Inspection Administration systems. The process shall be capable of receiving processing requests for information concerning clients registering with border agencies in programs like FAST or C-TPAT. This process shall also receive notices of pre-arrival and arrival of a carrier's vehicle at a border crossing. The requests and arrival notices, including domestic transportation and declaration information shall be passed on to another process for analysis. This process shall also be capable of providing border screening status, which includes domestic transportation information and border clearance status, in support of the request for client verification and to properly manage the border crossing. The border data provided shall include verification of the carrier, driver, vehicle, and cargo as pertaining credentials, duties, and safety records.

User Service Requirements:
4.0
4.4
4.4.0
4.4.3
4.4.3.2
4.4.3.2(a)
4.4.3.2(b)
4.4.3.2(c)
4.4.3.2(d)
4.4.3.2(e)
4.4.3.2(f)
4.4.3.2(g)
4.4.3.2(h)

2.5.3.2 Analyze Border Clearance Data

Input Flows:
border_database
cvo_border_clearance_info
cvo_border_status_from_other_cvas
cvo_declaration_info
cvo_domestic_transportation_info_from_trade

Output Flows:
border_database
cvo_border_clearance_for_fleet
cvo_border_results
cvo_border_status_for_other_cvas
cvo_border_status_for_trade
cvo_domestic_transportation_info_for_trade
cvo_transportation_border_results
tbia-border_clearance_status
tifs-border_clearance_status

Description:
This process is responsible for analyzing domestic transportation and border data to provide an assessment which will be used at a border crossing facility. The process shall be capable of receiving requests and arrival notices containing declaration and domestic transportation data from the process that communicates with border inspection administration systems. The process will use this information in addition to border status from other borders facilities to make an assessment regarding a commercial vehicle and driver at a border crossing. The process shall provide the results of this assessment to other border related organizations, including other borders facilities, fleet managers and intermodal freight shippers.

User Service Requirements:
4.0
4.4
4.4.0
4.4.3
4.4.3.2
4.4.3.2(a)
4.4.3.2(b)
4.4.3.2(c)
4.4.3.2(d)
4.4.3.2(e)
4.4.3.2(f)
4.4.3.2(g)
4.4.3.2(h)

2.5.4 Communicate with Other Commercial Vehicle Administration System

Input Flows:

cv_commit_remote_enrollment
cv_local_route_restrictions
cv_provide_enrollment_data
cv_remote_enrollment_request
cvo_border_status_for_other_cvas
focvas-accident_report
focvas-border_clearance
focvas-citation_info
focvas-credentials
focvas-credentials_status
focvas-cv_driver_record
focvas-data_table
focvas-permit_coordination
focvas-route_restrictions
focvas-safety_inspection
focvas-safety_status

Output Flows:

cv_commit_local_enrollment
cv_remote_enrollment_confirmation
cv_remote_route_restrictions
cv_request_enrollment_data
cvo_border_status_from_other_cvas
tocvas-accident_report
tocvas-border_clearance
tocvas-citation_info
tocvas-credentials
tocvas-credentials_status
tocvas-cv_driver_record
tocvas-data_table
tocvas-permit_coordination
tocvas-route_restrictions
tocvas-safety_inspection
tocvas-safety_status

Description:

This process shall be responsible for communicating with commercial vehicle administration facilities in ITS functions that serve areas outside that which is served by the local function. The communications supported by the process shall enable the local function to enroll commercial vehicles in other areas, and for those other areas to enroll their commercial vehicles in the local area. The process shall thus support the coordination and the determination of electronic credentials, international border clearance and tax filing across geographic and jurisdictional boundaries. In addition, the process shall facilitate the forwarding of local route restrictions information to remote administration functions, and similarly shall facilitate the reception of remote route restrictions information for local administration use.

User Service Requirements:

4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.1.1.3
4.6
4.6.0
4.6.1
4.6.1.1

2.5.5 Manage Commercial Vehicle and Driver Credentials and Enrollment

Input Flows:

asset_restrictions_for_com_veh
cf_driver_logs_for_admin
cf_safety_data
cv_check_credentials_request
cv_commit_local_enrollment
cv_database
cv_remote_route_restrictions
cv_roadside_driver_logs_for_admin
cv_roadside_facility_locations
cv_roadside_safety_data_for_admin
cv_safety_history
cv_update_new_credentials_request
cvo_border_results
cvo_database_info_request
cvo_onboard_driver_log_for_admin
cvo_onboard_safety_data_for_admin
cvo_repair_information
cvo_transportation_border_results
faas-alerts_and_advisories_for_cvas
fcvoir-record_review_request
fea-cv_enforcement_agency_response
fea-cv_enforcement_configuration
fea-cv_enforcement_control
fea-cv_enforcement_targets

Output Flows:

cf_enforcement_trigger_areas
cf_enforcement_trigger_notification
cv_admin_inspection_data
cv_check_credentials_response
cv_commit_remote_enrollment
cv_credentials_enrollment_data
cv_database
cv_local_route_restrictions
cv_roadside_facility_locations
cv_route_restrictions
cv_update_new_credentials_response
cvo_credentials_status_for_fms
cvo_database_info
cvo_driver_record_info
cvo_inspection_configuration
route_restrictions_for_isp
tcvoir-credential_status
tcvoir-credentials
tcvoir-cv_carrier_participation_report
tcvoir-driver_record
tcvoir-safety_status
tea-cv_carrier_participation_report
tea-cv_safety_inspection
tmup-route_restrictions

Description:

This process shall be responsible for enabling commercial vehicle fleet managers and drivers (who are owners) to enroll the electronic credentials for their vehicles. This enrollment data shall be downloaded to the commercial vehicle roadside checkstation and border crossing facilities by another process. When the roadside facility is located in the area not served by the local Manage Commercial Vehicles function, the process sends the data to another process that is responsible for communicating with a similar function in other geographic and/or jurisdictional areas. The process shall also be able to accept commercial vehicle enrollment requests from similar functions in other areas, query enforcement agency databases for outstanding prosecutions, and validate the selected route based on transportation asset restrictions (height, width, weight). This process shall be able to respond to requests for information from authorized entities, such as insurance underwriters. The process shall be able to accept border clearance information to support clearance at international borders. This process shall also provide local route restrictions data to remote administration functions, and shall receive remote route restrictions information for local administration usage. It shall also provide the combined route restrictions information to ISPs, Map Update Providers and local fleet management usage.

User Service Requirements:

4.0
4.1
4.1.0
4.1.1
4.1.1.8
4.2
4.2.0
4.2.1
4.2.1.1
4.2.1.4
4.4
4.4.0
4.4.1
4.4.1(a)
4.4.1(b)
4.4.1(c)
4.4.1(d)
4.4.1(e)
4.4.1(f)
4.4.1(g)
4.4.2
4.4.3
4.4.3.1
4.4.3.1(a)
4.4.3.1(b)
4.4.3.1(c)

2.5.6 Output Commercial Vehicle Enrollment Data to Roadside Facilities

Input Flows:
cv_facility_log
cv_safety_history
cvo_database_info
cvo_inspection_configuration

Output Flows:
cv_border_database_update
cv_carrier_participation_report_to_roadside
cv_credentials_database_update
cv_credentials_information_response
cv_roadside_inspection_configuration
cv_roadside_inspection_control
cv_safety_database_update
cv_safety_information_response
cvo_accident_report
cvo_border_agency_clearance_results
cvo_citation_info
cvo_credential_status
cvo_credentials_info
cvo_credentials_status
cvo_database_info_request
cvo_driver_record_to_roadside
cvo_safety_status
cvo_transportation_border_clearance

Description:
This process shall be responsible for providing credentials, safety and border clearance assessment data to commercial vehicle roadside checkstation and border crossing facilities. This data shall be output by the process periodically (e.g. daily) from an interrogation of the stores of safety history and credentials, and sent to the roadside facilities served by the local Manage Commercial Vehicles function. The process shall also provide selected credentials and safety data on request from the commercial vehicle inspectors at particular roadside checkstation facilities.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.1.1.8
4.2
4.2.0
4.2.1
4.2.1.1
4.2.1.4
4.2.1.5
4.2.1.5(a)
4.2.1.5(b)
4.2.1.5(c)
4.2.1.5(d)
4.4
4.4.0
4.4.3
4.4.3.1
4.4.3.1(a)
4.4.3.1(b)
4.4.3.1(c)

2.5.7 Process Commercial Vehicle Violations

Input Flows:
cv_facility_log

Output Flows:
cv_violation_data

Description:
This process shall be responsible for sending details of commercial vehicle carriers and drivers that require prosecution to a process in the Manage Emergency Services function. The receiving process in that function shall be responsible for sending the data to the appropriate law enforcement agency. This process shall obtain the data by periodically (e.g. daily) scanning the data in the log obtained from the commercial vehicle roadside checkstation facilities.

User Service Requirements:
4.0
4.2
4.2.0
4.2.1
4.4
4.4.0
4.4.3
4.4.3.2

2.5.8 Process Data Received from Roadside Facilities

Input Flows:
cv_facility_log
cv_roadside_daily_log
cv_roadside_data_collected
cvo_accident_data
cvo_border_clearance
cvo_citation_data
cvo_safety_inspection_data
cvo_violation

Output Flows:
cf_periodic_activity_report
cf_roadside_activity_report
cv_daily_logs
cv_facility_log
cv_safety_history
cvo_accident
cvo_accident_data_for_fleet
cvo_border_clearance_info
cvo_citation

Description:
This process shall be responsible for the examination of the daily logs received periodically from the commercial vehicle checkstation and border crossing facilities. It shall also be responsible for the receipt in real time of data about commercial vehicles that have failed their safety inspections, received citations or were involved in an accident. The examination of the received data shall lead the process to update the local stores containing the facility logs and vehicle safety history. This process shall also send details of the activity at the roadside facility to the Manage Archive Data function. It shall also provide reports to the commercial vehicle fleet manager regarding fleet activity through roadside facilities, either on-demand or as periodic summaries.

User Service Requirements:
4.0
4.1
4.1.0
4.1.1
4.1.1.2
4.1.1.2.1
4.1.1.2.1(a)
4.1.1.2.1(b)
4.1.1.2.1(c)
4.1.1.8
4.2
4.2.0
4.2.1
4.2.1.1
4.2.1.4
4.2.1.5
4.4
4.4.0
4.4.2
4.4.2(a)
4.4.2(b)
4.4.2(c)

2.5.9 Manage Commercial Vehicle Archive Data

Input Flows:
cv_archive_request
cv_archive_status
cv_credentials_enrollment_data
cv_daily_logs
cv_data_archive

Output Flows:
cv_archive_data
cv_data_archive

Description:
This process shall be responsible for processing request for archive data of commercial vehicle operations. This process shall receive operational data from the roadside check systems and administration and credentials data. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained with the commercial vehicle data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process quality control metrics shall be assigned. The appropriate meta-data shall be generated and store along with the data. A catalog of the data shall be maintained to allow requesters to know what data is available from the archive store. The process shall run when a request for data is received from an external source, or when fresh data is received.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.6
7.1.3.1.6(a)
7.1.3.1.6(b)
7.1.3.1.6(c)
7.1.3.1.6(d)
7.1.3.1.6(e)
7.1.3.1.6(f)

2.6.1 Provide Commercial Vehicle Manager Tag Data Interface

Input Flows:
cf_tag_data_store_output
cf_tag_initialization_data
cvo_tag_safety_data
fffm-carrier_number
fffm-driver_number
fffm-request_tag_data_output
fffm-trip_identity
fffm-vehicle_number

Output Flows:
cf_tag_data
cf_tag_data_store_request
cf_tag_data_store_write
cvo_tag_data_store_request
cvo_trip_identification_number
tffm-confirm_enrollment_data_stored
tffm-output_tag_data

Description:
This process shall be responsible for providing an interface through which the commercial vehicle fleet manager can set up the data in the tag on-board a commercial vehicle. This process enables the manager to write to the tag with information that identifies the trip identification number, carrier, driver and vehicle. The process shall also enable the manager to read only this data from the tag and will be prevented from reading of any other data from the tag. Data provided by the manager shall also be sent by the process to the tag the process that manages electronic credentials and tax filing for use by the manager in future enrollments. The process shall support inputs from the commercial vehicle fleet manager in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.1
4.1.0
4.1.2
4.1.2.2

2.6.2 Transmit Commercial Vehicle Tag Data

Input Flows:
cv_lock_tag_data
cv_on_board_border_record
cv_on_board_screening_record
cv_request_electronic_clearance_data
cv_request_electronic_screening_data
cv_tag_data_store_read
cvo_border_clearance_request
cvo_request_tag_data
cvo_safety_inspection_request
fbis-border_vehicle_clearance_notice
fbis-border_vehicle_pass_pull_in

Output Flows:
cv_electronic_clearance_data
cv_electronic_screening_data
cv_request_lock_tag_data
cv_tag_data_store_needed
cv_tag_data_store_update
cvo_border_clearance_data
cvo_safety_inspection
cvo_tag_data
tbis-border_vehicle_onboard_clearance_data

Description:
This process shall be responsible for providing the output of the data (including border clearance data, screening data, and safety inspection data) that has been previously stored on-board a commercial vehicle's tag on request from a commercial vehicle roadside checkstation facility. The process shall also provide the current status of the lock tag, if one is attached to the vehicle's cargo. The data shall only be sent by the process to the commercial vehicle roadside checkstation or border crossing facility that made the request. The output mechanism used by the process shall be an implementation issue, but it could be by radio, short range communications equipment, or a visual mechanism, such as a bar code. As the vehicle approaches a border crossing this process shall exchange data with the border inspection system in response to requests for manifest and other identification data. Once the vehicle has cleared customs and received an updated notification this process shall update its on-board data.

User Service Requirements:
4.0
4.1
4.1.0
4.1.2
4.1.2.1
4.1.2.2

2.6.3 Provide Commercial Driver Tag Data Interface

Input Flows:
cv_tag_data_store_output
fcvd-carrier_number
fcvd-driver_number
fcvd-request_tag_data_output
fcvd-trip_identification_number
fcvd-vehicle_number

Output Flows:
cv_tag_data_store_request
cv_tag_data_store_write
tcvd-confirm_data_stored
tcvd-output_tag_data

Description:
This process shall be responsible for providing the interface through which the commercial vehicle driver can set up the data in an on-board vehicle unit (e.g. an electronic tag). In this instance the driver is assumed to be acting in the role of a commercial vehicle fleet manager, and is thus likely to be the owner of the vehicle. The data the process enables the manager to write to the tag will be that which identifies the carrier, driver and vehicle. The process shall also enable the read this data from the tag, but shall not enable the manager to read any other data from the tag. The process shall support inputs from the commercial vehicle driver in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.1
4.1.0
4.1.2
4.1.2.2

2.6.4 Provide Lock Tag Data Interface

Input Flows:
cv_request_lock_tag_data
ffe-lock_tag_data_for_cv
lock_tag_data_store

Output Flows:
cv_lock_tag_data
lock_tag_data_store

Description:
This process shall be responsible for providing the interface through which the commercial vehicle driver can set up the data in an on-board vehicle unit (e.g. an electronic tag). In this instance the driver is assumed to be acting in the role of a commercial vehicle fleet manager, and is thus likely to be the owner of the vehicle. The data the process enables the manager to write to the tag will be that which identifies the carrier, driver and vehicle. The process shall also enable the read this data from the tag, but shall not enable the manager to read any other data from the tag. The process shall support inputs from the commercial vehicle driver in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.1
4.1.0
4.1.2
4.1.2.2
4.1.2.3

2.6.5 Manage Commercial Vehicle Tag Data Store

Input Flows:
cf_tag_data_store_request
cf_tag_data_store_write
cv_tag_data_store
cv_tag_data_store_needed
cv_tag_data_store_request
cv_tag_data_store_update
cv_tag_data_store_write
cvo_tag_data_store_request
cvo_trip_identification_number
fifs-trip_identification_number

Output Flows:
cf_tag_data_store_output
cv_provide_credentials_data_for_inspections
cv_tag_data_store
cv_tag_data_store_output
cv_tag_data_store_read
cvo_tag_safety_data

Description:
This process shall be responsible for managing the store of data that is held by a commercial vehicle's on-board tag. It shall manage all of the transactions that either write data to the store or read data from it, to ensure that the data retains its consistency. The process shall ensure that the commercial vehicle fleet manager or driver can only read the data that they are enabled to write to the store, and that the store only contains data from the last two roadside check station facilities passed by the commercial vehicle.

User Service Requirements:
4.0
4.1
4.1.0
4.1.2
4.1.2.1
4.1.2.2

2.7.1 Manage Freight Incidents

Input Flows:
cv_freight_breach
faas-alerts_and_advisories_for_freight
ffe-breach_warning
fifs-breach_response
freight_breach_warning
freight_incident_response
freight_route_deviation_warning

Output Flows:
freight_alarm
freight_incident_alert
taas-threat_info_from_freight
tifs-freight_breach

Description:
This process shall be responsible for receiving freight equipment security warnings and determining a response plan, which may include notifying Emergency Services or the Intermodal Freight Shipper. The process shall receive freight equipment security warnings, which includes route deviation and breach or tamper warnings. The process shall evaluate the warning utilizing current alerts and advisories. The evaluation results shall be sent to the Provide Manager Interface process. The freight manager's response to a warning shall be received and executed by this process. Freight incident information shall be sent to the Intermodal Freight Shipper and Manage Emergency Services function. This process shall be capable of receiving instructions from the Intermodal Freight Shipper in response to a freight breach warning. All threat information shall be sent to Alerting and Advisory Systems for further analysis.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.1
4.3.3.1.1
4.3.3.1.3
4.6
4.6.0
4.6.3
4.6.3.4

2.7.2 Monitor Freight Equipment Route

Input Flows:
cv_freight_location
ffe-location_data
freight_route_monitoring_parameters
planned_freight_route

Output Flows:
freight_location_information
freight_route_deviation_warning

Description:
This process shall monitor freight equipment's location and compare it against the known route. Known routes shall be received from the Manage Freight Equipment Fleet process. This function shall receive route monitoring parameters that define the allowable route deviation limits, which includes time and distance. (i.e. less then one-mile from known route, greater then one hour behind schedule, etc.). A warning shall be generated freight equipment exceeds allowable route deviation limits. This process shall provide the Manage Freight Equipment Fleet process periodic location information.

User Service Requirements:
4.0
4.6
4.6.0
4.6.2
4.6.2.1
4.6.2.1.1
4.6.3
4.6.3.3

2.7.3 Manage Freight Equipment Fleet

Input Flows:

cv_cargo_information
cv_freight_operations
cvo_border_clearance_for_fleet
cvo_route_for_freight
fbia-fleet_border_clearance_status
fbia-fleet_client_identification
fbia-fleet_expedited_clearance_response
fbia-fleet_expedited_clearance_status
fbia-fleet_manifest_receipt
ffe-cargo_information
ffe-operational_data
fifd-freight_depot_status_data
fifs-freight_shipper_status_data
freight_booking_information
freight_equipment_maint_status
freight_location_information
freight_manager_updates
freight_routes

Output Flows:

cvo_request_freight_route
freight_assignment_data
freight_equipment_maintenance_availability
freight_fleet_status
freight_routes
planned_freight_route
tbia-fleet_expedited_clearance_request
tbia-fleet_manifest_data
tfe-operational_monitoring_parameters
tifd-freight_shipment_status
tifs-freight_shipment_status

Description:

This process shall be responsible for coordinating commercial vehicle transportation for freight equipment in response to a freight booking. This process shall make freight equipment assignments utilizing availability status information collected directly from the Freight Equipment terminator or from the Manage Freight Equipment Maintenance process. In addition, this process shall make use of location information from the Monitor Freight Equipment Route process in determining equipment assignment. Equipment assignment information shall be provided to the Manage Commercial Vehicle Fleet process. This process shall obtain and store freight equipment routes from the Manage Commercial Vehicle Fleet function. Planned freight routes shall be provided to the Monitor Freight Equipment Route process in support of in-transit route monitoring. This process shall configure the Freight Equipment sensors to monitor maintenance and operational characteristics and to determine reporting schedule (i.e. supply chain events, heartbeat signal, etc). This process shall provide coordination of freight data with the Intermodal Freight Depot and the Intermodal Freight Shipper terminators. This process shall provide equipment availability information to the Manage Freight Equipment Maintenance process in support of preventive and corrective maintenance. Specific instructions shall be provided to this process by the Freight Manager Interface. For international shipments this process shall exchange information with the Border Inspection Administration terminator to file the appropriate data to expedite the shipment across the border.

User Service Requirements:

4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.1
4.6
4.6.0
4.6.3
4.6.3.1
4.6.3.2
4.6.3.5

2.7.4 Manage Freight Equipment Maintenance

Input Flows:
cv_freight_maintenance
ffe-maintenance_data
freight_equipment_maintenance_availability
freight_maint_data

Output Flows:
freight_equipment_maint_status
freight_maint_data

Description:
This process shall collect diagnostic information from freight equipment to schedule preventative and corrective maintenance. This process shall manage and store the fleet health reports, including maintenance records, and provide the data to the Manage Freight Equipment Fleet function. To better predict and schedule necessary equipment repairs, the Manage Freight Equipment Fleet function provides information on equipment utilization and availability schedules.

User Service Requirements:
4.0
4.6
4.6.0
4.6.2
4.6.2.1
4.6.2.1.2
4.6.2.1.2(a)
4.6.2.1.2(b)
4.6.2.1.2(c)

2.7.5 Process Freight Integrity Data

Input Flows:
cv_freight_integrity
ffe-integrity_data
ffe-lock_tag_data
freight_integrity_monitoring_parameters

Output Flows:
freight_breach_warning
tfe-integrity_monitoring_parameters

Description:
This process shall collect breach or tamper diagnostic information from freight equipment. This process shall receive monitoring parameters that defines the evaluation criteria for the detection of a breach or tamper event. This process shall configure integrity sensor thresholds on freight equipment. If a potential breach or tamper of the freight equipment is detected, this process shall send a freight breach warning to the Manage Freight Incidents function.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.1
4.3.3.1.2

2.7.6 Provide Freight Manager Interface

Input Flows:
cf_mgr_booking_request
fffm-freight_data_input
fffm-freight_incident_response
freight_fleet_status
freight_incident_alert

Output Flows:
cf_mgr_booking_response
freight_incident_response
freight_integrity_monitoring_parameters
freight_manager_updates
freight_route_monitoring_parameters
tffm-assignment_alert
tffm-freight_data_input_request
tffm-freight_integrity_alert
tffm-freight_route_alert

Description:
This process shall be responsible for providing an interface for the freight manager. The process shall enable this interface to provide the manager with facilities for the input of data used to set up freight routes in response to a freight booking, setup parameters for freight security monitoring and to respond to freight security alarms. It shall be possible for the manager to include details of the cargo to be picked up and/or dropped off at each point along the route. The process shall support inputs from the manager in both manual and audio form, and shall provide its outputs in audible and visual forms. It shall enable the visual output to be in hardcopy, or as a display.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.1
4.3.3.1.3
4.6
4.6.0
4.6.3
4.6.3.4
4.6.3.5

2.7.7 Provide Shipper Booking Interface

Input Flows:
cf_mgr_booking_response
cv_assignment_info
fifs-book_transportation
fifs-trip_id_number

Output Flows:
cf_mgr_booking_request
freight_booking_information
tifd-booking_information
tifs-booking_response

Description:
This process is responsible for providing the interface to an intermodal freight shipper to setup transportation for freight equipment. The process shall receive booking information along with the trip identification number for cross border shipments and forward the information to the 'Provide Freight Manager Interface' for processing. The fleet manager's response, which may include a request for additional information or a confirmation number, shall be forwarded to the shipper. This process shall receive information regarding the driver assigned to transport freight equipment by a commercial vehicle. Once the booking has been finalized, the freight booking information, which includes driver assignment information, is forwarded to the Intermodal Freight Depot and Intermodal Freight Shipper.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.1
4.6
4.6.0
4.6.3
4.6.3.1

3.1.1 Produce Collision and Crash Avoidance Data

Input Flows:
collision_data
emergency_vehicle_proximity
intersection_collision_avoidance_data

Output Flows:
position_warnings
vehicle_action_requests

Description:
This process shall be responsible for sensing and evaluating the likelihood of a collision between two vehicles or a vehicle and a stationary object. The process shall base its detection on input from three other processes. One of these processes shall be that which continuously processes sensor inputs on-board the vehicle, including safety messages received from surrounding vehicles and the roadside, the second shall be that which detects collision situations and signal phase and timing data at intersections, and the third input alerts the vehicle of the proximity of emergency vehicles that are responding to an incident. When an event is detected this process shall output the appropriate messages to another process in the vehicle to warn the driver. If the vehicle is suitably equipped, the process shall initiate the deployment of crash restraint devices in advance of the collision and/or generate data to initiate direct operation of the vehicle to take evasive maneuvers. This process shall provide other processes in the intersection with data on its speed and intended direction as it approaches an intersection.

User Service Requirements:
6.0
6.1
6.1.0
6.1.1
6.1.1.2
6.1.1.2.1
6.1.2
6.1.2.1
6.1.2.1.1
6.1.2.2
6.1.2.2.1
6.1.3
6.1.3.1
6.1.3.1.1
6.1.3.2
6.1.3.2.1
6.1.3.3
6.1.3.3.1
6.2
6.2.0
6.2.1
6.2.1.1
6.2.1.1.1
6.2.1.2
6.2.1.2.2
6.2.2
6.2.2.1
6.2.2.1.1
6.3
6.3.0
6.3.1
6.3.1.1
6.3.2
6.3.2.1
6.5
6.5.0
6.5.1
6.5.1.1
6.5.1.1.2
6.6
6.6.0
6.6.1
6.6.1.1
6.6.1.2

3.1.2 Carry-out Safety Analysis

Input Flows:
safety_data

Output Flows:
safety_warnings
vehicle_and_driver_safety_status

Description:
This process shall be responsible for producing safety warnings for display to the driver and output to the vehicle control processes. The process shall base its output on input from another process in the vehicle that is analyzing inputs to sensors. When data about a safety situation is received, the process shall output the appropriate messages to another process in the vehicle to warn the driver. If the vehicle is so equipped, the process shall send data to the process in the vehicle responsible for its control.

User Service Requirements:
6.0
6.5
6.5.0
6.5.1
6.5.1.1
6.5.1.1.1
6.5.1.1.2
6.5.1.1.3
6.5.2
6.5.2.1
6.5.2.1.1
6.5.2.1.2
6.5.3
6.5.3.1
6.5.3.1.1
6.5.3.1.2
6.7
6.7.0
6.7.1
6.7.1.3
6.7.1.3.1

3.1.3 Process Vehicle On-board Data

Input Flows:

fbv-diagnostics_data
fbv-driver_safety_status
fbv-vehicle_attitude_data
fbv-vehicle_identity
fbv-vehicle_motion_data
fbv-vehicle_occupants
fbv-vehicle_proximity_data
fbv-vehicle_safety_status
fbv-vehicle_security_status
fbv-vehicle_speed
fov-safety_msg_data_from_other_vehicles
fov-safety_status_from_other_vehicle
fre-environmental_conditions
fre-roadside_data
fre-roadway_characteristics
From_Location_Data_Source
From_Potential_Obstacles
intersection_status_data_for_vehicle
parking_vehicle_payment_number
roadside_safety_data_to_vehicle
toll_vehicle_payment_number
traffic_probe_configuration
vehicle_location_for_probe_data
vehicle_traffic_probe_configuration

Output Flows:

collision_data
env_probe_data_from_vehicle
safety_data
safety_data_for_mcv
tov-safety_msg_data_to_other_vehicles
tov-safety_status_to_other_vehicle
traffic_probe_data_from_vehicle
vehicle_characteristics_for_roadway
vehicle_env_probe_data
vehicle_identity_for_vmt
vehicle_identity_for_vmt_roadway
vehicle_location_for_vmt
vehicle_location_for_vmt_roadway
vehicle_occupants_detected
vehicle_roadside_safety_data
vehicle_speed_and_distance_for_vmt
vehicle_speed_and_distance_for_vmt_roadway
vehicle_status_details_for_broadcast
vehicle_status_details_for_driver_security
vehicle_status_details_for_emergencies
vehicle_status_details_for_emissions
vehicle_status_for_intersection
vehicle_traffic_probe_data
vehicle_traffic_probe_data_for_archive
vmt_equipment_status

Description:

This process shall be responsible for processing data received as input to sensors located on-board a vehicle and from communications with other surrounding vehicles. The process shall continuously analyze these inputs, along with a precise current location of the vehicle provided by the Location Data Source terminator. The traffic and environmental probe data may be sent to another process for roadside processing. The process may produce data from which safety, environmental, and/or position warnings and actions can be produced by another process. It shall also analyze the data to check for hazardous roadside conditions such as flooding, ice, snow, etc. and if detected shall output this data to processes in the Manage Traffic, Manage Maintenance and Construction, Manage Emergency Services, and Provide Driver and Traveler Services functions. This process shall communicate the status of the safety systems on-board to surrounding vehicles using wireless communications safety messages. For High Occupancy Vehicle lanes, this process shall determine the number of occupants on board from the Basic Vehicle inputs and provide it to the roadside for processing. This process shall calculate vehicle speed and distance traveled, and provide time-stamped data to another process as VMT data for calculation of vehicle road use charges.

User Service Requirements:

1.0
1.6
1.6.0
1.6.4
1.6.4(a)
6.0
6.1
6.1.0
6.1.1
6.1.1.1
6.1.1.1.1
6.1.1.1.1.1
6.1.1.1.1.2
6.1.1.1.2
6.1.1.2
6.1.1.2.1
6.1.1.3
6.1.1.3.1
6.1.2
6.1.2.1
6.1.2.1.1
6.1.2.2
6.1.2.2.1
6.1.2.3
6.1.2.3.1
6.2
6.2.0
6.2.1
6.2.1.1
6.2.1.1.1
6.2.1.2
6.2.1.2.2
6.2.1.3
6.2.1.3.1
6.2.2
6.2.2.1
6.2.2.1.1
6.2.2.2
6.2.2.2.1
6.2.2.3
6.2.2.3.1
6.3
6.3.0
6.3.1
6.3.1.1
6.3.2
6.3.2.1
6.3.3
6.3.3.1
6.5
6.5.0
6.5.1
6.5.1.1
6.5.1.1.1
6.5.1.1.2
6.5.1.1.3
6.5.2
6.5.2.1
6.5.2.1.1
6.5.2.1.2
6.5.3
6.5.3.1
6.5.3.1.1
6.6
6.6.0
6.6.1
6.6.1.1
6.6.1.2
6.7
6.7.0
6.7.2
6.7.2.1
6.7.2.3
8.0
8.1
8.1.0
8.1.1
8.1.1.4
8.1.1.4.1
8.1.1.4.1(a)
8.1.1.4.1(b)
8.1.1.4.1(c)
8.1.1.4.1(d)
8.1.1.4.1(e)
8.1.1.4.1(f)
8.1.1.5
8.1.1.5(a)

3.2.1 Provide Driver Interface

Input Flows:
avo_status
control_status
vehicle_control_request

Output Flows:
driver_avo_input
driver_input
vehicle_control_status

Description:
This process shall be responsible for providing an interface through which a vehicle driver can initiate, monitor and terminate automatic control of the vehicle. The output that any of these actions generates in terms of messages to the driver shall be sent by this process to another process that is in the Provide Driver and Traveler Services function and in the vehicle. The driver inputs shall be received by this process from another process that is also in the Provide Driver and Traveler Services function and in the vehicle.

User Service Requirements:
6.0
6.6
6.6.0
6.6.1
6.6.1.1
6.6.1.2

3.2.2 Provide Automatic Vehicle Operations Control

Input Flows:
avo_check_response
avo_route
avo_vehicle_data
driver_avo_input
lane_change_details
lane_change_strategy
platoon_status

Output Flows:
avo_control_data_update
avo_route_data
avo_route_request
avo_status
avo_vehicle_condition
platoon_action

Description:
This process shall be responsible for providing the facility that enables vehicles to operate in automatic vehicle operations lanes. This mode of operation shall only be initiated by the process when a request is received from the driver via other processes in the vehicle. The first action of the process must be to send data to the process that provides the automated lane check-in facility. If a positive response is received from that process, i.e., the vehicle's check in is accepted, then the process shall enable automatic operation by sending the data to the vehicle control processes. Once the vehicle is in automatic operation, the process shall continuously monitor for an input from the driver that cancels automatic mode, and when this is received, send mode canceling data to the vehicle control processes. Similarly the process shall also continuously monitor input from the process analyzing vehicle condition and the vehicle's presence on an automated lane. The process shall send mode canceling data to the vehicle control processes, if the condition does not support automated lane operation, or the vehicle is no longer on an automated lane. Finally, the process shall continuously monitor the detailed lane change strategy input from the process providing automated lane changing within a work zone.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.1
6.7.1.1.2
6.7.1.1.3
6.7.1.2
6.7.1.2.1
6.7.1.2.3
6.7.1.3
6.7.1.3.2
6.7.2
6.7.2.1
6.7.2.2
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.3

3.2.3.1 Provide Command Interface

Input Flows:
driver_input
feedback_actuator_status
feedback_platoon_status
feedback_sensor_status
feedback_servo_status

Output Flows:
control_status
driver_commands
driver_manual_input
driver_selection

Description:
This process shall be responsible for providing the interface through which all driver commands are passed to the correct processes in the vehicle for action. The process shall also pass all messages about vehicle control status on to another process in the vehicle for output to the driver. It shall also monitor the health of the other in-vehicle processes involved in automatic vehicle control. This process shall take the appropriate mode canceling action when any failures are detected in these processes.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.1
6.7.1.2.2
6.7.1.2.3
6.7.2
6.7.2.1

3.2.3.2 Manage Platoon Following

Input Flows:
driver_selection
fov-platoon_data_from_other_vehicle
manual_input_received
platoon_action
vehicle_and_driver_safety_status
vehicle_control_data

Output Flows:
feedback_platoon_status
platoon_following_commands
platoon_status
platooning_selected
tov-platoon_data_to_other_vehicle

Description:
This process shall be responsible for providing the facility for the automatic control of vehicles to be extended to cover the platooning of vehicles. The process shall enable vehicles to follow each other very closely (inches apart) in a platoon, responding to changes in speed and direction of the lead vehicle. The process shall support communications with the platoon vehicles that are both immediately in front of and behind the vehicle in which it operates. The process shall monitor data from other vehicles in the platoon and shall also send data about itself to other platoon vehicles. If the data received shows that the vehicle has been left on its own, i.e. there are no other vehicles in front or behind, the process shall send data to another process in the vehicle to increase speed and catch up with any platoon that may be ahead. The process shall only allow the vehicle to join or continue running in a platoon if it and/or the driver are considered to be in a safe condition, using data received from other processes in the vehicle.

User Service Requirements:
6.0
6.1
6.1.0
6.1.1
6.1.1.1
6.1.1.1.1
6.1.1.1.2
6.1.1.1.2.1
6.1.1.1.2.2
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.3
6.7.1.2
6.7.1.2.1
6.7.1.2.2
6.7.1.2.3
6.7.1.3
6.7.1.3.2
6.7.2
6.7.2.1
6.7.2.3

3.2.3.3 Process data for Vehicle Actuators

Input Flows:
actuator_commands
driver_manual_input
fbv-brake_servo_response
fbv-steering_servo_response
fbv-throttle_servo_response
platooning_selected
vehicle_action_requests

Output Flows:
feedback_actuator_response
feedback_actuator_status
manual_input_received
tbv-change_brake_setting
tbv-change_direction
tbv-change_throttle_setting
tbv-deploy_crash_restraints
tbv-steer_left
tbv-steer_right
tbv-steer_straight

Description:
This process shall be responsible for providing the interface between other automatic vehicle control process and the actuators which actually change the vehicle's controls. The process shall both implement commands and monitor the operation of the actuators to check that they only move when requested. If they move for any other reason, e.g. the driver has touched the vehicle controls, the process shall disable automatic operation. The process shall perform its own built-in self test (BIST) analysis. It shall report any errors that this shows to another process in the vehicle and shall cease to accept further requests to change the vehicle's actuators.

User Service Requirements:
6.0
6.1
6.1.0
6.1.1
6.1.1.1
6.1.1.1.1
6.1.1.1.2
6.1.1.1.2.1
6.1.1.1.2.2
6.1.1.1.3
6.1.1.1.3.1
6.1.1.3
6.1.1.3.1
6.1.2
6.1.2.3
6.1.2.3.1
6.1.3
6.1.3.3
6.1.3.3.1
6.2
6.2.0
6.2.1
6.2.1.3
6.2.1.3.1
6.2.2
6.2.2.3
6.2.2.3.1
6.3
6.3.0
6.3.3
6.3.3.1
6.6
6.6.0
6.6.1
6.6.1.2
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.3
6.7.2
6.7.2.1
6.7.2.3

3.2.3.4.1 Provide Speed Servo Control

Input Flows:
manual_throttle_input_detected
override_throttle
platoon_speed_servo_override
select_speed
speed
vehicle_speed_control_data

Output Flows:
feedback_speed_servo_status
throttle_commands

Description:
This process shall be responsible for providing data which enables the vehicle's throttle to be regulated in such a way that a desired vehicle speed is maintained. The process shall enable the throttle to be overridden temporarily in order to maintain a desired headway between the vehicle and others in a platoon. The data that actually changes the throttle's position shall be sent to the process that provides data to in-vehicle actuators. The process shall perform its own built-in self test (BIST) analysis. It shall report any errors that this shows to another process in the vehicle and shall cease to accept further requests to change the vehicle's throttle position.

User Service Requirements:
6.0
6.1
6.1.0
6.1.1
6.1.1.1
6.1.1.1.1
6.1.1.1.2
6.1.1.1.2.1
6.1.1.1.2.2
6.1.1.1.3
6.1.1.1.3.1
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.3
6.7.2
6.7.2.3

3.2.3.4.2 Provide Headway Servo Control

Input Flows:
headway
manual_brake_input_detected
platoon_headway_servo_override
select_headway
vehicle_headway_control_data

Output Flows:
brake_commands
feedback_headway_servo_status
override_throttle

Description:
This process shall be responsible for providing data which enables the vehicle's brake and throttle to be regulated in such a way that its headway, i.e. the distance between it and the vehicle in front, is maintained. The process shall support the brake movements that either maintain the vehicle's headway for normal operation, or hold it at the value used in platoon following, whether on or off automatic vehicle operations lanes. The process shall perform its own built-in self test. It shall report any errors that this shows to another process in the vehicle and shall cease to accept further requests to change the vehicle's brake setting.

User Service Requirements:
6.0
6.1
6.1.0
6.1.1
6.1.1.1
6.1.1.1.1
6.1.1.1.2
6.1.1.1.2.1
6.1.1.1.2.2
6.1.1.1.3
6.1.1.1.3.1
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.3
6.7.2
6.7.2.3

3.2.3.4.3 Provide Lane Servo Control

Input Flows:
lane_deviation
manual_steering_input_detected
override_lane_hold
platoon_lane_servo_override
select_lane_hold

Output Flows:
feedback_lane_servo_status
lane_steering_commands

Description:
This process shall be responsible for providing the data which enables the vehicle's steering to be adjusted so that it maintains a position that is in the middle of its current lane. The process shall enable this to be temporarily overridden as a result of action being taken by other processes to change lanes. The process shall perform its own built-in self test (BIST) analysis. It shall report any errors that this shows to another process in the vehicle and shall cease to accept further requests to change the vehicle's throttle position.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.3
6.7.2
6.7.2.3

3.2.3.4.4 Provide Change Lane Servo Control

Input Flows:
manual_steering_input_detected
platoon_change_lane_servo_override

Output Flows:
feedback_change_lane_servo_status
override_lane_hold
steering_commands

Description:
This process shall be responsible for providing the data which enables the vehicle's steering to be adjusted so that it will move either left or right from one lane to another. The process shall enable this to temporarily override the lane center holding facility available from another process in the vehicle. The process shall perform its own built-in self test (BIST) analysis. It shall report any errors that this shows to another process in the vehicle and shall cease to accept further requests to change the vehicle's throttle position.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.3
6.7.2
6.7.2.3

3.2.3.4.5 Provide Vehicle Control Data Interface

Input Flows:
avo_control_data_update
brake_commands
driver_commands
feedback_actuator_response
feedback_change_lane_servo_status
feedback_headway_servo_status
feedback_lane_servo_status
feedback_speed_servo_status
lane_steering_commands
platoon_following_commands
sensor_data
steering_commands
throttle_commands
vehicle_control_data_store

Output Flows:
actuator_commands
feedback_servo_status
headway
lane_deviation
manual_brake_input_detected
manual_steering_input_detected
manual_throttle_input_detected
platoon_change_lane_servo_override
platoon_headway_servo_override
platoon_lane_servo_override
platoon_speed_servo_override
select_headway
select_lane_hold
select_speed
speed
vehicle_control_data
vehicle_headway_control_data
vehicle_speed_control_data

Description:
This process shall be responsible for providing a communications and data processing interface between processes in the Provide Vehicle Control and Monitoring function. These processes shall comprise those responsible for controlling individual functions, e.g. throttle, brake, etc., and those that interface to actuators and those that monitor vehicle operation.

User Service Requirements:
6.0
6.1
6.1.0
6.1.1
6.1.1.1
6.1.1.1.1
6.1.1.1.2
6.7
6.7.0
6.7.1
6.7.1.2
6.7.1.2.3
6.7.2
6.7.2.3

3.2.3.5 Process Vehicle Sensor Data

Input Flows:
fbv-vehicle_headway
fbv-vehicle_lane_position
fbv-vehicle_on_avo_lane
fbv-vehicle_speed

Output Flows:
feedback_sensor_status
sensor_data

Description:
This process shall be responsible for providing the facility to decode the input being sent to on-board vehicle sensors. The process shall support inputs to those sensors that monitor conditions both on-board the vehicle and in the way the vehicle relates to its surroundings. The data produced by the process shall be sent to another process which shall determine if any action is required.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.3
6.7.1.2
6.7.1.2.1
6.7.1.2.3
6.7.1.3
6.7.1.3.2
6.7.2
6.7.2.1
6.7.2.3

3.2.4 Process Sensor Data for Automatic Vehicle Operations

Input Flows:
fbv-vehicle_condition

Output Flows:
avo_vehicle_data

Description:
This process shall be responsible for analyzing the input from the vehicle that provides information about its condition and that it is on an automated vehicle operations lane. The process shall continuously analyze this data and provide output to the process that provides automated control.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.3
6.7.1.2
6.7.1.2.1
6.7.1.2.3
6.7.1.3
6.7.1.3.2
6.7.2
6.7.2.1
6.7.2.3

3.2.5 Check Vehicle for Automated Operations Eligibility

Input Flows:
avo_control_information
avo_vehicle_checking_parameters
avo_vehicle_condition

Output Flows:
avo_check_response
avo_checking_data
avo_vehicle_checking_parameters

Description:
This process shall be responsible for checking that vehicles are eligible for using the automated vehicle operations lanes on a highway. The process shall decide whether or not the vehicle is suitable for has operation by checking locally stored data that has been provided by a process in the Manage Traffic function, against data from the vehicle provided through the check request by a process on-board the vehicle. The process shall send the results of the check to the process on-board the vehicle that requested the automated vehicle operations check-in. The vehicles that are successfully checked-in shall also be down loaded with automated vehicle control data from this process.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.2

3.2.6 Manage Check-in and Check-out

Input Flows:
avo_checking_data
avo_control_data_changes
avo_route_data

Output Flows:
avo_checking_details
avo_control_information
avo_device_status
avo_equip_status_for_m_and_c

Description:
This process shall be responsible for managing the checking in and checking out of suitably equipped vehicles requesting to use automated vehicle operations lanes. The process shall provide the special vehicle control parameters needed for automated vehicle operation to the process that manages check-in and collect data on vehicles that request check-in and check-out from that process. This process shall send a record of all check-in and check-out transactions regardless of whether they are successful or not, to the process responsible for managing operational data. The process shall accept inputs to control the automated vehicle operations equipment and return operational status (state of the device, configuration, and fault data) to the Manage Traffic and Manage Maintenance and Construction functions to arrange for repair.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.1
6.7.1.1.2
6.7.1.1.3

3.2.7 Manage Automatic Vehicle Operations

Input Flows:
avo_checking_details
avo_control_data
avo_usage_data

Output Flows:
automated_lane_changing_control_data
avo_control_data_changes
avo_operational_data
avo_usage_data

Description:
This process shall be responsible for recording data about vehicles that have requested check-in and check-out for the use of the automated vehicle operations lanes, and for receiving control parameters from a process in the Manage Traffic function. The process shall manage automated lane changing operations in a work zone. The process shall provide a process at the roadside with the vehicle control parameters needed for automatic vehicle operation. The process shall keep a log of all check-in and check-out transactions received from the roadside process regardless of whether they are successful or not, and periodically pass this data on to the Manage Archived Data function.

User Service Requirements:
6.0
6.7
6.7.0
6.7.1
6.7.1.1
6.7.1.1.1
6.7.1.1.2
6.7.1.1.3
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.1
8.1.3.1.3.1(a)
8.1.3.1.3.1(b)
8.1.3.1.3.1(c)
8.1.3.1.3.1(d)
8.1.3.1.3.1(e)
8.1.3.1.3.1(f)
8.1.3.1.3.2
8.1.3.1.3.3

3.2.8 Provide Automated Lane Changing

Input Flows:
automated_lane_changing_control_data
traffic_sensor_data_for_automated_lane_changing

Output Flows:
lane_change_details
lane_change_strategy

Description:
This process shall be responsible for providing automated lane changing within a work zone. The process shall receive traffic sensor data from sensors within the work zone. The process shall receive control data from another process in Provide Automatic Vehicle Operation. Based upon these inputs the process shall develop a lane changing strategy, and shall develop detailed lane changing parameters (e.g. exactly where, and at what speed the lane change will take place). The process shall output lane change strategy information and detailed lane change parameters to the process that provides actual vehicle control.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.1
8.1.3.1.3.1(a)
8.1.3.1.3.1(b)
8.1.3.1.3.1(c)
8.1.3.1.3.1(d)
8.1.3.1.3.1(e)
8.1.3.1.3.1(f)
8.1.3.1.3.3

3.3.1 Provide Communications Function

Input Flows:
emergency_data_request
emergency_request_vehicle_acknowledge
vehicle_emergency_request
vehicle_security_system_commands

Output Flows:
emergency_message_auto_output
emergency_request_vehicle_details
tbv-vehicle_security_system_commands
vehicle_security_system_commands_request
vehicle_status_update

Description:
This process shall be responsible for sending messages it receives from other processes in this facility to the Manage Emergency Services function. It shall also be responsible for passing on the resulting response to the driver via processes in the Provide Driver and Traveler Services function. This process is also capable of receiving requests for additional data from the Manage Emergency Services function and transmitting follow-up details. This process can also receive commands related to the vehicle's security system from the Manage Emergency Services function and forward the commands to the vehicle's security system.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.3

3.3.2 Build Automatic Collision Notification Message

Input Flows:
fbv-crash_sensor_data
processed_cargo_data
vehicle_identity_for_collision_notification_store
vehicle_location_for_incidents
vehicle_status_details_for_emergencies

Output Flows:
cargo_data_request
vehicle_emergency_request

Description:
This process shall be responsible for preparing and submitting data for transmission to the Manage Emergency Services function. The data shall be sent by this process when an emergency situation is detected by analyzing inputs from the vehicle or vehicle cargo. This process shall produce its outputs regardless of any action by the driver and shall be designed to be as the result of a crash which may have prevented the driver from initiating the emergency request personally.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.4
5.1.2
5.1.2.1
5.1.2.1.1
5.1.2.1.2
5.1.2.2
5.1.2.2(a)

3.4 Enhance Driver's Vision

Input Flows:
fre-roadway_characteristics

Output Flows:
vision_data

Description:
This process shall be responsible for providing data from which a continuously updated display showing an enhanced version of the driver's vision. The process shall produce the data for this display using inputs to sensors mounted on the vehicle. It shall operate at all times and shall send its output to another process for integration with other messages for the driver.

User Service Requirements:
6.0
6.4
6.4.0
6.4.1

3.5 Generate Vehicle Access Requests

Input Flows:
fd-driver_vehicle_access_request
vehicle_barrier_access_status

Output Flows:
td-driver_vehicle_access_status
vehicle_barrier_access_request

Description:
This process shall be responsible for generating access requests to secure areas, such as shipping yards, warehouses, airports, transit-only ramps, parking gates and other areas. This process shall accept inputs from the vehicle driver that include the necessary identity information (id, PIN codes, etc.). This process shall generate the request to activate a barrier to gain access to the secure area. Once the access status is received from the roadside device the status shall be passed onto the driver.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.3
1.6.3.3.4
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.1
5.1.3.5.1(a)
5.1.3.5.3
5.1.3.5.4

4.1.1 Process On-Board Systems Data

Input Flows:
fbtv-vehicle_maintenance_data
fbtv-vehicle_trip_data
ft-boarding_and_alighting
transit_vehicle_collected_maintenance_data_request

Output Flows:
transit_vehicle_arrival_times
transit_vehicle_collected_maintenance_data
transit_vehicle_on_board_data
transit_vehicle_passenger_loading
transit_vehicle_running_times

Description:
This process shall collect and process data available to sensors and systems on-board transit vehicles. This data includes on-board data (such as the status of on-board systems), passenger count as they board and exit the vehicle, and collected trip data. This data shall be sent by this process to other processes on-board the transit vehicle and elsewhere in the Manage Transit function for use in determining vehicle schedule deviations and for storage as operations data. This process shall also collect and process vehicle maintenance data available to sensors on-board transit vehicles. When processed, the data shall be sent by this process on request to another process in the Manage Transit function for storage as transit vehicle operating data so that it can subsequently be used for work on future vehicle maintenance.

User Service Requirements:
2.0
2.1
2.1.0
2.1.1
2.1.1.1
2.1.1.1(a)
2.1.1.1(b)
2.1.1.1(d)
2.1.1.1(e)
2.1.5
2.1.5.1
2.1.5.1.1

4.1.2 Determine Transit Vehicle Service Status

Input Flows:
approved_corrective_plan
ftvo-transit_service_status
road_network_info_for_transit
signal_priority_rules
schedule_change_for_connection_protection
transit_services_for_corrections
transit_services_for_eta
transit_vehicle_arrival_times
transit_vehicle_assignment_for_vehicle
transit_vehicle_location_for_eta
transit_vehicle_service_enable
traveler_transit_information

Output Flows:
transit_service_status
transit_services_for_eta_request
transit_vehicle_deviations_from_schedule
transit_vehicle_eta
transit_vehicle_eta_for_advisory
transit_vehicle_roadway_priorities
transit_vehicle_schedule_deviation
transit_vehicle_service_update
transit_vehicle_status_for_signing
ttvo-corrective_instructions
ttvo-transit_vehicle_schedule_deviations

Description:
This process shall determine the overall status of the transit vehicle, including the assigned operator, route, and schedule. This process shall determine the schedule deviation and estimated times of arrival (ETA) at transit stops of a transit vehicle. The data shall be used to calculate corrective instructions for output to the transit vehicle operators, for use in calculation of a much wider return to schedule strategy where more than one vehicle and/or service is involved. This process shall also send the data to the transit vehicle operator so that the operator is aware of the actual schedule deviation. This process shall generate corrective instructions for output to the transit vehicle operator by a process on-board the vehicle and priority requests for traffic signal controllers at intersections. The process shall receive input from the transit vehicle operator that is then distributed to another process in Manage Transit concerning transit schedules, passenger loading, and other service status. The interface shall also provide data to the transit vehicle operator about how far the vehicle is from its schedule and what corrective action the operator must take. This process shall provide requests for signal priority in a form that can be used by the controllers at intersections, pedestrian crossings, and multimodal crossings on the roads (surface streets) and freeway (ramp controls) network served by the Manage Traffic function to provide priority of the transit vehicle. This process shall provide the capability to broadcast a message concerning the status of the vehicle (e.g. that the vehicle is loading passengers or reentering the traffic lanes) to equipped vehicles in the vicinity.

User Service Requirements:
2.0
2.1
2.1.0
2.1.1
2.1.1.2
2.1.1.2.1
2.1.1.2.1.1
2.1.1.2.1.3
2.1.1.2.1.4
2.1.1.2.1.4(a)
2.1.1.2.1.4(b)
2.1.1.2.2
2.1.1.2.3
2.1.1.2.4

4.1.3 Provide Transit Vehicle Location Data

Input Flows:
From_Location_Data_Source
transit_vehicle_on_board_data

Output Flows:
paratransit_vehicle_location
secure_sensors_transit_vehicle_location
secure_surveillance_transit_vehicle_location
secure_transit_vehicle_location
transit_vehicle_location_for_advisories
transit_vehicle_location_for_deviation
transit_vehicle_location_for_eta
transit_vehicle_location_for_fares
transit_vehicle_location_for_security
transit_vehicle_location_for_store

Description:
This process shall provide the transit vehicle's current location with a high degree of accuracy. The location shall be computed by this process from data sent by other processes that provides basic vehicle location and on-board vehicle conditions, such as proximity to transit stop, vehicle doors opened or closed, etc. The data shall be output continuously by the process and sent to other processes for their use and for storage.

User Service Requirements:
2.0
2.1
2.1.0
2.1.1
2.1.1.1
2.1.1.1(d)
2.1.1.1(f)
2.1.2
2.1.2.2
2.1.2.2.1
2.1.2.2.1(a)
2.1.2.2.1(b)

4.1.4 Manage Transit Vehicle Deviations

Input Flows:

fevp-event_data_for_transit
ftrop-approved_corrections
incident_response_log_for_transit
m_and_c_work_plans_for_transit
planned_events
prediction_data
roadway_maint_status_for_transit
transit_highway_priority_given
transit_ramp_priority_given
transit_road_priority_given
transit_services_for_scenarios
transit_vehicle_deviations_from_schedule
transit_vehicle_location_for_deviation
vehicle_correction_actions

Output Flows:

approved_corrective_plan
m_and_c_plan_feedback_from_transit
signal_priority_rules
tevp-event_confirmation_from_transit
tmtsp-transit_arrival_deviations
transit_highway_overall_priority
transit_ramp_overall_priority
transit_road_overall_priority
transit_vehicle_deviation_update
transit_vehicle_reassignment_request
ttrop-proposed_corrections

Description:

This process shall manage large deviations of individual transit vehicles, deviations in rural areas, and deviations of large numbers of vehicles. The process shall generate the necessary corrective actions which may involve more than the vehicles concerned and more far reaching action, such as, the introduction of extra vehicles, wide area signal priority by the Manage Traffic function, the premature termination of some services, etc. In addition, this process will receive roadway maintenance status and work plan information from the Manage Maintenance and Construction function, and shall respond to that function with feedback regarding the work plan. Event plans from Event Promoters shall be received and confirmed. All corrective actions generated by this process shall be subject to the approval of the transit operations personnel before being implemented. The process shall generate transit signal priority business rules that are provided to the transit vehicle. Confirmation that the requested overall priority has been given by the Manage Traffic function shall be received by the process. This process shall provide the interface through which multimodal transportation service providers are informed of transit vehicle schedule deviations. The process shall provide the output in a form that enables adjustments to be made to any connecting services being provided by the multimodal supplier so that travelers are not inconvenienced by the deviations.

User Service Requirements:

2.0
2.1
2.1.0
2.1.1
2.1.1.2
2.1.1.2.1
2.1.1.2.1.4
2.1.1.2.2
2.1.1.2.3
2.1.1.2.4
8.0
8.1
8.1.0
8.1.1
8.1.1.2
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.1(d)
8.1.1.6.6
8.1.2
8.1.2.2
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.1.3
8.1.3.2
8.1.3.2.1
8.1.3.2.1(a)
8.1.3.2.1(b)
8.1.3.2.1(c)
8.1.3.2.1(d)
8.1.3.2.1(e)
8.1.3.2.1(f)
8.1.3.2.1(g)
8.1.3.2.1(h)
8.1.3.2.1(i)
8.1.3.2.1(j)
8.1.3.2.1(k)
8.1.3.2.4
8.1.3.2.4(e)
8.1.3.3
8.1.3.3(a)
8.1.3.3(b)
8.1.3.3(c)
8.1.3.3(d)
8.1.4
8.1.4.1
8.1.4.2
8.1.4.3
8.1.4.3(c)

4.1.5 Provide Transit Vehicle Status and Probe Information

Input Flows:
ftrop-request_transit_vehicle_data
transit_conditions_demand_request
transit_vehicle_information

Output Flows:
transit_information_request
transit_probe_data_for_isp
transit_probe_data_for_traffic
transit_running_data_for_demand
transit_vehicle_data
transit_vehicle_data_for_archive
transit_vehicle_status
ttrop-transit_vehicle_data

Description:
This process shall provide transit vehicle operational data to processes within the Manage Transit function, and on request to the transit system operator and the Manage Traffic function. The process shall aggregate probe data from individual transit vehicles to create summary information. This process shall also provide location-based transit probe information to the Manage Traffic and Provide Driver and Traveler Services functions for determination of traffic conditions. Transit probe information can be provided by fixed route, flexibly routed, or paratransit services. The process shall aggregate vehicle maintenance data and provide to the Schedule Transit Vehicle Maintenance function. The data shall be obtained by this process from another process that manages a store of transit vehicle operating data.

User Service Requirements:
2.0
2.1
2.1.0
2.1.1
2.1.1.1
2.1.1.2
2.1.1.2.1
2.1.1.2.1.2
2.1.1.2.1.3

4.1.6 Manage Transit Vehicle Operations

Input Flows:

asset_restrictions_for_transit
current_incidents_data_for_transit
dynamic_parking_information_for_transit
fstws-surface_trans_weather_forecasts
fstws-surface_trans_weather_observations
ftrop-parking_information_request
ftrop-trans_weather_info_request
ftrop-transit_operations_inputs
fws-current_weather_observations
fws-weather_forecasts
request_transit_operator_authentication
road_weather_info_for_transit
roadway_detours_and_closures_for_transit
traffic_data_for_transit
traffic_video_for_transit
transit_information_request
transit_service_status
transit_vehicle_assignment_for_operations
transit_vehicle_collected_maintenance_data
transit_vehicle_deviation_update
transit_vehicle_eta
transit_vehicle_location_for_store
transit_vehicle_operating_data
transit_vehicle_operator_authentication_status
transit_vehicle_passenger_loading
transit_vehicle_running_times
transit_vehicle_schedule_deviation
transit_vehicle_service_update
transportation_information_for_transit_operations
work_zone_info_for_transit

Output Flows:

parking_facility_information
parking_lot_dynamic_information_request_by_transit
personal_parking_facility_information
road_network_info_for_transit
schedule_change_for_connection_protection
tm-transit_schedule_deviations_to_media
traffic_incident_data_for_transit
transit_vehicle_advisory_eta
transit_vehicle_arrival_time
transit_vehicle_collected_maintenance_data_request
transit_vehicle_deviations_details
transit_vehicle_information
transit_vehicle_off_route_indication
transit_vehicle_operating_data
transit_vehicle_operator_authentication
transit_vehicle_operator_authentication_database_update
transit_vehicle_service_enable
transit_vehicle_user_data
tstws-trans_weather_info_request
ttrop-parking_information
ttrop-traffic_and_maint_and_const_data
ttrop-transit_operations_information
ttrop-transp_information_for_transit_operations
ttrop-weather_information

Description:

This process shall manage transit vehicle operations data. The data is collected from processes in transit vehicles and from other processes within the Manage Transit function. The process shall manage a store of transit vehicle operating data. When any new data is received from another process, this process shall load it into the data store. This process shall provide information on transit system operations to the transit system operator and receive inputs from the transit system operator to manage transit vehicle operations. The transit vehicle operations data shall be sent on to another process within the Manage Transit function to manage transit vehicle schedule deviations. This process shall perform authentication of the transit vehicle operator, if that authentication is done by the Transit Management Center. If authentication is done on the vehicle, the database of valid transit vehicle operators stored on the vehicle is periodically updated. This process also analyzes the transit vehicle ETA to determine if the vehicle is off-route, and sends this indication to another process in the Manage Transit function. This process will receive road weather information, asset restriction data, and work zone information from the Manage Maintenance and Construction function, traffic information from the Manage Traffic function, transportation system operations information from the Provide Driver and Traveler Services function, and weather information from the Weather Service and Surface Transportation Weather Services terminators. The process shall provide all this information to the Transit System Operator and to a process in Manage Transit that will provide it to the Transit Vehicle Operator. This process will also request and receive dynamic parking information for transit. Dynamic parking information for transit includes parking lot occupancy and state and detailed departure and arrival information. This process shall provide a dispatch control function for the transit facility. The process shall initialize vehicles and vehicle operators in preparation for the start of the operating day. It shall control exit and return of transit vehicles to the transit facility. This process shall receive vehicle location information from another process within the Operate Transit Vehicles and Facilities functional domain to determine advance notice of returning vehicles. It shall receive schedule assignment information from another process to determine vehicle and vehicle operator pairings and

departure times. It shall receive information from another process to authenticate vehicle operators and grant them access to their assigned vehicles. The output of this process shall be sent to the operations functions to update vehicle operational status and to initiate vehicle tracking during the operating day.

User Service Requirements:

2.0
2.1
2.1.0
2.1.1
2.1.1.1
2.1.1.1(a)
2.1.1.1(b)
2.1.1.1(e)
2.1.1.2
2.1.1.2.1
2.1.1.2.1.1
2.1.1.2.4
2.1.2
2.1.2.2
2.1.2.2.1
2.1.2.2.1(c)
2.1.3
2.1.3.2
2.1.3.2.3
2.1.3.2.3(b)
2.1.3.2.5
2.1.5
2.1.5.2
2.1.5.2.3
2.4
2.4.0
2.4.4
2.4.4.7
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
8.0
8.1
8.1.0
8.1.1
8.1.1.2
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.1(d)
8.1.1.6.2
8.1.1.6.3
8.1.1.6.3(a)
8.1.1.6.3(b)
8.1.1.6.4
8.1.1.6.6
8.1.2
8.1.2.2
8.1.2.4
8.1.2.4.1
8.1.2.4.2
8.1.2.4.2(a)
8.1.2.4.2(b)
8.1.2.4.3
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.2
8.1.3.2.1
8.1.3.2.1(a)
8.1.3.2.1(b)
8.1.3.2.1(c)
8.1.3.2.1(d)
8.1.3.2.1(e)
8.1.3.2.1(f)
8.1.3.2.1(g)
8.1.3.2.1(h)
8.1.3.2.1(i)
8.1.3.2.1(j)
8.1.3.2.1(k)
8.1.3.2.4
8.1.3.2.4(e)
8.1.3.3
8.1.3.3(a)
8.1.3.3(b)
8.1.3.3(c)
8.1.3.3(d)
8.1.4
8.1.4.1
8.1.4.2
8.1.4.3
8.1.4.3(c)

4.1.7 Provide Transit Advisory Interface on Vehicle

Input Flows:
ft-destination_on_vehicle
ft-other_services_vehicle_request
ft-request_advisory_information
other_services_vehicle_response
secure_transit_vehicle_broadcast_message
transit_traveler_wide_area_alert_info
transit_vehicle_advisory_eta
transit_vehicle_eta_for_advisory
transit_vehicle_location_for_advisories
traveler_transit_information_for_transit_advisories

Output Flows:
other_services_vehicle_request
transit_advisory_vehicle_information
tt-advisory_information
tt-other_services_vehicle_confirmed
tt-secure_transit_vehicle_broadcast_message
tt-traveler_information

Description:
This process shall provide a data input and output interface for a traveler on-board a transit vehicle. The process shall enable traffic and travel advisory information, plus yellow pages (including non-motorized transportation) information to be requested and output to the traveler. The process shall gather transit advisory data to construct the outputs of the process. The data may include alerts and advisories pertaining to major emergencies, or man made disasters. The interface shall receive requests from the traveler specifying the required destination of a transit service ride and other (yellow pages) type services. The traveler may also request and receive information about the state of traffic on the roadway, as well as transit route and stop data (i.e., traffic and transit advisory data). Outputs are customized to the current location of the transit vehicle. In addition to the traveler's request/response for information, broadcast advisories about the imminent arrival of the transit vehicle at the next stop or security announcements are also communicated to travelers via an on-board automated annunciation system. The input and output forms shall also include those that are suitable for travelers with physical disabilities.

User Service Requirements:

1.0	2.1.0	2.2.1.2.2
1.5	2.1.1	2.2.1.2.2.1
1.5.0	2.1.2	2.2.1.2.2.2
1.5.2	2.1.2.2	2.2.1.2.2.3
1.5.2.1	2.1.2.2.4	2.2.1.2.2.4
1.5.2.2	2.2	5.0
1.5.2.3	2.2.0	5.1
1.8	2.2.1	5.1.0
1.8.0	2.2.1.1	5.1.4
1.8.1	2.2.1.1.1	5.1.4.1
1.8.1.6	2.2.1.1.2	5.1.4.1.1
1.8.1.6(b)	2.2.1.1.3	5.1.4.1.2
2.0	2.2.1.1.4	5.1.4.2
2.1	2.2.1.2	5.1.4.2.1

4.1.8 Manage Individual Service Requests

Input Flows:
current_connection_status
current_connection_status_from_other_transit
fmtsp-individual_service_response
fotrm-individual_service_response
transit_trip_confirmation
transit_trip_confirmation_from_kiosks
transit_trip_confirmation_from_user
transit_trip_request
transit_trip_request_from_kiosks
transit_trip_request_from_user
transit_user_information

Output Flows:
connection_change_request
connection_change_request_for_other_transit
individual_transit_trip_plan
individual_transit_user_trip_plan
tmtsp-individual_service_request
totrm-individual_service_request
transit_trip_plan_for_kiosks
transit_trip_plan_for_user

Description:
This process shall manage service requests for routing of an individual through the transit system. The process shall take requests from other processes (associated with the Information Service Provider or the Transit Passenger Information functions) and provide transit plans for both fixed and demand responsive transit. The process shall be able to coordinate with Other Transit Management systems or Multimodal Transportation Service Providers in order to provide a complete multimodal trip plan. In a more advanced implementation the process shall accept confirmations for the plans provided, track the passenger through the transit network, and coordinate with Other TRM and Multimodal Transportation Service Providers so that the passenger makes efficient connections between the transit system and other transit systems or other modes of transportation.

User Service Requirements:
2.0
2.1
2.1.0
2.1.1
2.1.1.2
2.1.1.2.1
2.1.1.2.1.4
2.1.1.2.1.4(a)
2.1.1.2.1.4(b)
2.1.1.2.1.4(c)
2.1.1.2.2
2.1.1.2.3
2.1.1.2.4
2.1.1.2.5
2.3
2.3.0
2.3.2
2.3.2.11

4.2.1.1 Process Demand Responsive Transit Trip Request

Input Flows:
paratransit_schedule
paratransit_service_confirmation
paratransit_service_data
paratransit_trip_request

Output Flows:
paratransit_personal_schedule
paratransit_request
paratransit_requested_services
paratransit_service_data
paratransit_service_data_for_archive

Description:
This process shall provide the interface through which processes in the Provide Driver and Traveler Service function can gain access to the Provide Demand Responsive Transit Service facility. The process shall enable the interface to support the receipt of trip requests, their transfer to another process for the actual demand responsive and flexible-route schedule generation, the output of the proposed schedule and their (possible) subsequent confirmation. The process shall store the input and schedule data relating to each request until such time as the request is confirmed or the data in the request is no longer valid, e.g. the time(s) used in the proposed schedule has(ve) passed. The confirmation of a particular schedule shall be sent by the process to another process that will enable the schedule to be implemented.

User Service Requirements:
2.0
2.3
2.3.0
2.3.1
2.3.1.1
2.3.1.2
2.3.2
2.3.2.7

4.2.1.2 Compute Demand Responsive Transit Vehicle Availability

Input Flows:
paratransit_transit_vehicle_availability
paratransit_vehicle_location

Output Flows:
paratransit_available_vehicles

Description:
This process shall provide the facility for the calculation of the location and availability of transit vehicles for use in demand responsive and flexible-route transit operations. The process shall base its calculation on the vehicle's current location and on the output from a process that determines vehicle availability from data input to sensors. The output of available vehicles shall be sent for use by another process generating the schedules.

User Service Requirements:
2.0
2.3
2.3.0
2.3.2
2.3.2.6
2.3.2.7

4.2.1.3 Generate Demand Responsive Transit Schedule and Routes

Input Flows:
current_incidents_data_for_transit
paratransit_available_vehicles
paratransit_request
traffic_data_for_transit
transit_services_for_demand_response

Output Flows:
paratransit_schedule
paratransit_services
transit_services_demand_response_request

Description:
This process shall provide dynamic routing and scheduling of transit vehicles so that a demand responsive and/or flexible-route transit service can be provided. The generation of the specific route and schedule by the process shall be initiated by a request from another process. The choice of route and schedule produced by the process shall depend on what other demand responsive and flexible-route transit schedules have been planned, the availability and location of vehicles, the relevance of any fixed transit routes and schedules, and road network information. The process shall send its output for use if the schedule is later confirmed. Traffic incident data shall be received from the Manage Traffic function and sent on to the process that manages the interface to other transit management centers.

User Service Requirements:
2.0
2.3
2.3.0
2.3.2
2.3.2.1
2.3.2.10
2.3.2.2
2.3.2.3
2.3.2.4
2.3.2.5
2.3.2.6
2.3.2.7
2.3.2.8
2.3.2.9
2.3.4
2.3.4.2

4.2.1.4 Confirm Demand Responsive Transit Schedule and Route

Input Flows:
paratransit_requested_services
paratransit_service_status
paratransit_services

Output Flows:
paratransit_service_output
paratransit_services_for_transit_vehicle_operators
paratransit_transit_vehicle_operator_instructions
ttrop-paratransit_service

Description:
This process shall provide output when a demand responsive or flexible-route transit schedule is confirmed. The outputs shall contain details of the schedule and shall be sent to the transit operations personnel and to processes that provide interfaces to the transit vehicle operator, a store of data used by the regular transit routes and schedule generation processes, and the transit vehicle operator schedule generation processes. The process shall obtain the data for the outputs from the schedule generation process.

User Service Requirements:
2.0
2.3
2.3.0
2.3.1
2.3.1.3
2.3.2
2.3.2.2
2.3.2.3
2.3.4
2.3.4.3

4.2.1.5 Process Demand Responsive Transit Vehicle Availability Data

Input Flows:
fbtv-availability

Output Flows:
paratransit_transit_vehicle_availability

Description:
This process shall manage data input to sensor(s) on-board a transit vehicle. Data including the vehicle's availability for use in demand responsive and flexible-route transit services shall be provided by this process to other processes within the Manage Transit function.

User Service Requirements:
2.0
2.3
2.3.0
2.3.3
2.3.3.1
2.3.3.1(a)
2.3.3.1(b)
2.3.3.1(c)
2.3.3.2
2.3.3.2(a)
2.3.3.2(b)
2.3.3.3

4.2.1.6 Provide Demand Responsive Transit Vehicle Operator Interface

Input Flows:
ftvo-paratransit_status
paratransit_transit_vehicle_operator_instructions

Output Flows:
paratransit_service_status
ttvo-paratransit_information

Description:
This process shall receive the status of demand responsive or flexible-route transit schedules and passenger loading from the transit vehicle operator, which is then distributed to another process in Manage Transit. This process shall also provide the interface through which a transit vehicle operator will be sent instructions about the demand responsive or flexible-route transit schedule that has been confirmed. The process shall send the data in a format that will enable the transit vehicle operator to implement the schedule. The output provided by the process shall be available in audio or visual form in such a way that while alerting the vehicle operator to the information it contains, it shall in no way impair the operator's ability to operate the vehicle in a manner that is both safe to its passengers, and to other vehicles on the roads and freeways. The input and output forms shall also include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.3
2.3.0
2.3.5
2.3.5.1
2.3.5.2
2.3.5.2(a)
2.3.5.2(b)
2.3.5.3
2.3.5.4
2.3.5.4(a)
2.3.5.4(b)

4.2.2 Provide Transit Plans Store Interface

Input Flows:
paratransit_service_output
transit_plans
transit_routes_request
transit_routes_updates
transit_schedule_request
transit_schedule_updates
transit_services_demand_response_request

Output Flows:
transit_plans
transit_plans_for_assignment
transit_routes_current_data
transit_schedule_current_data
transit_services_for_demand_response

Description:
This process shall provide the interface to the store of current regular transit plans, i.e., fixed-route, flexible-route and demand responsive transit service schedules and routes. The process shall enable the store to be used by both flexible-route and demand responsive transit facilities as a source of data about regular transit services when it is generating its schedules. The demand responsive and flexible-route transit schedule data shall be accessible as input to the fixed-route and flexible-route transit route and schedule generation processes.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.1
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.4

4.2.3.1 Generate Transit Routes

Input Flows:
emergency_transit_route
map_data_for_transit_routes
transit_operational_data_for_routes
transit_routes_current_data
update_transit_routes

Output Flows:
transit_routes_data
transit_routes_request
transit_routes_updates

Description:
This process shall generate new transit routes. The process shall use parameters set up by the transit system operator, operational data for the current routes and schedules, plus the current routes and digitized map data, as sources of input from which the new routes are generated. The process shall also use the requested input data containing flexible-route and demand responsive transit routes and schedules. The generation of new routes by the process shall be initiated as a result of data received from the transit system operator interface process, with the output being sent to other processes for storage. The output data produced by the process shall include sufficient data for a specialist map data provider to generate maps showing transit routes and stops, either as separate data or as part of the general digitized map data provided to other ITS functions. In the event that an emergency transit route is received to support an incident, disaster, evacuation, or other emergency, the process will override existing routes and implement the emergency routes.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1

4.2.3.2 Generate Transit Schedules

Input Flows:
emergency_transit_schedule
transit_operational_data_for_schedules
transit_schedule_current_data
update_transit_schedules

Output Flows:
transit_schedule_data
transit_schedule_request
transit_schedule_updates

Description:
This process shall generate new transit schedules for use by fixed-route and flexible-route transit operations. The process shall use parameters set up by the transit system operator, operational data for the current routes and schedules, plus the current routes and schedules themselves, as sources of input from which the new schedules are generated. The process shall also use the data containing flexible-route and demand responsive transit routes and schedules to generate the new schedules. The generation of new schedules by the process shall be initiated as a result of data received from the transit system operator interface process or a request for services to a parking lot. The process shall send its output to another process for storage. In the event that an emergency transit schedule is received to support an incident, disaster, evacuation, or other emergency, the process will override the existing schedules as needed to implement the emergency schedule.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.1
2.1.2.2
2.1.2.2.1
2.1.2.2.2
2.1.2.2.3
2.1.2.2.5
2.1.2.2.6

4.2.3.3 Produce Transit Service Data for External Use

Input Flows:
connection_change_request
static_parking_information_for_transit
transit_service_external_data
transit_services_demand_request
transit_services_guidance_request
transit_services_personal_request
transit_services_travelers_request

Output Flows:
current_connection_status
parking_lot_static_information_request_by_transit
request_transit_service_external_data
tmtsp-service_request
tmtsp-transit_service_data
transit_services_for_demand
transit_services_for_deployment
transit_services_for_guidance
transit_services_for_isp
transit_services_for_personal_devices
transit_services_for_travelers
traveler_transit_information
traveler_transit_information_for_transit_advisories
vehicle_correction_actions

Description:
This process shall obtain transit routes, services and static parking data and distribute it to ITS functions that are outside the transit center. Static parking data includes parking lot rates, hours of operation, etc. The process shall run when a request for data is received from an external source, or when fresh data is received. Data requests shall not be supported for travelers in a transit vehicle or the Multimodal Transportation Service Provider. For data requests that include an origin and a destination, the process shall only provide details of the transit service(s), including transfer points, that link the two points. The details shall only cover those portion(s) of the service(s) that are needed to complete the requested trip and not full details of the services. In order to share transfer cluster data between multimodal transportation service providers, transfer clusters will initially be introduced from the multimodal transportation service provider into another process, sent to this process as part of external data, where it is returned to the multimodal transportation service provider as processed data.

User Service Requirements:
2.0
2.3
2.3.0
2.3.2
2.3.2.2
2.3.2.3

4.2.3.4 Provide Transit Operations Personnel Interface for Services Generation

Input Flows:
ftrop-initiate_service_updates
ftrop-planning_parameters
ftrop-planning_parameters_update_request
ftrop-transit_display_update_request
ftrop-transit_services_output_request
map_data_for_transit_operator
transit_archive_data_product
transit_service_planning_parameters
transit_services_changes_request
transit_services_data_for_output

Output Flows:
request_transit_map_update
request_transit_services_data_for_output
transit_archive_data_product_request
transit_service_planning_parameters
transit_services_changes_response
ttrop-parameters
ttrop-transit_services_output
update_transit_routes
update_transit_schedules

Description:
This process shall provide the interface through which the transit operations personnel controls the generation of new routes and schedules (transit services). The personnel shall be able to review and update the parameters used by the routes and schedules generation processes and to initiate these processes. This process shall support the requesting and receipt of archive data products from the Manage Archived Data function that will support the transit operation. This process shall also act as the interface through which the Manage Demand facility in the Manage Traffic function can request changes to the current routes and schedules in its efforts to adjust the modal split of travelers' trips in order to make the most efficient use of the road and highway network served by the local ITS functions. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.1
2.1.2.1.2
2.1.2.2
2.1.2.2.2
2.1.2.2.4
2.1.2.2.4(a)
2.1.2.2.4(b)

4.2.3.5 Manage Transit Operational Data Store

Input Flows:
ftrop-passenger_loading_updates
transit_operational_data
transit_roadside_passenger_data
transit_vehicle_assignment_data
transit_vehicle_availability
transit_vehicle_data
transit_vehicle_passenger_data

Output Flows:
transit_operational_data
transit_operational_data_for_archive
transit_operational_data_for_routes
transit_operational_data_for_schedules
transit_roadside_passenger_data_request
ttrop-passenger_loading_error

Description:
This process shall collect transit operational data and load it into a data store for use by the routes and schedules generation processes. The data shall be provided to this process by other processes in the Manage Transit function and shall enable an accurate picture of how routes and schedules are currently operating in terms of the numbers of vehicles that are available, the numbers of passengers that they are carrying, and the numbers of passengers passing through each roadside facility (transit stop).

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.1
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.4
2.3.0
2.3.4

4.2.3.6 Produce Transit Service Data for Manage Transit Use

Input Flows:
transit_service_internal_data
transit_services_for_eta_request

Output Flows:
request_transit_service_internal_data
transit_services_for_advanced_fares
transit_services_for_corrections
transit_services_for_eta
transit_services_for_roadside_fares
transit_services_for_scenarios
transit_services_for_transit_vehicle_operators
transit_services_for_vehicle_fares

Description:
This process shall obtain transit routes and services data and distribute it internally to other processes in the Manage Transit function. The process shall only provide its outputs when fresh data is received from another process. If this does not happen for a long period of time (days), then the process shall initiate its own request for fresh data.

User Service Requirements:
2.0
2.3
2.3.0
2.3.2
2.3.2.2
2.3.2.3

4.2.3.7 Provide Interface for Other Transit Management Data

Input Flows:
connection_change_request_for_other_transit
fotrm-transit_fare_data_coordination
fotrm-transit_service_data
fotrm-transit_traveler_information
traffic_incident_data_for_transit
transit_services_for_other_transit_management

Output Flows:
current_connection_status_from_other_transit
other_transit_management_service_data
totrm-transit_fare_data_coordination
totrm-transit_service_data
totrm-transit_traveler_information
transit_transfer_point_list
trmc_list

Description:
This process shall provide the interface through which transit routes (including transfer points and clusters), schedules, fares and incident information can be exchanged with other transit centers. This data shall be output when new data is received and shall enable coordination between services provided by adjacent transit operations, particularly where they serve the same geographic areas. The process shall also collect and output route and schedule information when new data is received from other transit centers.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(c)
1.8.1.3
1.8.1.3(c)
1.8.1.4
1.8.1.4(c)
2.0
2.1
2.1.0
2.1.1
2.1.1.2
2.1.1.2.1
2.1.1.2.1.4
2.1.1.2.1.4(c)
2.1.1.2.5
2.3
2.3.0
2.3.2
2.3.2.11

4.2.3.8 Provide Interface for Transit Service Raw Data

Input Flows:
fmtsp-transit_service_data
map_data_for_transit_service
other_transit_management_service_data
request_transit_service_external_data
request_transit_service_internal_data
request_transit_services_data_for_output
transit_routes_data
transit_schedule_data
transit_service_raw_data
trmc_list

Output Flows:
transit_service_external_data
transit_service_internal_data
transit_service_raw_data
transit_services_data_for_output
transit_services_for_other_transit_management

Description:
This process shall provide and manage the interface to the store in which the raw transit service data is held. This data shall be sent to the process by the routes and schedules generation processes, which are the only other processes permitted to access the store, and then in read-only mode. The received data shall be loaded into the store and distributed by this process to the three processes that are responsible for distributing the data within the Transit Management Center, to other local ITS functions, and to other Transit Management Centers (Other Transit Management), respectively. The process shall read data from the store and return it to whichever of the other three processes has made a data request. Data shall also be received by the process from other transit centers (Other Transit Management) and from multimodal transportation service providers. The process shall load this data into the data store for use by the local route and schedule generation processes. In order to share transfer cluster data between multimodal transportation service providers, transfer clusters will initially be introduced from the multimodal transportation service provider into this process, stored in the data store of raw data, sent as part of external data to another process, where it is returned to the multimodal transportation service provider as processed data.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.1
2.1.2.2
2.1.2.2.2

4.2.3.9 Update Transit Map Data

Input Flows:
fmup-transit_map_update
map_data_for_transit
request_transit_map_update

Output Flows:
map_data_for_transit
map_data_for_transit_operator
map_data_for_transit_routes
map_data_for_transit_service
tmup-transit_map_update_request

Description:
This process shall provide updates to the store of digitized map data used by the transit route generation process and as the background for displays of transit services requested by the transit system operator. The process shall obtain the new data from a specialist data supplier or some other appropriate data source, after receiving an update request from the transit system operator interface process within the function. The processes requiring data for use in transit route generation and as the background to displays will read the data from the store loaded by this process.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.4
1.8.2.4(c)
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.2.2
2.1.2.2.2

4.2.4 Manage Transit Archive Data

Input Flows:
bad_transit_collected_fare_payment
bad_transit_roadside_fare_payment
bad_transit_vehicle_fare_payment
ftrop-archive_commands
paratransit_service_data_for_archive
transit_archive_request
transit_archive_status
transit_data_archive
transit_emergency_data_for_archive
transit_fare_transactions
transit_incident_info_for_archive
transit_operational_data_for_archive
transit_route_assign_for_archive
transit_services_for_deployment
transit_technician_info
transit_vehicle_data_for_archive
transit_vehicle_maintenance_info
transit_vehicle_operator_data_for_archive
traveler_payments_transactions

Output Flows:
transit_archive_data
transit_data_archive
ttrop-archive_status

Description:
This process shall obtain transit passenger and deployment data, traveler payment transaction data, transit emergency data, transit security data, maintenance and personnel data, and distribute it to the Manage Archive Data function. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the transit data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data is received from an external source, or when fresh data is received.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.4
7.1.3.1.4(a)
7.1.3.1.4(b)
7.1.3.1.4(d)
7.1.3.1.4(e)
7.1.3.1.4(f)
7.1.3.1.4(g)
7.1.3.1.9
7.1.3.1.9(b)
7.1.3.1.9(c)
7.1.3.1.9(d)
7.1.3.1.9(e)

4.2.5 Generate Transit Vehicle Schedule Assignments

Input Flows:
transit_plans_for_assignment
transit_vehicle_inventory_for_assignment
transit_vehicle_operator_assignment
transit_vehicle_reassignment_request

Output Flows:
transit_vehicle_assignment_data
transit_vehicle_assignment_for_operations
transit_vehicle_assignment_for_vehicle

Description:
This process shall assign transit vehicles to transit schedules. The transit vehicle's availability in inventory, functional attributes, suitability to task, and in-service status shall be used by this process to determine the transit vehicle's route (block) assignment. This process shall also provide an exception handling process for the vehicle assignment function. This process shall generate new, supplemental vehicle assignments as required. New vehicle assignments may be needed due to vehicle incident, vehicle mechanical problem, etc. This process shall receive inputs from the inventory management function detailing vehicle availability and the scheduling function detailing potential routes (blocks). This process shall also receive inputs from the transit vehicle operations function and from the vehicle scheduling and assignment functions. It shall send vehicle assignments as outputs to the scheduling function to be combined with operator assignments to produce the daily operating schedule or to update the schedule for exception handling.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.2
2.1.2.2.6
2.1.5
2.1.5.2
2.1.5.2.1
2.1.5.2.2
2.1.5.2.4
2.1.5.2.5

4.3.1 Monitor Transit Vehicle Condition

Input Flows:
transit_vehicle_maintenance_specs
transit_vehicle_status

Output Flows:
transit_vehicle_conditions_for_inventory
transit_vehicle_maintenance
transit_vehicle_maintenance_information

Description:
This process shall monitor the condition of a transit vehicle. It shall use the transit vehicle maintenance specification to analyze brake, drive train, sensors, fuel, steering, tire, processor, communications equipment, and transit vehicle mileage to identify mileage based maintenance, out-of-specification or imminent failure conditions. The data resulting from this analysis shall be loaded by the process into the store of transit vehicle operations data, through the output flow transit vehicle maintenance. This data is then sent to the process that generates transit vehicle maintenance schedules.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.5
2.1.5.1
2.1.5.1.2
2.1.5.1.3

4.3.2 Generate Transit Vehicle Maintenance Schedules

Input Flows:
transit_vehicle_maintenance_information

Output Flows:
transit_vehicle_maintenance_schedule
transit_vehicle_maintenance_schedule_data

Description:
This process shall generate transit vehicle maintenance schedules and includes what and when maintenance or repair is to be performed. Transit vehicle availability listings (current and forecast) shall also be generated by the process to support transit vehicle assignment planning. The maintenance and/or repair that is to be performed on the transit vehicle shall be scheduled by the process for a specific month, week, day(s), and hour(s). The availability of the transit vehicle that is also output by the process shall be based upon the transit vehicle maintenance schedule. The process shall load each transit vehicle maintenance schedule that it produces into the store of transit vehicle operations data, through the process that maintains this data store.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.3
2.1.3.1
2.1.3.1.1
2.1.3.1.2
2.1.5
2.1.5.1
2.1.5.1.2
2.1.5.2
2.1.5.2.1
2.1.5.2.2

4.3.3 Generate Technician Work Assignments

Input Flows:
ftrop-technician_information_request
ftrop-technician_information_updates
transit_technician_data
transit_vehicle_maintenance_schedule_data
transit_vehicle_maintenance_verification_results

Output Flows:
transit_technician_data
transit_technician_info
transit_technician_work_assignment
ttrop-technician_information
ttrop-work_schedule

Description:
This process shall assign technicians to a transit vehicle maintenance schedule. The maintenance schedule shall be received from another process and shall define what and when maintenance repair is to be performed to a specific transit vehicle. The process shall base the personnel assignment upon details about the personnel obtained from the transit operations personnel and held in a local data store. These details shall comprise personnel eligibility, work assignments, preferences and seniority. The process shall also provide these details to the transit operations personnel on request. When a work assignment has been generated, the process shall send it to the transit operations personnel and also to the process that monitors and verifies maintenance work activity. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.3
2.1.3.1
2.1.3.1.1
2.1.3.1.2
2.1.5
2.1.5.1
2.1.5.1.2

4.3.4 Monitor And Verify Maintenance Activity

Input Flows:
transit_technician_work_assignment
transit_vehicle_maintenance_activity

Output Flows:
transit_vehicle_maintenance_log_data
transit_vehicle_maintenance_verification_results

Description:
This process shall verify that the transit vehicle maintenance activities were performed correctly and that a time stamped maintenance log for record keeping was generated. The correctness of the maintenance activities shall be judged by the process against the transit vehicle's status, the maintenance personnel's work assignment, and the transit maintenance schedules produced by other processes. The process shall save a time stamped record of all the maintenance activities performed on the vehicle into the transit vehicle maintenance log.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.5
2.1.5.1
2.1.5.1.2
2.1.5.1.4

4.3.5 Report Transit Vehicle Information

Input Flows:
ftrop-transit_vehicle_maintenance_information_request
ftrop-transit_vehicle_maintenance_specs
ftrop-transit_vehicle_maintenance_updates
transit_vehicle_maintenance_data

Output Flows:
transit_vehicle_maintenance_data_request
transit_vehicle_maintenance_specs_update
ttrop-transit_vehicle_maintenance_information

Description:
This process shall provide the transit operations personnel with the capability of requesting, receiving, and updating transit vehicle maintenance information. The process shall obtain the data for each request from the store of transit vehicle operations data, through the process that manages the data store, and shall produce the output to the transit operations personnel in an easily understood form. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.5
2.1.5.1
2.1.5.1.2
2.1.5.1.4

4.3.6 Manage Transit Vehicle Inventory

Input Flows:
ftrop-transit_vehicle_inventory_input
transit_vehicle_conditions_for_inventory
transit_vehicle_operations_data_for_inventory

Output Flows:
available_transit_vehicles
transit_vehicle_availability
transit_vehicle_inventory_for_assignment
ttrop-transit_vehicle_inventory

Description:
This process shall provide an inventory management function for the transit facility. This process shall store functional attributes about each of the vehicles in the fleet. These attributes shall permit the planning and assignment functions to match vehicles with routes based on suitability for the types of services required by the particular routes. This process shall also maintain knowledge of the operational status of individual vehicles and shall report that status (in-service, out-of-service, in maintenance, etc.) as requested by other functions. Based on a vehicle's status this process shall output vehicle availability to the vehicle scheduling and vehicle assignment functions. This process shall receive inputs from the maintenance function to determine vehicle maintenance status, and from the transit operations personnel to record functional attributes for individual vehicles.

User Service Requirements:
2.0
2.1
2.1.0
2.1.5
2.1.5.1
2.1.5.1.2
2.1.5.1.4
2.1.5.2
2.1.5.2.2
2.1.5.2.5

4.3.7 Manage Transit Vehicle Operations Data Store

Input Flows:
transit_vehicle_maintenance
transit_vehicle_maintenance_data_request
transit_vehicle_maintenance_log_data
transit_vehicle_maintenance_schedule
transit_vehicle_maintenance_specs_update
transit_vehicle_operations_data

Output Flows:
transit_vehicle_maintenance_activity
transit_vehicle_maintenance_data
transit_vehicle_maintenance_info
transit_vehicle_maintenance_specs
transit_vehicle_operations_data
transit_vehicle_operations_data_for_inventory

Description:
This process shall manage the store of transit vehicle operations data. It shall be able to load data it receives about vehicle maintenance into the store and provide that data on request to other processes.

User Service Requirements:
2.0
2.1
2.1.0
2.1.2
2.1.2.1
2.1.2.1.2
2.1.3
2.1.3.1
2.1.3.1.1
2.1.3.1.2
2.1.5
2.1.5.1
2.1.5.1.2
2.1.5.1.4

4.4.1 Provide Transit Security and Emergency Management

Input Flows:

available_transit_operators
available_transit_vehicles
deactivate_traveler_information_restrictions_for_transit
disaster_response_plan_coordination_to_transit
disaster_transportation_system_status_for_transit
emergency_data_for_transit
evacuation_information_for_transit_management
evacuation_plan_coordination_to_transit
evacuation_transportation_system_status_for_transit
faas-alerts_and_advisories_for_transit
infrastructure_integrity_status_for_transit
request_for_emergency_transit_support
secure_transit_vehicle_alarm_request_for_transit
threat_info_for_transit
transit_emergency_response_plan_from_personnel
transit_evacuation_resource_request
transit_media_interface_parameters
transit_operator_request_acknowledge
transit_operator_security_action
transit_preplanned_responses_for_archive
transit_vehicle_disable_acknowledge
transit_vehicle_disable_from_operator
transit_vehicle_location_for_security
transit_vehicle_off_route_indication
traveler_information_restrictions_for_transit
wide_area_alert_notification_for_transit
wide_area_alert_notification_status

Output Flows:

alert_notification_status_from_transit
disaster_response_plan_coordination_from_transit
emergency_transit_fares
emergency_transit_route
emergency_transit_schedule
emergency_transit_schedule_information_for_traffic
evacuation_plan_coordination_from_transit
evacuation_transit_schedule_information_for_traffic
on_board_traveler_alarm_response_from_transit
remote_transit_vehicle_disable
response_for_emergency_transit_support
secure_transit_vehicle_alarm_acknowledge_for_transit
secure_transit_vehicle_broadcast_message
secure_transit_vehicle_emergency_information
tm-transit_emergency_information
tm-transit_incident_information
transit_emergency_data
transit_emergency_data_for_archive
transit_emergency_response_plan_to_personnel
transit_evacuation_data_for_isp
transit_evacuation_status
transit_incident_data
transit_incident_details
transit_incident_info_for_archive
transit_incident_information
transit_operator_emergency_request
transit_operator_incident_information
transit_schedule_information_during_emergencies
transit_schedule_information_during_evacuation
transit_system_status
transit_traveler_wide_area_alert_info
transit_vehicle_disable_acknowledge_to_operator
transit_vehicle_disable_reset
transit_vehicle_operator_wide_area_alerts
transit_wide_area_alert_info
traveler_secure_area_broadcast_message
wide_area_alert_notification_within_transit

Description:

This process shall manage security in the transit system by monitoring for potential incidents. Data shall be obtained by the process from on-board transit vehicles and from the transit system operator. Emergencies on-board a transit vehicle may be reported by either the transit vehicle operator or a traveler, the latter through interfaces such as panic buttons, alarm switches, etc. This process shall analyze the transit incident data for any potential security problems and pass the results to the transit system operator for review and a recommended action. This process shall then perform the recommended security action, including broadcasting a message to the traveler, acknowledging receipt of the emergency call, notifying other agencies, etc. Information about security problems and emergencies detected within the transit system shall be formatted, using parameters set up by the transit system operator, for output to the Media and other information systems. Incident data shall be sent to the Manage Emergency Services function, the Provide Driver and Traveler Services function, and to other processes within the Manage Transit function to coordinate transit incident response among multiple agencies and for archival purposes. This process coordinates disaster and evacuation plans and response with the Emergency Services function and receives threat information, infrastructure integrity status, and wide area alerts from the Emergency Services function. In addition, this process receives the command from the transit system operator to remotely disable (or reset the disabling of) a transit vehicle in service, and sends this command on to another process that actually performs the disabling (or reset).

User Service Requirements:

2.0
2.1
2.1.0
2.1.4
2.1.4.2
2.1.4.3
2.1.4.4
2.1.4.4(a)
2.1.4.4(b)
2.1.4.4(c)
2.1.4.4(d)
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(a)
2.4.1.1(b)
2.4.1.1(c)
2.4.1.1(d)
2.4.1.1(e)
2.4.4
2.4.4.1
2.4.4.4
2.4.4.5
2.4.4.6
2.4.4.7
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
5.3
5.3.0
5.3.1
5.3.10
5.3.10.12
5.3.11
5.3.11.11
5.3.11.3
5.3.11.3.10
5.3.2
5.3.2.1
5.3.2.2
5.3.2.2(f)
5.3.3
5.3.3.4
5.3.5
5.3.5.3
5.3.9
5.3.9.2
5.3.9.4

4.4.2 Coordinate Multiple Agency Responses to Transit Incidents

Input Flows:
ftrop-coordination_data
incident_response_status_to_transit
secure_transit_vehicle_emergency_information
transit_incident_coordination_data
transit_incident_information
transit_preplanned_incident_responses

Output Flows:
request_transit_preplanned_incident_responses
transit_coordination_data
ttrop-coordination_request

Description:
This process shall provide transit operations personnel with an interface through which they can control the coordination data sent to the Manage Emergency Services function following the detection of a security problem or emergency within the transit operations network by other processes. The process shall send outputs to the Manage Emergency Services function from data requested from another process that manages the store of predefined responses to security problems and emergencies. If no match can be found then the process shall send all the available data to the transit operations personnel for action. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.4
2.4.0
2.4.4
2.4.4.3
2.4.4.5

4.4.3 Generate Responses for Transit Incidents

Input Flows:
ftrop-request_response_parameter_output
ftrop-response_parameters
request_transit_preplanned_incident_responses
transit_preplanned_responses_for_incidents

Output Flows:
transit_preplanned_incident_responses
transit_preplanned_responses_for_archive
transit_preplanned_responses_for_incidents
ttrop-response_parameter_output

Description:
This process shall provide the interface through which the transit operations personnel can enter and review predefined responses to security problems and emergencies that have been detected by other processes within the Manage Transit function. This data shall be stored in a form that can be used by another process to provide coordination data to the Manage Emergency Services function. When updates are made to the data in the store, the updated data is sent to other processes for coordinated response to incidents, and for coordinating response and planning for disasters and evacuation. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.4
2.4.0
2.4.4
2.4.4.4

4.4.4 Provide Transit Operations Personnel Security Interface

Input Flows:
ftrop-alert_notification_status
ftrop-disable_transit_vehicle
ftrop-emergency_plan_response
ftrop-media_parameter_request
ftrop-media_parameter_updates
ftrop-security_action
transit_emergency_response_plan_to_personnel
transit_operator_emergency_request
transit_operator_incident_information
transit_vehicle_disable_acknowledge_to_operator
wide_area_alert_notification_within_transit

Output Flows:
transit_emergency_response_plan_from_personnel
transit_media_interface_parameters
transit_operator_request_acknowledge
transit_operator_security_action
transit_vehicle_disable_from_operator
ttrop-emergency_plan_response
ttrop-emergency_request
ttrop-infrastructure_integrity_status
ttrop-media_parameters
ttrop-potential_incidents_alarm
ttrop-transit_vehicle_disable_status
ttrop-wide_area_alert_notification
wide_area_alert_notification_status

Description:
This process shall provide an interface for the transit operations personnel to identify and act upon potential security problems and emergencies. These emergency situations may arise from incidents on a transit vehicle or from infrastructure integrity (e.g., track integrity) problems. Passenger or vehicle operator alarms are forwarded to this process for response. The transit operations personnel shall be capable of initiating a transit vehicle disable command, or of rescinding such command. This process shall also provide the capability for the personnel to update parameters that control the output to the media of data about the potential security problems. The process shall provide the capability for the transit operations personnel to receive wide area alerts, to initiate wide area alerts, and to respond back to Emergency Management regarding the status of a wide area alert issued to the traveling public through transit traveler information processes. In addition, the process provides an interface to coordinate disaster response and recovery plans and evacuation plans with the Emergency Services function.

User Service Requirements:

2.0	2.1.4.4(d)	5.1.4.1
2.1	2.4	5.1.4.1.1
2.1.0	2.4.0	5.1.4.1.2
2.1.1	2.4.4	5.1.4.2
2.1.1.2	2.4.4.1	5.1.4.2.1
2.1.1.2.1	2.4.4.2	5.1.4.3
2.1.2	2.4.4.3	5.1.4.4
2.1.2.1	2.4.4.6	5.3
2.1.2.1.2	5.0	5.3.0
2.1.4	5.1	5.3.1
2.1.4.1	5.1.0	
2.1.4.4	5.1.4	

4.5.1 Assess Transit Vehicle Operator Performance

Input Flows:
transit_vehicle_operator_performance_considerations

Output Flows:
transit_vehicle_operator_performance
transit_vehicle_operator_performance_data

Description:
This process shall assess the transit vehicle operator's performance at previous work assignments. The process shall carry out this activity by 1) utilizing standardized performance evaluation criteria set forth by governmental regulations and transit operating company policies, 2) assessing the transit vehicle operator's driving history, and 3) assessing comments from the transit vehicle operator's supervisor(s). It shall also use the details of any moving violations or accidents, supervisor comments, government regulations, and company policies. The data shall be sent to this process by the process that provides the interface to a local data store, each time that the store is updated with operator performance data.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.4

4.5.2 Assess Transit Vehicle Operator Availability

Input Flows:
transit_vehicle_operator_availability_considerations

Output Flows:
transit_vehicle_operator_availability
transit_vehicle_operator_availability_data

Description:
This process shall assess the transit vehicle operator's availability based on previous work assignments plus health and vacation commitments. The process shall carry out this activity by 1) utilizing standardized transit vehicle operator work criteria set forth by governmental regulations and company policies, 2) monitoring the transit vehicle operator's health status and vacation status, and 3) monitoring the transit vehicle operator's accumulated work hours. The data shall be sent to this process by the process that provides the interface to a local data store, each time that the store is updated with transit vehicle operator availability data.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.1
2.1.3.2.2
2.1.3.2.3
2.1.3.2.3(e)
2.1.3.2.4
2.3
2.3.0
2.3.4
2.3.4.3

4.5.3 Access Transit Vehicle Operator Cost Effectiveness

Input Flows:
transit_vehicle_operator_cost_effectiveness_considerations

Output Flows:
transit_vehicle_operator_cost_effectiveness
transit_vehicle_operator_cost_effectiveness_data

Description:
This process shall assess the transit vehicle operator's cost effectiveness when carrying out previous work assignments. The process shall perform this activity by 1) utilizing standard transit vehicle operator cost criteria set forth by governmental regulations and company policies, and 2) monitoring the transit vehicle operator's hourly wage and accumulated work hours. The data shall be sent to this process by the process that provides the interface to a local data store, each time that the store is updated with transit vehicle operator cost effectiveness data.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.2
2.1.3.2.4

4.5.4 Assess Transit Vehicle Operator Eligibility

Input Flows:
transit_vehicle_operator_availability_data
transit_vehicle_operator_cost_effectiveness_data
transit_vehicle_operator_eligibility_considerations
transit_vehicle_operator_performance_data

Output Flows:
transit_vehicle_operator_eligibility
transit_vehicle_operator_eligibility_data

Description:
This process shall assess the transit vehicle operator's eligibility for future work assignments. The process shall carry out this activity by 1) monitoring the transit vehicle operator's performance, availability and cost effectiveness, 2) utilizing standardized transit vehicle operator eligibility criteria set forth by governmental regulations and company policies, and 3) ensuring that the transit vehicle operator has the required experience, education and certifications. The data shall be sent to this process in one of two ways: 1) by the process that provides the interface to a local data store, each time that the store is updated with transit vehicle operator eligibility data, or 2) the data is produced as the result of analysis work carried out by other processes within the Manage Traffic function.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.2
2.1.3.2.4
3.0
3.1
3.1.0
3.1.3
3.1.3.2

4.5.5 Generate Transit Vehicle Operator Route Assignments

Input Flows:
paratransit_services_for_transit_vehicle_operators
transit_services_for_transit_vehicle_operators
transit_vehicle_operator_eligibility_data
transit_vehicle_operator_route_assignment_considerations
transit_vehicle_operator_route_data

Output Flows:
available_transit_operators
transit_route_assign_for_archive
transit_vehicle_operator_assignment
transit_vehicle_operator_route_data
ttvo-route_assignments

Description:
This process shall assign transit vehicle operators to transit schedules. The transit vehicle operator's eligibility, route preferences, seniority, and transit vehicle availability shall be used by the process to determine the transit vehicle operator's route assignment. This process shall also provide an exception handling process for the operator assignment function. This process shall generate new, supplemental operator assignments as required. New operator assignments may be needed due to operator absence, vehicle incident, vehicle mechanical problem, etc. This process shall receive inputs from the transit vehicle operations function and from the operator scheduling and assignment functions. The output produced by this process shall send new operator assignment information to the operator scheduling and assignment functions. The output produced by this process shall also be sent to the transit vehicle operator in the form of the next work assignment.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.2
2.1.3.2.3
2.1.3.2.3(a)
2.1.3.2.3(c)
2.1.3.2.3(d)
2.1.3.2.3(e)
2.1.3.2.6
2.3
2.3.0
2.3.4
2.3.4.3

4.5.6 Report Transit Vehicle Operator Information

Input Flows:
ftrop-transit_vehicle_operator_information_request
ftrop-transit_vehicle_operator_information_updates
ftrop-transit_vehicle_operator_route_preferences
transit_vehicle_operator_information_output

Output Flows:
transit_vehicle_operator_consideration_updates
transit_vehicle_operator_information_output_request
ttrop-transit_vehicle_operator_information

Description:
This process shall provide the interface between the transit operations personnel and the store of transit vehicle operator information. The interface provided by the process shall enable the transit operations personnel to review and update transit vehicle operator information. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.1
2.1.3.2.2
2.1.3.2.3
2.1.3.2.4

4.5.7 Provide Transit Vehicle Operator Information Store Interface

Input Flows:
ftvo-information_updates
transit_route_assign_for_archive
transit_vehicle_operator_availability
transit_vehicle_operator_consideration_updates
transit_vehicle_operator_cost_effectiveness
transit_vehicle_operator_eligibility
transit_vehicle_operator_information
transit_vehicle_operator_information_output_request
transit_vehicle_operator_performance

Output Flows:
transit_vehicle_operator_availability_considerations
transit_vehicle_operator_cost_effectiveness_considerations
transit_vehicle_operator_data_for_archive
transit_vehicle_operator_eligibility_considerations
transit_vehicle_operator_information
transit_vehicle_operator_information_output
transit_vehicle_operator_performance_considerations
transit_vehicle_operator_route_assignment_considerations

Description:
This process shall provide the read and write interface to the store of transit vehicle operator information. The interface enables the contents of the store to be updated with inputs received from directly from the transit vehicle operator and from the transit operations personnel via another process, as well as, inputs resulting from analysis of transit vehicle operator availability, cost effectiveness, eligibility, and performance carried out by other processes. This process shall provide the interface through which the transit vehicle operator can input data to the store of transit vehicle operator information. The interface provided by this process shall enable the transit vehicle operator to update personal availability and route assignment information. The process shall also supply data to these processes when the store is updated with information from the transit vehicle operator and transit system operator. It shall also supply data to the process that generates operator route assignments when any of the analysis inputs is received.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.1
2.1.3.2.2
2.1.3.2.3
2.1.3.2.4

4.6.1 Manage Transit Fare Billing on Vehicle

Input Flows:

bad_tag_list_update
bad_transit_tag_data
confirm_vehicle_fare_payment
ft-boarding_and_alighting
ft-traveler_vehicle_image
ftvo-fare_transaction_mode_set_up
ftvo-request_batch_mode_data_transfer
request_traveler_vehicle_image
traveler_transaction_buffer
traveler_vehicle_fare
traveler_vehicle_tag_data

Output Flows:

bad_tag_list_request
bad_transit_tag_data
fare_collection_vehicle_violation_information
request_vehicle_fare_payment
traveler_transaction_buffer
traveler_vehicle_image
traveler_vehicle_payment_response
traveler_vehicle_processed_fare_data
traveler_vehicle_tag_identity
tt-vehicle_access_message
ttvo-batch_mode_data_transfer_status
ttvo-request_fare_transaction_mode_set_up

Description:

This process shall manage the traveler fare payments on-board a transit vehicle. This process shall detect embarking travelers on-board a transit vehicle and read data from the traveler card / payment instrument that they are carrying. The process shall provide an image of all travelers which shall be used for violation processing of those who do not have a traveler card / payment instrument or whose transit fare transaction fails. It shall obtain an image of the required accuracy under all lighting conditions and over the range of speeds with which travelers will pass through the fare collection point on a transit vehicle. The process shall receive information about the fare that is to be paid and the method of payment adopted by the traveler. It shall always support two modes of operation to complete the back end financial processing: infrastructure interactive, or semi-autonomous batch processing. The interactive method shall be used for individual transactions, such as those in paratransit type operations where value/volume ratios are high. It shall send traveler fare payment data to processes in the Provide Electronic Payment Services function for financial authorization and transaction processing, plus the return of the result for display to the traveler. A failed transaction shall result in the transmission of an image of the traveler to another process. Batch processing shall be used by the process for routes where value/volume ratios are low. It shall be performed using all the same data flows and processes as in the interactive method, except that transaction records are queued in a transaction buffer store which shall be maintained by this process. The accumulated data for the fare transactions shall be sent to the Provide Electronic Payment Services function to request payment processing of one or more transit fare transactions from on-board a transit vehicle. The accumulated data shall be sent on command from the transit vehicle operator, or when the transit vehicle has reached a convenient point on its route. The transit vehicle operator shall be notified when batch processing has completed successfully. In either mode of operation, a record of the status of all transit fare processing shall be sent to an interface process for the fare collection storage database.

User Service Requirements:

2.0
2.3
2.3.0
2.3.3
2.3.3.1
2.3.3.1(c)
3.0
3.1
3.1.0
3.1.1
3.1.2
3.1.2.1
3.1.2.2
3.1.2.3
3.1.2.4
3.1.2.5
3.1.2.6
3.1.2.7
3.1.2.8
3.1.4
3.1.4.3

4.6.2 Determine Traveler Needs on Vehicle

Input Flows:
individual_transit_user_trip_plan
transit_advisory_vehicle_information
transit_services_for_vehicle_fares
traveler_vehicle_information
traveler_vehicle_tag_identity

Output Flows:
transit_user_information
traveler_vehicle_ride
traveler_vehicle_ride_data

Description:
This process shall determine the traveler's travel routing based on the transit vehicle's current location and the traveler's destination. The process shall support the traveler's routing, enabling it to include travel on the vehicle for all or part of its route and (possibly) transfer to another vehicle on another route. In order to achieve this capability, the process shall have access to the complete range of transit services (routes and schedules) that are available to the traveler. The transit vehicle's location shall be provided by other processes within the Manage Transit function. Details of all transactions with the traveler's payment details removed, shall be sent by this process to the interface process for loading into a data store.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.7
3.1.4
3.1.4.3

4.6.3 Determine Transit Fare on Vehicle

Input Flows:
transit_fares_for_vehicle
traveler_vehicle_ride

Output Flows:
traveler_vehicle_fare

Description:
This process shall calculate the traveler's fare based on the origin and destination provided by the traveler. The process shall calculate the fare using the transit routing, transit fare category, traveler history, and route-specific information. The accumulated data shall be sent by this process to another process for the actual implementation of the fare payment transaction.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.2

4.6.4 Provide Traveler Fare Payment Interface on Vehicle

Input Flows:
ftc-traveler_vehicle_input_credit_identity_for_transit
transit_vehicle_advanced_payment_response
transit_vehicle_location_for_fares
traveler_vehicle_payment_response

Output Flows:
transit_vehicle_advanced_payment_request
traveler_vehicle_information
ttc-debited_traveler_payment_at_vehicle
tt-vehicle_payment_confirmed

Description:
This process shall provide the fare payment interface for the traveler on-board a transit vehicle. The process shall prompt the traveler for information necessary that has not been provided for the transaction. The result of the transit service ride fare payment plus other services request and payment, shall be reported back to the traveler by the process. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.2
2.2.0
2.2.1
2.2.1.2
2.2.1.2.2
2.2.1.2.2.1
2.2.1.2.2.2
2.2.1.2.2.3
2.2.1.2.2.4
2.3
2.3.0
2.3.3
2.3.3.1
2.3.3.1(c)
3.0
3.1
3.1.0
3.1.2
3.1.2.3

4.6.5 Update Transit Vehicle Fare Data

Input Flows:
emergency_transit_fares
transit_fares_for_vehicle_store
transit_vehicle_fare_data

Output Flows:
transit_fares_for_vehicle
transit_fares_for_vehicle_store

Description:
This process shall provide a database on-board the transit vehicle for use in fare processing. The database shall contain transit fare information from which the fares for all possible trips within the transit operational network can be determined. In the event that an emergency transit fare is received to support a response to an incident, disaster, evacuation or other emergency, the process shall override all other fares to implement the emergency fare.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.6

4.6.6 Provide Transit Vehicle Fare Collection Data

Input Flows:
transit_vehicle_fare_collection_data
traveler_vehicle_processed_fare_data
traveler_vehicle_ride_data

Output Flows:
transit_vehicle_fare_collection_data
transit_vehicle_passenger_data

Description:
This process shall manage a store of fare collection data and provide a complete record of fare collection activity to other ITS functions. This store receives data from the process that interfaces to the traveler on-board a transit vehicle.

User Service Requirements:
2.0
2.1
2.1.0
2.1.1
2.1.1.1
2.1.1.1(a)
2.1.1.1(c)
3.0
3.1
3.1.0
3.1.2
3.1.2.2
3.1.2.7

4.6.7 Manage Transit Vehicle Advanced Payments

Input Flows:
advanced_tolls_and_charges_vehicle_confirm
transit_vehicle_advanced_payment_request

Output Flows:
advanced_tolls_and_charges_vehicle_request
transit_vehicle_advanced_payment_response

Description:
This process shall act as the interface for advanced payment of tolls and parking lot charges from the traveler. Requests for these advanced payments shall be passed to other processes in the Provide Electronic Payment Services function for transaction processing. The process shall ensure that the response to these requests from travelers is returned to the transit vehicle from which it was made.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.3

4.7.1 Provide Traveler Roadside & Vehicle Data Interface

Input Flows:
ft-transit_information_request
parking_facility_information
transit_services_for_travelers
transit_services_roadside_data
transit_vehicle_arrival_time
transit_vehicle_user_data
transit_wide_area_alert_info
traveler_secure_area_broadcast_message

Output Flows:
transit_services_roadside_data
transit_services_travelers_request
tt-secure_area_broadcast_message
tt-transit_information
tt-transit_vehicle_information

Description:
This process shall provide public transit information to Travelers at roadside locations. These locations may consist of transit vehicle stops or other locations that provide general public transit information. The process shall enable the roadside unit to obtain information about the transit services on request from the local traveler interface process and to receive data about late running services from other processes within the Manage Transit function. This process shall also provide the roadside (transit stop) interface through which travelers receive information about an approaching transit vehicle or one that has already arrived. This process shall also provide transit facility parking information and information pertaining to wide area alerts such as major emergencies. The process shall output the data to the traveler as soon as it is received and shall load all data into the local store for future use. Output of the data shall be maintained until the vehicle leaves the stop, when the process shall cease output of the data and delete it from the local store. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.2
2.2.0
2.2.1
2.2.1.2
2.2.1.2.1
2.2.1.2.1.1
2.2.1.2.1.1.1
2.2.1.2.1.1.2
2.2.1.2.1.1.2(a)
2.2.1.2.1.1.2(b)
2.2.1.2.1.1.3
2.2.1.2.1.2
2.2.1.2.1.2(a)
2.2.1.2.1.2(b)
2.2.1.2.1.2(c)
2.2.1.2.1.3
2.2.1.2.2
2.2.1.2.2.1
2.2.1.2.2.2
2.2.1.2.2.3
2.2.1.2.2.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4

4.7.2.1 Detect Traveler at Roadside

Input Flows:
ft-traveler_roadside_image
request_traveler_roadside_image
traveler_roadside_tag_data

Output Flows:
traveler_roadside_image
traveler_roadside_tag_identity

Description:
This process shall detect travelers embarking at a roadside transit stop and read data from the traveler card / payment instrument that they are carrying. The process shall provide an image of all travelers which shall be used for violation processing of those who do not have a traveler card / payment instrument or whose transit fare transaction fails. It shall obtain an image of the required accuracy under all lighting conditions and over the range of speeds with which travelers will pass through the fare collection point at the roadside, i.e., a transit stop.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.2
3.1.2.7
3.1.2.8
3.1.4
3.1.4.3

4.7.2.2 Determine Traveler Needs at Roadside

Input Flows:
transit_services_for_roadside_fares
traveler_roadside_information
traveler_roadside_tag_identity

Output Flows:
traveler_roadside_ride
traveler_roadside_ride_data

Description:
This process shall determine the traveler's travel routing in the transit system based on the traveler's destination and the location of the roadside transit stop from which the route request is being made. The process shall support the traveler's routing enabling it to include travel on all or part of the route(s) operating from the stop and (possibly) transfer to another route. In order for this to be achieved, the process requires access to the complete range of transit services (routes and schedules) that are available to the traveler. Details of all transactions with the traveler's payment details removed, shall be sent by this process to the interface process for loading into the transit roadside fare collection data store.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.7
3.1.4
3.1.4.3

4.7.2.3 Determine Transit Fare at Roadside

Input Flows:
transit_fares_for_roadside
traveler_roadside_ride

Output Flows:
traveler_roadside_fare

Description:
This process shall calculate the traveler's fare based on the origin and destination provided by the traveler. The process shall calculate the fare using the transit routing, transit fare category, and traveler history components of the ride data together with data provided by the interface process to the database of transit fares. The accumulated data shall be sent by the process to another process for the actual implementation of the fare payment transaction.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.2

4.7.2.4 Manage Transit Fare Billing at Roadside

Input Flows:
confirm_roadside_fare_payment
ft-traveler_roadside_image
traveler_roadside_fare
traveler_roadside_tag_identity

Output Flows:
fare_collection_roadside_violation_information
request_roadside_fare_payment
traveler_roadside_payment_response
traveler_roadside_processed_fare_data
tt-roadside_access_message

Description:
This process shall generate the data necessary to enable the financial transaction between the traveler and the transit provider to be completed at the roadside, i.e., at a transit stop. The process shall accept and process current transit passenger fare collection information. The process shall perform the front end transaction between the traveler and the transit system, and use the infrastructure interactive mode of operation to complete the back end processing. This means that the process shall send data about each transaction to processes in the Provide Electronic Payment Services function for the back end financial authorization and transaction processing. The process shall then await the return of the result for display to the traveler before accepting the next transaction. A failed transaction shall result in the transmission of an image of the traveler to another process. A record of the status of all transit fare processing shall be sent to another process for storage in a fare collection database.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.2
3.1.2.3
3.1.2.4
3.1.2.5
3.1.2.6
3.1.2.7

4.7.2.5 Provide Traveler Roadside Fare Interface

Input Flows:
advanced_tolls_and_charges_roadside_confirm
ft-destination_at_roadside
ft-other_services_roadside_request
other_services_roadside_response
traveler_roadside_credit_identity_for_transit
traveler_roadside_payment_response

Output Flows:
advanced_tolls_and_charges_roadside_request
other_services_roadside_request
traveler_advanced_payment_at_roadside
traveler_roadside_information
tt-other_services_roadside_confirmed
tt-roadside_payment_confirmed

Description:
This process shall provide the interface for the traveler at the roadside, i.e., at a transit stop. The interface shall enable the traveler to specify the required destination of a transit service ride and request other (yellow pages) services. The process shall prompt the traveler for information necessary for the transaction that has not been provided. The result of the transit service ride fare payment plus other services request and payment, shall be reported back to the traveler by the process. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.3

4.7.2.6 Update Roadside Transit Fare Data

Input Flows:
transit_roadside_fare_data

Output Flows:
transit_fares_for_roadside

Description:
This process shall provide a database at the roadside, i.e., a transit stop, for use in fare processing. The database shall contain transit fare information from which the fares for all possible trips within the transit operational network can be determined.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.6

4.7.2.7 Provide Transit Roadside Passenger Data

Input Flows:
transit_roadside_fare_collection_data
transit_roadside_passenger_data_request
traveler_roadside_processed_fare_data
traveler_roadside_ride_data

Output Flows:
transit_roadside_fare_collection_data
transit_roadside_passenger_data

Description:
This process shall create passenger loading and fare statistics data based upon data collected at the roadside and send this data to the store of transit operations data. The process may send the data at regular periodic intervals, on-demand, or through some other trigger mechanism. The process shall create its outputs using information collected in the store of fare transaction data. This data is received from other processes at the roadside, i.e., at a transit stop.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.2
3.1.2.7

5.1.1.1 Coordinate Emergency Inputs

Input Flows:
emergency_verification_from_operator
incident_and_event_data
incident_cvo_data
incident_sensor_data
incident_surveillance_data
threat_detected

Output Flows:
collected_incident_data
verified_emergency

Description:
This process shall coordinate the emergency inputs received from the processes that collect incident and emergency data, the commercial vehicle and hazardous materials emergencies, as well as the emergency inputs received directly from sensors and surveillance functions. This process shall forward the collected incident data to the operator. Based on the verification received from the operator this process shall determine what responding agencies to notify and route the verified emergencies to those predesignated responding agencies for response. This process shall provide the identified emergency information in a standard format as required. Every set of emergency data received shall be assigned a level of confidence by the process depending on its source, so that the subsequent processes can assess the level of response to be provided. This process shall include verification, in that it shall determine if a number of inputs might all be referring to the same incident, then designate that incident in its notifications to the most appropriate responding agencies. By reconciling numerous reports and other collaborative information from the field (e.g. CCTV images, reports from field staff), the verification function confirms the existence, location, and nature of a reported emergency.

User Service Requirements:
4.0
4.5
4.5.0
4.5.1
4.5.1.1
4.5.1.2
4.5.1.2(a)
4.5.1.2(b)
4.5.1.2(c)
4.5.3
4.5.3.1
4.5.4
4.5.4.1
4.5.4.1.7
4.5.4.2
4.5.4.2.5
4.5.4.3
4.5.4.3.7
5.0
5.1
5.1.0
5.1.3
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.4
5.1.3.4.2
5.2
5.3
5.3.0
5.3.3
5.3.3.1
5.3.3.2
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(b)

5.1.1.2 Identify Commercial Vehicle Emergencies

Input Flows:
cf_hazmat_route_information
cv_hazmat_alarm
cvo_alarm
cvo_hazmat_spill_data
freight_alarm

Output Flows:
incident_cvo_data

Description:
This process shall enable existing emergency centers to receive information concerning commercial vehicle and freight equipment related emergencies. These emergencies may include incidents involving hazardous materials as well as the detection of non-permitted transport of security sensitive hazmat. This process shall receive the data concerning the location of the vehicle, the nature of the incident, the route information, and information concerning the freight itself. This process shall provide this collection of information to other processes to support the determination of the response, determination of what responding agencies to notify), and route the data to those predesignated responding agencies. This process shall provide the identified emergency information in a standard format as required.

User Service Requirements:
4.0
4.3
4.3.0
4.3.3
4.3.3.2
4.3.3.2.7
4.5
4.5.0
4.5.1
4.5.1.1
4.5.1.2
4.5.1.2(a)
4.5.1.2(b)
4.5.1.2(c)
4.5.3
4.5.3.1
4.5.4
4.5.4.1
4.5.4.1.6
4.5.4.1.7
4.5.4.2
4.5.4.2.5
4.5.4.3
4.5.4.3.6
4.5.4.3.7
4.6
4.6.0
4.6.3
4.6.3.4

5.1.1.3 Collect Incident And Event Data

Input Flows:
alerts_and_advisories_for_incident_detection
fets-caller_information
fets-incident_information
fevp-planned_event_data
fws-current_weather_observations
fws-weather_forecasts
incident_alert_details
incident_info_for_emerg
mayday_emergency_data
silent_and_audible_alarm_data
transit_emergency_data
transit_incident_details

Output Flows:
incident_and_event_data
tevp-planned_event_confirmation

Description:
This process shall enable existing emergency centers to receive the calls, determine response requirements (enough to determine what responding agencies to notify), and route distress calls to those predesignated responding agencies. This process shall provide the identified emergency information in a standard format as required. This process receives emergency requests from the general public, public safety agencies, alerts and advisories, and other service providers (e.g. a Mayday service provider). Every set of emergency data received shall be assigned a level of confidence by the process depending on its source, so that the subsequent processes can assess the level of response to be provided. This process shall include verification, in that it shall determine if a number of inputs might all be referring to the same incident, then designate that incident in its notifications to the most appropriate responding agencies. By reconciling numerous reports and other collaborative information from the field (e.g. CCTV images, reports from field staff), the verification function confirms the existence, location, and nature of a reported emergency.

User Service Requirements:
4.0
4.5
4.5.0
4.5.3
4.5.3.1
5.0
5.1
5.1.0
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.3
5.3.0
5.3.2
5.3.2.1
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(b)

5.1.1.4.1 Manage Secure Area Sensors

Input Flows:

field_processed_infrastructure_integrity_sensor_data
field_processed_intrusion_motion_sensor_data
field_processed_object_detection_sensor_data
field_processed_threat_sensor_data
field_processed_traveler_intrusion_motion_sensor_data
field_processed_traveler_object_detection_sensor_data
field_processed_traveler_threat_sensor_data
field_processed_vehicle_object_detection_sensor_data
field_processed_vehicle_threat_sensor_data
foem-secure_area_sensor_data
infrastructure_integrity_sensor_data
infrastructure_integrity_sensor_status
intrusion_motion_sensor_data
intrusion_motion_sensor_status
object_detection_sensor_data
object_detection_sensor_status
secure_area_sensor_control_from_operator
secure_area_sensor_proc_parameters_from_operator
secure_area_sensor_threat_data
security_sensor_equip_maint_status
threat_sensor_data
threat_sensor_status
transit_vehicle_location_for_sensors
traveler_intrusion_motion_sensor_data
traveler_intrusion_motion_sensor_status
traveler_object_detection_sensor_data
traveler_object_detection_sensor_status
traveler_secure_area_sensor_threat_data
traveler_threat_sensor_data
traveler_threat_sensor_status
vehicle_object_detection_sensor_data
vehicle_object_detection_sensor_status
vehicle_secure_area_sensor_threat_data
vehicle_threat_sensor_data
vehicle_threat_sensor_status

Output Flows:

incident_sensor_data
infrastructure_integrity_sensor_control
infrastructure_integrity_status_for_maint
infrastructure_integrity_status_for_traffic
infrastructure_integrity_status_for_transit
intrusion_motion_sensor_control
object_detection_sensor_control
secure_area_sensor_data_to_operator
secure_area_sensor_field_proc_parameters
secure_area_sensor_status_to_operator
secure_area_sensor_threat_information_to_operator
security_sensor_equip_status_for_m_and_c
sensor_threat_data_for_analysis
threat_sensor_control
toem-secure_area_sensor_data
traveler_intrusion_motion_sensor_control
traveler_object_detection_sensor_control
traveler_sensor_field_proc_parameters
traveler_threat_sensor_control
vehicle_object_detection_sensor_control
vehicle_secure_area_sensor_field_proc_parameters
vehicle_threat_sensor_control

Description:

This process shall remotely monitor sensor data collected in secure areas, including those frequented by travelers (transit stops, rest areas, park and ride lots, modal interchange facilities, on-board transit vehicles, etc.), and those typically away from travelers (tunnels, bridges, roadway infrastructure, etc.). Sensor data will also be collected from other emergency centers and the process shall return collected sensor data (raw and processed) to those centers. The types of sensor data include threat sensors (such as chemical, biological, explosives, and radiological), object detection sensors (such as metal detectors), motion and intrusion sensors, and infrastructure integrity sensors. In addition to raw sensor inputs, this process shall also receive data preprocessed in the field, and provide additional processing if directed by processing parameters established by center personnel. The process shall input threat information from field analysis functions and together with its own processing, shall identify potential threats, and verify those threats by correlating collected data. The process shall output identified threats to other processes for output to center personnel and to support further threat analysis. The process shall provide sensor data to other processes to assist in identification of potential incidents, and specifically, shall output infrastructure integrity data to support infrastructure maintenance. The process shall accept inputs that provide sensor equipment control and pass that control to the field. The process shall accept inputs that provide sensor data processing control, and use the parameters as well as output them as directed to the field for local processing control. The process shall monitor and output equipment status and fault indication.

User Service Requirements:

2.0
2.4
2.4.0
2.4.2
2.4.2.1
2.4.2.3
2.4.2.5
2.4.2.6
2.4.2.7
2.4.2.9
5.0
5.1
5.1.0
5.1.3
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.3
5.1.3.3.2
5.1.3.3.4
5.1.3.4
5.1.3.4.3
5.1.3.4.3(b)
5.3
5.3.0
5.3.3
5.3.3.1

5.1.1.4.2 Manage Secure Area Surveillance

Input Flows:

field_processed_secure_area_audio
field_processed_secure_area_images
field_processed_traveler_secure_area_audio
field_processed_traveler_secure_area_images
field_processed_vehicle_secure_area_audio
field_processed_vehicle_secure_area_images
foem-secure_area_surveillance
request_images_for_analysis
secure_area_audio
secure_area_images
secure_area_surveillance_control_from_operator
secure_area_surveillance_proc_parameters_from_operator
secure_area_surveillance_status
secure_area_surveillance_threat_data
security_surveillance_equip_maint_status
transit_vehicle_location_for_surveillance_and_security
traveler_secure_area_audio
traveler_secure_area_images
traveler_secure_area_surveillance_status
traveler_secure_area_surveillance_threat_data
vehicle_secure_area_audio
vehicle_secure_area_images
vehicle_secure_area_surveillance_status
vehicle_secure_area_surveillance_threat_data

Output Flows:

image_for_analysis
incident_surveillance_data
secure_area_surveillance_control
secure_area_surveillance_data_to_operator
secure_area_surveillance_field_proc_parameters
secure_area_surveillance_status_to_operator
secure_area_surveillance_threat_information_to_operator
security_surveillance_equip_status_for_m_and_c
surveillance_threat_data_for_analysis
toem-secure_area_surveillance
traveler_secure_area_surveillance_control
traveler_surveillance_field_proc_parameters
vehicle_secure_area_surveillance_control
vehicle_secure_area_surveillance_field_proc_parameters

Description:

This process shall remotely monitor video images and audio surveillance data collected in secure areas, including those frequented by travelers (transit stops, rest areas, park and ride lots, modal interchange facilities, on-board transit vehicles, etc.), and those typically away from travelers (tunnels, bridges, roadway infrastructure, etc.). Surveillance data will also be collected from other emergency centers and the process shall return collected surveillance data (raw and processed) to those centers. In addition to raw video and audio inputs, this process shall also receive data preprocessed in the field, and provide additional processing if directed by processing parameters established by center personnel. The process shall input threat information from field analysis functions and together with its own processing, shall identify potential threats, and verify those threats by correlating collected data. The process shall output identified threats to other processes for output to center personnel and to support further threat analysis. The process shall provide surveillance data to other processes to assist in identification of potential incidents and to support image matching for security purposes. The transit vehicle location data input to the process may be used for a variety of services. It may be used to support emergency notification, or regions can use this flow to model providing a simple AVL service that allows their Transit Police to track vehicle locations in parallel with the Transit Management Center. The process shall accept inputs that provide surveillance equipment control and pass that control to the field. The process shall accept inputs that provide surveillance data processing control, and use the parameters as well as output them as directed to the field for local processing control. The process shall monitor and output equipment status and fault indication.

User Service Requirements:

2.0	2.4.2.9	5.1.3.2.1.3
2.4	5.0	5.1.3.3
2.4.0	5.1	5.1.3.3.4
2.4.2	5.1.0	5.1.3.4
2.4.2.2	5.1.3	5.1.3.4.3
2.4.2.4	5.1.3.2	5.1.3.4.3(b)
2.4.2.7	5.1.3.2.1	

5.1.1.4.3 Analyze Threats

Input Flows:
alerts_and_advisories_for_threat_analysis
faas-alerts_and_advisories_for_threat_analysis
faas-threat_support_data
foem-threat_analysis_results
sensor_threat_data_for_analysis
surveillance_threat_data_for_analysis
threat_analysis_parameters

Output Flows:
sensor_data_for_archive
surveillance_data_for_archive
taas-threat_data_for_analysis
threat_data_for_archive
threat_detected
threat_info_to_operator
threat_information_for_dissemination
toem-threat_analysis_results

Description:
This process shall analyze, correlate, and evaluate for potential security threats data collected from a variety of sources. One source of data input to this process shall be sensor and surveillance data collected in secure areas, including those frequented by travelers (transit stops, rest areas, park and ride lots, modal interchange facilities, on-board transit vehicles, etc.), and those typically away from travelers (tunnels, bridges, roadway infrastructure, etc.). Threat analysis will also be based on threat support data received from Alerting and Advisory systems, other emergency centers, and from another process in Manage Emergency Services that evaluates alerts and advisories from multiple sources. Parameters to guide the analysis shall be input from another process that interfaces with center personnel. Detected threats based on the threat analysis will be sent to other processes for evaluation as a potential incident, for dissemination to other transportation centers, and for output to center personnel. More detailed threat analysis results shall be sent to Alerting and Advisory Systems and to other emergency centers for further analysis. Sensor, surveillance, and threat analysis results shall be sent to another process for archival.

User Service Requirements:
2.0
2.4
2.4.0
2.4.2
2.4.2.10
2.4.2.9
5.0
5.1
5.1.0
5.1.3
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.3
5.1.3.3.4
5.1.3.4
5.1.3.4.1
5.1.3.4.2
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.3
5.3.0
5.3.2
5.3.2.1

5.1.1.4.4 Disseminate Threat Info

Input Flows:
foem-threat_info
threat_information_for_dissemination
faas-confirm_image_match

Output Flows:
taas-threat_info
threat_info_for_maint
threat_info_for_traffic
threat_info_for_transit
toem-threat_info
tro-threat_info

Description:
This process shall be responsible for disseminating threat information to other functions, including Manage Traffic, Manage Transit, and Manage Maintenance and Construction, to Rail Operations, and to other emergency management agencies. The process shall filter, aggregate and/or format the information received from the Analyze Threats process so that the information is appropriate for distribution external to the Manage Emergency Services function. This threat information is based on data collected from sensors and surveillance in secure areas, processing, correlation, and verification of the collected data, inputs from federal, state, and local alerting and advisory systems, and data collected from secure areas by other emergency management centers.

User Service Requirements:
2.0
2.4
2.4.0
2.4.2
2.4.2.11
5.0
5.1
5.1.0
5.1.3
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.3
5.1.3.3.4
5.1.3.4
5.1.3.4.1
5.1.3.4.2

5.1.1.4.5 Analyze Traveler Image

Input Flows:
faas-confirm_image_match
faas-image_search_data
foem-verified_image_match
image_for_analysis
image_match_process_parameters

Output Flows:
image_matching_analysis_results
request_images_for_analysis
taas-traveler_image
taas-traveler_image_matching_details
toem-verified_image_match

Description:
This process shall request and monitor video images received from another process against a database of known images that may represent criminals and terrorists. This data is collected in secure areas, including those frequented by travelers (transit stops, rest areas, park and ride lots, modal interchange facilities, on-board transit vehicles, etc.), and those typically away from travelers (tunnels, bridges, roadway infrastructure, etc.). Surveillance video image data will also be collected from other emergency centers and the process shall return a confirmation that an image match was found or not to those centers. In addition to video inputs, this process shall also receive data preprocessed in the field, and provide additional processing if directed by processing parameters established by center personnel. The process shall analyze video images received against a database of known images, and return a potential confirmation that a match was found or not to the Alert and Advisory System. This system will then perform further analysis and return actual confirmation to this process that a match was found or not. This process shall then output identified images to other processes for output to emergency system personnel and to support further threat analysis.

User Service Requirements:
2.0
2.4
2.4.0
2.4.2
2.4.2.8
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3

5.1.1.4.6 Provide Operator Interface for Security

Input Flows:

feso-emergency_response
feso-image_processing_parameters
feso-secure_area_sensor_surveillance_control
image_matching_analysis_results
mayday_request_to_operator
secure_area_sensor_data_to_operator
secure_area_sensor_status_to_operator
secure_area_sensor_threat_information_to_operator
secure_area_surveillance_data_to_operator
secure_area_surveillance_status_to_operator
secure_area_surveillance_threat_information_to_operator
silent_and_audible_alarm_request
threat_info_to_operator

Output Flows:

image_match_process_parameters
mayday_response_from_operator
secure_area_sensor_control_from_operator
secure_area_sensor_proc_parameters_from_operator
secure_area_surveillance_control_from_operator
secure_area_surveillance_proc_parameters_from_operator
silent_and_audible_alarm_acknowledge
silent_and_audible_alarm_response
teso-emergency_request
teso-image_match
teso-secure_area_sensor_surveillance_information
threat_analysis_parameters

Description:

This process shall provide an interface between the emergency system operator and sensor, surveillance, threat detection and analysis, and personal security functions. Raw and processed surveillance data (video images and audio) and sensor data (threat, object detection, motion and intrusion detection, and infrastructure) shall be accepted based on control and processing parameters received by the operator and output to those processes. This data will have originated from surveillance and sensors placed in secure areas, including those frequented by travelers (transit stops, rest areas, park and ride lots, on-board transit vehicles, etc.) and in areas typically away from travelers (bridges, tunnels, roadway infrastructure, etc.). Operational status and fault information shall be received by this process and passed to the system operator. Threat information and threat analysis results based on processing parameters input by the operator will be received by this process and passed to the operator. Silent and audible alarm and Mayday requests from travelers, drivers, and transit vehicle operators will be received by this process and passed to the emergency system operator. The process shall receive acknowledgment of the emergency request from the system operator and pass the acknowledgment on to the requestor. This process shall input processing parameters for biometric image matching analysis from the system operator, and output those parameters to another process. That process in turn provides image matching results to this process, which are then returned to the system operator.

User Service Requirements:

2.0
2.4
2.4.0
2.4.1
2.4.1.2
2.4.1.3
2.4.2
2.4.2.10
2.4.2.2
2.4.2.3
2.4.2.4
2.4.2.5
2.4.2.6
2.4.2.7
2.4.2.8
2.4.2.9
5.0
5.1
5.1.0
5.1.3
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.2.2
5.1.3.2.3
5.1.3.3
5.1.3.3.3
5.1.3.4
5.1.3.4.3
5.1.3.4.3(b)

5.1.2 Determine Coordinated Response Plan

Input Flows:
disaster_coordination_response_data
emergency_service_allocation_data
emergency_status_feedback
foem-incident_details
foem-incident_response_coordination
verified_emergency

Output Flows:
emergency_input_for_disaster
emergency_response_data_for_communications
emergency_response_data_for_management
emergency_service_allocation_data_request
m_and_c_plan_feedback_from_emerg
toem-incident_details
toem-incident_response_coordination

Description:
This process shall determine the appropriate response for a verified emergency. This process shall classify, prioritize, and respond to verified emergencies accordingly. This process shall also determine the appropriate response plan. In the event of a major incident, disaster, or other major emergency that requires multiple agency coordination and response beyond that of normal emergency operations, this process will forward the disaster or other emergency data to another process for the required additional coordination activities and response and recovery operations plan development. In the case of personal vehicle security this process shall support the activation of remote controlled functions requested by a vehicle. A detailed description of the emergency, and any request for remote controlled emergency system activity, and any suggested response plan shall be sent to other processes for implementation. The same information shall also be forwarded to other emergency center processes for information and possible action. This process shall send feedback to the Manage Maintenance and Construction process to coordinate the response to an emergency with the actions taken by maintenance and construction.

User Service Requirements:
4.0
4.5
4.5.0
4.5.4
4.5.4.2
4.5.4.2.5
4.5.4.3
4.5.4.3.7
5.0
5.3
5.3.0
5.3.2
5.3.2.2
8.0
8.1
8.1.0
8.1.4
8.1.4.3
8.1.4.3(a)
8.1.4.3(b)

5.1.3 Communicate Emergency Status

Input Flows:
detailed_emergency_status
emergency_response_data_for_communications
emergency_service_action_log
emergency_service_log_output_request
evacuation_data_for_communications

Output Flows:
deactivate_traveler_information_restrictions_for_traffic
deactivate_traveler_information_restrictions_for_transit
deactivate_traveler_information_restrictions_for_travelers
emergency_data_for_transit
emergency_service_log_for_archive
emergency_service_log_output
evacuation_data_for_isp
incident_details
incident_info_from_emerg
incident_information
roadway_closure_from_emergency
tets-incident_acknowledge
tets-incident_information_dissemination
tm-emergency_information
transit_incident_coordination_data
traveler_information_restrictions_for_traffic
traveler_information_restrictions_for_transit
traveler_information_restrictions_for_travelers
tro-incident_information

Description:
This process shall receive the emergency service response plans and the status of their implementation for dissemination to other ITS functions. That dissemination shall be subject to sanitization according to prearranged rules, implemented in this process. The process shall also read data about emergency responses from the emergency services action log. All data shall be communicated by the process in standard formats to travelers, drivers, and other ITS functions. In the case of in-vehicle, personal traveler, and transit emergencies, after each emergency becomes a verified incident, the data shall be sent as soon as new status or plan data is received. Dissemination shall be controlled according to rules determined in this process to limit the information transmitted to that information useful to the receiver. Emergency information that is received from the emergency telephone system or E911 operators, shall be disseminated only when the response plan data is first received. That has the effect of only disseminating data on incidents that have been verified, since only verified incidents will have response plans. The process shall also extract data from the emergency service action log on request from processes in other ITS functions, and from the emergency services operator. Communication to in-vehicle processes may include requests for additional information or a set of commands to the vehicle security system. This process shall provide communication to the public by maintaining interfaces with Transit, Driver and Traveler Services, Maintenance and Construction, and Traffic functions as well as the media, rail operations, and the emergency telecommunications system. This latter interface shall support the use of Reverse 911 to accomplish the notification of an emergency situation to residents and business owners in a particular area during an emergency. This process shall support the identification of locations, such as neighborhoods or businesses, impacted by an emergency based on information received by this process. Such information may include the incident location, the severity of the incident, the impacted area, and the nature and schedule of the recovery efforts.

User Service Requirements:
5.0
5.1
5.1.0
5.1.4
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
5.2
5.3
5.3.0
5.3.10
5.3.10.8
5.3.10.8(b)
5.3.11
5.3.11.6
5.3.8
5.3.8(a)
5.3.8(b)
5.3.8(c)
5.3.8(d)
5.3.8(e)

5.1.4 Manage Emergency Response

Input Flows:

asset_restrictions_for_em_response
barrier_safeguard_activation_request_from_operator
barrier_system_status_to_emerg
cf_hazmat_vehicle_information
current_traffic_incident_response
em_resource_request_from_traffic
emergency_response_data_for_management
emergency_service_allocation_override
emergency_vehicle_acknowledge
emergency_vehicle_dispatch_status
fbis-border_incident_information
fep-incident_command_inputs
foem-emergency_resource_request
foem-emergency_resource_response
foem-incident_command_information_coordination
foem-request_for_emergency_support
foem-response_for_emergency_support
fphs-public_health_response
fro-rail_incident_information
fro-rail_incident_response_status
fstws-surface_trans_weather_forecasts
fstws-surface_trans_weather_observations
fws-current_weather_observations
fws-weather_forecasts
incident_response_clear
incident_video_for_emergency_services
m_and_c_resource_response_to_emerg
m_and_c_work_plans_for_emerg
planned_events_for_em_response
resource_deployment_status
response_for_emergency_transit_support
road_weather_info_for_emergency
roadway_detours_and_closures_for_em_response
roadway_information_status_from_traffic
safeguard_system_status_to_emerg
traffic_data_for_em_response
transit_coordination_data
transit_schedule_information_during_emergencies
transit_system_status
transportation_information_for_emerg_operations
wide_area_alerts_for_response
wrong_way_vehicle_detection

Output Flows:

barrier_safeguard_system_status_to_operator
barrier_system_activation_request_from_emerg
cf_hazmat_request
detailed_emergency_status
disable_commercial_vehicle
em_resource_response_to_traffic
emergency_service_action_log
emergency_service_allocations
emergency_status_feedback
emergency_vehicle_dispatch_failure
emergency_vehicle_incident_details
emergency_vehicle_response_request
incident_response_status
incident_response_status_from_emerg
incident_response_status_to_transit
issue_wide_area_alerts
local_decision_support
m_and_c_resource_request_from_emerg
remote_video_image_control
request_for_emergency_transit_support
resource_request
roadway_information_data_to_traffic
roadway_maint_action_req_from_emerg
safeguard_system_activation_request_from_emerg
tbis-border_incident_information
tep-incident_command_information_presentation
toem-emergency_resource_request
toem-emergency_resource_response
toem-incident_command_information_coordination
toem-request_for_emergency_support
toem-response_for_emergency_support
tphs-public_health_request
transp_information_for_emerg_operators
tro-incident_response_status
tstws-trans_weather_info_request

Description:

This process shall enable existing emergency centers to receive emergency calls, determine response requirements to the extent necessary to route the information, route distress calls and emergency information to predesignated responding agencies and vehicles, and request additional resources. All identified emergency information shall be provided by the process in a standard format as required. The process shall also communicate with commercial fleet managers to obtain details of cargo and other vehicle data where this will affect the response of the emergency services, e.g., in the case of a vehicle carrying a HAZMAT load. This process shall provide the capability to send a notice to commercial fleet managers to safely disable a commercial vehicle that may be involved in an unauthorized access or other emergency situation. The current status of all emergency service responses shall be stored by the process in an action log, for access by the communications process. This process shall receive roadway maintenance status, work zone status, and work plan information from the Manage Maintenance and Construction function, and provide feedback regarding the work plan to that function. This process shall identify and request maintenance

actions and resources from that same function. The process shall also request and receive environmental information from the Weather Service and Surface Transportation Weather Service, and shall receive transportation system operations information relevant to emergency operations. In the case of emergency situations involving biological, chemical, or other medically hazardous agents, this process shall communicate with the Public Health System to determine the best course of action. This process shall request and receive status on the use of resources to respond to an incident from the Manage Traffic function. The process shall receive updates to the responses to the current traffic incidents from the Manage Traffic function, including any changes to traffic control strategies, commercial vehicle restrictions, HRI overrides, or evacuation procedures.

User Service Requirements:

4.0
4.5
4.5.0
4.5.2
4.5.2.1
4.5.2.2
4.5.2.3
4.5.2.3(a)
4.5.2.3(b)
4.5.2.3(c)
4.5.2.3(e)
4.5.2.3(f)
4.5.2.3(g)
4.5.2.3(h)
4.5.3
4.5.3.3
4.5.3.4
4.5.4
4.5.4.2
4.5.4.2.5
4.5.4.3
4.5.4.3.7
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.3.4.3(a)
5.1.3.4.3(b)
5.1.3.5
5.1.3.5.2
5.1.3.5.3
5.2
5.2.0
5.2.1
5.2.1.1
5.2.1.2
5.2.1.3
5.3
5.3.0
5.3.2
5.3.2.2
5.3.2.2(b)
5.3.2.2(d)
5.3.2.2(e)
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(b)
8.1.4
8.1.4.1
8.1.4.2
8.1.4.3
8.1.4.3(a)
8.1.4.3(b)

5.1.5 Manage Emergency Service Allocation Store

Input Flows:
emergency_service_allocation_criteria
emergency_service_allocation_data_output_request
emergency_service_allocation_data_request
emergency_service_allocation_data_updates

Output Flows:
archive_provide_emergency_service_allocation_data
emergency_service_allocation_criteria
emergency_service_allocation_data
emergency_service_allocation_data_output

Description:
This process shall manage the store of data that defines the way in which the emergency service resources shall be deployed in response to emergencies. Deployment shall vary by certain criteria, such as, type of emergency, source of information, time of day, location, etc. Parameters to define this allocation shall be loaded into the data store following receipt from the process that provides the emergency services operator interface.

User Service Requirements:
2.0
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.4
2.3
2.3.0
2.3.4

5.1.6 Process Mayday Messages

Input Flows:
driver_status_update
emergency_request_driver_details
emergency_request_personal_traveler_details
emergency_request_vehicle_details
foem-mayday_emergency_data
mayday_response_from_operator
mayday_vehicle_tracking
vehicle_security_system_commands_request
vehicle_status_update

Output Flows:
emergency_data_request
emergency_request_driver_acknowledge
emergency_request_personal_traveler_acknowledge
emergency_request_vehicle_acknowledge
mayday_emergency_data
mayday_request_to_operator
mayday_vehicle_tracking
toem-mayday_emergency_data
vehicle_security_system_commands

Description:
This process shall receive mayday messages from vehicles and drivers, or via personal handheld devices, determine whether the mayday message indicates an emergency that requires the attention of public safety agencies, and forward mayday emergency data to the appropriate agency when assistance is required. The content of the data flow 'mayday emergency data' shall include all the key data from the incoming data flow 'emergency request details' and an agency ID indicating the mayday provider that received and processed the mayday message. While not depicted in the logical architecture, the process will also be heavily dependent on voice communications to better ascertain the nature and severity of the emergency and to report this information to the appropriate local agency. This process shall also receive and keep a historical log of signals sent in the mayday vehicle tracking data store.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.1
5.1.1.1(a)
5.1.1.1(b)
5.1.1.1(c)
5.1.1.1(d)
5.1.1.1(e)
5.1.1.2
5.1.1.3
5.1.1.4
5.1.2
5.1.2.1
5.1.2.1.1
5.1.2.1.2
5.1.2.2
5.1.2.2(a)
5.1.2.2(b)
5.1.2.2(c)

5.1.7.1.1 Surveil Traveler Secure Area

Input Flows:
fsae-area_audio_for_remote_traveler
fsae-area_image_for_remote_traveler
traveler_secure_area_surveillance_control

Output Flows:
traveler_secure_area_audio
traveler_secure_area_audio_for_field_proc
traveler_secure_area_images
traveler_secure_area_images_for_field_proc
traveler_secure_area_surveillance_status

Description:
This process shall perform video and audio surveillance of traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers). The process shall output raw video or audio data for either local or remote monitoring. The process shall accept inputs that provide equipment control. The process shall monitor and output equipment status and fault indication.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(a)
2.4.1.1(b)
2.4.1.1(c)
2.4.1.1(e)
2.4.1.1(f)
2.4.2
2.4.2.2
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.1

5.1.7.1.2 Process Traveler Secure Area Surveillance

Input Flows:
traveler_secure_area_audio_for_field_proc
traveler_secure_area_images_for_field_proc
traveler_surveillance_field_proc_parameters

Output Flows:
field_processed_traveler_secure_area_audio
field_processed_traveler_secure_area_images
traveler_secure_area_surveillance_threat_data

Description:
This process shall perform local monitoring of video or audio surveillance data collected in traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers), and shall analyze the data to identify potential incidents or threats based on received processing parameters. The process shall output an indication of potential incidents or threats and the processed video or audio information.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(a)
2.4.1.1(b)
2.4.1.1(c)
2.4.1.1(e)
2.4.1.1(f)
2.4.2
2.4.2.2
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3

5.1.7.1.3 Collect Traveler Secure Area Sensor Data

Input Flows:
fsae-area_characteristics_for_remote_traveler
traveler_intrusion_motion_sensor_control
traveler_object_detection_sensor_control
traveler_threat_sensor_control

Output Flows:
traveler_intrusion_motion_sensor_data
traveler_intrusion_motion_sensor_data_for_field_proc
traveler_intrusion_motion_sensor_status
traveler_object_detection_sensor_data
traveler_object_detection_sensor_data_for_field_proc
traveler_object_detection_sensor_status
traveler_threat_sensor_data
traveler_threat_sensor_data_for_field_proc
traveler_threat_sensor_status

Description:
This process shall be responsible for collecting data obtained from sensors in traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers). The sensors shall include threat sensors (such as chemical agent, toxic industrial chemical, biological, explosives, and radiological), object detection sensors (such as metal detectors), and motion and intrusion sensors. The process shall output raw sensor data for either local or remote monitoring. The process shall accept sensor control data to allow remote control of the sensors. The process shall monitor and output equipment status and fault indication.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(a)
2.4.1.1(b)
2.4.1.1(c)
2.4.1.1(e)
2.4.1.1(f)
2.4.2
2.4.2.3
2.4.2.5
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.2
5.1.3.3
5.1.3.3.2

5.1.7.1.4 Process Traveler Secure Area Sensor Data

Input Flows:
traveler_intrusion_motion_sensor_data_for_field_proc
traveler_object_detection_sensor_data_for_field_proc
traveler_sensor_field_proc_parameters
traveler_threat_sensor_data_for_field_proc

Output Flows:
field_processed_traveler_intrusion_motion_sensor_data
field_processed_traveler_object_detection_sensor_data
field_processed_traveler_threat_sensor_data
traveler_secure_area_sensor_threat_data

Description:
This process shall perform local monitoring of sensor data collected in traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers), and shall analyze the data to identify potential incidents or threats based on received processing parameters. Monitored sensor data includes data from threat sensors (such as chemical agent, toxic industrial chemical, biological, explosives, and radiological), object detection sensors (such as metal detectors), and motion and intrusion sensors. The process shall output an indication of potential incidents or threats and the processed sensor information.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(a)
2.4.1.1(b)
2.4.1.1(c)
2.4.1.1(e)
2.4.1.1(f)
2.4.2
2.4.2.3
2.4.2.5
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.3
5.1.3.3.2

5.1.7.1.5 Report Traveler Emergencies

Input Flows:
ft-remote_emergency_request
secure_area_traveler_alarm_response
traveler_alarm_acknowledge

Output Flows:
traveler_alarm_request
tt-remote_emergency_response

Description:
This process shall provide an interface through which travelers (including users of the transit system) can declare emergencies. The traveler may be at a transit stop, transit station, transit transfer point, park and ride lot, kiosk, rest stop, emergency pull-off, etc. The process shall output reported emergencies to the emergency management function and receive acknowledgments. The process shall output this acknowledgment to the traveler. The process shall be capable of accepting emergency textual or audio messages and broadcast them to the traveler. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(a)
2.4.1.1(b)
2.4.1.1(c)
2.4.1.1(e)
2.4.1.1(f)
2.4.1.2
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.3
5.1.3.3.1

5.1.7.2.1 Surveil Secure Area

Input Flows:
fsae-area_audio
fsae-area_image
secure_area_surveillance_control

Output Flows:
secure_area_audio
secure_area_audio_for_field_proc
secure_area_images
secure_area_images_for_field_proc
secure_area_surveillance_status

Description:
This process shall perform video and audio surveillance of secure areas of transportation infrastructure or facilities, such as tunnels, bridges, and roadway infrastructure. The process shall output raw video or audio data for either local or remote monitoring. The process shall accept inputs that provide equipment control. The process shall monitor and output equipment status and fault indication.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(g)
2.4.1.1(h)
2.4.2
2.4.2.2
2.4.2.7
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.1

5.1.7.2.2 Process Secure Area Surveillance

Input Flows:
secure_area_audio_for_field_proc
secure_area_images_for_field_proc
secure_area_surveillance_field_proc_parameters

Output Flows:
field_processed_secure_area_audio
field_processed_secure_area_images
secure_area_surveillance_threat_data

Description:
This process shall perform local monitoring of video or audio surveillance data collected in secure areas of transportation infrastructure or facilities, such as tunnels, bridges, and roadway infrastructure and shall analyze the data to identify potential incidents or threats based on received processing parameters. The process shall output an indication of potential incidents or threats and the processed video or audio information.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(g)
2.4.1.1(h)
2.4.2
2.4.2.2
2.4.2.7
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3

5.1.7.2.3 Collect Secure Area Sensor Data

Input Flows:
fsae-area_characteristics
infrastructure_integrity_sensor_control
intrusion_motion_sensor_control
object_detection_sensor_control
threat_sensor_control

Output Flows:
infrastructure_integrity_sensor_data
infrastructure_integrity_sensor_data_for_field_proc
infrastructure_integrity_sensor_status
intrusion_motion_sensor_data
intrusion_motion_sensor_data_for_field_proc
intrusion_motion_sensor_status
object_detection_sensor_data
object_detection_sensor_data_for_field_proc
object_detection_sensor_status
threat_sensor_data
threat_sensor_data_for_field_proc
threat_sensor_status

Description:
This process shall be responsible for collecting data obtained from sensors in secure areas of transportation infrastructure or facilities, such as tunnels, bridges, and roadway infrastructure. The sensors shall include threat sensors (such as chemical agent, toxic industrial chemical, biological, explosives, and radiological), object detection sensors (such as metal detectors), motion and intrusion detection sensors, and infrastructure integrity monitoring sensors. The process shall output raw sensor data for either local or remote monitoring. The process shall accept sensor control data to allow remote control of the sensors. The process shall monitor and output equipment status and fault indication.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(g)
2.4.1.1(h)
2.4.2
2.4.2.5
2.4.2.6
2.4.2.7
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.2
5.1.3.3
5.1.3.3.2

5.1.7.2.4 Process Secure Area Sensor Data

Input Flows:
infrastructure_integrity_sensor_data_for_field_proc
intrusion_motion_sensor_data_for_field_proc
object_detection_sensor_data_for_field_proc
secure_area_sensor_field_proc_parameters
threat_sensor_data_for_field_proc

Output Flows:
field_processed_infrastructure_integrity_sensor_data
field_processed_intrusion_motion_sensor_data
field_processed_object_detection_sensor_data
field_processed_threat_sensor_data
secure_area_sensor_threat_data

Description:
This process shall perform local monitoring of sensor data collected in secure areas of transportation infrastructure, such as tunnels, bridges, and roadway infrastructure, and shall analyze the data to identify potential incidents or threats based on received processing parameters. Monitored sensor data includes data from threat sensors (such as chemical agent, toxic industrial chemical, biological, explosives, and radiological), object detection sensors (such as metal detectors), motion and intrusion sensors, and infrastructure integrity sensors. The process shall output an indication of potential incidents or threats and the processed sensor information.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(g)
2.4.1.1(h)
2.4.2
2.4.2.5
2.4.2.6
2.4.2.7
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.1.1
5.1.3.2
5.1.3.2.1
5.1.3.2.1.3
5.1.3.3
5.1.3.3.2

5.1.7.3.1 Surveil Secure Vehicle Area

Input Flows:
fsae-area_audio_for_transit_vehicle
fsae-area_image_for_transit_vehicle
secure_surveillance_transit_vehicle_location
vehicle_secure_area_surveillance_control
vehicle_secure_area_surveillance_control_from_transit_operator

Output Flows:
transit_vehicle_location_for_surveillance_and_security
vehicle_secure_area_audio
vehicle_secure_area_audio_for_field_proc
vehicle_secure_area_images
vehicle_secure_area_images_for_field_proc
vehicle_secure_area_surveillance_for_transit_operator
vehicle_secure_area_surveillance_status

Description:
This process shall perform video and audio surveillance inside of transit vehicles. The process shall output raw video or audio data for either local monitoring (for processing or direct output to the transit vehicle operator), remote monitoring or for local storage (e.g., in an event recorder). This process shall monitor the location of the transit vehicle and pass it on to the process to detect and verify emergencies along with the surveillance data itself. The transit vehicle location data may be used for a variety of services. It may be used to support emergency notification, or regions can use this flow to model providing a simple AVL service that allows their Transit Police to track vehicle locations in parallel with the Transit Management Center. The process shall accept remote and local (transit vehicle operator) inputs that provide equipment control. The process shall monitor and output equipment status and fault indication.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(d)
2.4.2
2.4.2.4

5.1.7.3.2 Process Secure Vehicle Area Surveillance

Input Flows:
vehicle_secure_area_audio_for_field_proc
vehicle_secure_area_images_for_field_proc
vehicle_secure_area_surveillance_field_proc_parameters

Output Flows:
field_processed_vehicle_secure_area_audio
field_processed_vehicle_secure_area_images
vehicle_secure_area_surveillance_threat_data

Description:
This process shall perform local monitoring of video or audio surveillance data collected inside of transit vehicles, and shall analyze the data to identify potential incidents or threats based on received processing parameters. The process shall output an indication of potential incidents or threats and the processed video or audio information. The process shall archive the video or audio data on a storage medium for later review or processing. The process shall be capable of outputting information from the storage medium.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(d)
2.4.2
2.4.2.4

5.1.7.3.3 Collect Secure Vehicle Area Sensor Data

Input Flows:
fsae-area_characteristics_for_transit_vehicle
secure_sensors_transit_vehicle_location
vehicle_object_detection_sensor_control
vehicle_threat_sensor_control

Output Flows:
transit_vehicle_location_for_sensors
vehicle_object_detection_sensor_data
vehicle_object_detection_sensor_data_for_field_proc
vehicle_object_detection_sensor_status
vehicle_threat_sensor_data
vehicle_threat_sensor_data_for_field_proc
vehicle_threat_sensor_status

Description:
This process shall be responsible for collecting data obtained from sensors on-board transit vehicles. The sensors shall include threat sensors (such as chemical agent, toxic industrial chemical, biological, explosives, and radiological) and object detection sensors (such as metal detectors). The process shall output raw sensor data for either local or remote monitoring. The process shall accept sensor control data to allow remote control of the sensors. The process shall monitor and output equipment status and fault indication.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(d)
2.4.2
2.4.2.3
2.4.2.5

5.1.7.3.4 Process Secure Vehicle Area Sensor Data

Input Flows:
vehicle_object_detection_sensor_data_for_field_proc
vehicle_secure_area_sensor_field_proc_parameters
vehicle_threat_sensor_data_for_field_proc

Output Flows:
field_processed_vehicle_object_detection_sensor_data
field_processed_vehicle_threat_sensor_data
vehicle_secure_area_sensor_threat_data

Description:
This process shall perform local monitoring of sensor data collected inside of transit vehicles, and shall analyze the data to identify potential incidents or threats based on received processing parameters. Monitored sensor data includes data from threat sensors (such as chemical agent, toxic industrial chemical, biological, explosives, and radiological) and object detection sensors (such as metal detectors). The process shall output an indication of potential incidents or threats and the processed sensor information.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(d)
2.4.2
2.4.2.3
2.4.2.5

5.1.7.3.5 Manage Secure Vehicle Emergencies

Input Flows:
emergency_request_from_transit_operator
fbtv-transit_vehicle_disable_acknowledge
ft-secure_transit_vehicle_emergency_request
local_transit_operator_authentication
on_board_traveler_alarm_response
on_board_traveler_alarm_response_from_transit
remote_transit_vehicle_disable
secure_transit_vehicle_alarm_acknowledge
secure_transit_vehicle_alarm_acknowledge_for_transit
secure_transit_vehicle_location
transit_vehicle_disable_reset

Output Flows:
emergency_response_to_transit_operator
secure_transit_vehicle_alarm_request
secure_transit_vehicle_alarm_request_for_transit
tbtv-transit_vehicle_disable_command
tbtv-transit_vehicle_disable_reset_command
transit_vehicle_disable_acknowledge
transit_vehicle_disabled
transit_vehicle_location_for_alarms
tt-secure_transit_vehicle_emergency_response

Description:
This process shall support the management of emergencies that occur on-board a transit vehicle. The process shall accept emergency inputs from either the transit vehicle operator or a traveler through such interfaces as panic buttons, silent or audible alarms, etc. The process shall output reported emergencies to transit and emergency management functions. The process shall receive acknowledgments of the emergency request from the responsible management function and output this acknowledgment to the transit vehicle operator or to the travelers. The process shall be capable of receiving an emergency message for broadcast to the travelers or to the transit vehicle operator. The process shall be capable of receiving a vehicle disable command from the transit management function and of initiating the disabling of the transit vehicle. The process shall be capable of receiving a vehicle enable command that would reverse a previously received disable command. The process shall be capable of providing the status of this on-board disable action to the transit management function. The process shall be capable of disabling or enabling the operation of the transit vehicle based upon the authentication of the transit vehicle operator.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.5
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(d)
2.4.1.2
2.4.1.3
2.4.2
2.4.2.4
2.4.2.5
2.4.4
2.4.4.1
2.4.4.6

5.1.7.3.6 Provide Transit Vehicle Operator Interface for Emergencies

Input Flows:
emergency_response_to_transit_operator
ftvo-request_logon_authentication
ftvo-secure_transit_vehicle_emergency_request
ftvo-secure_transit_vehicle_surveillance_control
transit_vehicle_disabled
transit_vehicle_operator_authentication
transit_vehicle_operator_authentication_database_update
transit_vehicle_operator_wide_area_alerts
vehicle_secure_area_surveillance_for_transit_operator

Output Flows:
emergency_request_from_transit_operator
local_transit_operator_authentication
request_transit_operator_authentication
transit_vehicle_operator_authentication_status
ttvo-alert_notification
ttvo-secure_transit_vehicle_emergency_response
ttvo-secure_transit_vehicle_surveillance
ttvo-transit_vehicle_disable_status
vehicle_secure_area_surveillance_control_from_transit_operator

Description:
This process shall provide an interface between the transit vehicle operator and the transit vehicle for emergency and surveillance control functions. The operator shall be able to report an emergency situation and receive an acknowledgment from the transit or emergency management function that the emergency request has been received. The process shall provide this interface in such a way that its operation for both inputs and outputs shall be transparent to travelers on board the vehicle and to anyone outside the vehicle, and shall not compromise the safe operation of the vehicle by the operator. The process shall provide wide area alert information to the operator. The process shall perform authentication of the transit vehicle operator, which can be done in a variety of ways, either on the vehicle or at the Transit Management Center. If authentication is done on the vehicle, the database of valid transit vehicle operators stored on the vehicle is periodically updated. The process shall accept surveillance control inputs from the transit vehicle operator and output that controls the on-board surveillance equipment. The process shall forward video and audio outputs to the vehicle operator.

User Service Requirements:
2.0
2.1
2.1.0
2.1.3
2.1.3.2
2.1.3.2.5
2.4
2.4.0
2.4.1
2.4.1.1
2.4.1.1(d)
2.4.1.3
2.4.2
2.4.2.4
2.4.4
2.4.4.6

5.1.7.4 Manage Alarms

Input Flows:
secure_transit_vehicle_alarm_request
silent_and_audible_alarm_acknowledge
silent_and_audible_alarm_response
transit_vehicle_location_for_alarms
traveler_alarm_request

Output Flows:
on_board_traveler_alarm_response
secure_area_traveler_alarm_response
secure_transit_vehicle_alarm_acknowledge
silent_and_audible_alarm_data
silent_and_audible_alarm_request
traveler_alarm_acknowledge

Description:
The process shall manage silent and audible alarms received from traveler secure areas (such as transit stops, rest areas, park and ride lots, modal interchange facilities, etc.) and from on-board transit vehicles. The process shall receive the alarm from the traveler or transit vehicle operator. The process shall output the alarm to an emergency operator interface and to other emergency management processes for reporting and response coordination. The process shall generate and output a silent or audible alarm acknowledge to the source of the alarm. The process shall receive from the emergency operator interface responses (e.g. actions being taken by the emergency organization or actions the traveler should take) and requests (e.g. for additional information from the traveler) and forward the responses to the source of the alarm.

User Service Requirements:
2.0
2.4
2.4.0
2.4.1
2.4.1.2
2.4.1.3
5.0
5.1
5.1.0
5.1.3
5.1.3.1
5.1.3.3
5.1.3.3.1

5.1.8 Manage Wide Area Alerts and Advisories

Input Flows:
alert_notification_status_from_maint
alert_notification_status_from_tolls
alert_notification_status_from_traffic
alert_notification_status_from_transit
alert_notification_status_from_travelers
faas-wide_area_alert_notifications_and_advisories
feso-alerts_and_advisories
foem-alert_notification_status
foem-wide_area_alert_notification
issue_wide_area_alerts

Output Flows:
alerts_and_advisories_for_incident_detection
alerts_and_advisories_for_threat_analysis
teso-alerts_and_advisories
teso-wide_area_alert_status
toem-alert_notification_status
toem-wide_area_alert_notification
wide_area_alert_notification_for_maint
wide_area_alert_notification_for_tolls
wide_area_alert_notification_for_traffic
wide_area_alert_notification_for_transit
wide_area_alert_notification_for_travelers
wide_area_alerts_for_response

Description:
This process shall act on requests from the system operator, the Alerting and Advisory Systems, or the Manage Emergency Response process to broadcast wide area alerts and advisories for emergency situations such as severe weather events, civil emergencies, child abduction (AMBER alert system), military activities, and other situations that pose a threat to life and property where information must be immediately provided to the traveling public. The wide area alerts shall be sent to agencies that work in the field or have the ability to disseminate information to the public (e.g., information service providers, maintenance and construction management centers, toll administration facilities, traffic management centers, other emergency management centers, and transit management centers). This process shall receive notifications from those agencies that they have received the information and the status of how they are disseminating the alerts/advisories. This process shall provide alerts and advisories to other processes within Manage Emergencies for response, threat analysis, and incident detection. This process shall notify the system operator concerning the status of the issued alerts and advisories. This process will also tailor the information to be distributed to traveler information systems.

User Service Requirements:
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4

5.2 Provide Operator Interface for Emergency Data

Input Flows:
barrier_safeguard_system_status_to_operator
collected_incident_data
emergency_routing_information
emergency_service_allocation_data_output
emergency_service_allocations
emergency_service_log_output
emergency_vehicle_dispatch_failure
feso-emergency_action_log_request
feso-emergency_allocation_override
feso-emergency_data_input
feso-emergency_data_output_request
feso-emergency_display_update_request
feso-emergency_routing_input
map_data_for_emergency_display
transp_information_for_emerg_operators

Output Flows:
barrier_safeguard_activation_request_from_operator
emergency_routing_input
emergency_service_allocation_data_output_request
emergency_service_allocation_data_updates
emergency_service_allocation_override
emergency_service_log_output_request
emergency_verification_from_operator
request_emergency_display_update
teso-emergency_action_log_output
teso-emergency_data_output
teso-emergency_routing_information
teso-emergency_vehicle_dispatch_failure

Description:
This process shall provide the emergency services operator with an interface to the other processes in the Manage Emergency Services function. The process shall enable the operator to review and update the data used to verify collected emergency inputs, allocate emergency services to incidents, apply temporary overrides to current emergency service allocations to suit the special needs of a current incident, and request output of the log of emergency service actions. The process shall collect transportation system operations information relevant to emergency operations for use by personnel. This process shall request activation of barriers and safeguard systems. It shall also enable the output of a message showing the failure of an emergency vehicle dispatched in response to an incident. This output shall override all other outputs. The process shall support inputs from the emergency services operator in both manual and audio form, and shall provide its outputs in audible and visual forms. The visual output may appear in either hardcopy or as a display, or both, and an audible output shall accompany the emergency vehicle dispatch failure message.

User Service Requirements:
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.3.4.3(a)
5.1.3.4.3(b)
5.1.3.5
5.1.3.5.2
5.1.3.5.3
5.2
5.2.0
5.2.2
5.2.2.1

5.3.1 Select Response Mode

Input Flows:
emergency_vehicle_incident_details
emergency_vehicle_response_request
emergency_vehicle_status_data_for_responses

Output Flows:
emergency_vehicle_dispatch_data
emergency_vehicle_dispatch_status
emergency_vehicle_status_data_change
emergency_vehicle_status_data_request

Description:
This process shall select the appropriate emergency services and their vehicle(s) to respond to incidents. The process shall determine the type and number of vehicles to be dispatched, and provide the vehicle(s) with information on the type and location of the incident. It shall request data about the vehicles that are available from the interface process to the data store of emergency vehicle status. Once the vehicle determination has been made, the status data shall be changed by the process, and incident data sent to the process responsible for the actual dispatch of the vehicle(s).

User Service Requirements:
5.0
5.2
5.2.0
5.2.1
5.2.1.1
5.2.1.2
5.2.1.3

5.3.2 Dispatch Vehicle

Input Flows:
emergency_vehicle_dispatch_data
emergency_vehicle_dispatch_response
emergency_vehicle_route
emergency_vehicle_status_data_for_dispatch

Output Flows:
emergency_vehicle_dispatch_request
emergency_vehicle_route_request

Description:
This process shall direct selected emergency vehicles and drivers to respond to an incident, receive acknowledgment that they will in fact respond, and provide them with the location and details of the incident that was pre-calculated and sent to this process.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.2
1.6.3.2.2
1.6.3.2.2(c)
4.0
4.5
4.5.0
4.5.3
4.5.3.2
5.0
5.2
5.2.0
5.2.1
5.2.1.1
5.2.1.2
5.2.1.3
5.2.2
5.2.2.1
5.2.2.2

5.3.3 Provide Emergency Vehicle Location

Input Flows:
emergency_vehicle_enroute
From_Location_Data_Source

Output Flows:
emergency_vehicle_preemptions
emergency_vehicle_proximity
emergency_vehicle_tracking_data

Description:
This process shall manage information about the location of all emergency vehicles available for dispatch and that have been dispatched, and the ETA for vehicles en route. The process shall send this data to the store of emergency vehicle status data. The process shall also send the location, including speed and direction of travel, to other vehicles in the area. If the vehicle is on its way to an emergency, as indicated by the received vehicle status, the process shall also send data to processes in the Manage Traffic function that will enable the vehicle to have whatever level and mode of preemption is available and granted at traffic signals.

User Service Requirements:
5.0
5.2
5.2.0
5.2.1
5.2.1.1
8.0
8.1
8.1.0
8.1.1
8.1.1.1
8.1.1.1.1
8.1.1.1.1(e)

5.3.4 Assess Response Status

Input Flows:
emergency_vehicle_route_assignment
emergency_vehicle_status_data_for_assessment
incident_status_update

Output Flows:
emergency_vehicle_acknowledge
emergency_vehicle_status_data_needed
emergency_vehicle_status_data_update

Description:
This process shall assess the status of emergency vehicles that are responding to an incident. In making its assessment, the process shall use data from the process managing a store of vehicle status, plus data from the emergency vehicle driver interface process. The process shall send the results of the assessment to the process responsible for managing emergency and emergency response information and update the store of vehicle status.

User Service Requirements:
5.0
5.2
5.2.0
5.2.1
5.2.1.1

5.3.5 Provide Emergency Personnel Interface

Input Flows:
barrier_system_status_to_emerg_personnel
emergency_vehicle_dispatch_request
emergency_vehicle_suggested_route
fcf-care_facility_vehicle_status_response
fep-barrier_system_control
fep-emergency_dispatch_acknowledge
fep-incident_status
local_decision_support

Output Flows:
barrier_system_control_from_emerg_personnel
em_to_vehicle_incident_scene_information
emergency_vehicle_dispatch_response
emergency_vehicle_enroute
incident_status_update
tcf-care_facility_vehicle_status_request
tcf-emergency_vehicle_patient_status_update
tep-barrier_system_status
tep-decision_support
tep-emergency_dispatch_order

Description:
This process shall provide an interface for emergency personnel operating emergency vehicles, through which data can be exchanged with other processes in the Manage Emergency Services function. It shall support the exchange of incident data to which responses are being made by emergency personnel. This process shall include the ability to exchange information between the personnel and the care facility - either dispatch orders, status of the facility, or status of the patient. The process shall support inputs from emergency personnel in both audible and manual forms, with outputs being available in both audio or visual forms. The visual form may include display and hardcopy formats. Both inputs and outputs shall be provided in such a way that while alerting the driver to the information they contain, they shall in no way impair the driver's ability to operate the vehicle in a safe manner. This process shall support the transmission of data concerning the incident scene, e.g. nature of the incident, traffic control measures (detours) in place, out to surrounding nearby equipped passenger or commercial vehicles.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(i)
5.0
5.2
5.2.0
5.2.2
5.2.2.2

5.3.6 Maintain Vehicle Status

Input Flows:
emergency_vehicle_status_data
emergency_vehicle_status_data_change
emergency_vehicle_status_data_needed
emergency_vehicle_status_data_request
emergency_vehicle_status_data_update
emergency_vehicle_tracking_data

Output Flows:
archive_manage_emergency_vehicle_data
emergency_vehicle_status_data
emergency_vehicle_status_data_for_assessment
emergency_vehicle_status_data_for_dispatch
emergency_vehicle_status_data_for_responses

Description:
This process shall maintain a data store of the current status of all emergency vehicles available for dispatch and that have been dispatched. It shall provide data from the store on request from other processes and shall update the contents of the store with new data received from other processes. The process shall output the status of a vehicle to the process responsible for vehicle tracking for as long as it is on its way to an incident, to update ETA estimates and enable local vehicle preemption to be given at intersections, if that mode of preemption is chosen and granted.

User Service Requirements:
5.0
5.2
5.2.0
5.2.1
5.2.1.1
8.0
8.1
8.1.0
8.1.1
8.1.1.1
8.1.1.1.1
8.1.1.1.1(e)

5.3.7 Provide Emergency Vehicle Route

Input Flows:
asset_restrictions_for_emerg
emergency_route_response
emergency_routing_input
emergency_traffic_control_response
emergency_vehicle_route_request
fcf-care_facility_status_response
fmup-emergency_route_map_update
fro-railroad_schedules_for_emergency
roadway_detours_and_closures_for_em
roadway_maint_status_for_emerg
traffic_data_for_emergency_services
transportation_information_for_emerg_routing
work_zone_info_for_emergency

Output Flows:
emergency_route_request
emergency_routing_information
emergency_traffic_control_request
emergency_vehicle_route
emergency_vehicle_route_assignment
emergency_vehicle_suggested_route
tcf-care_facility_status_request
tmup-emergency_route_map_request

Description:
This process shall calculate and assign emergency vehicle routes for incident assistance upon request. This process shall use inputs from the Manage Traffic function, the Manage Maintenance and Construction function, and Rail Operations to determine what the conditions of the roadway are and what detours, closures, and restrictions may affect the routing of the emergency vehicle. If called for, the process shall send details to the Manage Traffic function to request a traffic control preemption be provided for the vehicle(s) if that mode of preemption is available and chosen. The data for the emergency vehicle driver shall be sent to the driver interface process. This process shall provide an interface to the care facilities to which emergency vehicles may be routed. This care facility interface shall be used to decide which care facility is open and ready to receive patients. This process shall interface with a map update provider to maintain an accurate digital map for routing purposes. Once the route is calculated the route is provided to the dispatch function and a record of the assigned route is provided to the assessment function. This process shall receive and accept inputs from the process that interfaces with the emergency system operator to manage the routing function.

User Service Requirements:
1.0
1.6
1.6.0
1.6.3
1.6.3.2
1.6.3.2.2
1.6.3.2.2(c)
4.0
4.5
4.5.0
4.5.3
4.5.3.2
5.0
5.2
5.2.0
5.2.1
5.2.1.2
5.2.1.3
5.2.2
5.2.2.1
5.2.2.2
5.2.3
5.2.3.1

5.3.8 Control Barrier Systems From Emergency Vehicle

Input Flows:
barrier_system_control_from_emerg_personnel
barrier_system_status_to_emerg_veh

Output Flows:
barrier_system_control_from_emerg_veh
barrier_system_status_to_emerg_personnel

Description:
This process shall control gates and other barrier systems from an emergency vehicle. The process shall open or close the barrier, as directed by emergency personnel in the vehicle. Barrier status shall be provided to other processes for presentation within the vehicle and distribution outside the vehicle.

User Service Requirements:
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.1
5.1.3.5.1(a)
5.1.3.5.2
5.1.3.5.3
5.2
5.2.0
5.2.1
5.2.1.1

5.4.1 Process TM Detected Violations

Input Flows:
enforcement_data_for_TM
fdmv-traffic_violation_state_identity
fdmv-traffic_violation_vehicle_registration
hov_lane_violation

Output Flows:
enforcement_data_for_TM
tdmv-traffic_violation_identity_code
tdmv-traffic_violation_vehicle_license
tea-traffic_violation_data

Description:
This process shall manage the details of high occupancy vehicle (HOV) lane use reported by the Manage Traffic function. The process shall use the parameters in the store of traffic management (TM) violation (enforcement) data to obtain the vehicle registration data from the appropriate State Department of Motor Vehicles (DMV) office, before sending all of the received information to the correct law enforcement agency. This process shall also maintain the TM enforcement data store, entering all information received from other processes.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.4
1.6.2.4.1
1.6.3
1.6.3.2
1.6.3.2.2
1.6.3.2.2(b)

5.4.2 Process Violations for Tolls

Input Flows:
enforcement_data_for_tolls
fdmv-toll_violation_state_identity
fdmv-toll_violation_vehicle_registration
toll_violation_information

Output Flows:
enforcement_data_for_tolls
tdmv-toll_violation_identity_code
tdmv-toll_violation_vehicle_license
tea-toll_violation_data

Description:
This process shall manage the details of toll payment violations reported by the Provide Electronic Payments Services function. The process shall use the parameters in the store of toll payment violation (enforcement) data to obtain the vehicle registration data from the appropriate State Department of Motor Vehicles (DMV) office (or alternate source) for vehicles that are not equipped with a vehicle payment device, before sending all of the received information to the correct law enforcement agency. This process shall also maintain the toll payment enforcement data store, entering all information received from other processes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

5.4.3 Process Parking Lot Violations

Input Flows:
enforcement_data_for_parking
fdmv-parking_lot_violation_state_identity
fdmv-parking_lot_violation_vehicle_registration
parking_lot_violation_information

Output Flows:
enforcement_data_for_parking
tdmv-parking_lot_violation_identity_code
tdmv-parking_lot_violation_vehicle_license
tea-parking_violation_data

Description:
This process shall manage the details of parking lot payment violations reported by the Provide Electronic Payment Services function. The process shall use the parameters in the store of parking lot violation (enforcement) data to obtain the vehicle registration data from the appropriate State Department of Motor Vehicles (DMV) office (or alternate source) for vehicles that are not equipped with a vehicle payment device, before sending all of the received information to the correct law enforcement agency. This process shall also maintain the store of parking lot violation (enforcement) data, entering all information received from other processes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

5.4.4 Process Fare Payment Violations

Input Flows:
enforcement_data_for_fare_payment
fare_violation_information

Output Flows:
bad_transit_collected_fare_payment
enforcement_data_for_fare_payment
tea-fare_payment_violation_data

Description:
This process shall manage the details of fare payment violations reported by the Provide Electronic Payments function. The process shall use the parameters in the store of fare payment violation (enforcement) data to process and send the data to the correct law enforcement agency. This process shall also maintain the fare payment enforcement data store, entering all information received from other processes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

5.4.5 Process Vehicle Fare Collection Violations

Input Flows:
enforcement_data_for_vehicle_fare_collection
fare_collection_vehicle_violation_information

Output Flows:
bad_transit_vehicle_fare_payment
enforcement_data_for_vehicle_fare_collection
tea-fare_collection_vehicle_violation_data

Description:
This process shall manage the details of fare collection violations reported by the Manage Transit function that have taken place on-board a transit vehicle. The process shall use the parameters in the store of vehicle fare collection violation (enforcement) data to process and send the information to the correct law enforcement agency. This process shall also maintain the vehicle fare collection enforcement data store, entering all information received from other processes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

5.4.6 Process CV Violations

Input Flows:
cv_violation_data
cvo_accident
enforcement_data_for_cv
fdmv-cv_violation_vehicle_registration

Output Flows:
enforcement_data_for_cv
tea-accident_data
tea-cv_citation_data
tea-cv_violation_data

Description:
This process shall manage the details of violations committed by commercial vehicles, their drivers and/or operators, reported by the Manage Commercial Vehicles function. The process shall use the parameters in the store of commercial vehicle violation (enforcement) data to obtain the vehicle registration data from the appropriate office, before sending all of the received data to the correct enforcement agency. This process shall also maintain the commercial vehicle violation (enforcement) data store.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

5.4.7 Process Roadside Fare Collection Violations

Input Flows:
enforcement_data_for_roadside_fare_collection
fare_collection_roadside_violation_information

Output Flows:
bad_transit_roadside_fare_payment
enforcement_data_for_roadside_fare_collection
tea-fare_collection_roadside_violation_data

Description:
This process shall manage the details of fare collection violations reported by the Manage Transit function that have taken place at the roadside, i.e., at a transit stop. The process shall use the parameters in the store of roadside fare collection violation (enforcement) data to process and send the information to the correct law enforcement agency. This process shall also maintain the roadside fare collection enforcement data store, entering all information received from other processes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

5.4.8 Process Emissions Violations

Input Flows:
enforcement_data_for_emissions
fdmv-emissions_violation_state_identity
fdmv-emissions_violation_vehicle_registration
vehicle_emissions_alert

Output Flows:
enforcement_data_for_emissions
tdmv-emissions_violation_identity_code
tdmv-emissions_violation_vehicle_license
tea-emissions_violation_data

Description:
This process shall manage the details of pollution violations reported by the Manage Traffic function. The process shall use the parameters in the store of emissions management violation (enforcement) data to obtain the vehicle registration data from the appropriate State Department of Motor Vehicles (DMV) office, before sending all of the received information to the correct law enforcement agency. This process shall also maintain the emissions enforcement data store, entering all information received from other processes.

User Service Requirements:
1.0
1.6
1.6.0
1.6.2
1.6.2.4
1.6.2.4.1
1.6.3
1.6.3.2
1.6.3.2.2
1.6.3.2.2(b)

5.5 Update Emergency Display Map Data

Input Flows:
fmup-emergency_display_update
request_emergency_display_update

Output Flows:
map_data_for_emergency_display
tmup-request_emergency_display_update

Description:
This process shall provide updates to the store of digitized map data used as the background for displays of incidents and emergencies produced by processes in the Manage Emergency Services function. The process shall obtain the new data from a specialist data supplier or some other appropriate data source, on receiving an update request from the emergency system operator interface process within the Manage Emergency Services function.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.1
5.1.1.1(d)
5.1.1.3
5.1.2
5.1.2.2
5.1.2.2(b)
5.1.4
5.1.4.1
5.1.4.1.1
5.1.5
5.1.5.2
5.2
5.2.0
5.2.1
5.2.1.3
5.2.2
5.2.2.1
5.2.2.2
5.2.3
5.2.3.1

5.6 Manage Emergency Services Data

Input Flows:
archive_manage_emergency_vehicle_data
archive_provide_emergency_service_allocation_data
disaster_data_for_archive
em_archive_request
em_archive_status
emergency_data_archive
emergency_service_log_for_archive
evacuation_data_for_archive
feso-archive_commands
sensor_data_for_archive
surveillance_data_for_archive
threat_data_for_archive

Output Flows:
em_archive_data
emergency_data_archive
teso-archive_status

Description:
This process shall collect emergency service data, emergency vehicle management data, emergency vehicle data, sensor and surveillance data, threat data, and incident data. It shall distribute this data to the Manage Archive Data Request where it can be archived and accessed upon request or upon receipt of fresh data. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the emergency data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.5
7.1.3.1.5(a)
7.1.3.1.5(b)
7.1.3.1.5(c)
7.1.3.1.5(d)
7.1.3.1.5(f)
7.1.3.1.5(h)

5.7.1 Assess System Status For Disasters

Input Flows:
emergency_disaster_response_plan
emergency_input_for_disaster
evacuation_status_for_disaster_response
foem-transportation_system_status_for_disaster
fro-rail_system_status_for_disaster
m_and_c_status_assessment_for_disaster
network_status_from_traffic_for_disaster
transportation_information_for_disaster_operations

Output Flows:
disaster_coordination_response_data
disaster_data_for_archive
disaster_response_evacuation_data
disaster_transportation_system_status_for_isp
disaster_transportation_system_status_for_traffic
disaster_transportation_system_status_for_transit
emergency_disaster_data
m_and_c_transportation_system_status_for_disaster
toem-transportation_system_status_for_disaster
tro-transportation_system_status_for_disaster

Description:
This process shall be responsible for collecting data relevant to an emergency regarding a disaster. It will collect data previously identified as disaster related data from the detect and verify emergencies function. It also collects information related to the current status of the transportation system. The status of the transportation system is assessed to determine facilities, structures, equipment, etc. that have been damaged or destroyed and what remains operational along with the general state of operations for the system. Collected information is then filtered and used to assist in establishing a coordinated disaster response and recovery plan. The complete view of the transportation system status is also forwarded to other management centers (e.g. transit, traffic, maintenance and construction, rail operations, other emergency management, etc.) to provide them with a view of the system that is available for disaster response and recovery operations.

User Service Requirements:
5.0
5.3
5.3.0
5.3.2
5.3.2.2
5.3.2.2(c)
5.3.3
5.3.3.3
5.3.3.4
5.3.3.5
5.3.4
5.3.4.1
5.3.4.1(a)
5.3.4.1(b)
5.3.4.1(c)
5.3.4.1(d)
5.3.4.1(e)
5.3.4.2
5.3.7
5.3.7.1
5.3.7.1(b)

5.7.2 Provide Disaster Response Coordination

Input Flows:
disaster_data
disaster_response_plan_coordination_from_m_and_c
disaster_response_plan_coordination_from_traffic
disaster_response_plan_coordination_from_transit
emergency_disaster_data
fcf-care_facility_status_response_for_disaster
foem-disaster_response_plan_coordination
fro-disaster_response_plan_coordination

Output Flows:
disaster_data
disaster_response_plan_coordination_to_m_and_c
disaster_response_plan_coordination_to_traffic
disaster_response_plan_coordination_to_transit
emergency_disaster_response_plan
tcf-care_facility_disaster_data
tcf-care_facility_status_request_for_disaster
toem-disaster_response_plan_coordination
tro-disaster_response_plan_coordination

Description:
This process provides the medium in which coordination between multiple agencies and other ITS functions can develop a response and recovery plan for a major disaster. This coordination is typically more involved than the coordination of minor emergencies or localized incidents and often involves agencies outside of the local jurisdictions managed in the emergency and incident management functions. This process allows multiple agencies to modify existing preplanned response and recovery plans along with current plans being implemented based on the most recent information available about the disaster and the conditions of the transportation infrastructure. The resulting response and recover plan is then forwarded to the local emergency response functions for implementation.

User Service Requirements:
5.0
5.3
5.3.0
5.3.2
5.3.2.2
5.3.6
5.3.6.1
5.3.6.2
5.3.7
5.3.7.1
5.3.7.1(a)
5.3.7.1(c)
5.3.7.2
5.3.7.3
5.3.7.3(a)
5.3.7.3(b)
5.3.7.3(c)
5.3.7.3(d)
5.3.7.3(e)

5.7.3 Assess System Status For Evacuation

Input Flows:
disaster_response_evacuation_data
emergency_evacuation_status
foem-transportation_system_status_for_evacuation
fro-rail_system_status_for_evacuation
m_and_c_status_assessment_for_evacuation
network_status_from_traffic_for_evacuation
transportation_information_for_evac_operations

Output Flows:
emergency_evacuation_data
evacuation_data_for_archive
evacuation_status_for_disaster_response
evacuation_transportation_system_status_for_isp
evacuation_transportation_system_status_for_traffic
evacuation_transportation_system_status_for_transit
m_and_c_transportation_system_status_for_evacuation
toem-transportation_system_status_for_evacuation
tro-transportation_system_status_for_evacuation

Description:
This process shall be responsible for collecting data relevant to an emergency regarding an evacuation. It will collect data regarding the emergency or disaster that has warranted the evacuation. It also collects information related to the current status of the transportation system. The status of the transportation system is assessed to determine facilities, structures, equipment, etc. that are available for use during the evacuation. Collected information is then filtered and used to assist in establishing a coordinated evacuation plan. The complete view of the transportation system status is also forwarded to other management centers (e.g. transit, traffic, maintenance and construction, rail operations, other emergency management, etc.) to provide them with a view of the system that is available for evacuation operations.

User Service Requirements:
5.0
5.3
5.3.0
5.3.1
5.3.11
5.3.11.1
5.3.11.11
5.3.12
5.3.12.1
5.3.12.1.1
5.3.9
5.3.9.1

5.7.4 Provide Evacuation Coordination

Input Flows:
emergency_evacuation_data
evacuation_plan_coordination_from_m_and_c
evacuation_plan_coordination_from_traffic
evacuation_plan_coordination_from_transit
evacuation_plans
evacuation_status_report
foem-evacuation_plan_coordination
fphs-public_health_evacuation
fro-evacuation_plan_coordination
fsp-shelter_information

Output Flows:
emergency_evacuation_plan
emergency_evacuation_status
evacuation_plan_coordination_to_m_and_c
evacuation_plan_coordination_to_traffic
evacuation_plan_coordination_to_transit
evacuation_plans
toem-evacuation_plan_coordination
tphs-public_health_evacuation_request
tro-evacuation_plan_coordination
tsp-shelter_evacuation_information
tsp-shelter_information_request

Description:
This process provides the medium in which coordination between multiple agencies and other ITS functions can develop an evacuation plan. This coordination often involves agencies outside of the local jurisdictions managed in the emergency and incident management functions. Based on the status reports of the evacuation situation that is being shared with involved agencies, this process allows multiple agencies to modify existing preplanned evacuation plans along with current plans being implemented due to the most recent information regarding the emergency which requires the evacuation and the current conditions of the transportation infrastructure. The resulting evacuation plan contains both exit and reentry plans and schedules for the evacuation area. The plan is also forwarded to the manage evacuation function for implementation. In the case of emergency evacuation situations involving biological, chemical, or other medically hazardous agents, this process shall communicate with the Public Health System to determine the best course of action, including how far to evacuate the public and when they should be allowed back.

User Service Requirements:
5.0
5.3
5.3.0
5.3.11
5.3.11.1
5.3.11.2
5.3.11.3
5.3.11.3.10
5.3.11.3.11
5.3.11.3.12
5.3.11.3.2
5.3.11.3.3
5.3.11.3.4
5.3.11.3.5
5.3.11.3.6
5.3.11.3.7
5.3.11.3.8
5.3.11.3.9
5.3.12
5.3.12.1
5.3.12.1.1
5.3.12.2
5.3.12.2.1
5.3.12.2.2
5.3.12.2.3
5.3.9
5.3.9.2
5.3.9.3
5.3.9.4
5.3.9.5

5.7.5 Manage Evacuation

Input Flows:
emergency_evacuation_plan
evacuation_toll_change_response
foem-evacuation_information_from_other_em
foem-evacuation_resource_request
foem-evacuation_resource_response
foem-evacuation_status
m_and_c_evacuation_resource_response
traffic_evacuation_status
transit_evacuation_status
transit_schedule_information_during_evacuation

Output Flows:
evacuation_data_for_communications
evacuation_information_for_m_and_c
evacuation_information_for_traffic_management
evacuation_information_for_transit_management
evacuation_status_report
evacuation_toll_change_request
m_and_c_evacuation_resource_request
toem-evacuation_information_for_other_em
toem-evacuation_resource_request
toem-evacuation_resource_response
toem-evacuation_status
traffic_evacuation_resource_request
transit_evacuation_resource_request
tro-evacuation_information_for_rail

Description:
This process shall enable emergency centers to manage and implement an evacuation plan. It allows emergency agencies to make request of traffic management agencies to adjust signal timing plans for evacuation and rapid response to an incident scene. It allows the centers to request resources from traffic, transit, toll, maintenance and construction, and other emergency management centers as needed. These other management areas then report back to this process the status of their resources and how well they are performing the evacuation. This process then forwards the status of the evacuation back to coordinate evacuation plans so that the plan can be improved as needed.

User Service Requirements:
5.0
5.3
5.3.0
5.3.11
5.3.11.4
5.3.11.4(a)
5.3.11.4(b)
5.3.11.4(c)
5.3.11.4(d)
5.3.11.4(e)
5.3.11.4(f)
5.3.11.4(g)
5.3.11.4(h)
5.3.11.4(j)
5.3.11.5
5.3.11.7
5.3.11.8
5.3.11.9
5.3.12
5.3.12.1
5.3.12.1.2
5.3.12.2
5.3.12.2.4

5.7.6.1 Control Safeguard Systems

Input Flows:
safeguard_system_control

Output Flows:
dms_safeguard_activated_from_roadway
safeguard_system_device_status
safeguard_system_equip_status_for_m_and_c
safeguard_system_status
t_other_rw_dms_safeguard_activated_from_roadway

Description:
This process shall automatically activate safeguard systems, equipment used to mitigate the impact of incidents on transportation infrastructure (e.g., blast shields, tunnel exhaust systems, etc.) upon receiving configuration and control commands from another process. Safeguard system operational status (state of the device, configuration, and fault data) is returned to the controlling process as well as to Manage Traffic and Manage Maintenance and Construction processes for repair. This process shall send activation information to another function for roadway information device (e.g. dynamic message sign) display to drivers.

User Service Requirements:
5.0
5.1
5.1.0
5.1.3
5.1.3.5
5.1.3.5.1
5.1.3.5.1(b)
5.1.3.5.2
5.1.3.5.3
5.1.3.5.4

5.7.6.2 Manage Safeguard Systems

Input Flows:
safeguard_system_activation_request_from_emerg
safeguard_system_activation_request_from_operator
safeguard_system_status

Output Flows:
roadway_info_safeguard_activated_from_traffic
safeguard_system_control
safeguard_system_data_for_archive
safeguard_system_status_for_detours
safeguard_system_status_to_emerg
safeguard_system_status_to_operator

Description:
This process shall remotely monitor and manage safeguard systems, equipment used to mitigate the impact of incidents on transportation infrastructure (e.g., blast shields, tunnel exhaust systems, etc.). The process also outputs data to other processes within Manage Traffic to control dynamic message signs (DMS), highway advisory radio (HAR), or in-vehicle signage used to inform travelers of safeguard system activation. Activation requests shall be accepted from other processes including a process that manages emergency response and the center personnel interface process. Operational status (state of the device, configuration, and fault data) about the safeguard system equipment shall be collected and forwarded to the processes that requested activation and to a process that handles detours. The information will also be forwarded to another process for archival.

User Service Requirements:
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.3.4.3(a)
5.1.3.5
5.1.3.5.2
5.1.3.5.3
5.1.3.5.4

6.1.1 Provide Trip Planning Information to Traveler

Input Flows:

incident_information_for_trip_planning
individual_transit_trip_plan
multimodal_data_for_trip_planning
paratransit_personal_schedule
paratransit_route_request
parking_data_for_trip_planning
price_data_for_trip_planning
profiles_for_trip_planning
rideshare_response
supplied_route
traffic_data_for_trip_planning
transit_data_for_trip_planning
traveler_personal_trip_request
traveler_trip_request
trip_planning_parameters
vehicle_trip_request
weather_data_for_trip_planning

Output Flows:

multimodal_data_request_from_trip_planning
paratransit_route_response
paratransit_trip_request
parking_data_request_from_trip_planning
price_data_request_from_trip_planning
traffic_data_request_from_trip_planning
transit_data_request_from_trip_planning
transit_trip_confirmation
transit_trip_request
traveler_personal_trip_information
traveler_rideshare_request
traveler_trip_information
trip_information
trip_planning_requests_for_archive
trip_requests_for_personnel
trip_route_request
vehicle_trip_information
weather_data_request_from_trip_planning

Description:

This process shall obtain all the information needed to fulfill the traveler's request for a trip. The process shall support the request for trips that require the use of one or more modes of transport, and shall use the preferences and constraints specified by the traveler in the trip request, plus data from the store of trip planning parameters, to select the most appropriate modes. It shall send details of the trip requirements to the specialized processes that provide route information for the different modes of transport. When route data is received back from these processes, this process shall ensure that the whole trip is covered by one coherent route for which all the data such as costs, arrival times, and modal (and intra-modal) transfer points are known. The information provided to the traveler by the process shall be sufficient to enable the traveler to understand the routing, modes and cost of the trip. The trip information shall be stored for possible use in subsequent trip confirmation. The process also includes parking lot data. This data is used in transactions requiring electronic payment of parking lot services, as well as for a traveler making a parking lot reservation. This process shall exchange all input and output data from and to the traveler with the appropriate traveler interface process. The traveler shall send parking lot data, traveler trip requests, and traveler current condition requests to the archival process.

User Service Requirements:

1.0
1.1
1.1.0
1.1.1
1.1.1.1
1.1.1.1.1
1.1.1.1.2
1.1.1.1.3
1.1.1.1.4
1.1.1.1.5
1.1.1.1.6
1.1.2
1.1.2.1
1.1.2.1.1
1.1.2.1.2
1.1.2.1.3
1.1.2.1.4
1.1.2.1.5
1.1.2.1.6
1.1.2.1.7
1.1.2.1.8
1.1.3
1.1.3.1
1.1.3.1.1
1.1.3.1.2
1.1.3.1.3
1.1.3.1.4
1.1.3.2
1.1.3.3
1.1.3.3.1
1.1.3.3.2
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.1.4.1.3
1.4
1.4.0
1.4.1
1.4.1.3
1.4.3
1.4.3.1
1.4.3.3
1.4.3.3(a)
1.4.3.3(b)
1.4.3.3(c)
1.4.3.3(d)
1.4.3.3(e)
1.4.3.3(f)
1.6
1.6.0
1.6.4
1.6.4(b)
1.6.4(c)
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(f)
1.7.1.1.1(g)
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(d)
1.8.1.2(e)
1.8.1.3
1.8.1.3(a)
1.8.1.3(e)
1.8.1.3(f)
1.8.1.6
1.8.1.6(a)
1.8.2
1.8.2.3
1.8.2.3(c)
1.8.2.4
1.8.2.4(a)
1.8.2.4(f)
2.0
2.3
2.3.0
2.3.1
2.3.1.2
2.4
2.4.0
2.4.3
2.4.3.1
2.4.3.2

6.1.2 Confirm Traveler's Trip Plan

Input Flows:

fmtsp-multimodal_service_confirmation
paratransit_route_confirm
parking_lot_reservation_confirm
rideshare_confirmation
traveler_payment_information
traveler_payment_response
traveler_personal_payment_information
traveler_personal_trip_confirmation
traveler_trip_confirmation
trip_information
trip_planning_parameters
vehicle_payment_information
vehicle_trip_confirmation

Output Flows:

paratransit_service_confirmation
parking_lot_reservation_request
tmtsp-confirm_multimodal_service
traveler_payment_confirmation
traveler_payment_request
traveler_personal_payment_confirmation
traveler_rideshare_confirmation
trip_confirmations_for_personnel
trip_planning_confirmations_for_archive
vehicle_payment_confirmation

Description:

This process shall confirm a trip previously requested by a traveler and any financial transactions that this may require. The process shall base the trip confirmation upon information created by the process responsible for trip planning and stored locally. Confirmation details shall be sent to specialized processes (such as those responsible for demand responsive transit, ridesharing, parking, etc.) to make reservations for their services. The response to these reservation requests and any necessary payment transactions shall be sent to the traveler. This process shall exchange all input and output data to and from the traveler via the appropriate traveler interface process. The trip confirmation shall be sent to the archival process.

User Service Requirements:

1.0
1.1
1.1.0
1.1.3
1.1.3.1
1.1.3.2
1.1.3.3
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.1.4.1.3
1.4
1.4.0
1.4.1
1.4.1.1
1.4.1.2
1.4.1.2(a)
1.4.1.3
1.4.1.4
1.4.2
1.4.2.1
1.4.2.4
1.4.3
1.4.3.2
1.8
1.8.0
1.8.1
1.8.1.6
1.8.1.6(a)
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(h)

6.1.3 Provide ISP Operator Interface for Trip Planning Parameters

Input Flows:
fispo-request_trip_planning_map_update
fispo-trip_planning_parameters_request
fispo-trip_planning_parameters_update
trip_confirmations_for_personnel
trip_planning_map_data
trip_planning_parameters
trip_requests_for_personnel

Output Flows:
request_trip_planning_map_update
tispo-trip_planning_data
tispo-trip_planning_parameters
trip_planning_parameters

Description:
This process shall manage the data store containing parameters used by the trip planning processes. These parameters shall govern the way in which multimodal trips are planned by other processes within Provide Trip Planning Services. This process shall accept inputs from the ISP Operator to define or update trip planning parameters. This process shall output these trip planning parameters to the ISP Operator.

User Service Requirements:
1.0
1.6
1.6.0
1.6.4
1.6.4(b)
1.6.4(c)

6.2.1 Collect Misc Traveler Information

Input Flows:

border_data_request_for_alerts
dynamic_parking_information_for_isp
env_probe_data_from_vehicles
event_information_request_for_alerts
event_information_request_from_interactive
fbis-actual_border_wait_time_for_info
fbis-current_border_wait_time_for_info
fbis-predicted_border_wait_time_for_info
fbis-traveler_border_status
fevp-event_information_for_travelers
fm-traveler_information
foisp-parking_data
foisp-road_weather_data
fstws-surface_trans_weather_forecasts
fstws-surface_trans_weather_observations
ftsp-travel_services_data
fws-current_weather_observations
fws-env_sensor_data_for_isp
fws-weather_forecasts
misc_trav_info_data_collection_parameters
misc_traveler_information
parking_data_request_for_alerts
parking_data_request_from_interactive
parking_data_request_from_trip_planning
parking_lot_availability
road_weather_info_for_isp
static_parking_information_for_isp
traffic_road_weather_data_for_isp
travel_services_new_data_request
travel_services_provider_data_for_data_collector
travel_services_update_request
weather_data_request_for_alerts
weather_data_request_from_interactive
weather_data_request_from_route_guidance
weather_data_request_from_trip_planning

Output Flows:

border_data_for_alerts
border_data_for_broadcast
border_data_for_centers
border_data_for_interactive
event_information_for_alerts
event_information_for_broadcast
event_information_for_centers
event_information_for_interactive
misc_trav_info_collected_for_personnel
misc_traveler_information
parking_data_for_alerts
parking_data_for_broadcast
parking_data_for_centers
parking_data_for_interactive
parking_data_for_trip_planning
parking_lot_data_request
parking_lot_dynamic_information_request_by_isp
parking_lot_static_information_request_by_isp
tevp-event_information_request
tm-traveler_information_request
toisp-parking_data
toisp-road_weather_data
travel_services_data_for_travel_services
tstws-trans_weather_info_request
ttsp-travel_services_info_request
weather_data_for_alerts
weather_data_for_broadcast
weather_data_for_centers
weather_data_for_interactive
weather_data_for_route_guidance
weather_data_for_trip_planning

Description:

This process shall collect miscellaneous traveler information including information about parking facilities, events, weather, border crossings, and the services of yellow pages service providers. Data quality checks shall be performed on all collected data. The process shall provide data formatted for use as part of a traveler's trip. The process shall provide the data to the broadcast traveler information application, and to the application which transmits traveler information to other operations centers. Upon request from the interactive traveler information application the process shall provide all or some requested subset of the collected traveler data. Upon receipt of traveler information alert subscriptions, this process shall output relevant traveler information (e.g., special event, road weather, border congestion, and parking) alerts. The process shall maintain a store of data collected from the miscellaneous sources. This process shall exchange information with Other Information Service Providers to allow one ISP to act as a wholesaler and provide information to other ISPs. The process shall select the appropriate subset of data which will be sent to each ITS application or entity that is requesting data. The process shall provide all of the received information to the ISP Operator Interface process and receive the data collection parameters (to define exactly what data shall be retrieved as a result of each request) from the operator interface process.

User Service Requirements:

1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.1
1.1.2.1.2
1.1.2.1.3
1.1.2.1.4
1.1.2.1.5
1.1.2.1.6
1.1.2.1.7
1.1.2.1.8
1.2
1.2.0
1.2.2
1.2.2.1
1.2.2.1.1
1.2.2.1.2
1.2.2.1.2.1
1.2.2.1.3
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(d)
1.3.1.2.1(d).1
1.3.1.2.1(d).2
1.3.1.2.1(d).3
1.4
1.4.0
1.4.1
1.4.1.4
1.4.2
1.4.2.1
1.4.2.2
1.5
1.5.0
1.5.1
1.5.1.1
1.5.1.2
1.5.1.2.1
1.5.1.2.2
1.5.1.2.3
1.5.1.2.4
1.5.1.2.5
1.5.1.3
1.5.1.4
1.5.1.5
1.5.2
1.5.2.1
1.5.2.2
1.5.2.2(a)
1.5.2.2(b)
1.5.2.2(d)
1.5.2.2(e)
1.5.2.2(f)
1.5.2.2(h)
1.5.2.3
1.5.2.3(a)
1.7
1.7.0
1.7.1
1.7.1.1
1.7.1.1.1
1.7.1.1.1(e)
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(d)
1.8.1.2(g)
1.8.1.3
1.8.1.3(d)
1.8.1.3(g)
1.8.2
1.8.2.1
1.8.2.1(d)
1.8.2.4
1.8.2.4(d)
1.8.2.4(g)
2.0
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.1
2.2.2
2.2.2.3
2.2.3
2.2.3.1
2.2.3.1.1

6.2.2 Collect Traffic Data

Input Flows:

asset_restrictions_for_info_provider
current_highway_network_state
current_road_network_state
current_traffic_pollution_data
foisp-incident_data
foisp-traffic_data
foisp-traffic_images
link_data_for_guidance
m_and_c_work_plans_for_info_provider
planned_events
prediction_data
reversible_lane_signal_state_for_freeways
reversible_lane_signal_state_for_roads
roadway_detours_and_closures_for_isp
roadway_maint_status_for_info_provider
route_restrictions_for_isp
traffic_data_for_isp
traffic_data_request_for_alerts
traffic_data_request_from_interactive
traffic_data_request_from_ridesharing
traffic_data_request_from_route_guidance
traffic_data_request_from_trip_planning
traffic_data_retrieval_parameters
traffic_probe_data_from_vehicles
traffic_traveler_data
traffic_traveler_data_collection_parameters
traffic_video_for_isp
work_zone_images_for_isp
work_zone_info_for_isp

Output Flows:

tm-traffic_information
toisp-incident_data
toisp-traffic_data
toisp-traffic_images
traffic_data_for_alerts
traffic_data_for_broadcast
traffic_data_for_centers
traffic_data_for_interactive
traffic_data_for_ridesharing
traffic_data_for_route_guidance
traffic_data_for_trip_planning
traffic_data_retrieval_parameters
traffic_traveler_data
traffic_traveler_data_collected_for_personnel

Description:

This process shall collect traffic, reversible/hov lane restriction data, toll, vehicle probe, and maintenance and construction data to be used for traveler information, trip planning, route guidance, and ridesharing applications and sent to the media. Data quality checks shall be performed on all collected data. Upon receipt of traveler information alert subscriptions, this process shall output relevant traffic alerts. This process shall exchange information with Other Information Service Providers to allow one ISP to act as a wholesaler and provide information to other ISPs. This process shall use the parameters in the data store 'traffic_data_retrieval_parameters' to define exactly what data shall be retrieved as a result of each request. The process shall select the appropriate subset of data which will be sent to each ITS application or entity that is requesting data. The process shall provide all of the received information to the ISP Operator Interface process and receive the data collection parameters from the operator interface process.

User Service Requirements:

1.0
1.1
1.1.0
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.1.4.1.3
1.1.4.1.4
1.6
1.6.0
1.6.3
1.6.3.4
1.6.3.4.1
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(g)

6.2.3 Collect Transit Operations Data

Input Flows:

foisp-transit_data
transit_data_request_from_interactive
transit_data_request_from_route_selection
transit_data_request_from_trip_planning
transit_data_request_for_alerts
transit_fare_data_for_isp
transit_incident_data
transit_services_for_guidance
transit_services_for_isp
transit_transfer_point_list
transit_traveler_data
transit_traveler_data_collection_parameters
transit_vehicle_deviations_details

Output Flows:

tm-transit_vehicle_deviations
toisp-transit_data
transit_data_for_alerts
transit_data_for_broadcast
transit_data_for_centers
transit_data_for_interactive
transit_data_for_route_selection
transit_data_for_trip_planning
transit_services_guidance_request
transit_traveler_data
transit_traveler_data_collected_for_personnel

Description:

This process shall collect and fuse transit services data that will be used to create broadcast or interactive messages to travelers and other operations centers as well as support trip planning and route guidance applications. Data quality checks shall be performed on all collected data. Upon receipt of traveler information alert subscriptions, this process shall output relevant transit alerts. This process shall collect transit service information including schedules, fares, deviations, incidents, and transfer points. The process shall load the incoming data into the 'transit_traveler_data' store. The data can be provided to the process either via direct request from the process or as a result of periodic (unrequested) updates. This process shall provide the media with transit information. This process shall exchange information with Other Information Service Providers to allow one ISP to act as a wholesaler and provide information to other ISPs. The process shall select the appropriate subset of data which will be sent to each ITS application or entity that is requesting data. The process shall provide all of the received information to the ISP Operator Interface process and receive the data collection parameters (to define exactly what data shall be retrieved as a result of each request) from the operator interface process.

User Service Requirements:

1.0
1.2
1.2.0
1.2.2
1.2.2.1
1.2.2.1.1
1.2.2.1.2
1.2.2.1.2.1
1.2.2.1.3
1.5
1.5.0
1.5.1
1.5.1.1
1.5.1.2
1.5.1.2.1
1.5.1.2.2
1.5.1.2.3
1.5.1.2.4
1.5.1.2.5
1.5.1.3
1.5.1.4
1.5.1.5
1.5.2
1.5.2.1
1.5.2.2
1.5.2.3
1.5.2.4
1.5.2.5
1.5.2.5(d)
1.5.2.5(g)
2.0
2.1
2.1.0
2.1.1
2.1.2
2.1.2.2
2.1.2.2.1
2.1.2.2.5
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.1
2.2.2
2.2.2.1
2.2.2.2
2.2.2.3
2.2.2.3(a)
2.2.2.3(b)
2.2.2.3(c)
2.2.3
2.2.3.1
2.2.3.1.1
2.2.3.1.1(a)
2.2.3.1.1(b)
2.2.3.1.1(c)
2.2.3.1.1(d)
2.2.3.1.2
2.2.3.1.2(a)
2.2.3.1.2(b)
2.2.3.2
2.2.3.2.1
2.2.3.2.2

6.2.4 Collect Multimodal Data

Input Flows:

fmtsp-air_services
fmtsp-ferry_services
fmtsp-non_motorized_services
fmtsp-rail_services
fmtsp-transit_transfer_clusters
foisp-multimodal_data
multimodal_data_request_for_alerts
multimodal_data_request_from_interactive
multimodal_data_request_from_route_selection
multimodal_data_request_from_trip_planning
multimodal_service_details_data
multimodal_traveler_data
multimodal_traveler_data_collection_parameters

Output Flows:

multimodal_data_for_alerts
multimodal_data_for_broadcast
multimodal_data_for_centers
multimodal_data_for_interactive
multimodal_data_for_route_selection
multimodal_data_for_trip_planning
multimodal_service_details_data
multimodal_traveler_data
multimodal_traveler_data_collected_for_personnel
tmtsp-air_services_request
tmtsp-ferry_services_request
tmtsp-non_motorized_services_request
tmtsp-rail_services_request
toisp-multimodal_data

Description:

This process shall collect data about services, including transfer points, that are available to travelers from multimodal transportation service providers. These suppliers shall be those that provide travel services that are not part of regular transit or demand responsive transit operations, e.g., suppliers of bicycle and pedestrian facilities and services and heavy rail operators, and may not involve surface transportation, e.g., ferry and airline operations. Data quality checks shall be performed on all collected data. The process shall provide data formatted for use as part of a traveler's multimodal trip, and shall support subsequent confirmation of any portion provided by the Multimodal Transportation Service Provider. The process shall provide the data to the broadcast traveler information application and to applications that provide traveler information to other operations centers. Upon request from the interactive traveler information application the process shall provide all or some requested subset of the multimodal traveler data. Upon receipt of traveler information alert subscriptions, this process shall output relevant multimodal service (e.g., air, ferry, rail) alerts. The process shall maintain a store of data collected from the multimodal transportation service provider. The process shall maintain a store of multimodal service details that have been requested as part of the trip planning application. This process shall exchange information with Other Information Service Providers to allow one ISP to act as a wholesaler and provide information to other ISPs. The process shall select the appropriate subset of data which will be sent to each ITS application or entity that is requesting data.
The process shall provide all of the received information to the ISP Operator Interface process and receive the data collection parameters (to define exactly what data shall be retrieved as a result of each request) from the operator interface process.

User Service Requirements:

1.0	1.2.2.1.2	1.5.2.2(b)	2.2.1.1.1
1.1	1.2.2.1.2.1	1.5.2.2(g)	2.2.1.1.3
1.1.0	1.2.2.1.3	1.5.2.2(i)	2.2.1.1.4
1.1.1	1.4	1.6	2.2.3
1.1.1.1	1.4.0	1.6.0	2.2.3.1
1.1.1.1.4	1.4.1	1.6.4	2.2.3.1.1
1.1.1.1.6	1.4.1.1	1.6.4(b)	2.2.3.2
1.1.4	1.4.1.2	1.6.4(c)	2.2.3.2.1
1.2	1.4.1.2(e)	2.0	2.2.3.2.2
1.2.0	1.5	2.2	2.2.3.2.2(a)
1.2.2	1.5.0	2.2.0	2.2.3.2.2(b)
1.2.2.1	1.5.2	2.2.1	2.2.3.2.2(c)
1.2.2.1.1	1.5.2.2	2.2.1.1	

6.2.5 Collect Probe Data From Vehicles

Input Flows:

env_probe_data_from_vehicle
guidance_probe_data_from_vehicle
probe_data_collection_parameters
toll_probe_data_for_isp
traffic_probe_data_from_vehicle
transit_probe_data_for_isp
vehicle_env_probe_data_for_isp
vehicle_env_probe_status_for_isp
vehicle_probe_data
vehicle_traffic_probe_data_for_isp
vehicle_traffic_probe_status_for_isp

Output Flows:

env_probe_data_from_vehicles
env_probe_info_from_isp_for_maint
probe_data_collected_for_personnel
traffic_probe_aggregated_data_for_archive
traffic_probe_configuration
traffic_probe_data_from_vehicles
traffic_probe_info_from_isp_for_traffic
tstws-env_probe_info_from_isp
tws-env_probe_info_from_isp
vehicle_probe_data

Description:

This process shall collect environmental and traffic probe data from vehicles. Data quality checks shall be performed on all collected data. The environmental data (such as measured air and surface temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, ALB status, and snapshots of recent events include ALB activations, etc.) and traffic data (e.g., vehicle identifier, vehicle speed, heading and snapshots of recent events including starts and stops, speed changes, etc.) will be sourced from vehicle-based sensors or vehicle control systems. The environmental and traffic probe data will be aggregated by this process with measurements from other vehicles, producing one set of environmental and traffic probe data. Traffic probe data in particular will be additionally aggregated with traffic probe data from electronic toll collection operations and transit vehicle probes. When any of the data is provided in analog form, the process shall convert it to digital form and calibrate it. The process shall provide all of the received information to the ISP Operator Interface process and receive the data collection parameters (to define exactly what data shall be retrieved as a result of each request) from the operator interface process.

User Service Requirements:

1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.1
1.3.2.1(b)
1.3.3
1.3.3.1
1.3.3.2
1.3.3.2.1
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.3
1.3.4.3.1
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(a)
7.1.3.1.8(c)

6.2.6 Collect Emergency Traveler Data

Input Flows:

deactivate_traveler_information_restrictions_for_travelers
disaster_transportation_system_status_for_isp
emergency_traveler_data
emergency_traveler_data_collection_parameters
evacuation_data_for_isp
evacuation_transportation_system_status_for_isp
fcf-care_facility_status_for_isp
ftsp-emergency_travel_service_update
fm-incident_details
foisp-emergency_data
fsp-shelter_information_to_travelers
incident_information
incident_information_request_for_alerts
incident_information_request_from_interactive
traffic_incident_data_for_isp
transit_evacuation_data_for_isp
traveler_information_restrictions_for_travelers
wide_area_alert_notification_for_travelers

Output Flows:

emergency_data_for_centers
emergency_data_for_emergency_operations
emergency_traveler_data
emergency_traveler_data_collected_for_personnel
incident_information_for_alerts
incident_information_for_broadcast
incident_information_for_interactive
incident_information_for_trip_planning
tm-incident_information
toisp-emergency_data

Description:

This process shall collect and fuse emergency and incident information that will be used to create broadcast or interactive messages to travelers and other operations centers as well as support trip planning applications. Data quality checks shall be performed on all collected data. Upon receipt of traveler information alert subscriptions, this process shall output relevant incident alerts. This process shall collect emergency and incident information including evacuation data and wide area alert notifications from emergency management, traffic management, transit management, media, care facilities, and shelter providers. The process shall load the incoming data into the 'emergency_traveler_data' store. This process shall provide the media with incident information. This process shall exchange information with Other Information Service Providers to allow one ISP to act as a wholesaler and provide information to other ISPs. The process shall select the appropriate subset of data which will be sent to each ITS application or entity that is requesting data. The process shall provide all of the received information to the ISP Operator Interface process and receive the data collection parameters (to define exactly what data shall be retrieved as a result of each request) from the operator interface process.

User Service Requirements:

5.0
5.1
5.1.0
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
5.3
5.3.0
5.3.10
5.3.10.1
5.3.10.1(a)
5.3.10.1(b)
5.3.10.1(c)
5.3.10.1(d)
5.3.10.1(e)
5.3.10.1(f)
5.3.10.1(g)
5.3.10.1(h)
5.3.10.10
5.3.10.11
5.3.10.11(a)
5.3.10.11(b)
5.3.10.11(c)
5.3.10.11(d)
5.3.10.11(e)
5.3.10.11(f)
5.3.10.12
5.3.10.2
5.3.10.3
5.3.10.4
5.3.10.4(a)
5.3.10.4(b)
5.3.10.4(c)
5.3.10.4(d)
5.3.10.5
5.3.10.5(a)
5.3.10.5(b)
5.3.10.6
5.3.10.6(a)
5.3.10.6(b)
5.3.10.6(c)
5.3.10.7
5.3.10.8
5.3.10.8(a)
5.3.10.8(b)
5.3.10.8(c)
5.3.10.8(d)
5.3.10.8(e)
5.3.10.9
5.3.10.9(a)
5.3.10.9(b)

6.2.7 Provide ISP Operator Data Collection Interface

Input Flows:
data_collection_map_data
emergency_traveler_data_collected_for_personnel
fispo-data_collection_parameters_request
fispo-data_collection_parameters_update
fispo-request_data_collection_map_update
fispo-traveler_data_collection_request
misc_trav_info_collected_for_personnel
multimodal_traveler_data_collected_for_personnel
probe_data_collected_for_personnel
traffic_traveler_data_collected_for_personnel
transit_traveler_data_collected_for_personnel
traveler_data_collection_parameters

Output Flows:
emergency_traveler_data_collection_parameters
misc_trav_info_data_collection_parameters
multimodal_traveler_data_collection_parameters
probe_data_collection_parameters
request_data_collection_map_update
tispo-data_collection_parameters
tispo-traveler_data_collected
traffic_traveler_data_collection_parameters
transit_traveler_data_collection_parameters
traveler_data_collection_parameters

Description:
This process shall provide the interface through which ISP operator personnel can obtain access to traffic data, traffic video images, transit information, incidents, emergencies, weather information, and other data collected by the Collect ISP Services Data function. This process shall provide the interface through which the ISP operator can input and update the parameters used by the Collect ISP Services Data function. This process shall maintain a store of traveler data collection parameters and provide the interface through which the ISP operator can manipulate data in the store. The data in this store shall be used by other processes to govern traveler data collection (transit, traffic, emergency, etc.) that support traveler services (trip planning, broadcast data, etc.). The process shall provide the ISP operator with the ability to request parameter data output and/or update the data store with new parameter values. The process shall provide an interface through which the ISP operator can review and request update of map data. The operator shall be able to use the process to request digitized map updates from suppliers. The process shall support inputs from the ISP operator in manual or audio form, and shall provide its outputs in audible or visual forms. It shall enable the visual output to be in hardcopy, and/or display.

User Service Requirements:
1.0
1.1
1.1.0
1.1.1
1.1.4
1.1.4.2
1.1.4.2.1
1.5
1.5.0
1.5.1
1.5.1.1
1.5.1.2

6.2.8 Provide ISP Map Update Interface

Input Flows:
fmup-info_provider_map_data
map_data_for_info_provider_display
request_data_collection_map_update
request_other_routes_map_update
request_route_selection_map_update
request_traveler_service_map_update
request_trip_planning_map_update

Output Flows:
data_collection_map_data
map_data_for_info_provider_display
other_routes_map_data
route_selection_map_data
tmup-request_info_provider_map_update
traveler_service_map_data
trip_planning_map_data

Description:
This process shall provide the interface to map update providers through which to obtain fresh updates of digitized map data used to support traveler services. The process shall request new data from the provider on request from various ISP operator interface processes. The data received from the supplier shall be returned to the requesting process.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(b)
1.3.2
1.3.2.1
1.3.2.1(a)

6.3.1 Get Traveler Request

Input Flows:
traveler_trip_planning_requests

Output Flows:
traveler_emergency_information_request
traveler_information_request
traveler_information_request_for_response
traveler_payment_information
traveler_payment_information_for_services
traveler_transaction_request
traveler_travel_services_data_request
traveler_trip_confirmation
traveler_trip_request
traveler_vmt_account_setup_info_from_trav
traveler_vmt_payment_info_from_trav

Description:
This process shall receive input data from a traveler located at a kiosk and send requests to the appropriate processes within the Provide Driver and Traveler Services function for further processing. The process shall provide support for trip planning, traffic, transit, yellow pages services and event information requests, trip confirmation, yellow pages confirmation, and payment requests. The actual interface to the traveler is provided through a separate process, which creates the input flow to this process.

User Service Requirements:

1.0	1.4.0
1.1	1.4.1
1.1.0	1.4.1.1
1.1.3	1.4.1.1(a)
1.1.3.2	1.4.1.1(b)
1.1.3.2.1	1.4.1.2
1.1.3.2.10	1.4.1.2(b)
1.1.3.2.2	1.4.1.2(c)
1.1.3.2.3	1.4.1.2(d)
1.1.3.2.4	1.4.1.2(e)
1.1.3.2.5	1.4.1.3
1.1.3.2.6	1.5
1.1.3.2.7	1.5.0
1.1.3.2.8	1.5.2
1.1.3.2.9	1.5.2.6
1.4	1.5.2.6(b)

6.3.2 Inform Traveler

Input Flows:

transit_trip_plan_for_kiosks
traveler_broadcast_border_data
traveler_broadcast_event_information
traveler_broadcast_incident_information
traveler_broadcast_multimodal_data
traveler_broadcast_parking_data
traveler_broadcast_price_data
traveler_broadcast_traffic_data
traveler_broadcast_transit_data
traveler_broadcast_weather_data
traveler_emergency_traveler_information
traveler_evacuation_traveler_information
traveler_information_request_for_response
traveler_interactive_border_data
traveler_interactive_event_information
traveler_interactive_incident_information
traveler_interactive_multimodal_data
traveler_interactive_parking_data
traveler_interactive_price_data
traveler_interactive_traffic_data
traveler_interactive_transit_data
traveler_interactive_weather_data
traveler_payment_confirmation
traveler_transaction_confirmation
traveler_transportation_system_status
traveler_travel_services_provider_data
traveler_trip_information
traveler_vmt_account_reports_to_trav
traveler_vmt_payment_request_to_trav
traveler_wide_area_alert_information

Output Flows:

remote_traveler_information
transit_trip_confirmation_from_kiosks
transit_trip_request_from_kiosks
traveler_trip_planning_responses

Description:

This process provides the traveler (located at a kiosk) with data about all requested trip, traffic, transit, yellow pages services, border crossings, or event information, confirmation of any requested reservations, and payments made as part of confirmed trip plans. This process shall also receive information concerning evacuation situations and wide area alerts to be provided to travelers. The data is sent by the process to an interface process that is responsible for its actual output to the traveler.

User Service Requirements:

1.0
1.1
1.1.0
1.1.1
1.1.1.1
1.1.1.1.1
1.1.1.1.2
1.1.1.1.3
1.1.1.1.4
1.1.1.1.5
1.1.1.1.6
1.1.2
1.1.2.1
1.1.2.1.1
1.1.2.1.2
1.1.2.1.3
1.1.2.1.4
1.1.2.1.5
1.1.2.1.6
1.1.2.1.8
1.4
1.4.0
1.4.1
1.4.1.3
1.5
1.5.0
1.5.2
1.5.2.1
1.5.2.2
1.5.2.6
1.5.2.6(a)
1.5.2.6(b)
1.5.2.6(e)
1.8
1.8.0
1.8.2
1.8.2.3
1.8.2.3(a)
2.0
2.3
2.3.0
2.3.1
2.3.1.3
2.3.1.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4

6.3.3 Provide Traveler Kiosk Interface

Input Flows:

ft-extra_trip_data
ft-trip_planning_requests
remote_traveler_information
traveler_display_map_data
traveler_regular_data
traveler_roadside_data
traveler_trip_planning_responses
fmup-traveler_display_update

Output Flows:

traveler_regular_data
traveler_roadside_data_update
traveler_trip_planning_requests
tt-extra_trip_data_request
tt-remote_traveler_information
tt-trip_planning_responses

Description:

This process shall provide an interface at a kiosk through which travelers can input data and can receive data. This data may include digitized map data to act as the background to the output when the data is to be shown in a suitable format. The functions that the traveler can perform include plan and confirm trips, and obtain current traffic and transit information. The process shall support the inclusion of yellow pages (including non-motorized transportation) services such as lodging, restaurants, theaters, bicycle facilities and other tourist activities as a part of trip planning and confirmation. The process shall be able to store frequently used data, such as the kiosk location, to reduce the amount of input needed by the traveler for each request. The process shall also carry out input data verification and require input confirmation before passing any of the traveler data to other processes (except when an emergency is being declared). The traveler's payment information shall be obtained by this process from another process specially designed for that purpose. The process shall support traveler inputs in manual or audio form, and shall provide its outputs in audible or visual forms consistent with a kiosk. These forms shall include those that are suitable for travelers with hearing or vision physical disabilities. The process shall enable viewing of data that has been previously output. Where it is appropriate, the process shall use the kiosk's location to filter data being displayed to only show information relevant to the kiosk's location, or to a specific location requested by the traveler.

User Service Requirements:

1.0
1.1
1.1.0
1.1.3
1.1.3.2
1.1.3.2.1
1.1.3.2.10
1.1.3.2.2
1.1.3.2.3
1.1.3.2.4
1.1.3.2.5
1.1.3.2.6
1.1.3.2.7
1.1.3.2.8
1.1.3.2.9
1.4
1.4.0
1.4.1
1.4.1.1
1.4.1.1(a)
1.4.1.1(b)
1.4.1.2
1.4.1.3
1.4.1.4
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(f)
1.5.2.6
1.5.2.6(b)
1.5.2.6(c)
1.5.2.6(d)
1.5.2.6(e)
2.0
2.3.0
2.3.1

6.3.4 Update Traveler Display Map Data at Kiosk

Input Flows:
map_data_for_traveler_displays

Output Flows:
map_data_for_traveler_displays
tmup-request_traveler_display_update
traveler_display_map_data

Description:
This process shall provide updates to the digitized map data used as the background for displays of trip, traffic and transit information. This data shall be suitable for use in kiosk displays. The process shall obtain the new data from map data suppliers or some other appropriate data source.

User Service Requirements:
1.0
1.1
1.1.0
1.1.3
1.1.3.1
1.1.3.1.1
1.1.3.2
1.1.3.2.8
1.1.4
1.1.4.1
1.1.4.1.3
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(f)

6.4.1 Screen Rider Requests

Input Flows:
rideshare_data
traveler_rideshare_request

Output Flows:
rideshare_ineligible_status_notification
rideshare_request_from_eligible_traveler

Description:
This process shall accept and screen traveler requests for ride-sharing. These requests shall be sent to the process as a result of trip plan requests received from travelers by other processes. This process shall use eligibility data from a rideshare data store to screen travelers before they are matched with other travelers and to enable ridesharing for all or part of their proposed trips. Traveler rideshare requests and rideshare data from the rideshare data store shall be sent to the data archival process.

User Service Requirements:
1.0
1.4
1.4.0
1.4.1
1.4.1.4
1.4.2
1.4.2.1
1.4.2.2
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(d)
1.8.1.2(g)
1.8.1.3
1.8.1.3(d)
1.8.1.3(g)
1.8.2
1.8.2.1
1.8.2.1(d)
1.8.2.4
1.8.2.4(d)
1.8.2.4(g)
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.4
7.1.3.1.4(c)

6.4.2 Match Rider and Provider

Input Flows:
rideshare_confirmation_data
rideshare_data
rideshare_request_from_eligible_traveler
traffic_data_for_ridesharing

Output Flows:
rideshare_data
rideshare_selection
traffic_data_request_from_ridesharing

Description:
This process shall match travelers for ridesharing trips. The process shall attempt to achieve a match by considering some or all of the following: the origin and destination of the traveler's proposed trip, any routing constraints, preferences specified by the traveler, compatibility of this rideshare with rideshares confirmed by other travelers, the requesting traveler's eligibility data, and traffic data obtained on request. The process shall consider the possible disbenefits to other travelers who will be part of the same rideshare when finding the rideshare best suited to the traveler's requirements. The process shall store data about selected rideshares in the rideshare data store, and shall update the data when confirmation of the rideshare acceptance is received from another process.

User Service Requirements:
1.0
1.4
1.4.0
1.4.1
1.4.1.2
1.4.1.3
1.4.1.4
1.4.3
1.4.3.4
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(d)
1.8.1.2(g)
1.8.1.3
1.8.1.3(d)
1.8.1.3(g)
1.8.2
1.8.2.1
1.8.2.1(d)
1.8.2.4
1.8.2.4(d)
1.8.2.4(g)

6.4.3 Report Ride Match Results to Requestor

Input Flows:
rideshare_ineligible_status_notification
rideshare_selection

Output Flows:
rideshare_response

Description:
This process shall report ridesharing match results to requesters. The data for the results shall be provided to this process by other processes responsible for assessing traveler eligibility, and the actual match with travelers in other rideshares. The process shall output data indicating a failure when either the data from the eligibility process shows a failure, or no ridesharing match can be found. The process shall also determine that no ridesharing match can be found if no match is found between the traveler's rideshare request and the rideshare data provided as input to it by another process. When a successful match is found, the process shall output the rideshare data to the process from which the traveler's request was received.

User Service Requirements:
1.0
1.4
1.4.0
1.4.1
1.4.1.3
1.4.1.4

6.4.4 Confirm Traveler Rideshare Request

Input Flows:
rideshare_payment_confirmation
traveler_rideshare_confirmation

Output Flows:
rideshare_confirmation
rideshare_confirmation_data
rideshare_payment_request

Description:
This process shall confirm the traveler's rideshare match and initiate a payment transaction where appropriate. The process shall send the payment transaction data for action by a process in the Provide Electronic Payment Services function. The results of this transaction shall be sent by this process to the process providing the overall trip confirmation. Once a rideshare match is confirmed, this data is sent to the rideshare match process where it can be factored in to subsequent matches.

User Service Requirements:
2.0
2.3
2.3.0
2.3.1
2.3.1.3
2.3.1.4

6.5.1 Provide Broadcast Data Interface

Input Flows:

border_data_for_broadcast
broadcast_traveler_information_parameters
event_information_for_broadcast
incident_information_for_broadcast
multimodal_data_for_broadcast
parking_data_for_broadcast
price_data_for_broadcast
traffic_data_for_broadcast
transit_data_for_broadcast
weather_data_for_broadcast

Output Flows:

field_broadcast_border_data
field_broadcast_event_information
field_broadcast_incident_information
field_broadcast_multimodal_data
field_broadcast_parking_data
field_broadcast_price_data
field_broadcast_traffic_data
field_broadcast_transit_data
field_broadcast_weather_data
traveler_broadcast_border_data
traveler_broadcast_event_information
traveler_broadcast_incident_information
traveler_broadcast_multimodal_data
traveler_broadcast_parking_data
traveler_broadcast_price_data
traveler_broadcast_traffic_data
traveler_broadcast_transit_data
traveler_broadcast_weather_data
traveler_personal_broadcast_border_data
traveler_personal_broadcast_event_information
traveler_personal_broadcast_incident_information
traveler_personal_broadcast_multimodal_data
traveler_personal_broadcast_parking_data
traveler_personal_broadcast_price_data
traveler_personal_broadcast_traffic_data
traveler_personal_broadcast_transit_data
traveler_personal_broadcast_weather_data
vehicle_broadcast_border_data
vehicle_broadcast_event_information
vehicle_broadcast_incident_information
vehicle_broadcast_multimodal_data
vehicle_broadcast_parking_data
vehicle_broadcast_price_data
vehicle_broadcast_traffic_data
vehicle_broadcast_transit_data
vehicle_broadcast_weather_data
event_information_request_from_interactive

Description:

This process shall receive data from the ISP data collector function for traffic, transit, incident, weather, event, parking, multimodal travel services, border crossings, and pricing information. The collected information will be broadcast out to kiosks, personal devices, in-vehicle units, or to field equipment for distribution to vehicles. The information shall be broadcast at locally determined intervals. The content and rate of these messages shall be based upon parameters which are managed by the ISP operator.

User Service Requirements:

1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.7
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.1.4.1.3
1.1.4.1.4
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(d)
1.3.1.2.1(d).1
1.3.1.2.1(d).2
1.3.1.2.1(d).3
1.4
1.4.0
1.4.1
1.4.1.4
1.4.2
1.4.2.1
1.4.2.2
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(e)
1.5.2.2(f)
1.6
1.6.0
1.6.3
1.6.3.4
1.6.3.4.1
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(d)
1.8.1.2(g)
1.8.1.3
1.8.1.3(d)
1.8.1.3(g)
1.8.2
1.8.2.1
1.8.2.1(d)
1.8.2.4
1.8.2.4(d)
1.8.2.4(g)

6.5.2 Provide Interactive Data Interface

Input Flows:

border_data_for_interactive
event_information_for_interactive
incident_information_for_interactive
interactive_traveler_information_parameters
multimodal_data_for_interactive
parking_data_for_interactive
price_data_for_interactive
profiles_for_interactive
traffic_data_for_interactive
transit_data_for_interactive
traveler_information_request
traveler_personal_information_request
traveler_telecomm_information_request
vehicle_information_request
weather_data_for_interactive

Output Flows:

incident_information_request_from_interactive
multimodal_data_request_from_interactive
parking_data_request_from_interactive
price_data_request_from_interactive
traffic_data_request_from_interactive
transit_data_request_from_interactive
traveler_info_requests_for_archive
traveler_interactive_border_data
traveler_interactive_event_information
traveler_interactive_incident_information
traveler_interactive_multimodal_data
traveler_interactive_parking_data
traveler_interactive_price_data
traveler_interactive_traffic_data
traveler_interactive_transit_data
traveler_interactive_weather_data
traveler_personal_interactive_border_data
traveler_personal_interactive_event_information
traveler_personal_interactive_incident_information
traveler_personal_interactive_multimodal_data
traveler_personal_interactive_parking_data
traveler_personal_interactive_price_data
traveler_personal_interactive_traffic_data
traveler_personal_interactive_transit_data
traveler_personal_interactive_weather_data
traveler_telecomm_interactive_border_data
traveler_telecomm_interactive_event_information
traveler_telecomm_interactive_incident_information
traveler_telecomm_interactive_multimodal_data
traveler_telecomm_interactive_parking_data
traveler_telecomm_interactive_price_data
traveler_telecomm_interactive_traffic_data
traveler_telecomm_interactive_transit_data
traveler_telecomm_interactive_weather_data
vehicle_interactive_border_data
vehicle_interactive_event_information
vehicle_interactive_incident_information
vehicle_interactive_multimodal_data
vehicle_interactive_parking_data
vehicle_interactive_price_data
vehicle_interactive_traffic_data
vehicle_interactive_transit_data
vehicle_interactive_weather_data
weather_data_request_from_interactive

Description:

This process shall receive data from the ISP data collector function for traffic, transit, incident, weather, event, parking, multimodal travel services, and pricing information. This process shall receive requests for information from kiosks (traveler), personal devices (traveler_personal), in-vehicle units (vehicle), and telecommunications-based traveler information systems (traveler_telecomm, commonly called "511"). The requested information will be pulled from the data being sent from the data collectors, processed for traveler consumption, filtered and sorted based on the traveler's request, and sent back out to the requesting processes. The data may be filtered depending on the type of request, location of the requesting process, or specifics provided by the requesting process. The content and format of these messages shall be based upon parameters which are managed by the ISP operator.

User Service Requirements:

1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.7
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.1.4.1.3
1.1.4.1.4
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(d)
1.3.1.2.1(d).1
1.3.1.2.1(d).2
1.3.1.2.1(d).3
1.4
1.4.0
1.4.1
1.4.1.4
1.4.2
1.4.2.1
1.4.2.2
1.5
1.5.0
1.5.1
1.5.1.3
1.5.1.5
1.5.2
1.5.2.2
1.5.2.2(a)
1.5.2.2(b)
1.5.2.2(d)
1.5.2.2(e)
1.5.2.2(f)
1.5.2.2(h)
1.5.2.3
1.5.2.3(a)
1.5.2.3(b)
1.5.2.4
1.6
1.6.0
1.6.3
1.6.3.4
1.6.3.4.1
1.8
1.8.0
1.8.1
1.8.1.2
1.8.1.2(d)
1.8.1.2(g)
1.8.1.3
1.8.1.3(d)
1.8.1.3(g)
1.8.2
1.8.2.1
1.8.2.1(d)
1.8.2.4
1.8.2.4(d)
1.8.2.4(g)
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(g)

6.5.3 Register Travel Services Providers

Input Flows:
ftsp-provider_profile_update
ftsp-request_provider_registration
travel_services_provider_data
travel_services_provider_registration_response

Output Flows:
travel_services_new_data_request
travel_services_provider_data
travel_services_provider_data_for_data_collector
travel_services_provider_registration_request
ttsp-provider_update_confirm

Description:
This process shall register travel services providers. The process shall accept requests for registration from the providers. This process shall pass the financial data (credit identity, etc.) to a process in the Provide Electronic Payment Services function for action. The process shall send the result of this action to the provider. This process shall send a new data request to the ISP data collector process to show that a new provider has been successfully registered and can be used as a source of tarvel services data.
The details of the provider shall also be loaded into a store so that data from the provider can readily be obtained in the future. This process shall manage this store by updating the travel services provider details. This data includes the provider name, contact details, scope of the geographic area for which it can provide data and the actual services that it can provide.

User Service Requirements:
1.0
1.7
1.7.0
1.7.4

6.5.4 Process Travel Services Provider Data

Input Flows:
fispo-travel_services_operator_inputs
ftsp-transaction_confirmation
profiles_for_travel_services
travel_services_data_for_travel_services
travel_services_data_parameters
traveler_other_services_payment_result
traveler_payment_information_for_services
traveler_personal_payment_information_for_services
traveler_personal_transaction_request
traveler_personal_travel_services_data_request
traveler_telecomm_travel_services_data_request
traveler_transaction_request
traveler_travel_services_data_request
vehicle_payment_information_for_services
vehicle_transaction_request
vehicle_travel_services_data_request

Output Flows:
tispo-travel_services_operator_information
travel_services_requests_for_archive
travel_services_update_request
traveler_other_services_payment_request
traveler_personal_transaction_confirmation
traveler_personal_travel_services_provider_data
traveler_telecomm_travel_services_data
traveler_transaction_confirmation
traveler_travel_services_provider_data
ttsp-transaction_request
vehicle_transaction_confirmation
vehicle_travel_services_provider_data

Description:
This process shall provide information and reservation services obtained from travel services providers. The process shall provide the information and reservation data to travelers using a kiosk, their own personal computing device, an in-vehicle unit, or a telecommunications based traveler information system, filtered and sorted based on their request. The process shall be able to request additional travel services information. The process shall send requests for payment to a process in the Provide Electronic Payment Services function for action, and shall send the response back to the process from which the payment request was received. The traveler's travel services requests shall be sent to the data archival process. An interface to the ISP Operator is maintained to allow the operator to set the parameters for the data interfaces and for the interface with the travel services provider. This process shall accept user profile information to facilitate the information output to travelers.

User Service Requirements:
1.0
1.5
1.5.0
1.5.1
1.5.1.3
1.5.1.5
1.5.2
1.5.2.2
1.5.2.2(a)
1.5.2.2(b)
1.5.2.2(h)
1.5.2.3
1.5.2.3(a)
1.5.2.3(b)
1.5.2.4

6.5.5 Provide Emergency Traveler Information

Input Flows:

emergency_data_for_emergency_operations
emergency_traveler_information_parameters
profiles_for_emergency_operations
traveler_emergency_information_request
traveler_personal_emergency_information_request
traveler_telecomm_emergency_information_request
vehicle_emergency_information_request

Output Flows:

alert_notification_status_from_travelers
emergency_info_requests_for_archive
field_emergency_traveler_information
field_evacuation_traveler_information
field_transportation_system_status
field_wide_area_alert_information
traveler_emergency_traveler_information
traveler_evacuation_traveler_information
traveler_personal_emergency_traveler_information
traveler_personal_evacuation_traveler_information
traveler_personal_transportation_system_status
traveler_personal_wide_area_alert_information
traveler_telecomm_emergency_traveler_information
traveler_telecomm_evacuation_traveler_information
traveler_telecomm_transportation_system_status
traveler_telecomm_wide_area_alert_information
traveler_transportation_system_status
traveler_wide_area_alert_information
tsp-evacuation_traveler_information
vehicle_emergency_traveler_information
vehicle_evacuation_traveler_information
vehicle_transportation_system_status
vehicle_wide_area_alert_information

Description:

This process shall provide emergency information to the traveler information system with region-specific data, including major emergencies such as a natural or manmade disaster, civil emergency, child abductions, severe weather watches and warnings, military activities, law enforcement warnings, and the current status of the transportation system. The output of the information can be either part of the normal dissemination of traveler information or in support of special wide-area alert notifications. This process shall provide outputs to travelers using a kiosk, their own personal computing device, an in-vehicle unit, field equipment for distribution to vehicles, or a telecommunications based traveler information system (e.g. 511-type services). Traveler requests received by the process shall be used to sort and filter the information. Traveler information may also be distributed to travelers at evacuation shelters. An interface to the ISP Operator is maintained to allow the operator to set the parameters for the dissemination of the emergency information. This process shall accept user profile information to facilitate the information output to travelers.

User Service Requirements:

5.0	5.1.5.2	5.3.10.11	5.3.10.5(a)
5.1	5.1.5.3	5.3.10.11(a)	5.3.10.5(b)
5.1.0	5.1.5.4	5.3.10.11(b)	5.3.10.6
5.1.3	5.3	5.3.10.11(c)	5.3.10.6(a)
5.1.3.4	5.3.0	5.3.10.11(d)	5.3.10.6(b)
5.1.3.4.3	5.3.10	5.3.10.11(e)	5.3.10.6(c)
5.1.4	5.3.10.1	5.3.10.11(f)	5.3.10.7
5.1.4.1	5.3.10.1(a)	5.3.10.12	5.3.10.8
5.1.4.1.1	5.3.10.1(b)	5.3.10.2	5.3.10.8(a)
5.1.4.1.2	5.3.10.1(c)	5.3.10.3	5.3.10.8(b)
5.1.4.2	5.3.10.1(d)	5.3.10.4	5.3.10.8(c)
5.1.4.2.1	5.3.10.1(e)	5.3.10.4(a)	5.3.10.8(d)
5.1.4.3	5.3.10.1(f)	5.3.10.4(b)	5.3.10.8(e)
5.1.4.4	5.3.10.1(g)	5.3.10.4(c)	5.3.10.9
5.1.5	5.3.10.1(h)	5.3.10.4(d)	5.3.10.9(a)
5.1.5.1	5.3.10.10	5.3.10.5	5.3.10.9(b)

6.5.6 Provide Traveler Telecomm Information

Input Flows:
ftsti-telecomm_batch_regional_info_request
ftsti-telecomm_caller_request
telecomm_traveler_information
traveler_telecomm_emergency_traveler_information
traveler_telecomm_evacuation_traveler_information
traveler_telecomm_interactive_border_data
traveler_telecomm_interactive_event_information
traveler_telecomm_interactive_incident_information
traveler_telecomm_interactive_multimodal_data
traveler_telecomm_interactive_parking_data
traveler_telecomm_interactive_price_data
traveler_telecomm_interactive_traffic_data
traveler_telecomm_interactive_transit_data
traveler_telecomm_interactive_weather_data
traveler_telecomm_transportation_system_status
traveler_telecomm_travel_services_data

Output Flows:
telecomm_traveler_information
traveler_telecomm_emergency_information_request
traveler_telecomm_information_request
traveler_telecomm_travel_services_data_request
ttsti-telecomm_alert_notification
ttsti-telecomm_batch_regional_traveler_information
ttsti-telecomm_caller_traveler_information

Description:
This process shall provide a voice-enabled traveler telephone information system (e.g. 511) with region-specific data, including traffic conditions, work zone and roadway maintenance information, roadway environment conditions, weather and event information, transit schedules, deviations, and fares, yellow pages information, border crossing information, current ferry and rail schedules, and airport status. The process shall receive specific caller requests from a 511-type system as well as requests for bulk upload of regional traveler information. The process shall then request this data from other ITS processes and return it to the voice-based traveler information system, filtered and sorted based on the traveler's request. Both the request from the voice-based system and the returned traveler information may be specially formatted by this process for voice.

User Service Requirements:
1.0
1.1
1.1.0
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(b)

6.5.7 Provide ISP Operator Traveler Information Parameters Interface

Input Flows:
field_equip_maint_status_for_isp
fispo-request_traveler_service_map_update
fispo-trav_info_equip_status_request
fispo-traveler_information_parameters_request
fispo-traveler_information_parameters_update
trav_info_equip_status_for_isp_operator
traveler_information_parameters
traveler_service_map_data

Output Flows:
alert_traveler_information_parameters
broadcast_traveler_information_parameters
center_traveler_information_parameters
emergency_traveler_information_parameters
field_equipment_status_from_isp
interactive_traveler_information_parameters
request_traveler_service_map_update
tispo-trav_info_equip_status
tispo-traveler_information_parameters
tispo-traveler_services_data
travel_services_data_parameters
traveler_information_parameters

Description:
This process shall provide the interface through which ISP operator personnel can input and update the parameters used by the Provide Traveler Information Services function. This process shall maintain a store of traveler information parameters and provide the interface through which the ISP operator can manipulate data in the store. The data in this store shall be used by other processes to control the dissemination of traveler information, including wide area information broadcast and interactive traveler data, traveler alerts, travel services information, and emergency traveler information. The process shall provide the ISP operator with the ability to request parameter data output and/or update the data store with new parameter values. The process shall provide an interface through which the ISP operator can review and request update of map data. The operator shall be able to use the process to request digitized map updates from suppliers. The process shall be able to request and receive the operational status of short range communications field equipment used to broadcast traveler information to vehicles. The process shall support inputs from the ISP operator in manual or audio form, and shall provide its outputs in audible or visual forms. It shall enable the visual output to be in hardcopy, and/or display.

User Service Requirements:
1.0
1.2
1.2.0
1.2.2
1.2.2.1
1.2.2.1.1
1.2.2.1.2
1.2.2.1.3

6.5.8 Provide Operational Data for Other Centers

Input Flows:

border_data_for_centers
center_traveler_information_parameters
emergency_data_for_centers
event_information_for_centers
multimodal_data_for_centers
parking_data_for_centers
parking_lot_charge_details
price_data_details_for_centers
price_data_for_centers
traffic_data_for_centers
transit_data_for_centers
weather_data_for_centers

Output Flows:

incident_data_for_cvo
parking_lot_charge_details
toll_price_details
toll_price_for_cvo
traffic_data_for_cvo
transit_fare_details
transportation_information_for_disaster_operations
transportation_information_for_emerg_operations
transportation_information_for_emerg_routing
transportation_information_for_evac_operations
transportation_information_for_maint_operations
transportation_information_for_traffic_operations
transportation_information_for_transit_operations

Description:

This process shall receive data from the ISP data collector function for traffic, transit, incident, weather, event, parking, multimodal travel services, and pricing information. The collected information will be disseminated to other operational centers, including traffic, transit, emergency, and maintenance and construction. Selected information will be sent to commercial vehicle operations centers. The information may be broadcast or customized based on the receiving center's specific requests or subscriptions at locally determined intervals.

User Service Requirements:

1.0
1.6
1.6.0
1.6.2
1.6.2.5
1.6.2.5.1
1.8
1.8.0
1.8.1
1.8.1.3
1.8.1.5
1.8.1.5(a)
1.8.1.5(c)
1.8.1.6
2.0
2.1
2.1.0
2.1.2
2.1.2.2
2.1.2.2.1
3.0
3.1
3.1.0
3.1.1
3.1.1.2
4.0
4.6
4.6.0
4.6.3
4.6.3.1
5.0
5.1
5.2
5.2.0
5.2.2
5.2.2.1
5.3
5.3.0
5.3.1
5.3.11
5.3.3
5.3.3.4
5.3.4
5.3.4.1
5.3.4.1(a)
5.3.4.1(b)
5.3.4.2
5.3.7
5.3.7.1
5.3.7.1(b)
5.3.9
5.3.9.1
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.1(d)
8.1.2
8.1.2.2
8.1.2.4
8.1.2.4.1

6.5.9 Provide Traveler Alert Interface

Input Flows:

alert_traveler_information_parameters
border_data_for_alerts
event_information_for_alerts
incident_information_for_alerts
multimodal_data_for_alerts
parking_data_for_alerts
profiles_for_alerts
traffic_data_for_alerts
transit_data_for_alerts
traveler_personal_alert_subscriptions
vehicle_alert_subscriptions
weather_data_for_alerts

Output Flows:

border_data_request_for_alerts
event_information_request_for_alerts
incident_information_request_for_alerts
multimodal_data_request_for_alerts
parking_data_request_for_alerts
traffic_data_request_for_alerts
transit_data_request_for_alerts
traveler_personal_border_alert
traveler_personal_event_alert
traveler_personal_incident_alert
traveler_personal_multimodal_alert
traveler_personal_parking_alert
traveler_personal_traffic_alert
traveler_personal_transit_alert
traveler_personal_weather_alert
vehicle_border_alert
vehicle_event_alert
vehicle_incident_alert
vehicle_multimodal_alert
vehicle_parking_alert
vehicle_traffic_alert
vehicle_transit_alert
vehicle_weather_alert
weather_data_request_for_alerts

Description:

This process shall provide alerts to travelers based on user-configurable parameters and thresholds (traveler_personal_alert_subscriptions, vehicle_alert_subscriptions) and equipment capabilities/preferences (traveler_personal_profile, vehicle_profile). The process shall receive requests for alerting information from personal devices and in-vehicle units. These requests may include location, search radius, drive or bus route, and relevant timeframe(s), as well as threshold values to customize alerts to the traveler based on severity level, congestion, schedule delay, etc. This process forwards the request to the ISP data collector functions which return traffic congestion, transit schedule delays or interruptions, incidents, border delays, special events, parking availability, air and ferry service issues, and road/weather conditions alerting information specific to the request parameters. This process applies the thresholds, and issues the alerts to the traveler. The content and format of these messages shall be based upon parameters which are managed by the ISP operator.

User Service Requirements:

1.0
1.1
1.1.0
1.1.2
1.1.2.1
1.1.2.1.1
1.1.2.1.2
1.1.2.1.3
1.1.2.1.5
1.1.2.1.6
1.1.2.1.7
1.1.4
1.1.4.1
1.1.4.1.4
1.2
1.2.2
1.2.2.1
1.2.2.1.1
1.2.2.1.2
1.2.2.1.2.1
1.2.2.1.3
1.5
1.5.0
1.5.1
1.5.1.5
1.5.2
1.5.2.2
1.5.2.2(c)

6.6.1 Provide Multimodal Route Selection

Input Flows:
other_route
paratransit_route_response
profiles_for_route_selection
transit_route
traveler_route_accepted
traveler_route_request
trip_route_request
vehicle_route

Output Flows:
get_other_route
get_transit_route
get_vehicle_route
paratransit_route_confirm
paratransit_route_request
supplied_route
traveler_guidance_route
traveler_route_guidance_data_for_archive

Description:
This process shall manage the creation of multimodal routes (e.g. routes where travelers use one or more transportation modes) in response to traveler's trip or route requests. It shall support on-line route guidance for travelers using personal devices, route guidance for vehicles, selection of specialized vehicle based routes for other ITS functions, (such as Manage Commercial Vehicles), and selection of multimodal routes in response to trip planning requests from travelers. The multimodal routes provided by the process shall take account of the traveler's preferences and constraints. Constraints can include the access needs of those with disabilities. Preferences can include minimizing waiting time at modal interchange points, level of traveler security, or minimum cost. Trip requests, traveler route requests, and traveler route acceptances shall be sent to the data archival process.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.2
1.3.2.1
1.3.2.2
1.3.2.2.2
1.3.3
1.3.3.1
1.3.3.1(b)
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.3
1.4
1.4.0
1.4.3
1.4.3.3
1.4.3.3(f)
1.4.3.3(g)
5.0
5.2
5.2.0
5.2.2
5.2.2.1
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(f)
7.1.3.1.8(g)
7.1.3.1.8(h)

6.6.2.1 Calculate Vehicle Route

Input Flows:

cf_route_request
cv_route_request
get_vehicle_route
map_data_for_route_selection
profiles_for_route_guidance
route_segment_details
route_segment_details_updated
route_selection_map_data
route_selection_parameters_for_guidance
routes_for_vehicles_data
vehicle_guidance_route_accepted
vehicle_route_request
weather_data_for_route_guidance

Output Flows:

cf_route
cv_route
logged_special_vehicle_route
map_data_for_route_selection
request_route_segment_data
routes_for_vehicles_data
special_vehicle_priority_routing
vehicle_guidance_route
vehicle_route
vehicle_route_guidance_data_for_archive
weather_data_request_from_route_guidance

Description:

This process shall calculate trip planning and real-time dynamic guidance routes for all types of vehicles. The route data provided by the process in response to requests from vehicles using infrastructure based in-vehicle guidance shall only contain data necessary for the vehicle to provide guidance (since the data is intended for use by an in-vehicle navigation unit). The route provided for trip planning purposes shall contain data in a form which can be presented to a traveler via display (or alternatively in audio form). The process shall select the route according to the data included in the route request. Data provided by the requesting process includes preferences and constraints. The process shall have the capability of using current and/or predicted conditions of the road network in route calculation. The process shall have the capability of including additional factors such as current or forecasted weather in the calculation of route. If the process cannot find the data it needs in the route_segment_details_data store, it shall request the process responsible for providing route calculation data to obtain it from the appropriate source. The process shall have the capability of outputting routes for special priority vehicles to the Manage Traffic function so that signal preemption could be provided for the special priority vehicle. The process shall send details of logged special vehicle routes including commercial vehicles with hazardous or unusual loads or other special vehicles to the Manage Incidents function within Manage Traffic for monitoring (as a potential incident, or a planned event). Route guidance data and vehicle guidance route requests and acceptances shall be sent to the data archival process.

User Service Requirements:

1.0
1.2
1.2.0
1.2.1
1.2.1.4
1.2.1.4.1
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(a)
1.3.1.2.1(b)
1.3.1.3
1.3.1.3(a)
1.3.1.3(b)
1.3.2
1.3.2.2
1.3.2.2.1
1.3.3
1.3.3.1
1.3.3.2
1.3.3.2(a)
1.3.3.2(b)
1.3.3.2.1
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.3
1.3.4.3.1
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(d)
7.1.3.1.8(g)
7.1.3.1.8(h)

6.6.2.2 Provide Vehicle Route Calculation Data

Input Flows:
other_route_segment_data
request_route_segment_data
route_segment_details
routes_for_vehicles_data
traffic_data_for_route_guidance

Output Flows:
current_road_network_use
current_road_network_use_for_archive
link_and_queue_data
link_data_store
request_other_route_segment_data
route_segment_details
route_segment_details_updated
route_segment_use_prediction
traffic_data_request_from_route_guidance

Description:
This process shall fuse link and queue data received from various sources and provide the processed data about links (speed or travel times) and queues to other centers and broadcasted to vehicles (to support autonomous route guidance with dynamic link updates). The input data to be fused shall be obtained from sources within the Manage Traffic function, probe data from vehicles under infrastructure-based route guidance, or with probe data obtained from other sources (such as an electronic toll collection systems). This process shall update the data stores used by another process to calculate vehicle routes. The process shall obtain route segment data upon request or at periodic intervals from other ITS functions. The process shall request data about route segments outside its own geographic area by sending a data request to the process that provides the interface with other ISPs. Link information from other ISPs shall be stored by this process in the link_data_store. Usage of current road networks shall be sent to the Manage Maintenance and Construction function and the data archival process.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.3
1.3.3.1
1.3.3.2
1.3.3.2.1
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.3
1.3.4.3.1
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(c)
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)

6.6.2.3 Provide Route Segment Data for Other Areas

Input Flows:
foisp-road_network_inventory
link_data_store
request_other_route_segment_data
route_segment_details

Output Flows:
other_route_segment_data
toisp-road_network_inventory

Description:
This process shall obtain from another ISP current or predicted data for road links that are outside the area served by the local supplier. This area, which may be defined on a geographic or jurisdictional basis, is the portion of the transportation network on which the ISP maintains real time information. Identification of which ISP to contact is based upon a store that maps a link to the ISP which maintains real time information about this link. If there is no map to another ISP in the data store, then the process will return default or static data for the link(s). This process shall also respond to similar requests from other ISPs for real time data on links within the local database.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(c)
1.7.0
1.7.4

6.6.3 Provide ISP Operator Route Parameters Interface

Input Flows:
fispo-request_other_routes_selection_map_data_update
fispo-request_route_selection_map_data_update
fispo-route_selection_parameters_request
fispo-route_selection_parameters_update
route_selection_parameters

Output Flows:
request_other_routes_map_update
request_route_selection_map_update
route_selection_parameters
route_selection_parameters_for_guidance
tispo-route_selection_parameters

Description:
This process shall provide the interface through which the ISP operator can input and update route calculation parameters used by the Provide Driver and Traveler Services function. The process shall provide an interface through which the ISP operator can review and request update of map data. The operator shall be able to use the process to request digitized map updates from suppliers, request output of trip planning and route selection control parameters, or to update the control parameters in the route_selection_parameters data store. The process shall support inputs from the ISP operator in manual or audio form, and shall provide its outputs in audible or visual forms. It shall enable the visual output to be in hardcopy, and/or display.

User Service Requirements:
1.0
1.3
1.3.0
1.3.3
1.3.3.1
1.3.3.1(a)
1.3.4
1.3.4.1
1.3.4.1(a)

6.6.4 Select Transit Route

Input Flows:
get_transit_route
transit_data_for_route_selection
transit_mode_routes
transit_route_details

Output Flows:
current_transit_routes_use
transit_data_request_from_route_selection
transit_mode_routes
transit_route
transit_route_details

Description:
This process shall determine routes that are based on regular transit services. Routes shall be provided by the process to travelers in response to trip planning and on-line personal guidance requests. The data provided by the process shall be different for the two types of requests since trip planning information will not need the detail that guidance data requires. The process shall base routes on the current state of the regular transit services using data obtained from processes in the Manage Transit function. It shall also respond to any preferences and constraints, such as those for travelers with special needs, that are specified in the route request. Data on the current use of transit routes in on-line guidance shall be provided by the process to the Manage Demand function to aid in demand management. This data on current use of the transit routes in on-line guidance is stored in the transit_mode_routes data store.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(b)
1.3.1.2.1(c)
1.3.1.3
1.3.3
1.3.3.2
1.3.3.2.1
1.3.3.2.2
1.3.4
1.3.4.3
1.4
1.4.0
1.4.3
1.4.3.3

6.6.5 Select Other Routes

Input Flows:
get_other_route
map_data_for_other_routes_selection
multimodal_data_for_route_selection
other_modes_routes
other_routes_map_data

Output Flows:
current_other_routes_use
current_other_routes_use_for_archive
map_data_for_other_routes_selection
multimodal_data_request_from_route_selection
other_modes_routes
other_route

Description:
This process shall determine routes, or portions of routes, not based on use of vehicles or regular transit services. Routes shall be provided by the process for travelers in response to trip planning, on-line personal guidance requests, and for data archival. Data provided by the process will be different for the two types of requests since the data for trip planning will not need the level of detail that guidance data requires. The process shall calculate its routes using digitized map data obtained and updated by another process. It shall make use of the alternative modes, (such as ferries, walking, cycling, etc.) that have been specified in the route request, and shall also take account of any preferences and constraints, (such as those for travelers with special needs). Data on current use of routes in on-line guidance shall be provided by the process to the Manage Demand function.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(d)
1.3.1.2.1(d).2
1.3.1.2.1(d).3
1.3.1.3
1.3.1.3(c)
1.3.1.3(d)
1.3.3
1.3.3.2
1.3.3.2.1
1.3.3.2.2
1.3.4
1.3.4.3
1.3.4.3.1
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.8
7.1.3.1.8(c)

6.7.1.1.1 Determine In-Vehicle Guidance Method

Input Flows:
autonomous_vehicle_guidance_data
driver_guidance_accepted
driver_guidance_data
driver_guidance_request
dynamic_vehicle_guidance_data
retained_vehicle_guidance_data

Output Flows:
autonomous_vehicle_guidance_accepted
autonomous_vehicle_guidance_data_request
driver_input_request
driving_guidance_instructions
dynamic_vehicle_guidance_data_request
retained_vehicle_guidance_data
vehicle_guidance_route_accepted

Description:
This process shall act as the interface for guidance requests received from drivers in vehicles. The process shall select the best method for in-vehicle guidance based on data in the driver's request. Three general methods of route guidance are supported: 1) dynamic (infrastructure based guidance is provided to the vehicle unit), 2) dynamic autonomous (link and queue speed or travel times are obtained from the infrastructure and used by the autonomous in vehicle unit), and autonomous (the in vehicle unit uses only locally available data- there is no information provided by the infrastructure). When dynamic guidance is selected, the vehicle's travel time for each link shall be provided by the process back to a central source of data. If the communications link to the central source fails in either of the modes that use it, the process shall automatically revert to the use of local data only. When the original mode was centralized guidance, the process shall use the last set of guidance data that was received, and if this is not sufficient for the vehicle to reach the requested destination, automatically revert to autonomous guidance using local data only.

User Service Requirements:
1.0
1.2
1.2.0
1.2.1
1.2.1.4
1.2.1.4.2
1.2.2
1.2.2.1
1.2.2.1.4
1.2.2.2
1.2.3
1.2.3.2
1.2.3.2.1
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.1
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3

6.7.1.1.2 Provide Dynamic In-Vehicle Guidance

Input Flows:
avo_route_request
dynamic_vehicle_guidance_data_request
vehicle_guidance_route
vehicle_location_for_dynamic_guidance

Output Flows:
avo_route
dynamic_vehicle_guidance_data
guidance_probe_data_from_vehicle
vehicle_guidance_probe_data
vehicle_guidance_probe_data_for_archive
vehicle_route_request

Description:
This process shall enable dynamic vehicle route guidance data to be calculated. The process shall perform the same dynamic vehicle route guidance services for vehicles that are using automatic vehicle operations lanes. When providing dynamic guidance, the process provides vehicle travel times as probe data to another process in the Provide Driver and Traveler Services function and the Manage Traffic function. The process shall base its guidance request on data input by the driver through another process, and on the vehicle's current location as provided by another process.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.1
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3

6.7.1.1.3 Provide Autonomous In-Vehicle Guidance

Input Flows:
autonomous_vehicle_guidance_accepted
autonomous_vehicle_guidance_data_request
link_and_queue_data
vehicle_location_for_autonomous_guidance
vehicle_map_database

Output Flows:
autonomous_vehicle_guidance_data

Description:
This process shall provide autonomous in-vehicle guidance. It shall calculate the route using data obtained from an in-vehicle navigable map database which can be supplemented with link queue and travel time data obtained from a central source, if specified by the driver and available. The process shall provide guidance in the form of actual driving instructions, e.g. turn left at the next intersection, take the right lane, etc. When link queue and travel time data are being used, the process shall provide guidance for the best route for current traffic conditions, within the preferences and constraints specified by the driver in the guidance request.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.1
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.2.2(a)
1.3.4.3

6.7.1.2 Provide Driver Guidance Interface

Input Flows:

driver_credit_identity
driver_input_request
driver_map_update_response
driving_guidance_instructions
fd-guidance_data
fd-guidance_map_update_request
fd-guidance_request
fd-guidance_route_accepted

Output Flows:

driver_advanced_payment_for_map
driver_guidance_accepted
driver_guidance_data
driver_guidance_request
driver_map_update_request
td-driving_guidance
td-guidance_input_request
td-guidance_map_update_response
td-guidance_route_details

Description:

This process shall provide a user interface for the vehicle's driver through which route guidance is provided. Three types of route guidance provided by other processes shall be supported by this process (dynamic infrastructure based, autonomous with infrastructure data update, and autonomous). The process shall enable input by the driver of the type of guidance required, the data from which the route is to be determined and output of the resulting route. The process shall not provide on-line guidance until the route has been accepted by the driver. For those forms of guidance that require an on-board map database, the process shall provide an interface through which the driver may obtain and pay for an initial copy of the database plus updates when needed. The process shall support inputs from the driver in either manual or audio form, and shall provide its outputs in audible or visual forms. It shall enable the visual output to be either in hardcopy, and/or display. Both types of output shall not impair the driver's ability to control the vehicle in a safe manner.

User Service Requirements:

1.0	1.3.1	5.1	6.5.2.1.2
1.2	1.3.1.2	5.1.0	6.5.3
1.2.0	1.3.1.2.1	5.1.1	6.5.3.1
1.2.1	1.3.2	5.1.1.1	6.5.3.1.1
1.2.1.1	1.3.2.1	5.1.1.1(d)	8.0
1.2.1.2	1.3.2.2	5.1.1.2	8.1
1.2.1.3	1.3.3	5.1.1.4	8.1.0
1.2.1.5	1.3.3.1	5.1.2	8.1.1
1.2.3	1.3.4	5.1.2.1	8.1.1.1
1.2.3.1	1.3.4.2	5.1.2.1.1	8.1.1.1.1
1.2.3.1.1	1.3.4.2.1	5.1.2.1.2	8.1.1.1.1(a)
1.2.3.1.2	1.3.4.2.2	5.1.2.2	8.1.1.1.1(b)
1.2.3.1.3	1.3.4.3	5.1.2.2(b)	8.1.1.1.1(c)
1.2.3.1.4	2.0	6.0	8.1.1.1.1(d)
1.2.3.1.4.1	2.2	6.5	8.1.1.1.1(e)
1.2.3.1.4.2	2.2.0	6.5.0	8.1.1.1.1(f)
1.2.3.1.5	2.2.1	6.5.1	8.1.1.1.1(g)
1.2.3.2	2.2.1.2	6.5.1.1	8.1.1.1.1(h)
1.2.3.2.2	2.2.1.2.2	6.5.1.1.1	8.1.1.1.1(i)
1.2.3.2.2.1	2.2.1.2.2.1	6.5.1.1.2	8.1.1.1.1(j)
1.2.3.2.4	2.2.1.2.2.2	6.5.1.1.3	8.1.1.1.1(k)
1.2.3.2.5	2.2.1.2.2.3	6.5.2	8.1.1.1.2
1.3	2.2.1.2.2.4	6.5.2.1	8.1.1.1.2(a)
1.3.0	5.0	6.5.2.1.1	

6.7.1.3 Process Vehicle Location Data

Input Flows:
From_Location_Data_Source
vehicle_map_database

Output Flows:
vehicle_location_for_advisories
vehicle_location_for_autonomous_guidance
vehicle_location_for_dynamic_guidance
vehicle_location_for_emergencies
vehicle_location_for_incidents
vehicle_location_for_probe_data

Description:
This process shall provide the vehicle's current location to other processes within the vehicle. It shall receive the precise location from a Location Data Source terminator. The terminator may base its data on one or more sources of position data such as GPS, DGPS, odometer and differential odometers, and may refine its calculations using techniques such as map matching, etc.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.2
1.3.1.2.1
1.3.1.2.1(d)
1.3.1.2.1(d).2
1.3.1.2.1(d).3
1.3.2
1.3.2.1
1.3.2.2
1.3.3
1.3.3.1
1.3.4
1.3.4.1
1.3.4.1(d)
1.3.4.1(e)
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3

6.7.1.4 Update Vehicle Navigable Map Database

Input Flows:
driver_map_update_payment_response
driver_map_update_request
fmup-vehicle_map_update
fmup-vehicle_map_update_cost

Output Flows:
driver_map_update_payment_request
driver_map_update_response
tmup-vehicle_map_update_cost_request
tmup-vehicle_map_update_request
vehicle_map_database

Description:
This process shall update the vehicle's navigable database based on digitized data obtained from a map provider, or other appropriate data source. The update shall be initiated by the driver through another process. The process shall have the capability to allow a financial transaction (to pay for the update) to be successfully completed using processes in the Provide Electronic Payment Services function. When the new map data is received, it shall be loaded by the process into the vehicle_map_database data store for use by other processes. The result of the update request (successful or not) shall be sent back to the driver interface process for output to the driver.

User Service Requirements:
1.0
1.3
1.3.0
1.3.2
1.3.2.1

6.7.2.1 Build Driver Personal Security Message

Input Flows:
fd-emergency_request
vehicle_identity_for_driver_security_store
vehicle_location_for_emergencies
vehicle_status_details_for_driver_security

Output Flows:
driver_personal_emergency_request
vehicle_identity_for_driver_security_store

Description:
This process shall respond to the input of a request from a driver for action by the emergency services. Input of the request shall be received by the process from the driver via a panic button or some other functionally similar form of input device provided as part of the in-vehicle equipment. When the input is received, the process shall send a message to the communications process, containing the vehicle's current location, its identity and basic vehicle data relevant to its current condition, as well as any other data, such as personal medical history, vehicle orientation, etc., that may be developed in-vehicle by other systems.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.1
5.1.1.1(a)
5.1.1.1(b)
5.1.1.1(c)
5.1.1.1(d)
5.1.1.1(e)
5.1.1.2

6.7.2.2 Provide Driver In-vehicle Communications Function

Input Flows:
driver_personal_emergency_request
emergency_request_driver_acknowledge

Output Flows:
driver_status_update
emergency_message_driver_output
emergency_request_driver_details

Description:
This process shall prepare and send an emergency message from a driver to the Manage Emergency Services function. The message shall only be sent by the process in response to data received from another process that monitors driver inputs. Once an emergency message has been sent, the process shall send a message to that effect to another process in the Provide Vehicle Monitoring and Control function for output to the driver. The process shall then await a response from the Manage Emergency Services function, and then send a detailed message to the other process for output to the driver. Output of the emergency message to the Manage Emergency Services function shall be repeated by the process at regular intervals until a response is received.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.3

6.7.3.1 Get Driver Personal Request

Input Flows:
vehicle_location_for_advisories
vehicle_trip_planning_requests

Output Flows:
vehicle_alert_subscriptions
vehicle_emergency_information_request
vehicle_information_request
vehicle_information_request_for_response
vehicle_payment_information
vehicle_payment_information_for_services
vehicle_profile
vehicle_transaction_request
vehicle_travel_services_data_request
vehicle_trip_confirmation
vehicle_trip_request

Description:
This process shall format requests from travelers for information and trip plans and output the requests to other processes. The request for advisory data including traveler information, emergency information, or travel services information shall allow the traveler to request only information relevant to the location of the vehicle. The request may be repeated, periodically, or when the vehicle changes location by a distance determined by the implementation. The traveler may also subscribe to traveler information alerts (e.g., traffic congestion, transit service disruption, incidents, weather road conditions) based on the traveler's location, search radius, and so forth. The process shall also support the transfer of trip planning requests and reservation requests from the travelers in vehicles for other services such as travel services, non-motorized transportation information, and event information. Once trip plans and reservations have been made and displayed to the driver this process shall forward confirmations to the appropriate processes including any payment information.

User Service Requirements:
1.0
1.2
1.2.0
1.2.1
1.2.1.1
1.2.1.3
1.2.1.5
1.2.3
1.2.3.1
1.2.3.1.1
1.2.3.1.2
1.2.3.1.3
1.2.3.1.4
1.2.3.1.4.1
1.2.3.1.4.2
1.2.3.1.5
1.2.3.2
1.2.3.2.2
1.2.3.2.2.1
1.2.3.2.4
1.2.3.2.5
1.3
1.3.0
1.3.4
1.3.4.2
1.3.4.2.2
1.3.4.2.2(b)
2.0
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.1
2.2.1.2
2.2.1.2.2
2.2.1.2.2.1
2.2.1.2.2.2
2.2.1.2.2.3
2.2.1.2.2.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
8.0
8.18.1.0
8.1.1
8.1.1.3
8.1.1.3.1
8.1.1.3.1(a)
8.1.1.3.1(b)
8.1.1.3.1(c)
8.1.1.3.1(d)
8.1.1.3.1(e)
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.1(d)
8.1.1.6.2

6.7.3.2 Provide Driver with Personal Travel Information

Input Flows:

em_to_vehicle_incident_scene_information
emergency_message_auto_output
emergency_message_driver_output
field_to_vehicle_broadcast_border_data
field_to_vehicle_broadcast_event_information
field_to_vehicle_broadcast_incident_information
field_to_vehicle_broadcast_multimodal_data
field_to_vehicle_broadcast_parking_data
field_to_vehicle_broadcast_price_data
field_to_vehicle_broadcast_traffic_data
field_to_vehicle_broadcast_transit_data
field_to_vehicle_broadcast_weather_data
field_to_vehicle_emergency_traveler_information
field_to_vehicle_evacuation_traveler_information
field_to_vehicle_transportation_system_status
field_to_vehicle_wide_area_alert_information
intrusion_alert_for_in_vehicle_signing
map_data_for_vehicle_displays
parking_to_vehicle_local_parking_data
position_warnings
safety_warnings
transit_vehicle_status_for_signing
vehicle_border_alert
vehicle_broadcast_border_data
vehicle_broadcast_event_information
vehicle_broadcast_incident_information
vehicle_broadcast_multimodal_data
vehicle_broadcast_parking_data
vehicle_broadcast_price_data
vehicle_broadcast_traffic_data
vehicle_broadcast_transit_data
vehicle_broadcast_weather_data
vehicle_control_status
vehicle_display_type
vehicle_emergency_traveler_information
vehicle_env_probe_data_output
vehicle_evacuation_traveler_information
vehicle_event_alert
vehicle_incident_alert
vehicle_information_request_for_response
vehicle_interactive_border_data
vehicle_interactive_event_information
vehicle_interactive_incident_information
vehicle_interactive_multimodal_data
vehicle_interactive_parking_data
vehicle_interactive_price_data
vehicle_interactive_traffic_data
vehicle_interactive_transit_data
vehicle_interactive_weather_data
vehicle_multimodal_alert
vehicle_parking_alert
vehicle_payment_confirmation
vehicle_signage_data
vehicle_signage_emissions_testing_results
vehicle_status_details_for_broadcast
vehicle_traffic_alert
vehicle_transaction_confirmation
vehicle_transit_alert
vehicle_transportation_system_status
vehicle_travel_services_provider_data
vehicle_trip_information
vehicle_weather_alert
vehicle_wide_area_alert_information
vision_data
work_zone_intrusion_alert_on_board_for_in_vehicle_signing

Output Flows:

vehicle_advisory_information
vehicle_traveler_information
vehicle_trip_planning_responses

Description:

This process shall provide in-vehicle advisory, broadcast, traveler information alert, and trip planning data for output to drivers and travelers aboard vehicles. Data broadcast to the driver (from both centers and short range communications field equipment) shall include traffic related data (incidents and link data), transit, weather, event, parking, multimodal, border crossings, and price data. Data broadcast to the driver shall also support emergency information including evacuation and wide area alert information, as well as data from the vehicle itself. This vehicle data includes vehicle conditions, environmental probe data, safety and position warnings, and enhanced vision images. Data broadcast can also include in-vehicle signage messages, which include roadside traffic indicator outputs, fixed signage (e.g., Stop signs, yield signs), roadside dynamic message sign (DMS) information, local conditions warnings identified by local environmental sensors, and work zone intrusion warning messages. Safety and warning messages shall be prioritized by the process to supersede advisory and broadcast messages. The process shall also provide travelers in vehicles with the status and confirmation of their request for trip plans and reservations for other services such as yellow pages, non-motorized transportation information, and event information.

The process shall tailor the output based on the vehicle display type that is input by the driver interface process. The process shall support the use of a digital map to form the display of information to the driver.

User Service Requirements:

1.0
1.2
1.2.0
1.2.1
1.2.1.1
1.2.1.3
1.2.1.5
1.2.3
1.2.3.1
1.2.3.1.1
1.2.3.1.2
1.2.3.1.3
1.2.3.1.4
1.2.3.1.4.1
1.2.3.1.4.2
1.2.3.1.5
1.2.3.2
1.2.3.2.2
1.2.3.2.2.1
1.2.3.2.4
1.2.3.2.5
1.3
1.3.0
1.3.4
1.3.4.2
1.3.4.2.2
1.3.4.2.2(b)
2.0
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.1
2.2.1.2
2.2.1.2.2
2.2.1.2.2.1
2.2.1.2.2.2
2.2.1.2.2.3
2.2.1.2.2.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4
8.0
8.1
8.1.0
8.1.1
8.1.1.3
8.1.1.3.1
8.1.1.3.1(a)
8.1.1.3.1(b)
8.1.1.3.1(c)
8.1.1.3.1(d)
8.1.1.3.1(e)
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.1(d)
8.1.1.6.2

6.7.3.3 Provide Driver Information Interface

Input Flows:
fd-activate_vehicle_control
fd-request_advisory_information
fd-vehicle_display_configuration_override
fd-vehicle_display_configuration_setting
vehicle_advisory_information
vehicle_display_definitions_data
vehicle_display_map_update_response
vehicle_regular_data
vehicle_traveler_information
vehicle_trip_planning_responses

Output Flows:
td-advisory_information
td-broadcast_information
td-vehicle_occupants_detected
vehicle_control_request
vehicle_display_definitions_data
vehicle_display_map_update_request
vehicle_display_type
vehicle_regular_data
vehicle_trip_planning_requests

Description:
This process shall provide a user interface for a driver through which traffic and travel information can be obtained. The process shall enable traffic and travel information to be requested and output to the driver, and shall also support the automatic output of wide area broadcast information. User-configurable traveler information alert subscriptions shall be supported and resultant alerts shall be output to the driver. In-vehicle signage shall also be output to the driver, including indicator outputs, fixed signage, and advisory information such as that typically displayed on a dynamic message sign (DMS). The process shall support output of safety and vision enhancement information to the traveler. This process shall support inputs from the driver to establish configurable parameters to customize the display of information and to set and override certain vehicle characteristics like trailer attached, number of axles, height of vehicle, etc. Such information could be used to customize the messages provided or displayed. When constructing all outputs the process shall use the store of vehicle display information parameters. This process shall use inputs for map data along with advisory data from other processes within the vehicle to present warnings to the driver of potential obstacles. One purpose of the vehicle display information parameters data store is to provide a translation table for road sign and message templates used for in-vehicle display. Part of the input interface provided by the process shall enable the driver to invoke and cancel automatic control of the vehicle including the use of automatic vehicle operations lanes. The process shall support inputs from the driver in manual or audio form, and shall provide its outputs in audible or visual forms. Visual output shall not impair the driver's ability to control the vehicle in a safe manner.

User Service Requirements:

1.0	1.3	1.8.0	8.0
1.2	1.3.0	1.8.1	8.1
1.2.0	1.3.3	1.8.1.6	8.1.0
1.2.1	1.3.3.1	1.8.1.6(c)	8.1.1
1.2.1.5	1.5	6.0	8.1.1.5
1.2.3	1.5.0	6.5	8.1.1.5(a)
1.2.3.2	1.5.2	6.5.0	8.1.2
1.2.3.2.2	1.5.2.5	6.5.3	8.1.2.4
1.2.3.2.2.1	1.5.2.5(e)	6.5.3.1	8.1.2.4.2
1.2.3.2.5	1.8	6.5.3.1.2	

6.7.3.4 Update Driver Display Map Data

Input Flows:
driver_display_update_payment_response
fmup-driver_display_update
fmup-driver_display_update_cost
vehicle_display_map_update_request
vehicle_regular_data

Output Flows:
driver_display_update_payment_request
map_data_for_vehicle_displays
tmup-request_driver_display_update
tmup-request_driver_display_update_cost
vehicle_display_map_update_response

Description:
This process shall provide updates to the digitized map data used as the background for displays on drivers' in-vehicle devices. These displays include details of traffic, trip and travel information for use by travelers. The process shall obtain the new map data from a map provider process or some other appropriate data source on request from the driver via the driver interface process. The process shall load data into the map_data_for_vehicle_displays data store. The data will be compatible with the types of displays that are found on personal devices.

User Service Requirements:
1.0
1.2
1.2.0
1.2.1
1.2.1.5
1.2.3
1.2.3.2
1.2.3.2.2
1.2.3.2.2.1
1.2.3.2.5
1.3
1.3.0
1.3.2
1.3.2.1
1.3.2.1(a)

6.7.3.5 Provide Short Range Traveler Information

Input Flows:

field_broadcast_border_data
field_broadcast_event_information
field_broadcast_incident_information
field_broadcast_multimodal_data
field_broadcast_parking_data
field_broadcast_price_data
field_broadcast_traffic_data
field_broadcast_transit_data
field_broadcast_weather_data
field_emergency_traveler_information
field_evacuation_traveler_information
field_transportation_system_status
field_wide_area_alert_information

Output Flows:

field_to_vehicle_broadcast_border_data
field_to_vehicle_broadcast_event_information
field_to_vehicle_broadcast_incident_information
field_to_vehicle_broadcast_multimodal_data
field_to_vehicle_broadcast_parking_data
field_to_vehicle_broadcast_price_data
field_to_vehicle_broadcast_traffic_data
field_to_vehicle_broadcast_transit_data
field_to_vehicle_broadcast_weather_data
field_to_vehicle_emergency_traveler_information
field_to_vehicle_evacuation_traveler_information
field_to_vehicle_transportation_system_status
field_to_vehicle_wide_area_alert_information
trav_info_equip_status_for_isp_operator
trav_info_equip_status_for_m_and_c

Description:

This process represents short-range communications field equipment that distributes information to vehicles for in-vehicle display. It shall receive inputs from a center and pass the information on to vehicles traveling in the vicinity of the field equipment, including traffic related data (incidents and link data), transit, weather, event, parking, multimodal, price data, and emergency information including evacuation and wide area alert information. The process shall return operational status (state of the device, configuration, and fault data) to other processes for repair.

User Service Requirements:

1.0
1.2
1.2.0
1.2.1
1.2.1.1
1.2.1.3
1.2.1.4
1.2.1.4.1
1.2.1.4.2
1.2.1.5
1.2.2
1.2.2.1
1.2.2.1.1
1.2.2.1.2
1.2.2.1.2.1
1.2.2.1.3
1.2.2.1.4
1.2.2.2
1.5
1.5.0
1.5.2
1.5.2.2
1.5.2.2(f)
2.0
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.1
2.2.1.2
2.2.1.2.2
5.0
5.1
5.1.0
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.3
5.3.0
5.3.10
5.3.10.10
5.3.10.11
5.3.10.12

6.8.1.1.1 Determine Personal Portable Device Guidance Method

Input Flows:
autonomous_traveler_guidance_data
dynamic_traveler_guidance_data
retained_traveler_guidance_data
traveler_guidance_accepted
traveler_guidance_data
traveler_guidance_request

Output Flows:
autonomous_traveler_guidance_accepted
autonomous_traveler_guidance_data_request
dynamic_traveler_guidance_data_request
retained_traveler_guidance_data
traveler_guidance_instructions
traveler_input_request
traveler_route_accepted

Description:
This process shall act as the interface for personal guidance requests received from travelers with personal portable devices. The process shall select the best method for personal guidance based on data in the traveler's request. Two methods shall be available to the process, comprising dynamic infrastructure based guidance is provided to the personal portable device), and autonomous (the personal portable device uses only locally available data- there is no information provided by the infrastructure) If the communications link to the central source fails, the process shall use the last set of guidance data that was received, and if this is not sufficient for the traveler to reach the requested destination, automatically revert to the use of autonomous guidance using local data only.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.1
1.3.4.1(d)
1.3.4.1(e)
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3

6.8.1.1.2 Provide Personal Portable Device Dynamic Guidance

Input Flows:
dynamic_traveler_guidance_data_request
traveler_guidance_route
traveler_location_for_dynamic_guidance

Output Flows:
dynamic_traveler_guidance_data
traveler_route_request

Description:
This process shall enable dynamic traveler guidance data to be calculated. The process shall base its guidance request on the data input by the traveler from a personal portable device through other processes, and on the traveler's current location as provided by another process.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3

6.8.1.1.3 Provide Personal Portable Device Autonomous Guidance

Input Flows:
autonomous_traveler_guidance_accepted
autonomous_traveler_guidance_data_request
traveler_location_for_autonomous_guidance
traveler_map_database

Output Flows:
autonomous_traveler_guidance_data

Description:
This process shall provide autonomous on-line guidance when requested by the traveler from a personal portable device. It shall calculate the route using data obtained from a navigable map database stored in the traveler's personal portable device. Guidance shall be provided by the process in the form of actual instructions to the traveler, e.g. cross the road here, take the subway to a specific station. The process shall provide guidance for the shortest route, within the preferences and constraints specified by the traveler in the guidance request.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(d)
1.5.2.5(g)

6.8.1.2 Provide Personal Portable Device Guidance Interface

Input Flows:
ft-guidance_data
ft-guidance_map_update_request
ft-guidance_request
ft-guidance_route_accepted
traveler_guidance_instructions
traveler_input_request
traveler_map_update_response
traveler_personal_data

Output Flows:
traveler_guidance_accepted
traveler_guidance_data
traveler_guidance_request
traveler_map_update_request
traveler_personal_map_update_cost
tt-guidance
tt-guidance_input_request
tt-guidance_map_update_response
tt-guidance_route_details

Description:
This process shall be responsible for providing a user interface for the traveler through which personalized route guidance can be delivered. The process shall enable the traveler to input data to request a suitable route. This process shall be capable of supporting two types of route guidance: dynamic (infrastructure based guidance is provided to the personal portable device), and autonomous (the personal portable device uses only locally available data- there is no information provided by the infrastructure). The process shall also act as the interface for output of on-line guidance to the traveler. Multimodal routes shall be supported by the process. The process shall not provide on-line guidance until the route has been accepted by the traveler. For those forms of guidance that require an on-board map database, the process shall provide an interface through which the traveler may obtain and pay for an initial copy of the database plus updates when needed. The process shall support inputs from the traveler in either manual or audio form, and shall provide outputs in audible or visual forms. It shall enable the visual output to be either in hardcopy, or display. Both types of output shall be produced in such a way that in using them the traveler does not become a hazard to other travelers.

User Service Requirements:
1.0
1.3
1.3.0
1.3.1
1.3.1.1
1.3.1.2
1.3.1.2.1
1.3.1.3
1.3.2
1.3.2.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.2
1.3.3.2.2
1.3.3.3
1.3.4
1.3.4.2
1.3.4.2.1
1.3.4.2.2
1.3.4.3

6.8.1.3 Process Personal Portable Device Location Data

Input Flows:
From_Location_Data_Source
traveler_map_database

Output Flows:
traveler_location_for_autonomous_guidance
traveler_location_for_dynamic_guidance
traveler_location_for_emergencies
traveler_location_for_information
traveler_location_for_planning

Description:
This process shall provide the traveler's current location to other personal traveler processes. It shall receive the precise location from a Location Data Source Terminator. The terminator may base its data on one or more sources of position data such as GPS or DGPS, and may refine its calculations using techniques such as map matching, dead reckoning, etc. The process shall provide the location to other processes for use in autonomous and dynamic route guidance. This location should be as precise as is practical within cost and technology constraints. It is intended for use by traveler personal navigation and guidance systems, as well as emergency notification systems.

User Service Requirements:
1.0
1.3
1.3.0
1.3.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.3
5.0
5.1
5.1.0
5.1.1
5.1.1.3

6.8.1.4 Update Traveler Navigable Map Database

Input Flows:
fmup-traveler_map_update
fmup-traveler_map_update_cost
traveler_map_update_payment_response
traveler_map_update_request

Output Flows:
tmup-traveler_map_update_cost_request
tmup-traveler_map_update_request
traveler_map_database
traveler_map_update_payment_request
traveler_map_update_response

Description:
This process shall update the traveler's navigable database based on digitized data obtained from a map provider, or other appropriate data source. The update shall be initiated by the traveler through another process. The process shall have the capability to allow a financial transaction (to pay for the update) to be completed using processes in the Provide Electronic Payment Services function. When the new map data is received, it shall be loaded by the process into the traveler_map_database data store for use by other processes. The result of the update request (successful or not) shall be sent back to the traveler interface process for output to the traveler.

User Service Requirements:
1.0
1.3
1.3.0
1.3.2
1.3.2.3
1.3.2.3.1
1.3.3
1.3.3.3

6.8.1.5 Provide Traveler Emergency Message Interface

Input Flows:
emergency_message_traveler_output
traveler_location_for_information

Output Flows:
tt-emergency_message

Description:
This process shall provide an emergency notification interface for a traveler using a personal portable device. The emergency notification interface shall enable the output of messages generated by a traveler's emergency request to another process.

User Service Requirements:
1.0
1.5
1.5.0
1.5.2
1.5.2.1
1.5.2.2
1.5.2.3

6.8.2.1 Build Traveler Personal Security Message

Input Flows:
ft-personal_emergency_request
traveler_identity_store
traveler_location_for_emergencies

Output Flows:
traveler_personal_emergency_request

Description:
This process shall respond to the input of a request from a traveler for action by the emergency services. Input of the request shall be received by the process from the traveler via a panic button or some other functionally similar form of input device provided as part of the traveler's personal portable device. When the input is received, the process shall send a message to the communications process, containing the traveler's current location and identity.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.1
5.1.1.1(d)
5.1.1.1(e)
5.1.1.2

6.8.2.2 Provide Traveler Emergency Communications Function

Input Flows:
emergency_request_personal_traveler_acknowledge
traveler_personal_emergency_request

Output Flows:
emergency_message_traveler_output
emergency_request_personal_traveler_details

Description:
This process shall prepare and send an emergency message from a traveler's personal portable device to the Manage Emergency Services function. The message shall only be sent by the process in response to data received from another process that monitors traveler inputs. Once an emergency message has been sent, the process shall send a message to that effect to another process for output to the traveler. The process shall then await a response from the Manage Emergency Services function, and when received again send a message to the other process for output to the traveler. Output of the emergency message to the Manage Emergency Services function shall be repeated by the process at regular intervals until a response is received.

User Service Requirements:
5.0
5.1
5.1.0
5.1.1
5.1.1.3

6.8.3.1 Get Traveler Personal Request

Input Flows:
traveler_personal_trip_planning_requests

Output Flows:
traveler_personal_alert_subscriptions
traveler_personal_emergency_information_request
traveler_personal_information_request
traveler_personal_information_request_for_response
traveler_personal_payment_information
traveler_personal_payment_information_for_services
traveler_personal_profile
traveler_personal_transaction_request
traveler_personal_travel_services_data_request
traveler_personal_trip_confirmation
traveler_personal_trip_request
traveler_personal_vmt_account_setup_info_from_trav
traveler_personal_vmt_payment_info_from_trav

Description:
This process shall receive traveler requests from a personal device (portable, or non portable) then provide support for trip planning, traffic, transit and other (yellow pages and event) services information, traveler information alerts, trip confirmation, yellow pages services confirmation, and payment requests. The traveler may also subscribe to traveler information alerts (e.g., traffic congestion, transit service disruption, incidents, weather road conditions) based on the traveler's location, search radius, and so forth. The process shall send these requests to the appropriate processes within the Provide Driver and Traveler Services function for further processing to generate responses. The interface to the traveler shall be provided through a separate process, from which input to this process originates.

User Service Requirements:
1.0
1.1
1.1.0
1.1.3
1.1.3.2
1.1.3.2.1
1.1.3.2.10
1.1.3.2.2
1.1.3.2.3
1.1.3.2.4
1.1.3.2.5
1.1.3.2.6
1.1.3.2.7
1.1.3.2.8
1.1.3.2.9
1.4
1.4.0
1.4.1
1.4.1.1
1.4.1.2
1.4.1.2(b)
1.4.1.2(c)
1.4.1.3
1.5.0
1.5.2

6.8.3.2 Provide Traveler with Personal Travel Information

Input Flows:

map_data_for_traveler_personal_displays
personal_parking_facility_information
transit_services_for_personal_devices
transit_trip_plan_for_user
transit_vehicle_arrival_time
traveler_personal_border_alert
traveler_personal_broadcast_border_data
traveler_personal_broadcast_event_information
traveler_personal_broadcast_incident_information
traveler_personal_broadcast_multimodal_data
traveler_personal_broadcast_parking_data
traveler_personal_broadcast_price_data
traveler_personal_broadcast_traffic_data
traveler_personal_broadcast_transit_data
traveler_personal_broadcast_weather_data
traveler_personal_emergency_traveler_information
traveler_personal_evacuation_traveler_information
traveler_personal_event_alert
traveler_personal_incident_alert
traveler_personal_information_request_for_response
traveler_personal_interactive_border_data
traveler_personal_interactive_event_information
traveler_personal_interactive_incident_information
traveler_personal_interactive_multimodal_data
traveler_personal_interactive_parking_data
traveler_personal_interactive_price_data
traveler_personal_interactive_traffic_data
traveler_personal_interactive_transit_data
traveler_personal_interactive_weather_data
traveler_personal_multimodal_alert
traveler_personal_parking_alert
traveler_personal_payment_confirmation
traveler_personal_traffic_alert
traveler_personal_transaction_confirmation
traveler_personal_transit_alert
traveler_personal_transportation_system_status
traveler_personal_travel_services_provider_data
traveler_personal_trip_information
traveler_personal_vmt_account_reports_to_trav
traveler_personal_vmt_payment_request_to_trav
traveler_personal_weather_alert
traveler_personal_wide_area_alert_information

Output Flows:

personal_traveler_information
transit_services_personal_request
transit_trip_confirmation_from_user
transit_trip_request_from_user
traveler_personal_trip_planning_responses

Description:

This process shall provide the traveler (using a personal device) with data about all requested trip, traffic, transit, other (yellow pages, border crossings, or event) services information, traveler information alerts, confirmation of any requested reservations, and payments made as part of confirmed trip plans. This process shall also receive information for the traveler concerning evacuation situations and wide area alerts. The data shall be sent by the process to an interface process which is responsible for its actual output to the traveler. This data shall include digitized map data to act as the background to the output when the data is shown in a suitable format. This process shall request data from other ITS functions or be sent the data as a result of requests from another process.

User Service Requirements:

1.0
1.1
1.1.0
1.1.1
1.1.1.1
1.1.1.1.1
1.1.1.1.2
1.1.1.1.3
1.1.1.1.4
1.1.1.1.5
1.1.1.1.6
1.1.2
1.1.2.1
1.1.2.1.1
1.1.2.1.2
1.1.2.1.3
1.1.2.1.4
1.1.2.1.5
1.1.2.1.6
1.1.2.1.8
1.1.4
1.1.4.1
1.1.4.1.1
1.1.4.1.2
1.1.4.1.3
1.1.4.1.4
1.4
1.4.0
1.4.1
1.4.1.3
1.5
1.5.0
1.5.2
1.5.2.1
1.5.2.2
2.0
2.3
2.3.0
2.3.1
2.3.1.3
2.3.1.4
5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
5.1.5
5.1.5.1
5.1.5.2
5.1.5.3
5.1.5.4

6.8.3.3 Provide Traveler Personal Interface

Input Flows:
ft-personal_extra_trip_data
ft-personal_map_display_update_request
ft-personal_trip_planning_requests
personal_traveler_information
traveler_location_for_planning
traveler_personal_data
traveler_personal_display_map_update_response
traveler_personal_regular_data
traveler_personal_trip_planning_responses

Output Flows:
traveler_personal_data_update
traveler_personal_display_map_update_request
traveler_personal_regular_data
traveler_personal_trip_planning_requests
tt-personal_extra_trip_data_request
tt-personal_traveler_information
tt-personal_trip_planning_responses

Description:
This process shall provide an interface in a personal device through which travelers can plan and confirm trips, as well as obtain current traffic and transit information via request or traveler information alert subscriptions. The process shall support trip planning and confirmation of other (yellow pages or non-motorized) services such as lodging, restaurants, theaters, bicycle facilities and other tourist activities. The process shall be able to load in the traveler_personal_regular_data store frequently used information such as traveler identity (the owner of the personal device), home and work locations, etc. This will reduce the amount of input needed by the traveler for each trip request. The process shall also carry out input data verification and require input confirmation, with the traveler, before passing the data to other processes. The traveler's payment information and location (when traveler is using a portable device) shall be obtained by this process from other processes. The process shall support inputs from the traveler in both digital and audio form, and shall provide its outputs in audible and visual forms that are consistent with a personal device. This process shall include forms suitable for travelers with hearing and vision physical disabilities. The process shall display data for as long as required by the traveler and must enable viewing of previously output data. When used with a portable device, the process shall provide the traveler the option to filter the data (to be displayed) relevant to the travelers current location.

User Service Requirements:

1.0	1.1.3.2.9	1.4.1.2
1.1	1.1.4	1.4.1.3
1.1.0	1.1.4.2	1.4.1.4
1.1.3	1.1.4.2.1	1.5
1.1.3.2	1.3	1.5.0
1.1.3.2.1	1.3.0	1.5.2
1.1.3.2.10	1.3.4	1.5.2.5
1.1.3.2.2	1.3.4.1	1.5.2.5(b)
1.1.3.2.3	1.3.4.1(b)	1.5.2.5(c)
1.1.3.2.4	1.3.4.1(c)	1.5.2.5(d)
1.1.3.2.5	1.4	2.0
1.1.3.2.6	1.4.0	2.3
1.1.3.2.7	1.4.1	2.3.0
1.1.3.2.8	1.4.1.1	2.3.1

6.8.3.4 Update Traveler Personal Display Map Data

Input Flows:
fmup-traveler_personal_display_update
fmup-traveler_personal_display_update_cost
traveler_personal_display_map_update_request
traveler_personal_display_update_payment_response
traveler_personal_regular_data

Output Flows:
map_data_for_traveler_personal_displays
tmup-request_traveler_personal_display_update
tmup-request_traveler_personal_display_update_cost
traveler_personal_display_map_update_response
traveler_personal_display_update_payment_request

Description:
This process shall provide updates to the digitized map data used as the background for displays on travelers' personal devices. These displays include details of traffic, trip and travel information for use by travelers. The process shall obtain the new map data from a map provider process or some other appropriate data source on request from the traveler via the traveler interface process. The process shall load data into the map_data_for_traveler_personal_displays data store. The data will be compatible with the types of displays that are found on personal devices.

User Service Requirements:
1.0
1.3
1.3.0
1.3.4
1.3.4.1
1.3.4.1(b)
1.3.4.1(c)
1.5
1.5.0
1.5.2
1.5.2.5
1.5.2.5(c)
1.5.2.5(d)

6.9 Manage Traveler Info Archive Data

Input Flows:
current_other_routes_use_for_archive
current_road_network_use_for_archive
emergency_info_requests_for_archive
fispo-archive_commands
traffic_probe_aggregated_data_for_archive
travel_services_requests_for_archive
traveler_archive_request
traveler_archive_status
traveler_info_data_archive
traveler_info_requests_for_archive
traveler_route_guidance_data_for_archive
trip_planning_confirmations_for_archive
trip_planning_requests_for_archive
vehicle_route_guidance_data_for_archive

Output Flows:
tispo-archive_status
traveler_archive_data
traveler_info_data_archive

Description:
This process shall accept records of traveler information service requests and confirmations, multimodal trip planning requests, payment transaction data, rideshare requests, commercial and private vehicle traffic and environmental probe data, route guidance data, and origin/destination data, and store it in its local traveler info data archive data store, together with a catalog to describe the data. When requested by the Manage Archived Data function, this information will be sent to that function. The process shall also provide a control interface to the ISP Operator, responding with the status received from the requester of the archive. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the traveler information data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data or a catalog is received from an external source, when a command is received from the ISP Operator, or when fresh data is received.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.4
7.1.3.1.4(c)
7.1.3.1.4(d)
7.1.3.1.8
7.1.3.1.8(a)
7.1.3.1.8(c)
7.1.3.1.8(d)
7.1.3.1.8(f)
7.1.3.1.8(g)
7.1.3.1.8(h)

6.10 Manage Traveler Profiles

Input Flows:
traveler_personal_profile
vehicle_profile

Output Flows:
profiles_for_alerts
profiles_for_emergency_operations
profiles_for_interactive
profiles_for_route_guidance
profiles_for_route_selection
profiles_for_travel_services
profiles_for_trip_planning

Description:
This process shall manage the profiles of users of the Provide Driver and Traveler Services function. This process shall collect traveler profile information from personal devices or in-vehicle units. This process shall provide traveler profile information to other processes within Provide Driver and Traveler Services to support applications such as trip planning, traveler information dissemination, traveler information alerts, emergency information dissemination, route guidance/selection, and yellow pages services. The traveler profile shall include the type and capabilities of the equipment that the traveler normally uses, their contact information, and personal preferences. Traveler profiles may be used by the applications to generate future personalized trip information.

User Service Requirements:
1.0
1.1
1.1.0
1.1.3
1.1.3.2
1.1.3.2.10
1.1.3.2.8
1.1.3.2.9
1.4
1.4.0
1.4.1
1.4.1.2
1.4.1.2(e)
1.4.3
1.4.3.1

7.1.1.1 Read Vehicle Payment Data for Tolls

Input Flows:
toll_vehicle_payment_data_collect
vehicle_toll_characteristic_data

Output Flows:
get_toll_vehicle_payment_violator_image
toll_vehicle_payment_data_request
toll_vehicle_payment_data_update
toll_vehicle_payment_problem_message
vehicle_payment_data_for_tolls
vehicle_type_for_tolls

Description:
This process shall be responsible for requesting the data from the vehicle payment device being carried on-board the vehicle and used as a traveler card / payment instrument. If there is no such device or the data it contains cannot be properly read, this process shall provide a message for the vehicle operator to contact the toll authority (or toll system operator). The process shall send a request to other processes to obtain an image of the vehicle. If the vehicle is exiting a closed toll system the data shall be checked by this process to see if it contains an entry point toll segment number. If not present, the process would be referred to another process for off-line resolution. If the toll segment identity is present, it shall be combined with the vehicle characteristics, e.g., size, type, etc., to form the data upon which the toll payment transaction can be based, and the data sent to another process. If the vehicle is entering a closed toll system, the entry point toll segment shall be written onto the vehicle payment device so that it can be used as the mechanism for charging for the use of the toll road.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.13
1.8.2.13(c)
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.6

7.1.1.2 Calculate Vehicle Toll

Input Flows:
fto-local_toll_price_variations
toll_price_data_for_vehicle_toll
vehicle_payment_data_for_tolls
vehicle_type_for_tolls

Output Flows:
toll_charge

Description:
This process shall be responsible for calculating the toll for the detected vehicle based on the vehicle's characteristics and data obtained from the vehicle. This process shall calculate the cost of the toll using segment(s) traveled by the vehicle. Segment information is obtained by reading data that contains standard prices for toll segments plus any variations to pricing received from the toll operator.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.13
1.8.2.13(c)
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.2
3.1.1.6

7.1.1.3 Manage Bad Toll Payment Data

Input Flows:
bad_toll_payment_list
ffi-bad_toll_payment_updates
toll_bad_payment_check_request
toll_payment_violator_data

Output Flows:
bad_toll_payment_list
tfi-toll_payment_violator_data
toll_bad_payment_check_response

Description:
This process shall be responsible for maintaining a data store containing a list of invalid driver credit identities. This process shall use this data to verify credit identities and commercial vehicle carrier numbers provided for checking by the billing process. Verification shall ensure that the current toll payment transaction is using a credit identity or carrier identity that has not previously had an invalid transaction. Details of potential invalid credit identities or carrier numbers shall be sent by this process to the financial institution for verification. This process shall also receive from the financial institution details of invalid traveler card / payment instrument data that has been found by other means.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.1
1.8.2.1(f)
3.0
3.1
3.1.0
3.1.1
3.1.1.4
3.1.1.5

7.1.1.4 Check for Advanced Tolls Payment

Input Flows:
advanced_toll_billing
advanced_toll_payment_list
advanced_toll_payment_update
alert_notification_for_toll_operator
toll_charge

Output Flows:
advanced_toll_payment_list
advanced_toll_transactions
billing_for_tolls_needed
tto-alert_notification
tto-transaction_reports

Description:
This process shall be responsible for checking to see if the required toll payment has already been made. The process shall determine the existence of an advanced payment for the toll segment(s) by comparing the received payment information with that in the store containing the list of advanced payments. If the payment has already been made then the process shall remove the requirement for local billing and remove the record of the advanced payment from the store. Details of each payment transaction shall be sent by the process to another process with the payment information received from the driver removed. In special situations this process shall pass along wide area alert information to the toll operators that have been received from the Manage Emergency function.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.5

7.1.1.5 Bill Driver for Tolls

Input Flows:
billing_for_tolls_needed
toll_bad_payment_check_response
toll_payment_confirmation

Output Flows:
advanced_toll_payment_update
confirm_advanced_tolls_payment
current_toll_transactions
get_toll_payment_violator_image
toll_bad_payment_check_request
toll_payment_debited
toll_payment_pull_in_message
toll_payment_request
toll_payment_violator_data
toll_vehicle_payment_data_clear

Description:
This process shall be responsible for obtaining payment for the current or advanced toll. The process shall achieve this either by requesting that the toll cost be deducted from the credit being stored by the vehicle payment device that is acting as the traveler card / payment instrument, or by informing the driver that payment for the toll will be debited to the credit identity provided by the vehicle payment device. Before sending data to the vehicle, the process shall check that either the credit identity is not already in the list of bad payers, or the stored credit is not less that the toll cost. If either of these conditions is true, the process shall obtain an image of the driver and vehicle which can be forwarded to the appropriate enforcement agency via another process. When the appropriate payment transaction has been completed, the toll entry segment identity shall be cleared from the vehicle payment device so that it can be used the next time that the vehicle is on a toll road. The vehicle payment device may be in the form of some type of credit or debit card, or an electronic purse. Details of the transaction shall always be sent by this process to the process that manages toll transactions. Where an advanced toll payment is identified, the process shall take no action if the credit identity is on the bad payers list, or the stored credit is less than the toll cost, other than the payment is not confirmed.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.8

7.1.1.6 Collect Probe Data From Toll Transactions

Input Flows:
toll_transactions_for_probe_data

Output Flows:
toll_probe_data_for_isp
toll_probe_data_for_traffic
toll_transactions_for_probe_data_request

Description:
This process shall calculate the time taken for vehicles to travel between successive toll plazas and send it to the Manage Traffic and Provide Driver and Traveler Services functions. The process shall periodically request the data from the process that manages toll financial processing and ensure that any references to the driver and/or vehicle identity plus any other payment information are removed from the data before it is sent to the other functions.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.4
3.1.1.6

7.1.1.7 Update Toll Price Data

Input Flows:
cvo_toll_price_request
evacuation_toll_change_request
fpa-toll_price_changes_response
fpa-toll_price_data
toll_price_changes_request
toll_price_data_request
toll_price_direct_request
toll_prices

Output Flows:
cvo_toll_price
evacuation_toll_change_response
toll_price_changes_response
toll_price_data
toll_price_data_for_advanced_toll
toll_price_data_for_vehicle_toll
toll_price_direct_details
toll_prices
toll_prices_for_archive
tpa-toll_price_changes_request

Description:
This process shall be responsible for maintaining a store of data containing the toll price, which may vary according to the type of vehicle. The process shall also act as the interface for the output and input of responses to toll price change requests from the Manage Traffic function, the provision of toll price information to the Centralized Payments facility, and to the toll administrator to enable changes to be made to the stored data. The input and output forms shall include those that are suitable for travelers with physical disabilities. This process supports the exchange of toll price information with the process to Manage Commercial Vehicle Fleet Operations.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.2
5.0
5.3
5.3.0
5.3.5
5.3.5.3

7.1.1.8 Register for Advanced Toll Payment

Input Flows:
advanced_other_tolls_request
advanced_traveler_tolls_request
confirm_advanced_tolls_payment
cvo_advanced_toll_request
fpa-confirm_advanced_toll

Output Flows:
advanced_other_tolls_confirm
advanced_toll_needed
advanced_traveler_tolls_confirm
cvo_advanced_toll_confirmation
tpa-request_advanced_toll

Description:
This process shall be responsible for responding to requests for tolls to be paid in advance. It shall provide the toll administrator with the opportunity to review the requests for advanced toll payments. If approved, the advanced toll data shall be forwarded by the process to other processes for the actual toll cost to be obtained and payment transactions initiated. This process also supports the advance payment of tolls by the Manage Commercial Vehicle function.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1

7.1.1.9 Manage Toll Processing

Input Flows:
advanced_toll_transactions
current_toll_transactions
ffi-confirm_toll_payment
fpa-alert_notification_input
other_toll_data_input
toll_transaction_records
toll_transactions_for_probe_data_request
wide_area_alert_notification_for_tolls

Output Flows:
alert_notification_for_toll_operator
alert_notification_status_from_tolls
other_toll_data_output
tfi-request_toll_payment
toll_operational_data
toll_transaction_records
toll_transactions_for_probe_data
tpa-alert_notification
tpa-transaction_reports

Description:
This process shall be responsible for maintaining a log of all toll transactions that are carried out by other processes in the toll payments system. At periodic intervals the process shall output the accumulated records to the toll administrator and the archive function. It shall also output the data on request to the process that calculates probe data from the average travel time between toll plazas. The identity of the payee shall be removed from the data before it is used in any of these outputs. The process shall also be responsible for sending details of transactions to the financial institution to enable the travelers to be billed through their credit identities. For commercial vehicles, this will be done using the data provided by the vehicle's on-board tag and shall enable billing to the financial institution to be made by carrier. This process shall also support the reconciliation of toll charges and data with other toll administration functions. This process shall also support situations in which the Manage Emergency function issues a wide-area alert to inform other systems and functions about an emergency situation including a child abduction. This process shall notify the administrator and pass it on to the toll collection personnel. Once that has happened this process shall inform the Manage Emergency function of their status, i.e. what has been done in response to the wide area alert.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.10
1.8.2.10(a)
1.8.2.12
1.8.2.12(a)
1.8.2.4
1.8.2.4(e)
3.0
3.1
3.1.0
3.1.4
3.1.4.3

7.1.1.10 Determine Advanced Toll Bill

Input Flows:
advanced_toll_needed
toll_price_data_for_advanced_toll

Output Flows:
advanced_toll_billing

Description:
This process shall be responsible for receiving a request to pay an advanced toll. It shall obtain the price of the toll segment(s) for which advanced payment is being requested from a local data store and shall then forward it to the billing processes. The store of toll prices shall be maintained by another process.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1

7.1.1.11 Manage Toll Archive Data

Input Flows:
fpa-archive_commands
toll_archive_request
toll_archive_status
toll_data_archive
toll_operational_data
toll_prices_for_archive

Output Flows:
toll_archive_data
toll_data_archive
tpa-archive_status

Description:
This process shall obtain toll operational data and toll pricing data and distribute it to the Manage Archived Data function. As data is received into this process quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. A catalog of the data shall be maintained to allow requesters to know what data is available from the archive store. This process shall be able to produce sample products of the data available. The process shall run when a request for data is received from an external source, or when fresh data is received. This process also accepts the status of the transmitted data from the Manage Archived Data function. The Toll Administrator interacts with this process to manage the collection and transfer of data.

User Service Requirements:
7.0
7.1
7.1.0
7.1.3
7.1.3.1
7.1.3.1.2
7.1.3.1.8
7.1.3.1.8(e)

7.1.2 Produce Roadside Displays

Input Flows:
toll_payment_pull_in_message
toll_vehicle_payment_problem_message

Output Flows:
td-toll_payment_confirmed
td-toll_payment_invalid

Description:
This process shall be responsible for driving the displays that tell vehicles whether or not their driver's toll payment has been confirmed or rejected. The process shall receive the data for output via the displays from other processes. The data input and output forms shall use an appropriate form of display that shall be easily readable under all lighting conditions and over the range of speeds that vehicles are expected to use when passing through the toll plaza. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.3

7.1.3 Obtain Toll Violator Image

Input Flows:
From_Vehicle_Characteristics
get_toll_payment_violator_image
get_toll_vehicle_payment_violator_image

Output Flows:
toll_violation_information

Description:
This process shall be responsible for obtaining an image of a violator for use by other processes. The form of the image data obtained by this process shall be very accurate so that there can be no mistake of the determination of the identity of the vehicle and/or driver, and shall be easily passed on by the other processes to the appropriate law enforcement agency(ies) so that punitive action may be taken. The process shall be capable of obtaining an image of the required accuracy under all lighting conditions and over the range of speeds with which vehicles will pass through the toll plaza.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

7.1.4 Provide Driver Toll Payment Interface

Input Flows:
advanced_fares_and_charges_response
driver_toll_payment_credit_identity
fbv-vehicle_identity
fd-other_services_toll_request

Output Flows:
advanced_fares_and_charges_request
driver_advanced_payment_at_toll
td-other_services_toll_response

Description:
This process shall be responsible for providing an interface through which drivers can request and pay for other services when paying their tolls at toll plazas. The services supported by this process include advanced payment for parking lot charges and transit fares. The process shall query the driver for sufficient information to enable the advanced parking lot charge and/or transit fare to be determined and the cost either billed to a credit identity provided by the driver's traveler card / payment instrument, or deducted from credit stored on the instrument. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.3
3.1.1.7

7.1.5 Detect Vehicle for Tolls

Input Flows:
From_Vehicle_Characteristics

Output Flows:
vehicle_toll_characteristic_data

Description:
This process shall be responsible for producing a vehicle's characteristics from data received by sensors located at the roadside, at or near the toll collection point. The data shall be sent by the process to another process in a form suitable for use in calculating the toll cost for the vehicle. The process shall ensure that the data includes such things as vehicle size, weight, axle count, type, identifiable features, etc.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4
3.1.1.8

7.1.6 Distribute Advanced Charges and Fares

Input Flows:
advanced_fares_and_charges_request
advanced_other_tolls_confirm
transfer_charges_to_tolls
transfer_fares_to_tolls

Output Flows:
advanced_fares_and_charges_response
advanced_other_tolls_request
transfer_tolls_to_charges
transfer_tolls_to_fares

Description:
This process shall be responsible for receiving requests for advanced payment of tolls from the parking lot charge or transit fare collection facilities within the Provide Electronic Payment Services function. It shall pass the requests on to another process in the toll collection facility, and shall return transaction success or failure details to the requesting process. The process shall also receive requests for the advanced payment of parking lot charges and transit fares from the toll payment interface process. It shall send these requests to other processes in the Provide Electronic Payment Services function and when received, return the results to the toll payment interface process.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.3
3.1.3.1

7.1.7 Provide Traveler Card Interface for Tolls

Input Flows:
driver_advanced_payment_at_toll
ftc-confirm_payment_at_toll_plaza
ftc-toll_vehicle_payment_data
toll_payment_debited
toll_payment_request
toll_vehicle_payment_data_clear
toll_vehicle_payment_data_request
toll_vehicle_payment_data_store
toll_vehicle_payment_data_update

Output Flows:
driver_toll_payment_credit_identity
toll_payment_confirmation
toll_vehicle_payment_data_collect
toll_vehicle_payment_data_store
toll_vehicle_payment_number
ttc-debited_payment_at_toll_plaza
ttc-request_payment_at_toll_plaza

Description:
This process shall be responsible for providing the interface through which the payment information can be read from a vehicle. The process shall enable the use of the data for the purposes of paying for current tolls, plus if required, the cost of advanced parking lot charges, and/or transit fares, as well as providing the data for use in traffic flow analysis. The data which can be collected by the process shall include credit identity, stored credit value, and the toll segment identity at the vehicle's entry point so that a closed toll system can be used. When stored credit is used, the process shall enable the deduction of the cost of the toll and (possibly) advanced payments from the stored credit value. The process shall support collection of data from on-board a range of vehicle types including private cars or vans, commercial vehicles, transit vehicles, including those used for demand responsive transit services.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.1.8 Exchange Data with Other Payment Administration

Input Flows:
fopa-toll_charges_reconciliation_data
fopa-toll_pricing_data
other_toll_admin_data
other_toll_data_output

Output Flows:
other_toll_admin_data
other_toll_data_input
topa-toll_charges_reconciliation_data
topa-toll_pricing_data

Description:
This process shall exchange data with similar processes in other Payment Administration functions. The other payment administration can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The exchange of data shall include prices for comparison between administration functions. The exchange of data shall also support the reconciliation of toll charges for travelers that use more than one toll agency property.

User Service Requirements:
3.0
3.1
3.1.0
3.1.4
3.1.4.2
3.1.4.4

7.2.1.1 Read Parking Lot Vehicle Payment Data

Input Flows:
parking_lot_vehicle_payment_data_collect
vehicle_parking_lot_characteristic_data

Output Flows:
get_parking_lot_vehicle_payment_violator_image
parking_lot_vehicle_payment_data_request
parking_lot_vehicle_payment_data_update
parking_lot_vehicle_payment_pull_in_message
vehicle_payment_for_charges
vehicle_type_for_charges

Description:
This process shall be responsible for requesting the data from the parking lot payment device being carried on-board the vehicle and used as the traveler card / payment instrument being read. If there is no vehicle payment device or the data it contains cannot be properly read, the process shall send a message for the vehicle to pull in for output by another process, and send a request to other processes to obtain an image of the vehicle. If there is no entry time data on the vehicle payment device, then the process shall re-write this data plus the number of the entry lane onto the vehicle payment device, so that it can be used as the mechanism for charging for the use of the parking lot. If the entry time is present, the process shall combine it with the vehicle characteristics, e.g., size, type, etc. to form the data upon which the parking lot payment transaction can be based, and send it to another process.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.2.1.2 Calculate Vehicle Parking Lot Charges

Input Flows:
parking_lot_prices
vehicle_payment_for_charges
vehicle_type_for_charges

Output Flows:
parking_lot_charge

Description:
This process shall be responsible for calculating the parking lot charge for the detected vehicle based on its characteristics and data obtained from the vehicle. The process shall obtain the cost of the use of the parking lot from the Update Parking Lot Data process. This process combines the vehicle information with the price to determine the charge and forwards that charge information to the Check for Advanced Parking Lot Payment process.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.13
1.8.2.13(c)
3.0
3.1
3.1.0
3.1.3
3.1.3.1
3.1.3.3

7.2.1.3 Collect Bad Charge Payment Data

Input Flows:
charge_payment_violator_data
ffi-bad_charges_payment_updates

Output Flows:
bad_charge_payment_list
tfi-parking_lot_payment_violator_data

Description:
This process shall be responsible for providing a list of invalid driver credit identities. The process shall check credit identities provided by the billing process. This checking shall ensure that the current parking lot payment transaction is using a credit identity that has not previously had an invalid transaction. Details of possible invalid credit identities shall be sent by the process to the financial institution for verification. The process shall also receive from the financial institution details of invalid traveler card / payment instrument data that has been found by other means.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.2.1.4 Check for Advanced Parking Lot Payment

Input Flows:
advanced_charges_payment_list
advanced_parking_lot_billing
advanced_parking_payment_update
parking_lot_charge

Output Flows:
advanced_charge_transactions
advanced_charges_payment_list
billing_for_charges_needed

Description:
This process shall be responsible for checking to see if the required parking lot charge payment has already been made. The process shall determine the existence of an advanced payment for the parking lot charges by comparing the received payment information with that in the store containing the list of advanced payments. If the payment has already been made then the process shall remove the requirement for local billing and remove the record of the advanced payment from the store. Details of each payment transaction shall be sent by the process to another process with the payment information received from the driver removed.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1
3.1.3.2

7.2.1.5 Bill Driver for Parking Lot Charges

Input Flows:
bad_charge_payment_list
billing_for_charges_needed
ftc-confirm_traveler_parking_payment
ftc-traveler_parking_input_credit_identity
parking_lot_payment_confirmation

Output Flows:
advanced_parking_payment_update
charge_payment_violator_data
confirm_advanced_charges_payment
current_charge_transactions
get_charge_payment_violator_image
parking_lot_payment_debited
parking_lot_payment_pull_in_message
parking_lot_payment_request
parking_lot_vehicle_payment_data_clear
ttc-debited_traveler_parking_payment
ttc-request_traveler_parking_payment

Description:
This process shall be responsible for obtaining payment for either the current or advanced parking lot charge. The process shall achieve this either by requesting that the charge be deducted from the credit being stored by the vehicle payment device that is acting as the traveler card / payment instrument, or informing the driver that payment for the charge will be debited from the credit identity provided by the vehicle payment device. Before sending data to the device, the process shall check that either the credit identity is not already in the list of bad payers, or the stored credit is not less that the parking lot charge. If either of these conditions is true the process shall send a request to obtain an image of the driver and vehicle which can be forwarded to the appropriate enforcement agency via another process. When the appropriate payment transaction has been completed, the parking lot entry time data shall be cleared from the vehicle payment device so that it can be used for the next visit by the vehicle to a parking lot. The vehicle payment device may be in the form of some type of credit or debit card, or an electronic purse. Details of the transaction shall always be sent to the process that manages parking lot transactions which will also send details to the financial institution if a credit or debit card is involved. Where an advanced parking lot charge payment is identified, no action is taken if the credit identity is on the bad payers list, or the stored credit is less than the charge, other than the payment is not confirmed.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.2.1.6 Manage Parking Lot Financial Processing

Input Flows:
advanced_charge_transactions
current_charge_transactions
ffi-confirm_charges_payment
fpo-transaction_reports_request
parking_lot_transaction_records

Output Flows:
parking_lot_transaction_records
tfi-request_charges_payment
tpo-transaction_reports

Description:
This process shall be responsible for maintaining a log of all transactions that are carried out by other processes in the Process Electronic Parking Lot Payment facility. The identity of the payee shall have been removed from the data before it is stored. At periodic intervals the process shall output the accumulated records to another process in the Provide Electronic Payment Services function. It shall also output the same data on request to the parking operator, either in hardcopy form, or as a visual display. The process shall be responsible for sending details of transactions to the financial institution to enable the users to be billed through their credit identities. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
1.0
1.8
1.8.0
1.8.1
1.8.1.6
1.8.1.6(e)
1.8.2
1.8.2.12
1.8.2.12(b)
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.2.1.7 Update Parking Lot Data

Input Flows:
fpo-parking_lot_charge_change_response
fpo-parking_lot_data
other_parking_lot_price_data_request
parking_charge_request_for_archive
parking_lot_capacity_update_confirm
parking_lot_charge_change_request
parking_lot_charge_direct_request
parking_lot_price_data_request

Output Flows:
advanced_parking_lot_prices
other_parking_lot_price_data
parking_charge_response_for_archive
parking_lot_capacity_update
parking_lot_charge_change_response
parking_lot_charge_direct_details
parking_lot_price_data
parking_lot_prices
tpo-parking_lot_charge_change_request

Description:
This process shall be responsible for maintaining the parking lot charges data, which may vary according to the type of vehicle. The process shall also act as the interface to the parking operator to enable changes to be made to the parking data, for the output and input of responses to parking lot price change requests from the Manage Traffic function, and for requests for parking lot price data from the Centralized Payments facility. This process shall also share parking lot data with other parking lot operators. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1
3.1.3.3

7.2.1.8 Register for Advanced Parking Lot Payment

Input Flows:
advanced_other_charges_request
advanced_traveler_charges_request
confirm_advanced_charges_payment
fpo-confirm_advanced_parking_payment
parking_lot_bookings_confirm

Output Flows:
advanced_charges_needed
advanced_other_charges_confirm
advanced_traveler_charges_confirm
parking_lot_bookings_request
tpo-request_advanced_parking_payment

Description:
This process shall be responsible for responding to requests for parking lot charges to be paid in advance. It shall provide the parking operator with the opportunity to deny the request for advanced payment of a parking lot charge. If approved, the advanced parking lot charge data shall be forwarded by the process to other processes for the actual cost to be obtained and the payment transactions initiated.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1
3.1.3.2
3.1.4
3.1.4.1

7.2.1.9 Manage Parking Lot Reservations

Input Flows:
parking_lot_bookings_request
parking_lot_capacity_update
parking_lot_data
parking_lot_data_request
parking_lot_reservation_request

Output Flows:
parking_lot_availability
parking_lot_bookings_confirm
parking_lot_capacity_update_confirm
parking_lot_data
parking_lot_reservation_confirm

Description:
This process shall be responsible for maintaining a store of parking lot data. This data shall cover the capacity of the parking lot, i.e., the maximum number of spaces available, which may vary according to the type of vehicle. The process shall also act as the interface for inquiries from other ITS functions both for details of parking lot capacity, both now and in the future and for the reservation of spaces as part of travelers' confirmed trips. The parking lot data also contains data on the hours of operation of parking lots. This data is used in transactions requiring electronic payment of parking lot services, as well as for a traveler making a parking lot reservation.

User Service Requirements:
3.0
3.1
3.1.0
3.1.4
3.1.4.3

7.2.1.10 Determine Advanced Charges

Input Flows:
advanced_charges_needed
advanced_parking_lot_prices

Output Flows:
advanced_parking_lot_billing

Description:
This process shall be responsible for receiving a request to pay an advanced parking lot charge. It shall obtain the required parking lot charge from a data store and shall then forward the data to the billing processes. The store of parking lot charges shall be maintained by another process.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.2
3.1.4
3.1.4.1

7.2.2 Produce Parking Lot Displays

Input Flows:
parking_lot_payment_pull_in_message
parking_lot_vehicle_payment_pull_in_message

Output Flows:
td-parking_lot_payment_confirmed
td-parking_lot_payment_invalid

Description:
This process shall be responsible for driving the displays that tell vehicles whether or not their parking lot charge payment has been confirmed or rejected. The process shall receive the data for output via the displays from other processes. The data input and output formats shall use an appropriate form of display that shall be easily readable under all lighting conditions and over the range of speeds that vehicles are expected to use when entering or leaving a parking lot. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.2.3 Obtain Parking Lot Violator Image

Input Flows:
From_Vehicle_Characteristics
get_charge_payment_violator_image
get_parking_lot_vehicle_payment_violator_image

Output Flows:
parking_lot_violation_information

Description:
This process shall be responsible for obtaining an image of a violator for use by other processes. The form of the image data obtained by this process shall be very accurate so that there can be no mistake of the determination of the identity of the vehicle and/or driver, and shall be easily passed on by the other processes to the appropriate law enforcement agency(ies) so that punitive action may be taken. The process shall be capable of obtaining an image of the required accuracy under all lighting conditions and over the range of speeds with which vehicles will enter or leave parking lots.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.2.4 Provide Driver Parking Lot Payment Interface

Input Flows:
advanced_tolls_and_fares_response
driver_parking_payment_credit_identity
fbv-vehicle_identity
fd-other_services_parking_request

Output Flows:
advanced_tolls_and_fares_request
driver_advanced_payment_at_lot
td-other_services_parking_response

Description:
This process shall be responsible for providing an interface through which drivers can request other services when paying their charges at parking lots. The services supported by this process include advanced parking lot payment, as well as advanced payment for tolls and transit fares. The process shall query the driver for sufficient information to enable the advanced toll, parking lot charge, and/or transit fare to be determined and the cost either billed to a credit identity provided by the driver's traveler card / payment instrument, or deducted from credit stored on the instrument. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.4
3.1.4.1
3.1.4.4

7.2.5 Detect Vehicle for Parking Lot Payment

Input Flows:
From_Vehicle_Characteristics

Output Flows:
vehicle_parking_lot_characteristic_data

Description:
This process shall be responsible for producing a vehicle's characteristics from data received by sensors located at or near the parking lot entry and exit lanes. The data shall be sent by the process to another process in a form suitable for use in calculating the parking lot charge for the vehicle. The process shall ensure that the data includes such things as vehicle size, type, identifiable features, etc.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1
3.1.3.3

7.2.6 Distribute Advanced Tolls and Fares

Input Flows:
advanced_other_charges_confirm
advanced_tolls_and_fares_request
transfer_fares_to_charges
transfer_tolls_to_charges

Output Flows:
advanced_other_charges_request
advanced_tolls_and_fares_response
transfer_charges_to_fares
transfer_charges_to_tolls

Description:
This process shall be responsible for receiving requests for advanced payment of parking lot charges from the toll or transit fare collection facilities within the Provide Electronic Payment Services function. It shall pass the requests on to another process in the Provide Electronic Parking Lot Payment facility, and shall return transaction success or failure details to the requesting process. The process shall also receive requests for the advanced payment of tolls and transit fares from the parking lot payment interface process. It shall send these requests to other processes in the Provide Electronic Payment Services function and when received, return the results to the Parking Lot payment interface process.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.3
3.1.2
3.1.2.1
3.1.2.4
3.1.4
3.1.4.1

7.2.7 Provide Traveler Card Interface for Parking

Input Flows:
driver_advanced_payment_at_lot
ftc-confirm_payment_at_parking_lot
ftc-parking_vehicle_payment_data
parking_lot_payment_debited
parking_lot_payment_request
parking_lot_vehicle_payment_data_clear
parking_lot_vehicle_payment_data_request
parking_lot_vehicle_payment_data_store
parking_lot_vehicle_payment_data_update

Output Flows:
driver_parking_payment_credit_identity
parking_lot_payment_confirmation
parking_lot_vehicle_payment_data_collect
parking_lot_vehicle_payment_data_store
parking_vehicle_payment_number
ttc-debited_payment_at_parking_lot
ttc-request_payment_at_parking_lot

Description:
This process shall be responsible for providing the interface through which the payment information can be read from a vehicle payment device. The process shall enable the use of the data for the purposes of paying the current parking lot charge and if required, advanced payments for tolls and/or transit fares. It shall be possible for the process to collect either the credit identity or the stored credit value data and to update the stored credit value as a result of the parking lot charge and (possibly) advanced charges having been paid. The time at which the vehicle entered the parking lot shall also be collected from the vehicle payment device by the process so that the charge for the use of the lot can be calculated. The process shall support collection of data from on-board a range of vehicle types including private cars or vans, commercial vehicles, transit vehicles, including those used for demand responsive transit services. This process shall manage a store of parking lot vehicle payment data.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.3.1.1 Register for Advanced Transit Fare Payment

Input Flows:
advanced_other_fares_request
advanced_traveler_fares_request
confirm_advanced_fares_payment

Output Flows:
advanced_fares_needed
advanced_other_fares_confirm
advanced_traveler_fares_confirm

Description:
This process shall be responsible for responding to requests for transit fares to be paid in advance. The advanced transit fare data shall be forwarded by the process to other processes for the actual cost to be obtained and the payment transactions initiated.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.4
3.1.2.8

7.3.1.2 Determine Advanced Transit Fares

Input Flows:
advanced_fares_needed
transit_fares_for_advanced_payments
transit_services_for_advanced_fares

Output Flows:
advanced_fare_billing

Description:
This process shall be responsible for receiving a request to pay an advanced transit fare. It shall obtain the required transit fare data from another process and shall then forward the data to the billing processes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.2
3.1.2.8

7.3.1.3 Manage Transit Fare Financial Processing

Input Flows:
advanced_fare_transactions
current_fare_transactions
ffi-confirm_fare_payment
transit_fare_transaction_records

Output Flows:
tfi-request_fare_payment
transit_fare_transaction_records
transit_fare_transactions
ttrop-transaction_reports

Description:
This process shall be responsible for maintaining a log of all the transactions carried out by other processes in the Process Electronic Transit Fare Payment facility. The identity of the payee shall have been removed from the data before it is stored. At periodic intervals the process shall output the accumulated records to the transit operations personnel and to another process in the Provide Electronic Payment Services function. The process shall also be responsible for sending details of transactions to the financial institution to enable the users to be billed through their credit identities. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.10
1.8.2.10(a)
2.0
2.3
2.3.0
2.3.3
2.3.3.1
2.3.3.1(c)
2.3.3.3
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.3
3.1.2.5

7.3.1.4 Check for Advanced Transit Fare Payment

Input Flows:
advanced_fare_billing
advanced_fare_payment_list
request_roadside_fare_payment
request_vehicle_fare_payment

Output Flows:
advanced_fare_transactions
billing_for_fares_needed

Description:
This process shall be responsible for checking to see if the required transit fare payment has already been made. The process shall determine the existence of an advance payment for the transit fare by comparing the received payment information with the list of advanced payments. If payment has already been made then the process shall remove the requirement for local billing. Details of each payment transaction shall be sent by the process to another process with the payment information received from the traveler removed.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.4
3.1.2.8
3.1.4

7.3.1.5 Bill Traveler for Transit Fare

Input Flows:
bad_fare_payment_list
bad_tag_list_request
billing_for_fares_needed
transit_roadside_fare_payment_confirmation
transit_vehicle_fare_payment_confirmation

Output Flows:
advanced_fare_payment_list
bad_tag_list_update
confirm_advanced_fares_payment
confirm_roadside_fare_payment
confirm_vehicle_fare_payment
current_fare_transactions
fare_payment_violator_data
get_fare_violator_payment_image
transit_roadside_fare_payment_debited
transit_roadside_fare_payment_request
transit_vehicle_fare_payment_debited
transit_vehicle_fare_payment_request

Description:
This process shall be responsible for obtaining payment for a transit fare transaction using data provided by the traveler. The process shall achieve this either by requesting that the fare be deducted from the credit being stored by the tag that is acting as the payment instrument for the traveler, or by informing the traveler that payment for the fare will be debited to the credit identity provided by the tag. Before sending data to the tag, the process shall check that the traveler's credit identity is not already in the list of bad payers, and if it is request an image of the traveler which can be forwarded to the appropriate enforcement agency via another process. The tag may be in the form of cash, some type of credit or debit card, an electronic purse, or an intelligent transit ticket upon which pre-payment has been recorded, etc. Details of the transaction shall always be sent by the process to the process that manages transit fare transactions. The process shall pass details of advanced transit fare payments to another process when the traveler eventually passes a fare payment point. If requested the process shall provide a copy of the current bad payers list to processes in the transit vehicle fare collection facility for use in on-board payment validation.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.3
3.1.2.8

7.3.1.6 Collect Bad Transit Fare Payment Data

Input Flows:
fare_payment_violator_data
ffi-bad_fare_payment_updates

Output Flows:
bad_fare_payment_list
tfi-fare_payment_violator_data

Description:
This process shall be responsible for maintaining a list of invalid traveler (including users of the transit system) credit identities. The process shall use this data to check credit identities provided for checking by the billing process. This checking shall ensure that the current transit fare payment transaction is using a credit identity that has not previously had an invalid transaction. Details of possible invalid credit identities shall be sent by the process to the financial institution for verification. The process shall also receive from the financial institution details of invalid traveler card / payment instrument data that has been found by other means.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.3
3.1.2.5

7.3.1.7 Update Transit Fare Data

Input Flows:
ftrop-fare_updates
ftrop-request_fare_output
transit_fare_data_request
transit_fare_direct_request

Output Flows:
transit_fare_data
transit_fare_data_for_isp
transit_fare_direct_details
transit_fares_for_advanced_payments
transit_roadside_fare_data
transit_vehicle_fare_data
ttrop-transit_fare_output

Description:
This process shall be responsible for managing the actual value of transit fares for each segment of each regular transit route. The process shall also act as the interface through which the transit operations personnel can output and make changes to the data, and copies of this data can be provided to the Centralized Payments facility on request. The process shall support inputs from the transit operations personnel. The process shall automatically output the new fares for use by processes on-board a transit vehicle and at the roadside, as well as by other ITS functions.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.6

7.3.2 Distribute Advanced Tolls and Parking Lot Charges

Input Flows:
advanced_other_fares_confirm
advanced_tolls_and_charges_roadside_request
advanced_tolls_and_charges_vehicle_request
transfer_charges_to_fares
transfer_tolls_to_fares

Output Flows:
advanced_other_fares_request
advanced_tolls_and_charges_roadside_confirm
advanced_tolls_and_charges_vehicle_confirm
transfer_fares_to_charges
transfer_fares_to_tolls

Description:
This process shall be responsible for receiving requests for advanced payment of transit fares from the toll and parking lot charge collection facilities within the Provide Electronic Payment Services function. It shall pass the advanced fare requests on to another process in the Process Electronic Transit Fare Payment facility, and when received, shall return transit success or failure details to the requesting process. The process shall also receive requests for advanced payment of tolls and parking lot charges from transit vehicle and roadside (transit stop) fare collection facilities. It shall send these requests to other processes in the Provide Electronic Payment Services function and when received, return the results to the requesting process.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.4
3.1.4.1
3.1.4.2

7.3.3 Get Traveler Image for Violation

Input Flows:
get_fare_violator_payment_image
traveler_roadside_image
traveler_vehicle_image

Output Flows:
fare_violation_information
request_traveler_roadside_image
request_traveler_vehicle_image

Description:
This process shall be responsible for obtaining an image of a traveler who is trying to carry out an invalid fare payment transaction. The process shall send the image request to other processes either at the roadside, i.e., a transit stop, or on-board a transit vehicle, depending on where the transaction is being attempted. However if the collection method is set to batch, then the process shall take no further action, as an image of the offending traveler will not be available. When the image is received, the process shall use it to form part of the data sent to a process in the Manage Emergency Services function for forwarding to the appropriate enforcement agency.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.5

7.3.4 Provide Remote Terminal Traveler Card Interface

Input Flows:
ftc-confirm_fare_payment_at_roadside
ftc-transit_roadside_tag_data
transit_roadside_fare_payment_debited
transit_roadside_fare_payment_request

Output Flows:
transit_roadside_fare_payment_confirmation
traveler_roadside_tag_data
ttc-debited_fare_payment_at_roadside
ttc-request_fare_payment_at_roadside

Description:
This process shall be responsible for providing the interface through which payment information can be read from a traveler card. The process shall support reading this data from travelers at the roadside, e.g., a transit stop, for use in paying the current transit fare and (if required) advanced payments. The process shall support advanced payments for tolls, parking lot charges, and/or transit fares. The process shall collect either the credit identity or the stored credit value data from the traveler card, and update the stored credit value as a result of the fare and (possibly) advanced charges.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.3.5 Provide Transit Vehicle Traveler Card Interface

Input Flows:
ftc-confirm_fare_payment_on_transit_vehicle
ftc-transit_vehicle_tag_data
transit_vehicle_fare_payment_debited
transit_vehicle_fare_payment_request

Output Flows:
transit_vehicle_fare_payment_confirmation
traveler_vehicle_tag_data
ttc-debited_payment_on_transit_vehicle
ttc-request_fare_payment_on_transit_vehicle

Description:
This process shall be responsible for providing the interface through which the payment information can be read from a traveler card. The process shall support the reading of this data from travelers embarking on-board transit vehicles, for use in paying the current transit fare, and if required, advanced payments. The process shall support advanced payments for tolls, and/or parking lot charges, and/or transit fares. It shall be possible for the process to collect either the credit identity or the stored credit value data from the traveler card, and to update the stored credit value as a result of the fare and (possibly) advanced charges having been paid.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.4.1.1 Process Commercial Vehicle Payments

Input Flows:
ffi-cv_payment_confirm
financial_request

Output Flows:
financial_response
tfi-cv_payment_request

Description:
This process shall be responsible for transacting payments for electronic credential and tax filing by processes in the Manage Commercial Vehicles function. The payment transaction shall be initiated by processes in the Administer Commercial Vehicles facility which may accept inputs from both the commercial vehicle fleet manager and the commercial vehicle driver acting in the role of fleet manager, i.e., the owner driver. The process shall send the transaction data to the financial institution and report the response back to the requesting process.

User Service Requirements:
1.0
1.4
1.4.0
1.4.2
1.4.2.1
1.4.2.4
1.4.3
1.4.3.2
3.0
3.1
3.1.0
3.1.4
3.1.4.1

7.4.1.2 Process Travel Services Provider Payments

Input Flows:
ffi-registration_payment_confirm
travel_services_provider_registration_request

Output Flows:
tfi-registration_payment_request
travel_services_provider_registration_response

Description:
This process shall be responsible for transacting payments for the registration of other travel services providers. The process shall be initiated by receiving data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into a store of transaction records.

User Service Requirements:
2.0
2.2
2.2.0
2.2.1
2.2.1.1
2.2.1.1.4
2.3
2.3.0
2.3.4
4.0
4.1
4.1.0
4.1.2
4.1.2.2

7.4.1.3 Process Driver Map Update Payments

Input Flows:
driver_display_update_payment_request
driver_map_update_payment_request
ffi-driver_display_payment_confirm
ffi-driver_map_payment_confirm

Output Flows:
driver_display_update_payment_response
driver_map_update_payment_response
tfi-driver_display_payment_request
tfi-driver_map_payment_request

Description:
This process shall be responsible for transacting payments from the driver for updates to the navigable map database in the vehicle. The process shall receive the transaction request data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution for action. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into the payment_transaction_records data store.

User Service Requirements:
1.0
1.3
1.3.0
1.3.3
1.3.3.2
1.3.3.2.1
3.0
3.1
3.1.0
3.1.4

7.4.1.4 Process Traveler Map Update Payments

Input Flows:
ffi-traveler_display_payment_confirm
ffi-traveler_map_payment_confirm
traveler_map_update_payment_request
traveler_personal_display_update_payment_request

Output Flows:
tfi-traveler_display_payment_request
tfi-traveler_map_payment_request
traveler_map_update_payment_response
traveler_personal_display_update_payment_response

Description:
This process shall be responsible for transacting payments from the traveler for updates to the navigable map database carried in the personal device. The process shall receive the transaction request data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into the payment_transaction_records data store.

User Service Requirements:
1.0
1.3
1.3.0
1.3.3
1.3.3.2
1.3.3.2.1

7.4.1.5 Process Traveler Other Services Payments

Input Flows:
ffi-other_services_payment_confirm
other_services_roadside_request
other_services_vehicle_request

Output Flows:
other_services_roadside_response
other_services_vehicle_response
tfi-other_services_payment_request
traveler_payments_transactions

Description:
This process shall be responsible for collecting advance payments for other (yellow pages) services. The transaction data shall be provided by processes in the Manage Transit function in response to reservation requests from a traveler either at the roadside, i.e., a transit stop, or on-board a transit vehicle. The process shall send the received transaction data to the financial institution and shall send the response to the requesting process. It shall also send details of the transaction to another process for entry into a store of transaction records.

User Service Requirements:
1.0
1.3
1.3.0
1.3.3
1.3.3.2
1.3.3.2.1
3.0
3.1
3.1.0
3.1.4

7.4.1.6 Process Traveler Trip and Other Services Payments

Input Flows:
ffi-traveler_other_services_payments_confirm
traveler_advanced_payments_confirm
traveler_other_services_payment_request
traveler_payment_request

Output Flows:
tfi-traveler_other_services_payments_request
traveler_advanced_payments_request
traveler_other_services_payment_result
traveler_payment_response

Description:
This process shall be responsible for transacting advanced payments required for the confirmation of a trip by a traveler. Payments supported by the process shall comprise those for any tolls, parking lot charges, transit fares, or other (yellow pages) services that need to be paid for the trip to be confirmed. The process shall receive the transaction data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution. Tolls, fares and parking lot charges are sent to the Route Traveler Advanced Payment function for processing. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into the payment_transaction_records data store.

User Service Requirements:
3.0
3.1
3.1.0
3.1.4

7.4.1.7 Process Traveler Rideshare Payments

Input Flows:
ffi-traveler_rideshare_payment_confirm
rideshare_payment_request

Output Flows:
rideshare_payment_confirmation
tfi-traveler_rideshare_payment_request

Description:
This process shall be responsible for transacting payments for ridesharing that are required for the confirmation of a traveler's trip. The process shall start the transaction by receiving data from a process in the Provide Driver and Traveler Services function and shall send the data to the appropriate financial institution. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into a store of transaction records.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.1
3.1.2.2

7.4.2 Collect Price Data for ITS Use

Input Flows:
foisp-transit_fare_data
parking_lot_price_data
price_data_for_services
price_data_request_from_interactive
price_data_request_from_trip_planning
toll_price_data
transit_fare_data
vmt_price_data

Output Flows:
parking_lot_price_data_request
price_data_details_for_centers
price_data_for_broadcast
price_data_for_centers
price_data_for_interactive
price_data_for_services
price_data_for_trip_planning
toll_price_data_request
toisp-transit_fare_data
transit_fare_data_request

Description:
This process shall be responsible for collecting data about the prices being charged for tolls, road use, parking lots and transit fares. This process shall accept data sent to it by the other processes when they have updated their data and automatically sent it, or this process shall request a transfer of data from the other processes. The process shall load the data into the price_data_for_services data store from which some or all of it can be read on request from processes in other ITS functions. When requested, this process shall provide the price information.

User Service Requirements:
1.0
1.4
1.4.0
1.4.2
1.4.2.3
1.4.3
1.4.3.5
1.4.3.6
3.0
3.1
3.1.0
3.1.2
3.1.2.7
3.1.4
3.1.4.3
3.1.5
3.1.5.1
3.1.5.1.1
3.1.5.2
3.1.5.3

7.4.3 Route Traveler Advanced Payments

Input Flows:
advanced_traveler_charges_confirm
advanced_traveler_fares_confirm
advanced_traveler_tolls_confirm
cvo_advanced_payments_request
traveler_advanced_payments_request

Output Flows:
advanced_traveler_charges_request
advanced_traveler_fares_request
advanced_traveler_tolls_request
cvo_advanced_toll_payment_information
traveler_advanced_payments_confirm

Description:
This process shall be responsible for receiving a traveler's request for advanced payment (for tolls, parking lot charges, and/or transit fares) and routing it to the appropriate part of the Provide Electronic Payment Services function. The process shall also receive responses to the advanced payment requests and shall return them to the originating process. This process also supports requests for advanced payment information from the Manage Commercial Vehicle function.

User Service Requirements:
3.0
3.1
3.1.0
3.1.2
3.1.2.4
3.1.2.6
3.1.3
3.1.3.2
3.1.4
3.1.4.1
3.1.4.2

7.5.1 Provide Vehicle Traveler Card Interface

Input Flows:
cv_driver_enrollment_cost
driver_advanced_payment_for_map
ftc-driver_vehicle_input_credit_identity

Output Flows:
cv_driver_credit_identity
driver_credit_identity
ttc-debited_driver_payment_at_vehicle

Description:
This process shall be responsible for providing the interface through which driver credit identities and stored credit may be entered into the ITS from on-board vehicle payment devices. The types of vehicles from which data is collected shall include private cars or vans, commercial vehicles, and transit vehicles, including those used for demand responsive transit services. This process shall also provide an interface through which the stored credit held by the vehicle payment device can be debited for the payment of current or advanced tolls, plus advanced parking lot charges, and/or transit fares. This process also supports the payment of enrollment for Commercial Vehicles.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.5.2 Provide Traveler Roadside Traveler Card Interface

Input Flows:
ftc-traveler_roadside_input_credit_identity_for_transit
traveler_advanced_payment_at_roadside

Output Flows:
traveler_roadside_credit_identity_for_transit
ttc-debited_traveler_payment_at_roadside_for_transit

Description:
This process shall be responsible for providing the interface through which credit identities and stored credit values may be collected from tags being used by travelers. The process shall support the collection of this data at the roadside (which in this instance is a transit stop). Payments by the traveler for fares, other services, payment of advanced tolls, and/or parking lot charges shall be supported by the process. It shall also provide an interface through which stored credit held by the tag can be debited for the same types of payment.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.5.3 Provide Personal Traveler Card Interface

Input Flows:
ftc-traveler_personal_information
ftc-traveler_personal_input_credit_identity
traveler_personal_data_update
traveler_personal_map_update_cost

Output Flows:
traveler_personal_data
ttc-debited_payment_at_personal_device
ttc-traveler_personal_information_update

Description:
This process shall be responsible for providing the interface through which credit identity, stored credit, or traveler information may be collected from the traveler card being used by a traveler with a personal device. The process shall support the collection of this data from any location in which the device (and hence the traveler card) is being used. It shall provide an interface through which the credit identity can be used for the payment of advanced tolls, parking lot charges, transit fares, display updates, and/or map updates. The process shall also enable the stored credit value on the tag to be used for the same purposes.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.5.4 Provide Traveler Kiosk Traveler Card Interface

Input Flows:
ftc-traveler_remote_personal_information
ftc-traveler_roadside_input_credit_identity
traveler_roadside_data_update

Output Flows:
traveler_roadside_data
ttc-debited_traveler_payment_at_roadside
ttc-traveler_remote_personal_information_update

Description:
This process shall be responsible for providing the interface through which credit identities and stored credit values may be collected from traveler cards / payment instruments being used by travelers. The process shall support the collection of data at the roadside (which in this instance is a kiosk) and use this data for payments needed to confirm a traveler's trip. Payments supported by the process shall include those for advanced tolls, parking lot charges, transit fares, and/or other (yellow pages) services. It shall also provide an interface through which the stored credit held by the traveler card can be debited for the same types of payment.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.6.1.1 Collect VMT Data

Input Flows:
vehicle_identity_for_vmt_roadway
vehicle_location_for_vmt_roadway
vehicle_speed_and_distance_for_vmt_roadway

Output Flows:
vehicle_identity_for_vmt_from_roadway
vehicle_location_for_vmt_from_roadway
vehicle_speed_and_distance_for_vmt_from_roadway

Description:
This process shall collect vehicle location, speed, distance, and other VMT data at the roadside and pass to another process for calculation of vehicle road use charges.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.6

7.6.1.2 Calculate Vehicle VMT Charges

Input Flows:
vehicle_identity_for_vmt
vehicle_identity_for_vmt_from_roadway
vehicle_location_for_vmt
vehicle_location_for_vmt_from_roadway
vehicle_speed_and_distance_for_vmt
vehicle_speed_and_distance_for_vmt_from_roadway
vmt_price_data_for_vehicles

Output Flows:
vmt_charge
vmt_cost_data

Description:
This process shall be responsible for calculating the road use charges for the detected vehicle based on the vehicle's mileage, roads traveled, time periods, emissions profile for make/model, fuel economy for make/model, weight, axels, tires, or other policies. Current charging policies are received by the process from the Payment Administrator. Resultant VMT charges are sent to other processes for presentation to the driver and reconciliation of charges with a financial institution.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.2

7.6.1.3 Bill Driver for VMT

Input Flows:
vmt_payment_collected
vmt_payment_confirmation
vmt_payment_request_to_field
vmt_vehicle_payment_data_clear_to_field

Output Flows:
vmt_payment_collected_from_field
vmt_payment_confirmation_from_field
vmt_payment_request
vmt_vehicle_payment_data_clear

Description:
This process shall be responsible for obtaining payment for road use charges. This process forwards payment requests and responses between the requestor process and vehicle processes. The process shall forward requests for payment to another process for payment by a traveler card, and forward the payment information to the requesting process. When the appropriate payment transaction has been completed, the road use entry identity shall be cleared from the vehicle payment device.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.8

7.6.1.4 Manage VMT Price Data

Input Flows:
fpa-vmt_price_data

Output Flows:
vmt_price_data
vmt_price_data_for_vehicles

Description:
This process shall be responsible for maintaining a store of data containing the road use prices, as configured by the Payment Administrator, for use by another process in calculation of VMT charges. This process shall process VMT price data to another process in the Provide Driver and Traveler Services function for distribution to travelers.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.2

7.6.1.5 Manage VMT Processing

Input Flows:
ffi-confirm_vmt_payment
fpa-vmt_parameters
vmt_account_setup_info_from_travelers
vmt_charge
vmt_coordination_data_from_other_admin_sys
vmt_payment_collected_for_admin
vmt_payment_collected_from_field
vmt_payment_confirmation_for_admin
vmt_payment_confirmation_from_field
vmt_payment_info_from_travelers

Output Flows:
tfi-request_vmt_payment
tpa-vmt_data
vmt_account_reports_to_travelers
vmt_coordination_data_to_other_admin_sys
vmt_payment_request_from_admin
vmt_payment_request_to_field
vmt_payment_request_to_travelers
vmt_vehicle_payment_data_clear_from_admin
vmt_vehicle_payment_data_clear_to_field

Description:
This process shall request payment for road use from other processes at the roadside and vehicle, and reconcile payments with financial institutions. At periodic intervals the process shall provide VMT invoice reports to another process for output to vehicle owner accounts, and request payment from those accounts based on previously established account parameters. This process shall also support the reconciliation of road use charges and data with other jurisdictions. This process shall be controlled by configuration parameters issued by the Payment Administrator.

User Service Requirements:
1.0
1.8
1.8.0
1.8.2
1.8.2.4
1.8.2.4(e)
1.8.2.10
1.8.2.10(a)
1.8.2.12
1.8.2.12(a)
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.2
3.1.4
3.1.4.3
5.0
5.3
5.3.0
5.3.5
5.3.5.3

7.6.2 Obtain VMT Vehicle Image

Input Flows:
From_Vehicle_Characteristics

Output Flows:
vmt_vehicle_image

Description:
This process shall be responsible for obtaining an image of a vehicle for use by other processes in the Provide Open Road Tolling function. The form of the image data obtained by this process shall be very accurate so that there can be no mistake of the determination of the identity of the vehicle and/or driver, and shall be easily passed on by the other processes to the appropriate law enforcement agency(ies) so that punitive action may be taken. The process shall be capable of obtaining an image of the required accuracy under all lighting conditions and over the range of speeds with which vehicles will pass.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.4

7.6.3 Provide Driver VMT Payment Interface

Input Flows:
driver_vmt_payment_confirmation
fbv-vehicle_identity
vmt_cost_data

Output Flows:
td-vmt_cost_data
td-vmt_payment_confirmation

Description:
This process shall be responsible for providing an interface through which drivers can receive real-time VMT (road use charging) information for use in operator decision applications to select routes and times for the vehicle. The process shall also receive confirmation that the traveler card has been debited to pay road use charges. The input and output forms shall include those that are suitable for travelers with physical disabilities.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.3
3.1.1.7

7.6.4 Provide Traveler Card Interface for VMT

Input Flows:
ftc-confirm_vmt_payment
ftc-vmt_vehicle_payment_data
vmt_payment_request
vmt_payment_request_from_admin
vmt_vehicle_payment_data_clear
vmt_vehicle_payment_data_clear_from_admin

Output Flows:
driver_vmt_payment_confirmation
ttc-debited_vmt_payment
ttc-request_vmt_payment
vmt_payment_collected
vmt_payment_collected_for_admin
vmt_payment_confirmation
vmt_payment_confirmation_for_admin

Description:
This process shall be responsible for providing the interface through which the payment information can be read from a vehicle using a traveler card. The process shall enable the use of the data for the purposes of paying for current road use charges. The process shall accept requests for payment from processes at the roadside or center.

User Service Requirements:
3.0
3.1
3.1.0
3.1.3
3.1.3.1

7.6.5 Exchange VMT Data with Other Payment Administration

Input Flows:
fopa-vmt_coordination_data
vmt_coordination_data_to_other_admin_sys

Output Flows:
topa-vmt_coordination_data
vmt_coordination_data_from_other_admin_sys

Description:
This process shall coordinate apportionment of VMT data or charges with similar processes in other jurisdictions (e.g., federal government, other states, various jurisdictions that might be public, quasi-public or private within a state). Apportionment reconciliation can mean either sharing information about VMT data in other jurisdictions or sharing revenue collected.

User Service Requirements:
3.0
3.1
3.1.0
3.1.4
3.1.4.2
3.1.4.4

7.6.6.1 Provide VMT Services User Interface

Input Flows:
traveler_personal_vmt_account_setup_info
traveler_personal_vmt_payment_info
traveler_vmt_account_setup_info
traveler_vmt_payment_info
vmt_account_reports_to_travelers
vmt_payment_request_to_travelers

Output Flows:
traveler_personal_vmt_account_reports
traveler_personal_vmt_payment_request
traveler_vmt_account_reports
traveler_vmt_payment_request
vmt_account_setup_info_from_travelers
vmt_payment_info_from_travelers

Description:
This process shall receive periodic VMT invoice reports from another process in the Provide Open Road Tolling function and send to another process for payment via Internet sites at kiosks or personal devices. This process shall maintain VMT user accounts and provide payment information to another process when requested.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.3

7.6.6.2 Provide VMT Services Kiosk Interface

Input Flows:
traveler_vmt_account_reports
traveler_vmt_account_setup_info_from_trav
traveler_vmt_payment_info_from_trav
traveler_vmt_payment_request

Output Flows:
traveler_vmt_account_reports_to_trav
traveler_vmt_account_setup_info
traveler_vmt_payment_info
traveler_vmt_payment_request_to_trav

Description:
This process shall receive periodic VMT invoice reports from another process in the Provide Open Road Tolling function and send to another process for payment by travelers via kiosks. This process shall accept VMT user account information and payment, and provide invoice reports to travelers.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.3

7.6.6.3 Provide VMT Services Personal Interface

Input Flows:
traveler_personal_vmt_account_reports
traveler_personal_vmt_account_setup_info_from_trav
traveler_personal_vmt_payment_info_from_trav
traveler_personal_vmt_payment_request

Output Flows:
traveler_personal_vmt_account_reports_to_trav
traveler_personal_vmt_account_setup_info
traveler_personal_vmt_payment_info
traveler_personal_vmt_payment_request_to_trav

Description:
This process shall receive periodic VMT invoice reports from another process in the Provide Open Road Tolling function and send to another process for payment by travelers via personal devices. This process shall accept VMT user account information and payment, and provide invoice reports to travelers.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.3

7.6.7 Collect VMT Equipment Status

Input Flows:
vmt_equipment_status
vmt_vehicle_image

Output Flows:
vmt_equipment_fault
vmt_vehicle_image_for_enforcement

Description:
This process shall accept VMT equipment status and determine whether the equipment is operating correctly. This process shall also receive the vehicle's image and pass to another process for use in verifying the vehicle registration information.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.4
3.1.1.7

7.6.8 Provide VMT Enforcement Interface

Input Flows:
fdmv-vehicle_state_id
fdmv-vmt_vehicle_registration
vmt_equipment_fault
vmt_vehicle_image_for_enforcement

Output Flows:
tdmv-vmt_identity_code
tdmv-vmt_vehicle_license
tea-vmt_equipment_failure

Description:
This process shall accept VMT equipment fault information and use the vehicle's image to independently identify and verify the vehicle registration information with the DMV, including the VIN information (vehicle type, weight, axles, etc.) and vehicle owner. This process shall report anomalies to the Enforcement Agency as a VMT equipment fault.

User Service Requirements:
3.0
3.1
3.1.0
3.1.1
3.1.1.1
3.1.1.4
3.1.1.7
3.1.1.8

8.1 Get Archive Data

Input Flows:

collected_roadside_data
cv_archive_data
em_archive_data
emissions_archive_data
fam-asset_archive_data
fbia-border_archive_data
fbis-border_wait_times_archive
fifd-intermodal_archive_data
fmtsp-multimodal_archive_data
fmup-map_archive_data
fods-other_data_source_archive_data
fstws-trans_weather_archive_data
fws-weather_and_env_data_for_archive
import_administration_request
m_and_c_archive_data
parking_archive_data
toll_archive_data
traffic_management_archive_data
traffic_probe_data_from_vehicles_archive_data
transit_archive_data
traveler_archive_data

Output Flows:

collected_roadside_data_status
cv_archive_request
cv_archive_status
em_archive_request
em_archive_status
emissions_archive_request
emissions_archive_status
import_administration_status
m_and_c_archive_request
m_and_c_archive_status
parking_archive_request
parking_archive_status
retrieved_archive_data
tam-archive_request
tam-asset_archive_status
tbia-archive_request
tbia-border_archive_status
tifd-intermodal_archive_request
tifd-intermodal_archive_status
tmtsp-multimodal_archive_request
tmtsp-multimodal_archive_status
tmup-map_archive_request
tmup-map_archive_status
tods-other_data_source_archive_request
tods-other_data_source_archive_status
toll_archive_request
toll_archive_status
traffic_management_archive_request
traffic_management_archive_status
transit_archive_request
transit_archive_status
traveler_archive_request
traveler_archive_status
tstws-archive_request
tstws-trans_weather_archive_status
tws-weather_archive_request
tws-weather_archive_status

Description:

This process shall collect data from each major function within ITS and external sources for archive purposes that may not exist within current ITS data sources. This process shall respond to requests from the Manage Archive Data Administrator Interface process to import data or data catalogs. This process shall send requests for data or a catalog of available data to the other functions and terminators, either a subscription for data or a one-time request. This process shall receive meta-data along with the data to describe the conditions under which the data was collected or any other information about the operational data. When data is received this process shall perform quality checks such as range validation or reformat the data as necessary to meet the archive schema. This process shall execute methods on the incoming data such as cleansing, summarizations, aggregations, or transformations applied to the data before it is stored in the archive. Any changes made to the data shall be recorded in the meta-data stored in the archive to assist in the reconstruction of the original data if possible. This process shall receive inputs from the Manage Archive Data Administrator Interface that contain the parameters for managing the processing on the data. This process forwards the collected onto the Manage Archive function along with updated meta-data and a record of any methods applied to the incoming data. This process shall also support the notification of the operational source functions of any errors that may be present in the data that could be caused by equipment failures or a transmission error.

User Service Requirements:

7.0
7.1
7.1.0
7.1.1
7.1.1.1
7.1.1.3
7.1.2
7.1.2.1
7.1.2.1.1
7.1.2.1.2
7.1.2.1.3
7.1.2.1.3(a)
7.1.2.1.3(b)
7.1.2.1.3(c)
7.1.2.1.4
7.1.2.1.5
7.1.2.1.5(a)
7.1.2.1.5(b)
7.1.2.2
7.1.2.3
7.1.2.4
7.1.3
7.1.3.1
7.1.3.1.1
7.1.3.1.1(a)
7.1.3.1.1(b)
7.1.3.1.1(c)
7.1.3.1.1(d)
7.1.3.1.1(e)
7.1.3.1.10
7.1.3.1.11
7.1.3.1.2
7.1.3.1.3
7.1.3.1.3(a)
7.1.3.1.3(b)
7.1.3.1.3(c)
7.1.3.1.3(d)
7.1.3.1.3(e)
7.1.3.1.4
7.1.3.1.4(a)
7.1.3.1.4(b)
7.1.3.1.4(c)
7.1.3.1.4(d)
7.1.3.1.4(e)
7.1.3.1.4(f)
7.1.3.1.4(g)
7.1.3.1.5
7.1.3.1.5(a)
7.1.3.1.5(b)
7.1.3.1.5(c)
7.1.3.1.5(d)
7.1.3.1.5(e)
7.1.3.1.5(f)
7.1.3.1.5(g)
7.1.3.1.5(h)
7.1.3.1.6
7.1.3.1.6(a)
7.1.3.1.6(b)
7.1.3.1.6(c)
7.1.3.1.6(d)
7.1.3.1.6(e)
7.1.3.1.6(f)
7.1.3.1.7
7.1.3.1.7(a)
7.1.3.1.7(b)
7.1.3.1.8
7.1.3.1.8(a)
7.1.3.1.8(b)
7.1.3.1.8(c)
7.1.3.1.8(d)
7.1.3.1.8(e)
7.1.3.1.8(f)
7.1.3.1.8(g)
7.1.3.1.8(h)
7.1.3.1.9
7.1.3.1.9(a)
7.1.3.1.9(b)
7.1.3.1.9(c)
7.1.3.1.9(d)
7.1.3.1.9(e)
7.1.3.1.9(f)
7.1.3.2
7.1.3.3
7.1.3.4
7.1.3.5
7.1.3.5.1
7.1.3.5.2
7.1.3.6
7.1.3.7
7.1.3.8
7.1.3.9
7.1.4
7.1.4.1
7.1.4.1.1
7.1.4.1.2
7.1.4.1.3
7.1.4.2
7.1.4.2(c)
7.1.4.4
7.1.4.4(a)
7.1.4.4(b)
7.1.4.4(c)
7.1.4.5
7.1.6
7.1.6.2
7.1.6.2.1
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.7
8.1.2
8.1.2.10
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.2

8.2 Manage Archive

Input Flows:

analyze_archive_data_request
archive_administration_request
archive_data
archive_data_product_request
global_schema
government_report_data_request
other_archive_data_input
other_archive_data_request_input
retrieved_archive_data

Output Flows:

archive_administration_data
archive_data
archive_data_for_analysis
archive_data_product
government_report_data
local_schema
other_archive_data
other_archive_data_request

Description:

This process shall store the collected and formatted data in a permanent archive data store. This process shall receive the formatted data from the Get Archive Data function accompanied by any updates to the meta data that would describe the formatting operations performed on the data as it was imported. This process shall respond to requests from the administrator interface function to maintain the schema of the archive data, set update frequencies, backup schedules, user authentication schemes, cleansing algorithms. This process shall provide the administrator interface function with status of the data quality in the archive, frequency reports on use of the archive, updates to the measure of the volume of the data and other data archive metrics. This process shall receive inputs from the Coordinate Archives function to provide data and information about the archive schema to other archives. In turn the process shall receive data and schema of other archives to use to build a global schema. The process shall use the global schema to support requests from user systems for data that may be spread across multiple archives. The process shall maintain the access privileges information for the data held in the archive to maintain the security of the archive. The process shall employ such techniques as necessary to maintain the integrity of the data and ensure no data is lost from the archive. The process shall respond to requests for data to support user data products, user analysis, and inputs to government reporting systems. The process shall respond to such request by authenticating the originator of the request and providing the data that is available. The process shall also be capable of providing a sample or catalog of data contained within the archive to support the user requests.

User Service Requirements:

7.0
7.1
7.1.0
7.1.1
7.1.1.1
7.1.1.2
7.1.1.3
7.1.1.4
7.1.1.4.1
7.1.1.4.2
7.1.1.4.3
7.1.1.4.4
7.1.2
7.1.2.3
7.1.4
7.1.4.1
7.1.4.1.1
7.1.4.1.2
7.1.4.1.3
7.1.4.2
7.1.4.2(a)
7.1.4.2(b)
7.1.4.2(c)
7.1.4.2(d)
7.1.4.3
7.1.4.4
7.1.4.5
7.1.5
7.1.5.1
7.1.5.1(a)
7.1.5.1(b)
7.1.5.1(c)
7.1.5.1(d)
7.1.5.2
7.1.5.2.3
7.1.5.2.4
7.1.6
7.1.6.2
7.1.6.2.1
7.1.6.2.2
7.1.6.3
7.1.6.3.1
7.1.6.3.2
7.1.6.3.3

8.3 Manage Archive Data Administrator Interface

Input Flows:

archive_administration_data
collection_administration_status
data_collection_device_status_to_personnel
fada-archive_administration_requests
fada-data_collection_device_control
import_administration_status
on_demand_archive_request

Output Flows:

archive_administration_request
archive_request_confirmation
collection_administration_request
data_collection_device_control_from_personnel
import_administration_request
tada-archive_administration_data
tada-data_collection_device_status

Description:

This process shall interface with the Archive Data Administrator terminator and receive inputs from the administrator concerning the management and administration of the archive. The process shall establish user authentication controls for the archive and send the information to the Manage Archive function. The process shall maintain the schema of the archive, including the data and meta data contained within the archive data. Updates to the schema shall be distributed to the Manage Archive function as well as the Get Archive Data function. The process shall send the parameters and requests to the Get Archive Data function to control what data is imported into the archive and how the data is to be formatted when it is received. The parameters sent shall include such things as the schema, data format, methods to apply to the data, cleansing parameters, quality metrics, and checking specifications. The process shall send requests to the Get Archive Data function for new data or a catalog of data that may be available. The process shall respond to requests from the Manage On Demand Archive Requests function by making requests of the Get Archive Data function to establish the source and identity of the data that may exist in ITS or non-ITS sources. Then the process shall respond to the user request with the confirmation that the request can be satisfied and specifications about the data once it is imported. In cases where the Manage Archive function will be managing a roadside data collection function, this process shall initiate and control the function by sending commands and requests to the Manage Roadside Data Collection function. This process receives the status from the other functions within Manage Archived Data and presents them to the administrator.

User Service Requirements:

7.0	7.1.3	7.1.4.2(c)
7.1	7.1.3.1	7.1.4.2(d)
7.1.0	7.1.3.2	7.1.4.4
7.1.1	7.1.3.3	7.1.4.4(a)
7.1.1.4	7.1.3.4	7.1.4.4(b)
7.1.1.4.1	7.1.3.5	7.1.4.4(c)
7.1.1.4.2	7.1.3.5.1	7.1.4.5
7.1.1.4.3	7.1.3.5.2	7.1.5
7.1.1.4.4	7.1.3.6	7.1.5.3
7.1.2	7.1.3.7	7.1.6
7.1.2.1	7.1.3.8	7.1.6.1
7.1.2.1.1	7.1.4	7.1.6.1.1
7.1.2.1.2	7.1.4.1	7.1.6.2
7.1.2.1.4	7.1.4.1.1	7.1.6.2.1
7.1.2.1.5	7.1.4.1.2	7.1.6.2.2
7.1.2.1.5(a)	7.1.4.1.3	7.1.6.3
7.1.2.1.5(b)	7.1.4.2	7.1.6.3.1
7.1.2.2	7.1.4.2(a)	7.1.6.4
7.1.2.4	7.1.4.2(b)	

8.4 Coordinate Archives

Input Flows:
foa-archive_coordination_data
local_schema
other_archive_data
other_archive_data_request

Output Flows:
global_schema
other_archive_data_input
other_archive_data_request_input
toa-archive_coordination_data

Description:
This process shall coordinate the information exchange between different Manage Archived Data functions represented through the Other Archives terminator. This process shall allow other archives to share data collected by other archive functions to share the data in response to local requests from users systems. This process shall use data collected from different archives to build a set of global schema which the data archive definitions for the local archive plus any archives known to the local archive. This process shall provide the global schema to the local Manage Archive function. This process shall receive the schema of the local archive to share with other archive functions. This process shall provide data to those other archives when requested. This process shall support analysis, data fusion, and data mining of archived information across geographically dispersed archives.

User Service Requirements:
7.0
7.1
7.1.0
7.1.4
7.1.4.4
7.1.5
7.1.5.1
7.1.5.1(a)
7.1.5.1(b)
7.1.5.1(c)
7.1.5.1(d)
7.1.5.2
7.1.5.2.3
7.1.5.2.4
7.1.6
7.1.6.2
7.1.6.2.2
7.1.6.3
7.1.6.3.1

8.5 Process Archived Data User System Requests

Input Flows:
archive_data_product
fadu-archive_data_product_request
ffi-archive_payment_confirm
traffic_archive_data_product_request
transit_archive_data_product_request

Output Flows:
archive_data_product_request
tadu-archive_data_product
tfi-archive_payment_request
traffic_archive_data_product
transit_archive_data_product

Description:
This process shall monitor the archive data user systems interface for requests for data from the archive. This process shall support requests from users involved in planning, research, safety, as well as operations of transportation functions. This process shall receive requests for data and catalogs of data that may be contained in the archive. This process shall translate the requests into a format that can be understood by the Manage Archive function to retrieve data from the archive. When data or a catalog of data is received from the archive, this process shall generate the requested data product for the users systems. For archive data requiring financial payment this archive process the financial requests and manages an interface to a Financial Institution.

User Service Requirements:

7.0	7.1.6.1
7.1	7.1.6.1.1
7.1.0	7.1.6.2
7.1.1	7.1.6.2.2
7.1.1.4	7.1.6.3
7.1.1.4.1	7.1.6.3.1
7.1.1.4.3	7.1.6.3.3
7.1.1.4.4	7.1.6.4
7.1.2	7.1.6.4.1
7.1.2.5	7.1.6.4.1(a)
7.1.3	7.1.6.4.1(b)
7.1.3.7	7.1.6.4.1(c)
7.1.4	7.1.6.4.1(d)
7.1.4.4	7.1.6.4.1(e)
7.1.4.4(c)	7.1.6.4.1(f)
7.1.5	7.1.6.4.1(g)
7.1.5.1	7.1.6.4.2
7.1.5.1(a)	7.1.6.4.2(a)
7.1.5.1(b)	7.1.6.4.2(b)
7.1.5.1(c)	7.1.6.4.2(c)
7.1.5.1(d)	7.1.6.4.2(d)
7.1.5.2	7.1.6.4.3
7.1.5.2.2	7.1.6.4.3(a)
7.1.5.2.3	7.1.6.4.3(b)
7.1.5.2.4	7.1.6.4.3(c)
7.1.6	7.1.6.4.4

8.6 Analyze Archive

Input Flows:
archive_data_for_analysis
fadu-archive_analysis_request
ffi-archive_analysis_payment_confirm

Output Flows:
analyze_archive_data_request
tadu-archive_analysis_results
tfi-archive_analysis_payment_request

Description:
This process shall support the interface with Archive Data User Systems for requests for analysis of the archive data. This process shall support analysis products that can provide users with the ability to perform activities such as data mining, data fusion, summarizations, aggregations, and recreation from archive data. This process shall receive the users systems requests and develop the request that the Manage Archive function can process to retrieve the data from the archive. This process shall be able to respond to users systems requests for a catalog of the analysis products available. When data and meta data are returned from the archive and the analysis is performed this process shall produce the output for the Archive Data User Systems terminator. For archive data requiring financial payment this archive process the financial requests and manages an interface to a Financial Institution.

User Service Requirements:

7.0
7.1
7.1.0
7.1.1
7.1.1.4
7.1.1.4.1
7.1.1.4.3
7.1.1.4.4
7.1.1.5
7.1.2
7.1.2.6
7.1.3
7.1.3.7
7.1.4
7.1.4.4
7.1.5
7.1.5.1
7.1.5.1(a)
7.1.5.1(b)
7.1.5.1(c)
7.1.5.1(d)
7.1.5.2
7.1.5.2.1
7.1.5.2.1(a)
7.1.5.2.1(b)
7.1.5.2.1(c)
7.1.5.2.1(d)
7.1.5.2.3
7.1.5.2.4
7.1.6
7.1.6.1
7.1.6.1.1
7.1.6.2
7.1.6.2.2
7.1.6.3
7.1.6.3.1
7.1.6.3.2
7.1.6.3.3
7.1.6.4
7.1.6.4.1
7.1.6.4.1(a)
7.1.6.4.1(b)
7.1.6.4.1(c)
7.1.6.4.1(d)
7.1.6.4.1(e)
7.1.6.4.1(f)
7.1.6.4.1(g)
7.1.6.4.2
7.1.6.4.2(a)
7.1.6.4.2(b)
7.1.6.4.2(c)
7.1.6.4.2(d)
7.1.6.4.3
7.1.6.4.3(a)
7.1.6.4.3(b)
7.1.6.4.3(c)
7.1.6.4.4

8.7 Process On Demand Archive Requests

Input Flows:
archive_request_confirmation
fadu-on_demand_archive_request

Output Flows:
on_demand_archive_request
tadu-on_demand_confirmation

Description:
This process shall receive requests for data to be imported into the archive that is not already in the archive. The process shall forward the request to the Manage Archive Data Administrator Interface function for the administrator to handle the user request. The process shall receive the response from the administrator and forward the information to the Archive Data User System.

User Service Requirements:
7.0
7.1
7.1.0
7.1.2
7.1.2.2
7.1.4
7.1.4.4
7.1.4.4(a)
7.1.4.4(b)
7.1.4.4(c)
7.1.6
7.1.6.1
7.1.6.1.1
7.1.6.2
7.1.6.2.2
7.1.6.3
7.1.6.3.1
7.1.6.4
7.1.6.4.1
7.1.6.4.1(a)
7.1.6.4.1(b)
7.1.6.4.1(c)
7.1.6.4.1(d)
7.1.6.4.1(e)
7.1.6.4.1(f)
7.1.6.4.1(g)
7.1.6.4.2
7.1.6.4.2(a)
7.1.6.4.2(b)
7.1.6.4.2(c)
7.1.6.4.2(d)
7.1.6.4.3
7.1.6.4.3(a)
7.1.6.4.3(b)
7.1.6.4.3(c)
7.1.6.4.4

8.8 Prepare Government Reporting Inputs

Input Flows:
fgrs-government_data_report_request
government_report_data

Output Flows:
government_report_data_request
tgrs-government_data_report_input

Description:
This process shall support the preparation of inputs to reporting systems of the federal or state governments that require data from the ITS archive. This process shall respond to requests from the Government Reporting Systems terminator for data from the archive and generate the request in a form understood by the Manage Archive function. The data and any meta data necessary shall be returned from the Manage Archive function. This process shall receive the data and format it as requested and send it to the Government Reporting Systems terminator where it may be combined with other data before final submission.

User Service Requirements:
7.0
7.1
7.1.0
7.1.5
7.1.5.2
7.1.5.2.5
7.1.5.2.5(a)
7.1.5.2.5(b)
7.1.5.2.5(c)
7.1.5.2.5(d)
7.1.5.2.5(e)
7.1.5.2.5(f)
7.1.5.2.5(g)
7.1.5.2.5(h)
7.1.5.2.5(i)
7.1.5.2.5(j)
7.1.6
7.1.6.2
7.1.6.2.2
7.1.6.3
7.1.6.3.1

8.9 Manage Roadside Data Collection

Input Flows:
collected_roadside_data_status
collection_administration_request
data_collection_device_control_from_personnel
data_collection_device_status
roadside_archive_data

Output Flows:
collected_roadside_data
collection_administration_status
data_collection_device_control
data_collection_device_status_to_personnel
roadside_archive_control

Description:
This process shall manage the collection of archive data directly from collection equipment located at the roadside. This process shall collect traffic information as well as environmental or other information that may be collected by roadside devices. This process shall respond to requests from the Manage Archive Data Administer Interface process to input the parameters that control the collection process. The request for data and control parameters shall be sent to the Manage Traffic function where the information is collected and returned. This process shall forward the data onto the Get Archive Data function for import into the archive. The Get Archive Data function shall be able to return status about the imported data. This process shall use the status information to adjust the collection function and report back to the administrator function. The process shall provide control and collect operational status (state of the sensor device, configuration, and fault data) from the data collection and monitoring equipment.

User Service Requirements:
7.0
7.1
7.1.0
7.1.2
7.1.2.1
7.1.2.1.1
7.1.2.1.2
7.1.2.1.3
7.1.2.1.3(a)
7.1.2.1.3(b)
7.1.2.1.3(c)
7.1.3
7.1.3.1
7.1.3.1.1
7.1.3.1.1(a)
7.1.3.1.1(c)
7.1.3.1.3
7.1.3.1.3(e)
7.1.3.1.7
7.1.3.1.7(a)

9.1.1 Manage M&C Systems On-Board

Input Flows:
fbmcv-materials_status
fomcv-vehicle_operational_data
fre-roadway_infrastructure_characteristics
infrastructure_sensor_data_for_mcv
infrastructure_sensor_status_for_mcv
mcv_infrastructure_sensor_control
mcv_vehicle_systems_control_by_fleet_manager
vehicle_systems_control_by_mcv_operator

Output Flows:
infrastructure_sensor_control_from_mcv
materials_status_onboard_to_mcv_operator
mcv_infrastructure_sensor_data
mcv_infrastructure_sensor_status
mcv_materials_status
mcv_operational_data
system_status_onboard_to_mcv_operator
tbmcv-vehicle_system_control
tomcv-vehicle_operational_data

Description:
This process shall use on-board vehicle sensors to monitor roadway infrastructure conditions (e.g. pavement cracks) and vehicle operational functions, including operating status (e.g. materials stored, materials usage, plow blade up/down etc.). It shall receive control information from the vehicle operator. It shall also receive control information from the Manage M&C Vehicle Fleet function to allow remote operation of the on-board vehicle systems. These systems shall include winter maintenance equipment for plowing, treating, and anti-icing, and routine maintenance equipment for cutting, repairs, hazard removal, etc. This process shall communicate status information to other maintenance, construction, or specialized service vehicles.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.5
8.1.1.5(b)
8.1.1.7
8.1.2
8.1.2.1
8.1.2.1(a)
8.1.2.1(b)
8.1.2.1(d)
8.1.2.1(e)

9.1.2 Collect M&C Vehicle Data On-Board

Input Flows:
fbmcv-basic_mcv_measures
fre-roadway_characteristics_for_mcv
From_Location_Data_Source
safety_data_for_mcv

Output Flows:
basic_mcv_measures_for_maint_sched
basic_mcv_measures_for_mcv_operator
safety_data_for_fleet_mgmt
terf-basic_mcv_measures_for_equip_repair
vehicle_location_for_mcv_operator
vehicle_location_for_mcv_tracking

Description:
This process shall collect and process non-ITS data available from sensors on-board maintenance, construction, and specialized service vehicles. This includes vehicle diagnostics, operating conditions (status of the brake system, oil pressure, tire wear, etc.), and safety status. This data shall be sent by this process to other processes in the Manage M&C Vehicles function for use in determining vehicle schedule deviations, scheduling vehicle maintenance, monitoring safety status, and informing the vehicle operator of the conditions. This process shall receive inputs from Process Vehicle Location Data to determine the current position of the maintenance or construction vehicle and shall forward it to the Track M&C Vehicle function.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.1
8.1.1.1.1
8.1.1.1.1(a)
8.1.1.1.1(b)
8.1.1.1.1(c)
8.1.1.1.1(d)
8.1.1.1.1(f)
8.1.1.1.1(g)
8.1.1.1.1(h)
8.1.1.1.1(i)
8.1.1.1.1(j)
8.1.1.1.1(k)
8.1.1.1.2
8.1.1.1.2(a)
8.1.1.1.2(b)
8.1.1.1.3
8.1.1.4
8.1.1.4.1
8.1.1.4.1(a)
8.1.1.4.1(b)
8.1.1.4.1(c)
8.1.1.4.1(d)
8.1.1.4.1(e)
8.1.1.4.1(f)

9.1.3 Track M&C Vehicles and Equipment

Input Flows:
ferf-equipment_status_for_tracking
fsf-equipment_status_for_tracking
vehicle_location_for_mcv_tracking

Output Flows:
mcv_tracking_data_for_fleet_manager
mcv_tracking_data_for_personnel

Description:
This process shall track public and contracted fleets of maintenance, construction, and specialized service vehicles and associated equipment. Based upon the vehicle location data received as input, this process shall generate current and past vehicle locations, vehicle speed information, and location analysis data (e.g. average speed). This data provides the Manage M&C Vehicle Fleet function a complete view of the fleet locations and speeds. This data, together with similar location and status data about maintenance and construction equipment, shall be provided to the maintenance and construction center personnel. The types of vehicles and equipment tracked include roadway maintenance or construction trucks and motorized equipment, snow plows, salt/sand trucks, bucket trucks, vegetation control and grass cutting equipment, traffic control vehicles, street and drainage cleaning vehicles, among others.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.1
8.1.1.1.1
8.1.1.1.1(a)
8.1.1.1.1(b)
8.1.1.1.1(c)
8.1.1.1.1(d)
8.1.1.1.1(f)
8.1.1.1.1(g)
8.1.1.1.1(h)
8.1.1.1.1(i)
8.1.1.1.1(j)
8.1.1.1.1(k)
8.1.1.1.2
8.1.1.1.2(a)
8.1.1.1.2(b)
8.1.1.1.3

9.1.4 Manage M&C Vehicle Fleet

Input Flows:

alert_and_threats_for_maint_field_personnel
dispatch_info_for_m_and_c_fleet
dispatch_response_from_mcv
env_info_for_mcv_mgmt
faas-alerts_and_advisories_for_maint
fleet_activity_schedule
fleet_resource_request
fleet_vehicle_request_for_roadway_maint
fleet_vehicle_request_for_winter_maint
fsf-equipment_availability_for_fleet_manager
m_and_c_status_from_mcv_operator
m_and_c_vehicle_maintenance_info
m_and_c_view_of_road_network_for_fleet_manager
map_data_for_m_and_c_routing
mcv_materials_status
mcv_operational_data
mcv_tracking_data_for_fleet_manager
routing_parameters_for_m_and_c_fleet
safety_data_for_fleet_mgmt
threat_info_for_maint
vehicle_systems_control_by_mc_center_personnel
wide_area_alert_notification_for_maint

Output Flows:

alert_and_threats_for_maint_personnel
alert_notification_status_from_maint
dispatch_orders_to_mcv
fleet_resource_response
fleet_vehicle_response_to_roadway_maint
fleet_vehicle_response_to_winter_maint
m_and_c_fleet_activity_schedule_for_maint
m_and_c_fleet_manager_status
mcv_vehicle_systems_control_by_fleet_manager
request_m_and_c_routing_map_data
road_network_info_to_mcv
suggested_route_to_mcv
vehicle_fleet_status_for_personnel
vehicle_fleet_status_for_scheduler
winter_dispatch_orders_to_mcv

Description:

This Maintenance and Construction fleet management process shall dispatch and route maintenance and construction vehicle drivers and support them with route- specific environmental, incident, advisory, threat, alert, and traffic congestion information. This process shall accept vehicle systems control information from the M&C Center Personnel interface and remotely control maintenance and construction vehicle on-board equipment. Fleet health information shall be collected from the Schedule M&C Vehicle Maintenance function, and location tracking data and analysis of the fleet shall be received from the Track M&C Vehicle function. This function shall receive information from the storage facility about the status of maintenance and construction vehicles and equipment. This process shall respond to requests for vehicle resources with fleet and equipment availability information. This function shall pass information received on to the process that manages the M&C Center Personnel Interface to advise the operators of events taking place and request for resources. Specific instructions shall be provided to this process by the Maintenance and Construction Center Personnel Interface.

User Service Requirements:

5.0
5.1
5.1.0
5.1.3
5.1.3.4
5.1.3.4.3
5.1.4
5.1.4.1
5.1.4.1.1
5.1.4.1.2
5.1.4.2
5.1.4.2.1
5.1.4.3
5.1.4.4
8.0
8.1
8.1.0
8.1.1
8.1.1.2
8.1.1.3
8.1.1.3.1
8.1.1.3.1(a)
8.1.1.3.1(b)
8.1.1.3.1(c)
8.1.1.3.1(d)
8.1.1.3.1(e)
8.1.1.6
8.1.1.6.5
8.1.2
8.1.2.1
8.1.2.1(c)

9.1.5 Schedule M&C Vehicle Maint

Input Flows:
basic_mcv_measures_for_maint_sched
ferf-current_fleet_maintenance_status
ferf-fleet_maintenance_record
m_and_c_fleet_activity_schedule_for_maint

Output Flows:
m_and_c_vehicle_maintenance_info
terf-fleet_maintenance_availability
terf-vehicle_utilization_information

Description:
This process shall collect the vehicle condition diagnostics information from maintenance and construction vehicles and automatically schedule preventive and corrective vehicle maintenance with the Equipment Repair Facility. This process shall receive fleet health reports, including maintenance records, from that repair facility and provide the data to the Manage M&C Vehicle Fleet function. To better predict and schedule necessary equipment repairs, the Manage M&C Vehicle Fleet function provides information on the vehicle utilization and vehicle availability schedules.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.4
8.1.1.4.1
8.1.1.4.1(a)
8.1.1.4.1(b)
8.1.1.4.1(c)
8.1.1.4.1(d)
8.1.1.4.1(e)
8.1.1.4.1(f)
8.1.1.4.2

9.1.6 Provide M&C Vehicle Operator Interface for Maint

Input Flows:

basic_mcv_measures_for_mcv_operator
dispatch_orders_to_mcv
environmental_sensor_data_on_board
environmental_sensor_status_on_board
fmcfp-dispatch_response
fmcfp-environmental_sensor_control
fmcfp-field_equip_repair_status
fmcfp-m_and_c_activity_status
fmcfp-vehicle_systems_control
fomcv-env_conditions
materials_status_onboard_to_mcv_operator
mdss_recommended_actions_for_operator
road_network_info_to_mcv
suggested_route_to_mcv
system_status_onboard_to_mcv_operator
vehicle_location_for_mcv_operator
winter_dispatch_orders_to_mcv

Output Flows:

dispatch_response_from_mcv
environmental_sensor_control_on_board
field_equip_status_from_mcv_operator
m_and_c_status_from_mcv_operator
td-traffic_advisory_from_mcv
tmcfp-dispatch_info
tmcfp-environmental_sensor_info
tmcfp-materials_status_onboard
tmcfp-mcv_operational_data
tmcfp-mdss_recommended_actions
tmcfp-road_network_info
tmcfp-suggested_route
tmcfp-vehicle_condition_status
vehicle_systems_control_by_mcv_operator

Description:

This process shall manage the interface to the operator of the maintenance or construction vehicle. This process shall receive inputs from the vehicle operator such as requests for status from on-board systems, field equipment operational status (state of the device, configuration, and fault data), and work activity status. This process shall forward to the vehicle operator from the maintenance and construction vehicle fleet manager new dispatch orders including routing information or updates to weather or road network conditions in the area, threat information, and alert notifications of potential emergency situations. This function shall receive recommended road treatment and maintenance actions from the Manage Maintenance Decision Support function. This function shall also receive inputs from the vehicle's environmental sensors (data and operational status), sensors monitoring materials on-board the vehicle, and operational vehicle status. This process shall then formulate the output to the vehicle operator either in digital screen displays or audio formats based on received input from the on-board systems.

User Service Requirements:

8.0
8.1
8.1.0
8.1.1
8.1.1.3
8.1.1.3.1
8.1.1.3.1(a)
8.1.1.3.1(b)
8.1.1.3.1(c)
8.1.1.3.1(d)
8.1.1.3.1(e)
8.1.1.3.2
8.1.1.3.2(a)
8.1.1.3.2(b)
8.1.1.3.2(c)
8.1.1.3.2(d)
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.1(d)
8.1.1.6.5

9.1.7 Process Road Network Information

Input Flows:
disaster_network_status_from_traffic_to_m_and_c
env_info_for_road_network
evacuation_information_for_m_and_c
fam-asset_damage
fam-asset_restrictions
incident_info_from_emerg
incident_info_from_traffic
incident_response_status_from_emerg
m_and_c_transportation_system_status_for_disaster
m_and_c_transportation_system_status_for_evacuation
planned_events_for_maint
road_network_info_from_traffic
traffic_video_for_mcm
transportation_information_for_maint_operations

Output Flows:
m_and_c_view_of_road_network_for_fleet_manager
m_and_c_view_of_road_network_for_mdss
m_and_c_view_of_road_network_for_personnel
m_and_c_view_of_road_network_for_scheduler

Description:
This process shall gather information about the road network specifically to support the Manage Maintenance and Construction function. The data collected by this process shall include incident information and response status, traffic information, planned events, roadway restrictions, transportation asset damage information, transportation systems operations information, and environmental information. This data shall then be processed to provide a maintenance and construction view of the road network that is forwarded to vehicle fleet dispatchers, center personnel, and the maintenance decision support function.

User Service Requirements:
5.0
5.3
5.3.0
5.3.2
5.3.2.2
5.3.2.2(c)
5.3.4
5.3.4.1
5.3.4.1(a)
5.3.4.1(b)
5.3.4.1(c)
5.3.4.1(d)
5.3.4.1(e)
5.3.4.2
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.1.6.5

9.2.1 Schedule M&C Activities

Input Flows:

auto_treatment_system_status
env_info_for_scheduling
fam-asset_damage
fam-asset_restrictions
fmcas-m_and_c_administrative_information
fmcas-m_and_c_personnel_information
fmcas-m_and_c_regulations
fomcm-m_and_c_plan_feedback
fomcm-m_and_c_work_plans
fro-m_and_c_plan_feedback_from_rail
fro-railroad_schedules
m_and_c_activity_schedule
m_and_c_activity_status_for_scheduler
m_and_c_plan_feedback_from_emerg
m_and_c_plan_feedback_from_traffic
m_and_c_plan_feedback_from_transit
m_and_c_resources_avail_to_scheduler
m_and_c_roadway_needs_to_scheduler
m_and_c_view_of_road_network_for_scheduler
m_and_c_winter_needs_to_scheduler
request_for_m_and_c_schedule
roadway_detours_and_closures_for_m_and_c
vehicle_fleet_status_for_scheduler

Output Flows:

auto_treatment_system_control
fleet_activity_schedule
m_and_c_activity_schedule
m_and_c_activity_schedule_for_archive
m_and_c_resource_status_for_needs
m_and_c_work_plans_for_emerg
m_and_c_work_plans_for_info_provider
m_and_c_work_plans_for_traffic
m_and_c_work_plans_for_transit
resource_needs_from_scheduler
scheduled_work_plan
scheduled_work_plan_for_personnel
tmcas-m_and_c_administrative_request
tm-m_and_c_work_plans_for_media
tmtsp-m_and_c_work_plans_for_mtsp
tomcm-m_and_c_plan_feedback
tomcm-m_and_c_work_plans
tro-m_and_c_work_plans_for_rail
tro-railroad_schedule_feedback
work_zone_activity_plan

Description:

This process shall generate new maintenance, construction, and work zone activity schedules for use by maintenance and construction vehicles, maintenance and construction operators, and for information coordination purposes with other ITS functions. This process shall also schedule assets for use in maintenance activities and work zone activities. The process shall use parameters and input data set up by the maintenance center personnel, roadway network information, data gathered from the roadway, data input from the maintenance vehicle fleet management, and knowledge of assets within the infrastructure. The process shall also respond to requests from the Determine M&C Needs function. The process shall send its output to other functions in the Manage Maintenance and Construction function for archival, fleet dispatch and routing, and coordination of work plans with other agencies.

User Service Requirements:

8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.4
8.1.1.6.8
8.1.2
8.1.2.1
8.1.2.1(a)
8.1.2.1(b)
8.1.2.1(c)
8.1.2.1(d)
8.1.2.1(e)
8.1.2.1(f)
8.1.2.2
8.1.2.3
8.1.2.4
8.1.2.4.3
8.1.2.5
8.1.2.5.1
8.1.2.5.2
8.1.2.8
8.1.4
8.1.4.1
8.1.4.3
8.1.4.3(a)
8.1.4.3(b)
8.1.4.3(c)
8.1.4.3(d)
8.1.4.3(e)
8.1.4.3(f)
8.1.4.3(g)

9.2.2 Status Current M&C Activities and Transportation Infrastructure

Input Flows:

fam-asset_damage
fam-asset_restrictions
field_equip_status_from_mcv_operator
fomcm-roadway_maint_status
m_and_c_activity_status
m_and_c_fleet_manager_status
map_data_for_m_and_c_status_display
materials_availability_for_status
work_zone_data_for_status

Output Flows:

asset_restrictions_for_com_veh
asset_restrictions_for_em_response
asset_restrictions_for_emerg
asset_restrictions_for_info_provider
asset_restrictions_for_traffic
asset_restrictions_for_transit
field_equip_maint_status
field_equip_maint_status_for_isp
incident_info_for_emerg
incident_info_for_traffic
m_and_c_activity_status
m_and_c_activity_status_for_archive
m_and_c_activity_status_for_mdss
m_and_c_activity_status_for_personnel
m_and_c_activity_status_for_scheduler
m_and_c_status_assessment_for_disaster
m_and_c_status_assessment_for_evacuation
m_and_c_status_assessment_for_traffic
materials_status_request
request_m_and_c_status_display_update
roadway_maint_status_for_emerg
roadway_maint_status_for_info_provider
roadway_maint_status_for_traffic
roadway_maint_status_for_transit
security_sensor_equip_maint_status
security_surveillance_equip_maint_status
tmcas-m_and_c_work_performance
tm-roadway_maint_status_for_media
tomcm-roadway_maint_status
tstws-asset_treatment_info

Description:

This process shall assess the current status of all maintenance and construction activities, transportation assets, and infrastructure, and provide the information to center personnel, other agencies, and functions within Manage Maintenance and Construction to support the vehicle fleet manager and maintenance needs assessment. This status shall include actual work activities performed, current locations and operational conditions of M&C vehicles, asset inventories, materials and equipment inventories, field equipment status, environmental information, work zone status, transportation system damage assessments, etc. Asset usage restrictions, such as height, width, or weight requirements, whether permanent or temporary due to maintenance and construction activity, shall be gathered from Asset Management and communicated to other agencies. Incident information gathered by this function shall be forwarded to emergency and traffic management functions.

User Service Requirements:

8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.6
8.1.1.6.7
8.1.2
8.1.2.1
8.1.2.1(a)
8.1.2.1(b)
8.1.2.1(c)
8.1.2.1(d)
8.1.2.1(e)
8.1.2.1(f)
8.1.2.6
8.1.2.7
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.2
8.1.3.2.1
8.1.3.2.1(a)
8.1.3.2.1(b)
8.1.3.2.1(c)
8.1.3.2.1(d)
8.1.3.2.1(e)
8.1.3.2.1(f)
8.1.3.2.1(g)
8.1.3.2.1(h)
8.1.3.2.1(i)
8.1.3.2.1(j)
8.1.3.2.1(k)
8.1.4
8.1.4.1
8.1.4.3
8.1.4.3(a)
8.1.4.3(b)
8.1.4.3(c)
8.1.4.3(d)
8.1.4.3(g)

9.2.3.1 Determine Winter Roadway Treatment Needs

Input Flows:
env_info_for_maint_needs
fleet_vehicle_response_to_winter_maint
m_and_c_resources_avail
materials_availability
mdss_recommended_actions_for_winter_treatment_needs
winter_maint_action_req_from_traffic

Output Flows:
fleet_vehicle_request_for_winter_maint
m_and_c_winter_maint_needs_for_archive
m_and_c_winter_needs_to_scheduler

Description:
This process shall determine the need for roadway treatment based on current and forecasted weather information, current usage of treatments and materials, available resources, requests for action from other agencies, and recommendations from the Provide M&C Maintenance Decision Support function, specifically under winter conditions. This shall include winter maintenance such as plowing, treating, anti-icing, etc. Once roadway treatment needs are established by this process, the recommended treatment shall be output to the Schedule M&C Activities or directly to the Manage M&C Vehicle Fleet function, depending upon the urgency of the request. A record of winter maintenance needs shall be output to another process for archival.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(a)
8.1.2.4
8.1.2.4.3
8.1.2.4.4
8.1.2.5
8.1.2.5.1
8.1.2.6

9.2.3.2 Determine Roadway M&C Needs

Input Flows:
env_info_for_maint_needs
env_probe_data_for_infrastructure_repair_needs
fam-asset_maint_and_repair_needs
field_device_status
field_equipment_status_from_isp
field_equipment_status_from_traffic
fleet_vehicle_response_to_roadway_maint
infrastructure_integrity_status_for_maint
infrastructure_processed_data_for_repair_needs
m_and_c_resources_avail
materials_availability
mdss_recommended_actions_for_roadway_maint_needs
roadway_maint_action_req_from_emerg
roadway_maint_action_req_from_traffic

Output Flows:
fleet_vehicle_request_for_roadway_maint
m_and_c_roadway_maint_needs_for_archive
m_and_c_roadway_needs_to_scheduler

Description:
This process shall determine the need for roadway maintenance and construction activities based on current and forecasted weather information, current usage of treatments and materials, available resources, requests for action by other agencies, identification of faulty roadside equipment and transportation infrastructure, and recommendations from the Provide M&C Maintenance Decision Support function. This shall include routine maintenance such as cleaning, cutting, field equipment repair, etc. This process shall collect sensor status, identify fault conditions, identify infrastructure conditions, and log faults that have been detected by processes in the Manage Maintenance and Construction, Manage Traffic, and Provide Driver and Traveler Services functions. Once roadway treatment needs are established by this process, the recommended maintenance activity shall be output to the Schedule M&C Activities function or directly to the Manage M&C Vehicle Fleet function, depending upon the urgency of the request. A record of roadway maintenance needs shall be output to another process for archival.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(b)
8.1.2.1(d)
8.1.2.1(e)
8.1.2.4
8.1.2.4.3
8.1.2.4.4
8.1.2.6

9.2.3.3 Provide Maintenance Decision Support

Input Flows:
env_and_weather_data_for_decision_support
env_info_for_decision_support
m_and_c_activity_status_for_mdss
m_and_c_resources_avail
m_and_c_view_of_road_network_for_mdss
maint_dec_support_parameter_updates

Output Flows:
mdss_recommended_actions_for_operator
mdss_recommended_actions_for_personnel
mdss_recommended_actions_for_resource_needs
mdss_recommended_actions_for_roadway_maint_needs
mdss_recommended_actions_for_winter_treatment_needs
terf-mdss_recommended_actions

Description:
This process shall provide decision support to the maintenance and construction center personnel and maintenance and construction field personnel. This process shall tailor external information for the decision maker. Some of the external information used could be weather or road condition observations, forecasted weather information or road conditions, current usage of treatments and materials, available resources, equipment and vehicle availability, road network information, and source reliability information. The tailoring of information may include filtering (selection from a large amount of external information), error reduction ('smoothing' the information), fusion (combination of disparate information to match the decision needs), analysis (creating the decision), and information presentation to the operator. The center or field personnel shall be able to input control parameters for the decision support process. The center or field personnel shall be able to interactively provide inputs and receive decisions or information presentation. The maintenance decision recommendations shall be distributed to other processes within the Determine M&C Needs function.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.4
8.1.2.4.3
8.1.2.4.4
8.1.2.5
8.1.2.5.2

9.2.3.4 Manage M&C Resource Needs

Input Flows:

disaster_response_plan_coordination_to_m_and_c
evacuation_plan_coordination_to_m_and_c
fam-asset_inventory
ferf-equipment_repair_status
fleet_resource_response
fmcas-resupply_response
fomcm-resource_coordination_data
fsf-equipment_availability
m_and_c_emergency_response_plan_from_personnel
m_and_c_evacuation_resource_request
m_and_c_resource_request_from_emerg
m_and_c_resource_request_from_traffic
m_and_c_resource_status_for_needs
materials_availability
mdss_recommended_actions_for_resource_needs
resource_needs_from_scheduler
resource_response_from_personnel
scheduled_work_plan
work_zone_resource_status

Output Flows:

disaster_response_plan_coordination_from_m_and_c
evacuation_plan_coordination_from_m_and_c
fleet_resource_request
m_and_c_emergency_response_plan_to_personnel
m_and_c_evacuation_resource_response
m_and_c_maint_resource_needs_for_archive
m_and_c_resource_response_to_emerg
m_and_c_resource_response_to_traffic
m_and_c_resources_avail
m_and_c_resources_avail_to_scheduler
resource_request_to_personnel
tmcas-resupply_request
tomcm-resource_coordination_data
tsf-equipment_availability_request

Description:

This process shall coordinate resources with other ITS functions, including Manage Traffic, Manage Emergency Services, and other Manage Maintenance and Construction processes based on scheduled M&C work activity plans, and equipment, materials, and vehicle availability. Equipment availability and status from the Storage Facility, Equipment Repair Facility, and Asset Management shall be collected by this process, and equipment and materials resupply requests to the Maintenance and Construction Administrative Systems shall be submitted and tracked. This process shall also output information on M&C resources available to assist other Manage Maintenance and Construction processes that address M&C personnel and equipment needs, including work zones. Resource requests and plan coordination requests shall be sent on to Center Personnel for concurrence. This process shall output information on available resources to the Provide M&C Maintenance Decision Support function, and receive inputs on recommendations for road maintenance actions. A record of maintenance needs shall be output to another process for archival.

User Service Requirements:

5.0
5.3
5.3.0
5.3.2
5.3.2.2
5.3.2.2(f)
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(c)
8.1.2.4
8.1.2.4.4
8.1.2.5
8.1.2.5.1
8.1.2.5.2
8.1.2.6
8.1.2.7
8.1.4
8.1.4.1
8.1.4.2
8.1.4.3
8.1.4.3(a)
8.1.4.3(b)
8.1.4.3(d)
8.1.4.3(h)

9.2.3.5 Collect Roadside Equipment Status

Input Flows:
auto_treat_equip_status_for_m_and_c_from_center
env_sensor_equip_status_for_m_and_c_from_center
field_equip_status_for_m_and_c
infrastructure_sensor_equip_status_for_m_and_c_from_center
security_sensor_equip_status_for_m_and_c
security_surveillance_equip_status_for_m_and_c
work_zone_equip_status_for_m_and_c_from_center

Output Flows:
field_device_status
field_device_status_for_archive

Description:
This process shall collect a consolidated report of the operational status of field equipment (state of the devices, configuration, and fault data). The report can include information on sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, vehicle traffic and environmental probe field equipment, security surveillance equipment, lighting systems, short range communications equipment, vehicle signage field equipment, etc.). This process will generate a listing of field equipment repair needs and send to another maintenance and construction function to arrange for repair. A record of the fault information shall also be sent to the Manage Archived Data function for archival.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

9.2.3.6 Collect Field Equipment Status for Repair

Input Flows:
auto_treat_equip_status_for_m_and_c
avo_equip_status_for_m_and_c
barrier_system_equip_status_for_m_and_c
dms_equip_status_for_m_and_c
environmental_sensor_equip_status_for_m_and_c
fmcfp-field_equip_status_request
har_equip_status_for_m_and_c
hov_sensor_equip_status_for_m_and_c
hri_equip_status_for_m_and_c
indicator_equip_status_from_highways_for_m_and_c
indicator_equip_status_from_roads_for_m_and_c
infrastructure_sensor_equip_status_for_m_and_c
intrusion_alert_equip_status_for_m_and_c
intrusion_detection_equip_status_for_m_and_c
lane_management_equip_status_for_m_and_c
lighting_system_equip_status_for_m_and_c
multimodal_crossing_sensor_equip_status_for_m_and_c
pedestrian_sensor_equip_status_for_m_and_c
reversible_lane_sensor_equip_status_for_m_and_c
roadway_warning_equip_status_for_m_and_c
safeguard_system_equip_status_for_m_and_c
shoulder_management_equip_status_for_m_and_c
speed_sensor_equip_status_for_m_and_c
traffic_sensor_equip_status_for_m_and_c
trav_info_equip_status_for_m_and_c
variable_speed_limit_equip_status_for_m_and_c
vehicle_env_probe_equip_status_for_m_and_c
vehicle_sign_equip_status_for_m_and_c
vehicle_traffic_probe_equip_status_for_m_and_c
video_device_equip_status_for_m_and_c

Output Flows:
field_equip_status_for_m_and_c
tmcfp-field_equip_status

Description:
This process shall monitor, collect, and consolidate the operational status from roadside sensors and devices (state of the devices, configuration, and fault data). Field equipment includes sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, vehicle traffic and environmental probe field equipment, security surveillance equipment, lighting systems, short range communications equipment, vehicle signage field equipment, etc.). This status data will be processed in the field to provide a complete view of the operational state of field equipment, and sent to another process to arrange for repair. The information will also be sent to Maintenance and Construction Field Personnel. Fault data will also be accepted from Field Personnel.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

9.2.3.7 Process Environmental Probe Data for Maintenance

Input Flows:
vehicle_env_probe_data_for_infrastructure_maint

Output Flows:
env_probe_data_for_infrastructure_repair_needs

Description:
This process shall process data collected from vehicle environmental probes (e.g., vertical acceleration data) to determine the condition of the infrastructure (e.g., pavement) and forward the information to other processes that determine roadway maintenance needs.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(a)
8.1.2.1(d)
8.1.2.1(e)

9.2.4 Manage M&C Map Data

Input Flows:
fmup-m_and_c_display_update
fmup-m_and_c_route_map_update
map_data_for_m_and_c_display
request_m_and_c_routing_map_data
request_m_and_c_status_display_update
request_m_and_c_tracking_display_update
request_m_and_c_wz_status_display_update

Output Flows:
map_data_for_m_and_c_display
map_data_for_m_and_c_routing
map_data_for_m_and_c_status_display
map_data_for_m_and_c_tracking_display
map_data_for_m_and_c_wz_status_display
tmup-request_m_and_c_display_update
tmup-request_m_and_c_route_map

Description:
This process shall provide updates to the store of digitized map data used as the background for displays of maintenance and construction activity status including work zone activities, routing maps, and vehicle fleet and equipment locations produced by processes in the Manage Maintenance and Construction function. The process shall obtain the new data from a specialist data supplier or some other appropriate data source. The process shall be able to request a map update from a specialist data supplier or some other appropriate data source.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.1
8.1.1.1.1

9.2.5 Provide M&C Center Personnel Interface for Maint

Input Flows:

alert_and_threats_for_maint_personnel
auto_treatment_system_status_for_personnel
fmccp-alert_and_threats_for_field_personnel
fmccp-archive_commands
fmccp-dispatch_and_routing_info
fmccp-emergency_plan_response
fmccp-infrastructure_sensor_control
fmccp-mdss_parameter_input
fmccp-request_for_schedule
fmccp-request_m_and_c_tracking_display_update
fmccp-resource_response
fmccp-vehicle_speed_sensor_control
fmccp-vehicle_systems_control
fmccp-wz_collection_and_distribution_parameters
fmccp-wz_device_control
m_and_c_activity_status_for_personnel
m_and_c_archive_status_to_personnel
m_and_c_emergency_response_plan_to_personnel
m_and_c_view_of_road_network_for_personnel
map_data_for_m_and_c_tracking_display
mcv_tracking_data_for_personnel
mdss_recommended_actions_for_personnel
resource_request_to_personnel
scheduled_work_plan_for_personnel
speed_data_for_m_and_c_display
vehicle_fleet_status_for_personnel
work_zone_data_for_display
work_zone_device_status_for_display
work_zone_images_for_display
work_zone_info_for_operator_display

Output Flows:

alert_and_threats_for_maint_field_personnel
center_control_of_on_board_work_zone_devices
dispatch_info_for_m_and_c_fleet
infrastructure_sensor_control_by_center_personnel
m_and_c_archive_commands_from_personnel
m_and_c_emergency_response_plan_from_personnel
maint_dec_support_parameter_updates
request_for_m_and_c_schedule
request_m_and_c_tracking_display_update
resource_response_from_personnel
routing_parameters_for_m_and_c_fleet
speed_sensor_control_from_m_and_c_personnel
tmccp-alert_and_threats_info
tmccp-archive_status
tmccp-auto_treat_status
tmccp-barrier_system_status
tmccp-emergency_response_plan
tmccp-m_and_c_activity_status
tmccp-mdss_recommended_actions
tmccp-resource_request
tmccp-scheduled_work_plan
tmccp-vehicle_fleet_status
tmccp-vehicle_speed_data
tmccp-view_of_road_network
tmccp-work_zone_images_for_display
tmccp-work_zone_info
vehicle_systems_control_by_mc_center_personnel
work_zone_data_collection_parameters
work_zone_device_operator_control
work_zone_info_distribution_parameters

Description:

This process shall manage the interface to the maintenance and construction center personnel for maintenance, construction, and work zone operations. This process shall receive inputs from the M&C Center Personnel concerning schedule and data archival parameters, dispatch information, advanced maintenance decision support parameters, control of systems on-board maintenance and construction vehicles, infrastructure sensor control information, or responses to requests from other agencies for resources. Coordination with other agencies could include the development and approval of disaster response, recovery, and evacuation plans. This process shall also display outputs to the center personnel such as work activity schedule updates, M&C fleet tracking information, environmental and road network information, maintenance decision support system recommendations, vehicle speeds and work activity status in work zones, or flashes of new requests from other management functions within ITS. This process shall also display work zone device status and work zone video images to the center personnel. Maintenance and construction activity, vehicle, and equipment status shall be presented to the M&C Center Personnel in a map-based format. This process shall receive information about potential threats or a major emergency such as a man-made disaster, civil emergency, or child abduction, alert the center personnel, and send the information to another process that will pass it along to warn field personnel.

User Service Requirements:

8.0
8.1
8.1.0
8.1.1
8.1.1.2
8.1.1.3
8.1.1.6
8.1.1.6.1
8.1.1.6.1(a)
8.1.1.6.1(b)
8.1.1.6.1(c)
8.1.2
8.1.2.1
8.1.2.1(a)
8.1.2.1(b)
8.1.2.1(c)
8.1.2.1(d)
8.1.2.1(e)
8.1.2.1(f)
8.1.2.9

9.2.6.1 Operate Roadway Automated Treatment System

Input Flows:
auto_treatment_system_control
dms_auto_treat_status_to_maint
roadway_treatment_system_status

Output Flows:
auto_treat_equip_status_for_m_and_c_from_center
auto_treatment_system_status
auto_treatment_system_status_for_archive
auto_treatment_system_status_for_personnel
dms_auto_treat_data_from_maint
roadway_treatment_system_control

Description:
This process shall remotely monitor and manage automated road treatment systems, including environmental sensor equipment and dynamic message signs (DMS) used to inform travelers of road conditions. Fault information about the automated road treatment equipment shall be collected and forwarded to another process for equipment repair. Operational status (state of the device, configuration, and fault data), including activation occurrences of roadway treatment equipment shall be collected from the roadside devices, and forwarded to other processes to inform center personnel and to assist in scheduling M&C activities. The information will also be forwarded to another process for archival.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(f)
8.1.2.9

9.2.6.2 Control Roadway Automated Treatment System

Input Flows:
env_sensor_data_for_auto_treat_device
f_other_rw_env_sensor_data_for_auto_treat_device
roadway_treatment_system_control

Output Flows:
auto_treat_equip_status_for_m_and_c
dms_auto_treat_data_from_roadway
env_sensor_control_by_auto_treat_device
roadway_treatment_system_status
t_other_rw_dms_auto_treat_data_from_roadway
t_other_rw_env_sensor_control_by_auto_treat_device

Description:
This process shall automatically treat a roadway section based on environmental or atmospheric conditions as determined from environmental sensors under its control. Treatments can be in the form of fog dispersion, anti-icing chemicals, etc. This process shall send treatment information to another function for roadway information device (e.g. dynamic message sign) display to drivers. Control information for the environmental sensor and automated treatment equipment is received from another process. Operational status (state of the device, configuration, and fault data) of the automated treatment system, including activation occurrences, is returned to that process and to another process to arrange for repair if deemed necessary.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(f)
8.1.2.9

9.2.6.3 Operate Infrastructure Monitoring Devices

Input Flows:
infrastructure_sensor_control_by_center_personnel
infrastructure_sensor_data_for_m_and_c
infrastructure_sensor_status_for_m_and_c
mcv_infrastructure_sensor_data
mcv_infrastructure_sensor_status

Output Flows:
infrastructure_data_for_archive
infrastructure_processed_data_for_repair_needs
infrastructure_sensor_control_from_m_and_c
infrastructure_sensor_equip_status_for_m_and_c_from_center
mcv_infrastructure_sensor_control
tam-infrastructure_data_for_analysis

Description:
This process shall remotely monitor and manage infrastructure sensors located both on the roadway and the maintenance and construction vehicle. Control information shall be issued to the sensor equipment, while data and status shall be collected. Sensor data, both raw and processed, detailing roadway infrastructure conditions shall be forwarded to another process which schedules repair. Similar information shall be sent to the Managed Archived Data function for archival, and to Asset Management for their records. Operational status (state of the sensor device, configuration, and fault data) about the sensors themselves shall be forwarded to another process to arrange field sensor or vehicle sensor equipment repair.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.1
8.1.2.1(e)

9.2.7 Manage M&C Archive Data

Input Flows:
auto_treatment_system_status_for_archive
field_device_status_for_archive
infrastructure_data_for_archive
m_and_c_activity_schedule_for_archive
m_and_c_activity_status_for_archive
m_and_c_archive_commands_from_personnel
m_and_c_archive_request
m_and_c_archive_status
m_and_c_data_archive
m_and_c_maint_resource_needs_for_archive
m_and_c_roadway_maint_needs_for_archive
m_and_c_winter_maint_needs_for_archive
work_zone_data_for_archive

Output Flows:
m_and_c_archive_data
m_and_c_archive_status_to_personnel
m_and_c_data_archive
tam-asset_status_update_for_asset_mgmt

Description:
This process shall process requests for maintenance and construction archive data and provide that data gathered from the roadway, traffic, and other maintenance and construction sources. Archived maintenance and construction data shall include work zone data, automated treatment system data, data about maintenance and construction resource requests and needs, activity schedules and status, and field device status. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the M&C data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data is received from an external source, or when fresh data is received. Data from this process shall also be sent to Asset Management to assist in maintaining a current record of transportation assets.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.7
8.1.2
8.1.2.10
8.1.3
8.1.3.1
8.1.3.1.3
8.1.3.1.3.2

9.2.8 Manage M&C Materials

Input Flows:
fsf-materials_status
materials_status_request

Output Flows:
materials_availability
materials_availability_for_status
tsf-materials_status_request

Description:
This process shall monitor the amount and availability of materials at storage facilities and provide that information upon request to the Status Current M&C Activities function and to the maintenance and construction resource needs manager.

User Service Requirements:
8.0
8.1
8.1.0
8.1.2
8.1.2.7

9.3.1.1 Operate Work Zone Devices

Input Flows:
barrier_system_status_to_m_and_c
dms_status_for_m_and_c
har_status_for_m_and_c
intrusion_alert_device_status
intrusion_detection_device_status
video_device_status_for_m_and_c
work_zone_device_operator_control

Output Flows:
barrier_system_control_from_m_and_c
dms_data_from_m_and_c
har_data_from_m_and_c
intrusion_alert_device_control
intrusion_detection_device_control
video_control_from_m_and_c
work_zone_device_status
work_zone_device_status_for_display

Description:
This process shall monitor, operate, and control devices located at or alongside the roadway that monitor and control traffic in areas with construction, maintenance, or utility work activities. The devices operated include driver information devices (e.g. dynamic message signs and highway advisory radio), imaging devices (e.g. closed circuit television), barriers (e.g. gates), and work zone intrusion detection and alert devices. This process shall collect the operational status (state of the device, configuration, and fault data) from each of the devices.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.3
8.1.3.3(a)
8.1.3.3(b)
8.1.3.3(c)
8.1.3.3(d)
8.1.3.4

9.3.1.2 Operate WZ Devices On-Board

Input Flows:
barrier_system_status_to_mcv
center_control_of_on_board_work_zone_devices
dms_status_for_mcv
intrusion_alert_device_status_on_board
on_board_intrusion_detection_device_status
operator_control_of_on_board_work_zone_devices

Output Flows:
barrier_system_control_from_mcv
dms_data_from_mcv
intrusion_alert_device_control_on_board
on_board_intrusion_detection_device_control
on_board_work_zone_device_status
on_board_work_zone_device_status_for_operator
td-mcv_on_board_display

Description:
This process shall monitor, operate, and control devices located on the maintenance and construction vehicle. The process shall monitor, operate, and control from a maintenance and construction vehicle devices located at or alongside the roadway in areas with construction, maintenance, or utility work activities. The devices operated on board the vehicle include driver information devices (e.g. dynamic message signs) and work zone intrusion detection and alert devices. The roadside devices operated and controlled include driver information devices (e.g., dynamic message signs) and barrier systems (e.g., automatic or remote-controlled gates).

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.3
8.1.3.3(a)
8.1.3.3(b)
8.1.3.3(c)
8.1.3.3(d)
8.1.3.4

9.3.1.3 Monitor Crew Movement

Input Flows:
fmcfp-crew_movements
work_zone_intrusion_detection_output

Output Flows:
roadside_crew_warning_given
tmcfp-work_zone_intrusion_warning

Description:
This process shall monitor the crew movements to identify when a crew member is crossing the boundary between the work zone and vehicle traffic. This process shall also be responsible for issuing an alert to the crew member that is crossing the work zone boundary. The process shall accept input from work zone intrusion detection devices and issue alerts to crew based upon knowledge of the intrusion and where the crew is located.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.4
8.1.3.5

9.3.1.4 Monitor Crew Movement On-Board

Input Flows:
fmcfp-crew_movements
fomcv-crew_movements
fomcv-work_zone_intrusion_warning_to_crew
work_zone_intrusion_detection_on_board_output

Output Flows:
tmcfp-work_zone_on_board_intrusion_warning
tomcv-crew_movements
tomcv-work_zone_intrusion_warning_to_crew
work_zone_warning_given_on_board

Description:
This process shall monitor the crew movements to identify when a crew member is crossing the boundary between a work zone and vehicle traffic. This process shall also be responsible for issuing an alert to the crew member that is crossing the work zone boundary. This process shall identify the location of crew members and place this location within a map based representation of the work zone. This map based monitoring shall be provided to the maintenance field personnel in the maintenance vehicle. The process shall accept input from work zone intrusion detection devices and issue alerts to crew or to other maintenance vehicles based upon knowledge of the intrusion and where the crew is located. The process shall send information on crew movements to other maintenance vehicles.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.4
8.1.3.5

9.3.2.1 Status Work Zone Activity

Input Flows:
work_zone_intrusion_alert_on_board
work_zone_intrusion_detected_on_board
work_zone_status_inputs
work_zone_warning_given_on_board

Output Flows:
work_zone_intrusion_warning_notification
work_zone_status_for_display
work_zone_status_from_mcv

Description:
This process shall create a view of work zone activity through inputs from field personnel and from work zone devices on-board the maintenance and construction vehicle. Field personnel inputs could include the status of maintenance or construction work, field personnel, equipment, or materials. The process shall collect inputs from work zone devices on board the maintenance and construction vehicle that monitor intrusion detection, intrusion alert, or crew movement and format these for transmission to other maintenance and construction management processes.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.3
8.1.1.3.2
8.1.1.3.2(a)
8.1.1.3.2(b)
8.1.1.3.2(c)
8.1.1.3.2(d)
8.1.3
8.1.3.2
8.1.3.2.1
8.1.3.2.1(a)
8.1.3.2.1(b)
8.1.3.2.1(c)
8.1.3.2.1(d)
8.1.3.2.1(e)
8.1.3.2.1(f)
8.1.3.2.1(g)
8.1.3.2.1(h)
8.1.3.2.1(i)
8.1.3.2.1(j)
8.1.3.2.1(k)
8.1.3.4

9.3.2.2 Collect Work Zone Data

Input Flows:

fomcm-work_zone_images
fomcm-work_zone_info
map_data_for_m_and_c_wz_status_display
on_board_work_zone_device_status
roadside_crew_warning_given
speed_data_for_status
work_zone_activity_plan
work_zone_data_collection_parameters
work_zone_device_status
work_zone_images
work_zone_intrusion_alert
work_zone_intrusion_detected
work_zone_intrusion_video_image
work_zone_intrusion_warning_notification
work_zone_status_from_mcv

Output Flows:

request_m_and_c_wz_status_display_update
status_of_other_work_zones
work_zone_data_for_archive
work_zone_data_for_display
work_zone_data_for_distribution
work_zone_data_for_status
work_zone_equip_status_for_m_and_c_from_center
work_zone_images_for_display
work_zone_images_for_distribution
work_zone_resource_status

Description:

This process shall be responsible for collecting work zone data from a variety of sources in order to develop an overall view of the work zone status that can be output to center personnel, forwarded to other processes for archival, or prepared for distribution to agencies beyond the maintenance and construction management facility collecting the data. The process shall collect both work zone activity plans and work zone status. The work zone data collected shall include video images from cameras located in or near the work zone. The work zone data collected shall also include inputs from field personnel, and inputs from work zone monitoring devices (such as intrusion detection or alert devices and speed monitoring devices) on-board the vehicle and at the roadside. The process shall collect work zone data from other maintenance and construction management entities. The process shall forward status of work zone activity collected from other maintenance and construction management entities to M&C Center Personnel. The process shall collect operational status (state of the sensor device, configuration, and fault data) of devices used in the work zone and provide to another process to arrange field equipment or on-board vehicle equipment repair.

User Service Requirements:

8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.1.3
8.1.3.1.3.2
8.1.3.2
8.1.3.2.1
8.1.3.2.1(a)
8.1.3.2.1(b)
8.1.3.2.1(c)
8.1.3.2.1(d)
8.1.3.2.1(e)
8.1.3.2.1(f)
8.1.3.2.1(g)
8.1.3.2.1(h)
8.1.3.2.1(i)
8.1.3.2.1(j)
8.1.3.2.1(k)
8.1.3.2.2

9.3.2.3 Generate Work Zone Information for Distribution

Input Flows:
work_zone_data_for_distribution
work_zone_images_for_distribution
work_zone_info_distribution_parameters

Output Flows:
tmcas-work_zone_info
tm-work_zone_images
tm-work_zone_info
tomcm-work_zone_images
tomcm-work_zone_info
work_zone_images_for_isp
work_zone_images_for_traffic
work_zone_info_for_display
work_zone_info_for_emergency
work_zone_info_for_isp
work_zone_info_for_operator_display
work_zone_info_for_traffic
work_zone_info_for_transit

Description:
This process shall process and format the work zone data into information suitable for distribution to terminators and other processes outside the maintenance and construction management function, as directed by the M&C center personnel. These include the media and other maintenance and construction management as well as processes in Manage Traffic, Manage Transit, Manage Emergency Services, and Provide Driver and Traveler Services. The process shall send work zone video images to traffic management, media, and other maintenance and construction management. Information shall also be sent to other processes for output to drivers via roadside information equipment such as dynamic message signs.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.1
8.1.3.1.1(a)
8.1.3.1.1(b)
8.1.3.1.1(c)
8.1.3.2
8.1.3.2.2
8.1.3.2.3
8.1.3.2.4
8.1.3.2.4(a)
8.1.3.2.4(b)
8.1.3.2.4(c)
8.1.3.2.4(d)
8.1.3.2.4(e)
8.1.3.3
8.1.3.3(a)
8.1.3.3(b)
8.1.3.3(c)
8.1.3.3(d)

9.3.2.4 Provide M&C Field Personnel Interface for Work Zones

Input Flows:
fmcfp-work_zone_status_inputs
on_board_work_zone_device_status_for_operator
status_of_other_work_zones
work_zone_status_for_display

Output Flows:
operator_control_of_on_board_work_zone_devices
tmcfp-work_zone_status_presentation
work_zone_status_inputs

Description:
This process shall provide an interface for M&C Field Personnel to input status of their work zone activities. This work zone status input shall include the status of maintenance or construction work, field personnel, equipment, or materials. The process shall also be responsible for providing status information to the M&C Field Personnel on devices operated or monitored from on-board the maintenance and construction vehicle. The process shall accept control inputs for those devices operated from on-board the maintenance and construction vehicle. The process shall receive status of other work zone activity for presentation to the M&C Field Personnel.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.3
8.1.1.3.2
8.1.1.3.2(a)
8.1.1.3.2(b)
8.1.1.3.2(c)
8.1.1.3.2(d)
8.1.3
8.1.3.2
8.1.3.2.1
8.1.3.2.1(a)
8.1.3.2.1(b)
8.1.3.2.1(c)
8.1.3.2.1(d)
8.1.3.2.1(e)
8.1.3.2.1(f)
8.1.3.2.1(g)
8.1.3.2.1(h)
8.1.3.2.1(i)
8.1.3.2.1(j)
8.1.3.2.1(k)

9.3.3.1 Collect Vehicle Speed

Input Flows:
env_sensor_data_for_variable_speed_limits
f_other_rw_variable_speed_limit_data
fea-speed_sensor_control
fre-environmental_conditions
From_Vehicle_Characteristics
ftrf-traffic_data
road_user_warning_speed_conditions
speed_sensor_control_from_m_and_c
speed_sensor_control_from_traffic
traffic_sensor_data_for_variable_speed_limits
variable_speed_limit_control

Output Flows:
dms_variable_speed_data_from_roadway
individual_vehicle_speed
individual_vehicle_speed_for_display
individual_vehicle_speed_for_signage
signage_variable_speed_data_from_roadway
speed_sensor_equip_status_for_m_and_c
speed_sensor_log_for_m_and_c
speed_sensor_log_for_traffic
speed_sensor_status
speed_sensor_status_for_m_and_c
speed_warning_for_display
speed_warning_for_signage
t_other_rw_individual_vehicle_speed_to_dms
t_other_rw_individual_vehicle_speed_to_signage
t_other_rw_speed_warning_to_dms
t_other_rw_speed_warning_to_signage
t_other_rw_variable_speed_limit_data
t_other_rw_variable_speed_limit_data_to_signage
tea-speed_sensor_status
variable_speed_limit_equip_status_for_m_and_c
variable_speed_limit_status

Description:
This process shall be responsible for collecting the speed of individual vehicles. The process shall accept inputs to control the speed monitoring device and return data and operational status (state of the sensor device, configuration, and fault data) to the controlling process, and to another process for repair if deemed necessary. The process shall pass the speed measurement onto other roadside devices for display to drivers, or provide individual speed information to another process for speed enforcement. The process shall receive safe speed threshold parameters based on environmental conditions and vehicle characteristics, and send a safe speed advisory to another process for display to drivers if the threshold has been exceeded. The process shall aggregate speed data to provide periodic logs of the vehicle speed.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.2

9.3.3.2 Monitor Vehicle Speed in Work Zone

Input Flows:
env_sensor_data_for_m_and_c_speed_monitoring
speed_data_for_m_and_c_speed_monitoring
speed_sensor_control_from_m_and_c_personnel
speed_sensor_log_for_m_and_c
speed_sensor_status_for_m_and_c
speed_violation_notification_for_m_and_c

Output Flows:
speed_data_for_m_and_c_display
speed_data_for_status
speed_sensor_control_from_m_and_c
tea-enforcement_request_from_m_and_c

Description:
This process shall be responsible for monitoring the speeds of vehicles traveling in a work zone. The process shall receive inputs from devices that monitor the speed of individual vehicles as well as from devices that monitor the speed of the flow of traffic. The process shall be responsible for the control of the devices that monitor individual vehicle speed. The process shall receive an input from environmental sensors at the roadway. The process shall assess, using the environmental conditions as an input, whether speed in the work zone exceeds the speed limit, or is excessive given the environmental conditions. The process shall be capable of notifying the Enforcement Agency when vehicle speeds in the work zone are in excess of the posted speed limit or are creating an unsafe condition based upon the current environmental conditions. The process shall provide safe speed threshold parameters based on environmental conditions and vehicle characteristics to another process for determining whether driver safe speed advisories should be issued. The process shall receive an input from the speed enforcement process indicating speed violations that have been identified.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.2

9.3.3.3 Manage Vehicle Speed on Roadway

Input Flows:
env_sensor_data_for_traffic_speed_monitoring
speed_data_for_traffic_speed_monitoring
speed_sensor_control_from_traffic_personnel
speed_sensor_log_for_traffic
speed_violation_notification_for_traffic
variable_speed_limit_control_from_traffic_personnel

Output Flows:
roadway_info_variable_speed_limit_data
speed_data_for_traffic_display
speed_data_for_traffic_status
speed_sensor_control_from_traffic
tea-enforcement_request_from_traffic
variable_speed_limit_control
variable_speed_limit_data_for_signage

Description:
This process shall be responsible for monitoring the speeds of vehicles, calculating optimal speed limit by lane, and adjusting speed limits to create more uniform speeds and increase safety. The process shall receive inputs from devices that monitor the speed of individual vehicles as well as from devices that monitor the speed of the flow of traffic. The process shall be responsible for the control of the devices that monitor individual vehicle speed. The process shall receive an input from environmental sensors at the roadway. The process shall assess, using the environmental conditions as an input, whether the speed exceeds the speed limit (such as in a work zone) or is excessive given the environmental conditions. The process shall pass speed measurements, variable speed limits, and other advisory information to other processes for display on a dynamic message sign or in-vehicle. The process shall be capable of notifying the Enforcement Agency when vehicle speeds are in excess of the posted speed limit or are creating an unsafe condition based upon the current environmental conditions. The process shall provide safe speed threshold parameters based on environmental conditions, traffic conditions, and vehicle characteristics to another process for determining whether driver safe speed advisories should be issued. The process shall receive an input from the speed enforcement process indicating speed violations that have been identified.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.2

9.3.3.4 Support Vehicle Speed Enforcement

Input Flows:
env_sensor_data_for_speed_enforcement
fea-enforcement_parameters
From_Vehicle_Characteristics
individual_vehicle_speed

Output Flows:
speed_violation_notification_for_m_and_c
speed_violation_notification_for_traffic
tea-speed_violation_notification

Description:
This process shall be responsible for obtaining the information needed to enforce vehicle speed limits in a work zone. The process shall associate a vehicle identification with the individual vehicle speed measured in excess of posted speed limits. The process shall provide the information on a specific vehicle that exceeds the speed limit to the Enforcement Agency. The process shall have the capability of including current environmental conditions, as measured by local environmental sensors, in its assessment of whether the vehicle speed exceeds a safe operating speed. The process shall provide information regarding speed violations to speed monitoring processes in the Manage Maintenance and Construction function. The process shall accept device control or parameter inputs from the Enforcement Agency.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.1
8.1.3.1.2

9.3.4.1 Detect Work Zone Intrusion

Input Flows:
ftrf-vehicle_presence
intrusion_detection_device_control

Output Flows:
intrusion_detection_device_status
intrusion_detection_equip_status_for_m_and_c
t_other_rw_work_zone_intrusion_detection
work_zone_intrusion_detected
work_zone_intrusion_detection
work_zone_intrusion_detection_for_on_board
work_zone_intrusion_detection_output

Description:
This process shall be responsible for detecting that a vehicle has intruded upon the boundary of a work zone. The process shall output an intrusion detection indication to other processes that provide intrusion alerts. The process shall accept inputs to control the intrusion detection device and return operational status (state of the device, configuration, and fault data) to the controlling process and to another process to arrange for repair if deemed necessary. The process shall output intrusion detection for monitoring by M&C Center Personnel.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.4

9.3.4.2 Provide Work Zone Intrusion Alert

Input Flows:
f_other_rw_work_zone_intrusion_detection
intrusion_alert_device_control
work_zone_intrusion_detection

Output Flows:
intrusion_alert_device_status
intrusion_alert_equip_status_for_m_and_c
intrusion_alert_for_in_vehicle_signing
td-work_zone_intrusion_alert
tmcfp-work_zone_intrusion_alert
work_zone_intrusion_alert

Description:
This process shall be responsible for alerting drivers that they have intruded upon the perimeter of the work zone, or are about to do so. The process shall provide alerts directly to drivers or shall send the alert to another process that provides in-vehicle signing. The process shall be responsible for alerting the Field Personnel of an actual or impending intrusion in the work zone. The alerts shall be generated when an intrusion detection indication is received from another process. The process shall accept inputs to control the intrusion alert devices and return operational status (state of the device, configuration, and fault data) to the controlling process and to another process to arrange for repair if deemed necessary.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.4

9.3.4.3 Detect Work Zone Intrusion On-Board

Input Flows:
ftrf-vehicle_presence
on_board_intrusion_detection_device_control

Output Flows:
on_board_intrusion_detection_device_status
tomcv-work_zone_intrusion_detection_on_board
work_zone_intrusion_detected_on_board
work_zone_intrusion_detection_on_board
work_zone_intrusion_detection_on_board_output

Description:
This process shall be responsible for detecting on-board a maintenance and construction vehicle that a vehicle has intruded upon the boundary of a work zone. For this process the boundary of the work zone represents an area around the maintenance and construction vehicle, which may be stationary or moving. The process shall accept inputs to control the intrusion detection device.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.4

9.3.4.4 Provide On-Board Work Zone Intrusion Alert

Input Flows:
fomcv-work_zone_intrusion_alert_on_board
fomcv-work_zone_intrusion_detection_on_board
intrusion_alert_device_control_on_board
work_zone_intrusion_detection_for_on_board
work_zone_intrusion_detection_on_board

Output Flows:
intrusion_alert_device_status_on_board
td-work_zone_intrusion_alert_from_mcv
tmcfp-work_zone_intrusion_alert_from_mcv
tomcv-work_zone_intrusion_alert_on_board
work_zone_intrusion_alert_on_board
work_zone_intrusion_alert_on_board_for_in_vehicle_signing

Description:
This process shall be responsible for alerting drivers that they have intruded upon the perimeter of the work zone as represented by an area surrounding a maintenance and construction vehicle, or are about to do so. The process shall provide alerts directly to drivers or shall send the alert to another process that provides in-vehicle signing. The process shall be responsible for alerting the Field Personnel of an actual or impending intrusion in the work zone. The alerts shall be generated when an intrusion detection indication is received from another process. The process shall accept inputs to control the intrusion alert devices.

User Service Requirements:
8.0
8.1
8.1.0
8.1.3
8.1.3.4

9.4.1 Collect Environmental Data On-Board

Input Flows:
environmental_sensor_control_for_mcv
environmental_sensor_control_on_board
environmental_sensor_data_from_roadway
environmental_sensor_status_from_roadway
fre-environmental_conditions_at_roadway

Output Flows:
environmental_sensor_control_for_roadway
environmental_sensor_data_for_roadway
environmental_sensor_data_from_mcv
environmental_sensor_data_on_board
environmental_sensor_status_from_mcv
environmental_sensor_status_on_board
tomcv-env_conditions

Description:
This process shall be responsible for collecting environmental and road condition data obtained from environmental sensors which are on-board the maintenance vehicle or are located at the roadway but are monitored on-board a maintenance and construction vehicle. The process shall be capable of accepting sensor control data. The process shall be capable of providing control signals to environmental sensors located at the roadway. The process shall be capable of providing operational status (state of the sensor device, configuration, and fault data) of the sensors on the vehicle or for roadway sensors that are monitored from the maintenance vehicle. The process shall be capable of filtering or summarizing the environmental sensor data collected on-board and sending it to the Other Maintenance and Construction Vehicle terminator for display to the operator of another vehicle. When any of the data is provided in analog form, the process shall be responsible for converting it into digital form. The converted data shall be sent to other processes for distribution, further processing and analysis, and storage.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.5
8.1.1.5(a)

9.4.2 Collect Environmental Data

Input Flows:

env_data_collection_parameters
env_probe_info_from_isp_for_maint
env_sensor_control_by_operator
environment_sensor_data_for_maint
environmental_sensor_data_from_mcv
environmental_sensor_data_from_roadway_sensors
environmental_sensor_data_from_traffic_management
environmental_sensor_status_from_mcv
environmental_sensor_status_from_roadway_sensors
fomcm-env_sensor_data
fstws-env_sensor_data_for_maint
fstws-surface_trans_weather_forecasts
fstws-surface_trans_weather_observations
fws-current_weather_observations
fws-env_sensor_data_for_maint
fws-maintenance_environment_sensor_data_status
fws-weather_forecasts
vehicle_env_probe_data_for_maint
vehicle_env_probe_status_for_maint

Output Flows:

env_and_weather_data
env_and_weather_data_for_decision_support
env_and_weather_data_for_display
env_and_weather_data_for_dissemination
env_sensor_data_for_m_and_c_speed_monitoring
env_sensor_equip_status_for_m_and_c_from_center
environment_sensor_data_for_traffic
environmental_sensor_control_for_mcv
environmental_sensor_control_for_roadway_sensors
tomcm-env_sensor_data
tstws-env_sensor_data
tstws-trans_weather_info_request
tws-env_sensor_data

Description:

This process is responsible for gathering environmental and road condition data from sensors, weather sources, and other ITS centers to support the Manage Maintenance and Construction function. The data gathered by this process shall include the outputs of environmental and road condition sensors located at the roadway or on maintenance and construction vehicles. It shall also include environmental probe data collected from ITS-equipped vehicles by short range communications equipment or ITS centers. Data gathered by this process shall include data collected from weather sources, including both the weather service and transportation weather service providers. Data gathered by this process shall include data collected from other maintenance and construction management centers. The process shall be capable of controlling environmental sensors at the roadway or on maintenance and construction vehicles. The process shall send the environmental and road condition data to other Manage Maintenance and Construction processes for display, processing, analysis, storage, and for use in anticipating needed roadway maintenance and treatment activities. The process shall collect and send environmental sensor operational status (state of the sensor device, configuration, and fault data) to other processes for equipment repair, if needed. The process shall also receive quality check information from weather service providers to assist in identifying where environmental sensors are not providing quality data.

User Service Requirements:

8.0
8.1
8.1.0
8.1.1
8.1.1.5
8.1.1.5(a)
8.1.1.6
8.1.1.6.1
8.1.1.6.1(d)
8.1.1.6.3
8.1.1.6.3(a)
8.1.1.6.3(b)
8.1.2
8.1.2.4
8.1.2.4.2
8.1.2.4.2(a)
8.1.2.4.2(b)

9.4.3 Process Environmental Data

Input Flows:
env_and_weather_data
env_data_processing_parameters
fomcm-road_weather_info

Output Flows:
env_info_for_decision_support
env_info_for_maint_needs
env_info_for_mcv_mgmt
env_info_for_road_network
env_info_for_scheduling
processed_env_info
processed_env_info_for_display
tstws-env_info
tws-env_info

Description:
This process shall receive data from the Collect Environmental Data function and shall filter, fuse, and process the many types of environmental data that are collected, as prescribed using parameters from the M&C Center Personnel. This process shall also receive road weather information from other maintenance and construction management systems. The process shall perform quality control on the data received and develop source reliability information. The process shall use the various data inputs to develop a view of current and predicted road weather and road conditions. This processed environmental information shall be forwarded to another process for dissemination to other agencies. The information shall be provided to the weather service and the surface transportation weather service. The information shall be provided to other Manage Maintenance and Construction processes for use in determining treatment needs, for providing decision support, and for scheduling maintenance and construction activities.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.1
8.1.1.6.1(d)
8.1.1.6.2
8.1.2
8.1.2.4
8.1.2.4.1
8.1.2.4.5

9.4.4 Disseminate Environmental Information

Input Flows:
env_and_weather_data_for_dissemination
env_info_dissemination_parameters
processed_env_info

Output Flows:
env_info_for_display
road_weather_info_for_emergency
road_weather_info_for_isp
road_weather_info_for_traffic
road_weather_info_for_transit
tm-road_weather_info
tomcm-road_weather_info
tro-road_weather_info

Description:
This process shall be responsible for disseminating environmental and road weather information to other functions, including Manage Traffic, Manage Transit, Manage Emergency Services, and Provide Driver and Traveler Services. The process shall disseminate current and forecasted road weather and road condition information. The process shall filter, aggregate and/or format the information received from the Process Environmental Data and Collect Environmental Data processes so that the information is appropriate for distribution external to the Manage Maintenance and Construction function. This environmental information is based on data collected from maintenance vehicle on-board sensors, roadside short range communications equipment that collects environmental probe data from ITS-equipped vehicles, roadside sensors, sensors owned by other agencies, and data from weather service and surface transportation weather service sources.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.2
8.1.2
8.1.2.4
8.1.2.4.1

9.4.5 Provide M&C Center Personnel Interface for Environment

Input Flows:
env_and_weather_data_for_display
env_info_for_display
fmccp-env_data_collection_inputs
fmccp-env_data_processing_inputs
fmccp-env_info_dissemination_inputs
fmccp-env_sensor_control_inputs
processed_env_info_for_display

Output Flows:
env_data_collection_parameters
env_data_processing_parameters
env_info_dissemination_parameters
env_sensor_control_by_operator
tmccp-env_and_weather_data
tmccp-env_info_for_dissemination
tmccp-processed_env_info

Description:
This process shall present environmental and road weather information to the M&C Center Personnel based on processing parameters input by that operator. This represents the operator display for the environmental and road weather information that is collected, processed, and disseminated by the Manage Maintenance and Construction function. The information is based on data collected via maintenance vehicle on-board sensors, roadside short range communications equipment that collects environmental probe data from ITS-equipped vehicles, roadside sensors, vehicle probe data from other ITS centers, and weather service providers.

User Service Requirements:
8.0
8.1
8.1.0
8.1.1
8.1.1.6
8.1.1.6.2
8.1.1.6.3
8.1.1.6.3(a)
8.1.1.6.3(b)
8.1.2
8.1.2.4
8.1.2.4.1
8.1.2.4.2
8.1.2.4.2(a)
8.1.2.4.2(b)

10 Satisfy Implementation Requirements

Input Flows:
NONE

Output Flows:
NONE

Description:
This process represents the physical implementation of functions and communications links that are required by the architecture. It has no data flows or logical functions but is needed to meet the User Service Requirements (USR's).

User Service Requirements:
1.0
1.4
1.4.0
1.4.2
1.4.2.2
2.0
2.1
2.1.0
2.1.4
2.1.4.5
2.3
2.3.0
2.3.4
2.3.4.1
4.0
4.5
4.5.0
4.5.3
4.5.3.5