Data Element

Name SCP-LoggedEventType

Identifier tspdd 108

Purpose Identify the type of a signal priority related event in an event log.

Usage

Definition

```
ENUMERATED
{
priority-request (1),          --priority request message to PRS
priority-request-ack (2),   --to PRG
priority-update     (3),       --priority update message to PRS
priority-update-ack (4),    --to PRG
priority-control (5),          --priority status control message to PRS
priority-control-ack (6),    --to PRG
priority-buffer      (7),       --priority status buffer message to PRS
priority-buffer-response (8),   --to PRG
priority-cancel (9),           --priority request cancellation message to PRS
priority-cancel-ack (10),   --to PRG
priority-clear (11),           --priority request clear message to PRS
priority-clear-ack (12),     --to PRG
priority-request-grant (21),
priority-request-deny (22),
priority-request-downgrade (23),
priority-request-preempted (24),
priority-request-cleared (25), --from table
green-phase-begin (26),
green-phase-end (27),
vehicle-arrival-at-queue (51),
vehicle-arrival-at-stopbar (52),
vehicle-clear-intersection (53),
vehicle-delay-detected (54),
vehicle-diversion-detected (55)
}
```

Data Element

Name SCP-NTCIP-1211-Scenario

Identifier tspdd 101

Purpose Define which of four NTCIP 1211 defined scenarios is to be used at a given intersection.

Usage

Definition

ENUMERATED
{
scenario1 (1),--per NTCIP 1211
scenario2 (2),--per NTICP 1211
scenario3 (3),--per NTCIP 1211
scenario4 (4),--message based per NTCIP 1211
scenario5 (5),
scenario4 optical (104)
}

Data Element

Name SCP-PriorityRequestID

Identifier tspdd 104

Purpose Provide a unique identifier (from the PRG's perspective) for a signal priority request.

Usage This data element corresponds exactly to the "Priority Request ID" defined in NTCIP 1211.

Definition UBYTE

Data Element

Name SCP-PriorityStrategyNumber

Identifier tspdd 100

Purpose Provide a locally defined 1-byte priority strategy variable, consistent with the strategy number definition of NTCIP 1211.

Usage

Definition UBYTE

Data Element

Name	SCP-StatusCodeForPRG
Identifier	tspdd 111
Purpose	Provide the status code for a priority request from the PRS to the PRG.
Usage	This data element is intended to exactly match the data element "PriorityRequestStatusCodeForPRG" defined in NTCIP 1211.
Definition	UBYTE

Data Element

Name	SCP-StatusForPRG
Identifier	tspdd 110
Purpose	Provide the status of a table entry for a priority request from the PRS to the PRG.
Usage	This data element is intended to exactly match the data element "PriorityRequestStatusForPRG" defined in NTCIP 1211.
Definition	UBYTE

Data Element

Name SCP-TimeInterval

Identifier tspdd 105

Purpose Define a time interval in seconds into the future at which a signal priority event (e.g. arrival at the stop bar, or clearance of the intersection) is predicted to occur.

Usage This data element corresponds exaclty to either of the elements "PriorityRequestTimeOfServiceDesired" or "PriorityRequestTimeOfEstimatedDeparture". Defined in NTCIP 1211.

Definition USHORT

Data Element

Name	SCP-VehicleClassLevel
Identifier	tspdd 119
Purpose	Identify a vehicle level within a class to a Priority Request Server as part of a signal priority request.
Usage	This data element corresponds exactly to "PriorityRequestVehicleClassLevel" as defined in NTCIP 1211. The allowed range of values is 1..10.
Definition	UBYTE

Data Element

Name	SCP-VehicleClassType
Identifier	tspdd 106
Purpose	Identify a vehicle class to a Priority Request Server as part of a signal priority request.
Usage	This data element corresponds exactly to "PriorityRequestVehicleClassType" as defined in NTCIP 1211. The allowed range of values is 1..10.
Definition	UBYTE

Data Element

Name	TSP-ApproachID
Identifier	tspdd 116
Purpose	A unique identifier for an approach to a specified intersection.
Usage	The value zero is used to signify all approaches.
Definition	IDENS

Data Element

Name TSP-ArrivalTime

Identifier tspdd 117

Purpose Define the schedule, expected, earliest, or latest arribal time of a PTV at an intersection.

Usage

Definition SCHTIME

Data Element

Name TSP-BoundaryID

Identifier tspdd 115

Purpose A unique numeric identifier for a geographical boundary related to an intersection for signal priority usage.

Usage

Definition IDENS

Data Element

Name TSP-DropAddr

Identifier tspdd 114

Purpose A layer-2 address for an intersection on a multidrop communications path

Usage

Definition UBYTE

Data Element

Name TSP-IntersectionPath

Identifier tspdd 109

Purpose Used to identify the path that a transit vehicle wants to follow through an intersection.

Usage In NTCIP Scenario #3, the TMC requires this information from the transit control center to generate priority requests on behalf of the transit fleet. Value 0 is reserved. Values 1-8 are "normal" and diagonal moves. Values 9-100 are reserved. Values 101-200 are for local use. Values 201-255 are reserved.

Definition

```
ENUMERATED
{
straight-thru (1), --approximately 0 degree turn
right-turn (2),          --approximately +90 degree turn
left-turn (3),       --approximately -90 degree turn
u-turn (4),          --approximately 180 degree turn
diag-right-turn (5),    --approximately +45 degree turn
diag-left-turn (6),--approximately -45 degree turn
sharp-right-turn (7),  --approximately +135 degree turn
sharp-left-turn (8),    --approximately -135      degree turn
}
```

Data Element

Name TSP-ModemPhoneNum

Identifier tspdd 112

Purpose The telephone number of a modem to access an intersection controller.

Usage

Definition TELEPHONE

Data Element

Name	TSP-TMS-IntersectionID
Identifier	tspdd 113
Purpose	A Unique numeric identifier for an intersection.
Usage	
Definition	IDENL

Data Frame

Name SCPApproachAbandoned

Identifier tsp 1007

Purpose This frame provides information about a vehicle that was approaching an intersection as a signal priority generation candidate, but has now diverted, stopped, or otherwise abandoned its approach to the intersection.

Usage

Definition

```
SEQUENCE {
vehicle              CPT-VIN,
intersection         TMDD.Intersection-identifier,
time-abandoned       CPT-DateTime                  OPTIONAL
}
```

Data Frame

Name SCPIntersectionPass

Identifier tsp 1001

Purpose Provide the information required for the onboard Priority Request Generator to process a passage through an intersection as part of a pattern.

Usage The intersection-id field optionally allows a TMDD-compatible intersection identifier to be associated with the intersection. The intersection-address, and intersection-port fields optionally allow communications address information to be conveyed. The approach-direction and depart-direction provide optional information which may assist the PRG in accurately determining when the vehicle is approaching the stop bar, and clears the intersection. The decision-distance field is used to override the default decision distance (at which a priority request decision is made) for this intersection only. The scenario-number field indicates whether the PRG communicates with the PRS: directly (4), through the control center (1), or not at all (2 or 3). The strategies field contains the available priority strategies for this intersection, and the criteria that must be met to request each strategy. The clear-required field indicates whether the PRG should explicitly send a priority clear (TRUE), or allow the PRS to delete the priority request based on a timeout (FALSE).

Definition

```
SEQUENCE {
intersection-address      CPT-IP-Address                          OPTIONAL,
intersection-port         CPT-UDP-TCP-PortNumber                  OPTIONAL,
stop-bar-location         LRMS.GeoLocation,
approach-direction        SP-AngularDirection                     OPTIONAL,
depart-direction          SP-AngularDirection                     OPTIONAL,
decision-distance         SP-DistanceInMeters                     OPTIONAL,
clear-required            CPT-Boolean,
scenario-number           SCP-NTCIP-1211-Scenario,
strategies                SEQUENCE (SIZE(1..20)) OF SCPStrategyCriteria
}
```

Data Frame

Name SCPIntersectionPattern

Identifier tsp 1000

Purpose Provide the information required to implement signal priority for the equipped intersections in a pattern.

Usage If the pattern includes more than one pass through the same intersection, there must be two entries in the intersections field. Intersections must be included in the order in which they are traversed when the bus executes the pattern.

Definition

```
SEQUENCE {
pattern-id          SCH-PatternID,
intersections       SEQUENCE (SIZE(1..1000)) OF SCPIntersectionPass
}
```

Data Frame

Name SCPStrategyCriteria

Identifier tsp 1002

Purpose Define a signal priority strategy available for use at an intersection, and the criteria that must be met for that strategy to be requested.

Usage

The strategy in this frame may be requested at the intersection specified in the ScpIntersectionPass frame, based on this frame only if all criteria fields that are present are satisfied. It is an error for the criteria to be defined in such a way that more than one set of criteria is met on any single pass through an intersection. Any criteria fields that are not included in the frame, are not considered in determining whether the strategy may be requested.

The earliest-time-of-day, and latest-time-of-day fields, if present, limit the PRG to requesting this strategy only if the current time is within the specified interval. The day-types-allowed field, if present, constrains the PRG to request the strategy only if the current day type matches an item in the list. The minimum-passengers-onboard, and maximum-passengers-onboard field constrain the PRG to request the strategy only if the current passenger loading is within the specified range.

The trip-types-allowed field, if present, constrains the PRG to request the strategy only if the vehicle's current status matches one of the items in the list. The earliest-adherence-allowed field if present precludes the PRG from requesting the strategy if the vehicle is earlier than the indicated amount. The latest-adherence-allowed field, if present, precludes the PRG from requesting the strategy if the vehicle is later than the indicated amount. Note that a strategy can be assigned for use by a sypervisory vehicle by including the vehicle class field with the appropriate supervisory vehicle class, and omitting all other optional fields in an instance of this frame.

Definition

```
SEQUENCE {
strategy-number                 SCP-PriorityStrategyNumber,
earliest-time-of-day            SCH-TimeBegin                                   OPTIONAL,
latest-time-of-day              SCH-TimeEnd                                     OPTIONAL,
day-types-allowed               SEQUENCE (SIZE(1..20)) OF SCH-DayType           OPTIONAL,
minimum-passengers-onboard      OB-J1587-PassengerCounterPatronCount            OPTIONAL,
 maximum-passengers-onboard     OB-J1587-PassengerCounterPatronCount            OPTIONAL,
 trip-types-allowed             SEQUENCE (SIZE(1..20)) OF SCH-TripType          OPTIONAL,
earliest-adherence-allowed      OB-ScheduleAdherenceOffset                      OPTIONAL,
latest-adherence-allowed        OB-ScheduleAdherenceOffset                      OPTIONAL,
vehicle-class SEQUENCE (SIZE(1..10)) OF SCP-VehicleClassType            OPTIONAL
}
```

Data Frame

Name TSPAllowedIntersection

Identifier tsp 1010

Purpose Define an allowed intersection, approach, boundary combintaion for a specified TSP strategy.

Usage If the "allowed-approaches" field is missing then all approaches are allowed. Either intersection-tsp or intersection-tmdd must be present.

Definition

```
SEQUENCE {
intersection-tsp      TSP-TMS-IntersectionID                      OPTIONAL,
intersection-tmdd     TMDD.Intersection-identifier                OPTIONAL,
allowed-approaches SEQUENCE (SIZE(1..10)) OF TSP-ApproachID       OPTIONAL
}
```

Data Frame

Name TSPBoundaryEntry

Identifier tsp 1012

Purpose Provide a boundary definition. The boundary is used to specify limits wihtin which signal priority is allowed for an intersection or group of intersections.

Usage

Definition

```
SEQUENCE {
boundaryID          TSP-BoundaryID,
boundaryPolygon     LRMS.PolygonType
}
```

Data Frame

Name TSPEventLogEntry

Identifier tsp 1005

Purpose Convey information about a signal priority logged event.

Usage This data frame is used for both PRS and PRG transfers of signal priority event history to the transit control center, or data repository. Optional fields are included if applicable to the event type specified in the frame.Normally the PRS will use the strategy employed field and not the actual-wait-time field, and vice versa for the PRG.

Definition

```
SEQUENCE {
event-type                  SCP-LoggedEventType,
event-time                  CPT-DateTime,
 intersection-tsp           TSP-TMS-IntersectionID          OPTIONAL,
intersection-tmdd           TMDD.Intersection-identifier    OPTIONAL,
requestID                   SCP-PriorityRequestID           OPTIONAL,
vehicleID                   CPT-VIN                         OPTIONAL,
vehicleClassType            SCP-VehicleClassType            OPTIONAL,
serviceStrategyNumber       SCP-PriorityStrategyNumber      OPTIONAL,
timeOfServiceDesired        SCP-TimeInterval                OPTIONAL,
timeOfEstimatedDeparture    SCP-TimeInterval                OPTIONAL,
preemption-vehicle          CPT-VIN                         OPTIONAL,
actual-wait-time            SCP-TimeInterval                OPTIONAL,
strategyEmployed            SCP-PriorityStrategyNumber      OPTIONAL
}
```

Data Frame

Name TSPIntersectionEntry

Identifier tsp 1008

Purpose Provide intersection information in the data load for a PRG.

Usage

Definition

```
SEQUENCE {
intersection-tsp          TSP-TMS-IntersectionID                    OPTIONAL,
intersection-tmdd         TMDD.Intersection-identifier              OPTIONAL,
boundaryID                TSP-BoundaryID,
intersectionIP            CPT-IP-Address                            OPTIONAL,
intersectionPort          CPT-UDP-TCP-PortNumber                    OPTIONAL,
intersectionModem         TSP-ModemPhoneNum                         OPTIONAL,
intersectionDropAddr      TSP-DropAddr                              OPTIONAL,
intersection-approaches   SEQUENCE (SIZE(1..10))OF TSPTmsIntersectionApproach
}
```

Data Frame

Name TSPPRGInputsCCEntry

Identifier tsp 1014

Purpose Provides a single PRGInputs set for a fixed PRG.

Usage

Definition

```
SEQUENCE {
status              TSPStatus,
vehicle             CPT-VIN,
block               SCH-BlockID,
intersectionParam   TSPTmsIntersectionParam
}
```

Data Frame

Name TSPScenario5Intersection

Identifier Tsp 1017

Purpose Provide information about a scenario 5 equipped intersection to the VLU.

Usage

Definition

```
SEQUENCE {
intersectionTSP          TSP-TMS-IntersectionID                          OPTIONAL,
intersectionTMDD         TMDD.Intersection-identifier                    OPTIONAL,
intersection-location    LRMS.GeoLocation,
stop-bar-locations       SEQUENCE (SIZE(1..8)) OF LRMS.GeoLocation,
prg-address              CPT-IP-Address                                  OPTIONAL,
prg-port                 CPT-UDP-TCP-PortNumber                          OPTIONAL
}
```

Data Frame

Name TSPScheduleEntry

Identifier tsp 1011

Purpose Provide information about a PTV's schedule approach to an intersection.

Usage If scheduledArrival is not present, then the agency does not schedule individual intersection arrival times.

Definition

```
SEQUENCE {
boundaryID          TSP-BoundaryID,
boundaryPolygon     LRMS.PolygonType
}
```

Data Frame

Name TSPStatus

Identifier tsp 1013

Purpose Near-real-time operating status of a PTV input to a PRG.

Usage Negative adherence offset signifies early. The doorStatusOpen field signifies at least one door is open if true. The requestCancel field signifies that any previous request should be cancelled if true.

Definition

```
SEQUENCE {
scheduleDeviation       OB-ScheduleAdherenceOffset,
currentLocation         SPGeoDynamicPoint,
currentTime             CPT-DateTime,
doorStatusOpen          CPT-Boolean,
requestCancel           CPT-Boolean
}
```

Data Frame

Name TSPStrategyEntry

Identifier tsp 1009

Purpose Define the constraints that must be met to use a specific TSP strategy for an intersection or group of intersections.

Usage Absent fields do not constrain the use of the strategy. For example if the "strategyTimeBegin" field absent then there is no earliest time to implement the strategy. If there are no "allowed-intersections" then all intersection are allowed.

Definition

```
SEQUENCE {
resultantStrategyID      SCP-PriorityStrategyNumber,
resultantClassType       SCP-VehicleClassType,
resultantClassLevel      SCP-VehicleClassLevel,
strategyTimeBegin        TSP-ArrivalTime                                OPTIONAL,
strategyTimeEnd          TSP-ArrivalTime                                OPTIONAL,
schLateMinimum           OB-ScheduleAdherenceOffset                     OPTIONAL,
schLateMaximum           OB-ScheduleAdherenceOffset                     OPTIONAL,
schRecoveryMinimum       OB-ScheduleAdherenceOffset                     OPTIONAL,
prgLoadMinimum           OB-J1587-PassengerCounterPatronCount           OPTIONAL,
travelPath               TSP-IntersectionPath     OPTIONAL,
allowed-boundaries       SEQUENCE (SIZE(1..10000)) OF TSP-BoundaryID,
allowed-intersections    SEQUENCE (SIZE(1..10000)) OF TSPAllowedIntersection  OPTIONAL
}
```

Data Frame

Name TSPTmsIntersectionApproach

Identifier TSP 1016

Purpose Define parameters related to an approach to an intersection by a PTV.

Usage

Definition

```
SEQUENCE {
approachID              TSP-ApproachID,
approachAngle           SP-AngularDirection,
departAngle             SP-AngularDirection,
travelPath              TSP-IntersectionPath,
stopBarLocation         LRMS.GeoLocation            OPTIONAL,
requestBeginLocation    LRMS.GeoLocation            OPTIONAL,
requestEndLocation      LRMS.GeoLocation            OPTIONAL,
requestCancelLocation   LRMS.GeoLocation            OPTIONAL,
allowedStrategies       SEQUENCE (SIZE(1..10)) OF SCP-PriorityStrategyNumber
}
```

Data Frame

Name TSPTmsIntersectionParam

Identifier tsp 1015

Purpose Convey information about an itersection for use by PRG.

Usage At least one of te intersection-tsp or intersection-tmdd fields must be present.

Definition

```
SEQUENCE {
intersection-tsp        TSP-TMS-IntersectionID                      OPTIONAL,
intersection-tmdd       TMDD.Intersection-identifier                OPTIONAL,
boundary                TSP-BoundaryID                              OPTIONAL,
intersectionIP          CPT-IP-Address                              OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber                      OPTIONAL,
intersectionModem       TSP-ModemPhoneNum                           OPTIONAL,
intersectionDropAddr    TSP-DropAddr                                OPTIONAL,
approaches              SEQUENCE (SIZE(1..25)) OF TSPTmsIntersectionApproach OPTIONAL
}
```

Message

Name ScpEventLog

Identifier Tsp 2014

Purpose Provide an event log for signal priority requests from the Traffic Management Center to the transit Control Center or data repository.

Usage The begin-time, and end-time fields specify the time interval for which logged information is provided. The intersections-list field or the intersection tsp field specifies the list of intersections for which log information is provided. If there is no log data for the specified interval, the intersection-list, intersection-tsp, and event-log fields are omitted.

Definition

```
SEQUENCE {
subscriptionInfo    CPTSubscriptionHeader,
begin-time          CPT-DateTime,
end-time            CPT-DateTime,
intersections-tsp   SEQUENCE(SIZE(1..100000)) OF TSP-TMS-IntersectionID,
intersections-tmdd  SEQUENCE(SIZE(1..100000)) OF TMDD.Intersection-identifier   OPTIONAL,
intersection-ids    SEQUENCE(SIZE(1..100000)) OF TSP-TMS-IntersectionID         OPTIONAL,
event-log           SEQUENCE(SIZE(1..1000000))OF TSPEventLogEntry
}
```

Message

Name ScpEventLogSub

Identifier Tsp 2015

Purpose Request an event log for signal priority events from the Traffic Management Center.

Usage The begin-time and end-time fields are used to specify the time interval for which history data is requested. The intersection-tsp, or intersection-tmdd field specifies the list of intersections for which history data is requested, omission of this field signifies "all intersections".

Definition

```
SEQUENCE {
subscriptionInfo    CPTSubscriptionHeader,
begin-time          CPT-DateTime,
end-time            CPT-DateTime,
intersections-tsp   SEQUENCE(SIZE(1..100000))OF TSP-TMS-IntersectionID        OPTIONAL,
intersections-tmdd  SEQUENCE(SIZE(1..100000))OF TMDD.Intersection-identifier  OPTIONAL
}
```

Message

Name ScpPriorityCancel

Identifier Tsp 2002

Purpose Instruct the PRS to cancel a previously requested priority request.

Usage For transmission to the PRS, this is an Octet Encoding Rules (OER) string of size 21. This message equates to the prgPriorityCancel defined in NTCIP 1211. The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID               SCP-PriorityRequestID, --1octet
vehicleID               CPT-VIN,               --17octets
vehicleClassType        SCP-VehicleClassType, --1octet
vehicleClassLevel       SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber   SCP-PriorityStrategyNumber,        --1octet
intersectionID          TSP-TMS-IntersectionID              OPTIONAL,
intersectionModem       TSP-ModemPhoneNum                   OPTIONAL,
intersectionDropAddr    TSP-DropAddr                        OPTIONAL,
intersectionIP          CPT-IP-Address                      OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber              OPTIONAL,
intersectionIdentifier  TMDD.Intersection-identifier        OPTIONAL
}
```

Message

Name ScpPriorityCancelAck

Identifier Tsp 2003

Purpose Acknowledge a cancellation of a priority request.

Usage For transmission from the PRS, this is an Octet Encoding Rules (OER) string of size 21. The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID               SCP-PriorityRequestID, --1octet
vehicleID               CPT-VIN,               --17octets
vehicleClassType        SCP-VehicleClassType, --1octet
vehicleClassLevel       SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber   SCP-PriorityStrategyNumber,        --1octet
intersectionID          TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem       TSP-ModemPhoneNum              OPTIONAL,
intersectionDropAddr    TSP-DropAddr                    OPTIONAL,
intersectionIP          CPT-IP-Address                  OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber     OPTIONAL,
intersectionIdentifier  TMDD.Intersection-identifier    OPTIONAL
}
```

Message

Name ScpPriorityClear

Identifier Tsp 2012

Purpose Notify the PRS that the vehicle has cleared the intersection and that the priority request can be cleared from the table.

Usage For transmission to the PRS, this is an Octet Encoding Rules (OER) string of size 21. This message equates prgPriorityClear defined in NTCIP 1211.The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID               SCP-PriorityRequestID, --1octet
vehicleID               CPT-VIN,               --17octets
vehicleClassType        SCP-VehicleClassType, --1octet
vehicleClassLevel       SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber   SCP-PriorityStrategyNumber,        --1octet
intersectionID          TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem       TSP-ModemPhoneNum              OPTIONAL,
intersectionDropAddr    TSP-DropAddr                    OPTIONAL,
intersectionIP          CPT-IP-Address                  OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber     OPTIONAL,
intersectionIdentifier  TMDD.Intersection-identifier    OPTIONAL
}
```

Message

Name ScpPriorityClearAck

Identifier Tsp 2001

Purpose Acknowledge a priority clear.

Usage For transmissions from the PRS, this is an Octet encoding rules (OER) string of size 21. the optional fields are for use only between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID               SCP-PriorityRequestID, --1octet
vehicleID               CPT-VIN,               --17octets
vehicleClassType        SCP-VehicleClassType, --1octet
vehicleClassLevel       SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber   SCP-PriorityStrategyNumber,        --1octet
intersectionID          TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem       TSP-ModemPhoneNum              OPTIONAL,
intersectionDropAddr     TSP-DropAddr                   OPTIONAL,
intersectionIP          CPT-IP-Address                  OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber      OPTIONAL,
intersectionIdentifier  TMDD.Intersection-identifier    OPTIONAL
}
```

Message

Name ScpPriorityRequest

Identifier Tsp 2011

Purpose Request priority treatment for a transit vehicle from a traffic signal.

Usage For transmission to the PRS this is an Octet Encoding Rules (OER) string of size 25. The requestID field is assigned by the PRG. This message equates to the prgPriorityRequest defined in NTCIP 1211.

Definition

```
SEQUENCE {
requestID                 SCP-PriorityRequestID, --1octet
vehicleID                 CPT-VIN,               --17octets
vehicleClassType          SCP-VehicleClassType, --1octet
vehicleClassLevel         SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber     SCP-PriorityStrategyNumber,          --1octet
timeOfServiceDesired      SCP-TimeInterval,       --2octets
timeOfEstimatedDeparture  SCP-TimeInterval,       --2octets
intersectionID            TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem         TSP-ModemPhoneNum         OPTIONAL,
intersectionDropAddr      TSP-DropAddr                OPTIONAL,
intersectionIP            CPT-IP-Address              OPTIONAL,
intersectionPort          CPT-UDP-TCP-PortNumber      OPTIONAL,
intersectionIdentifier    TMDD.Intersection-identifier    OPTIONAL
}
```

Message

Name ScpPriorityRequestAck

Identifier Tsp 2010

Purpose Acknowledge a priority request

Usage

For transmission from the PRS this is an Octet Encoding Rules (OER) string of size 25.The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID                SCP-PriorityRequestID, --1octet
vehicleID                CPT-VIN,               --17octets
vehicleClassType         SCP-VehicleClassType, --1octet
vehicleClassLevel        SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber    SCP-PriorityStrategyNumber,          --1octet
timeOfServiceDesired     SCP-TimeInterval,        --2octets
timeOfEstimatedDeparture SCP-TimeInterval,        --2octets
intersectionID           TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem        TSP-ModemPhoneNum              OPTIONAL,
intersectionDropAddr     TSP-DropAddr                    OPTIONAL,
intersectionIP           CPT-IP-Address                  OPTIONAL,
intersectionPort         CPT-UDP-TCP-PortNumber     OPTIONAL,
intersectionIdentifier   TMDD.Intersection-identifier     OPTIONAL
}
```

Message

Name ScpPriorityUpdate

Identifier Tsp 2009

Purpose Request a modification to a previously sent priority request.

Usage For transmission to the PRS, this is an Octet Encoding Rules (OER) string of size 25. This message equates to the prgPriorityUpdate defined in NTCIP 1211. The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID                 SCP-PriorityRequestID, --1octet
vehicleID                 CPT-VIN,               --17octets
vehicleClassType          SCP-VehicleClassType, --1octet
vehicleClassLevel         SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber     SCP-PriorityStrategyNumber,          --1octet
timeOfServiceDesired      SCP-TimeInterval,        --2octets
timeOfEstimatedDeparture  SCP-TimeInterval,        --2octets
intersectionID            TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem          TSP-ModemPhoneNum         OPTIONAL,
intersectionDropAddr      TSP-DropAddr                 OPTIONAL,
intersectionIP            CPT-IP-Address               OPTIONAL,
intersectionPort          CPT-UDP-TCP-PortNumber       OPTIONAL,
intersectionIdentifier    TMDD.Intersection-identifier OPTIONAL
}
```

Message

Name ScpPriorityUpdateAck

Identifier Tsp 2008

Purpose Acknowledge a modification to a previously sent priority request.

Usage For transmission from the PRS, this is an Octet Encoding Rules (OER) string of size 25. The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID                 SCP-PriorityRequestID, --1octet
vehicleID                 CPT-VIN,               --17octets
vehicleClassType          SCP-VehicleClassType, --1octet
vehicleClassLevel         SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber     SCP-PriorityStrategyNumber,          --1octet
timeOfServiceDesired      SCP-TimeInterval,        --1octet
timeOfEstimatedDeparture  SCP-TimeInterval,        --1octet
intersectionID            TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem         TSP-ModemPhoneNum              OPTIONAL,
intersectionDropAddr      TSP-DropAddr                    OPTIONAL,
intersectionIP            CPT-IP-Address                  OPTIONAL,
intersectionPort          CPT-UDP-TCP-PortNumber     OPTIONAL,
intersectionIdentifier    TMDD.Intersection-identifier     OPTIONAL
}
```

Message

Name ScpStatusBuffer

Identifier Tsp 2004

Purpose Provide a status buffer for the PRS to use to return the status of a previously sent priority request. This message equates to the prgPriorityStatusBuffer defined in NTCIP 1211.

Usage For transmission to the PRS, this is an Octet Encoding Rules (OER) string of size 23. This message equates to the prgPriorityStatusBuffer defined in NTCIP 1211.The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID               SCP-PriorityRequestID, --1octet
vehicleID               CPT-VIN,               --17octets
vehicleClassType        SCP-VehicleClassType, --1octet
vehicleClassLevel       SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber   SCP-PriorityStrategyNumber,         --1octet
statusForPRG            SCP-StatusForPRG,          --1octet
statusCodeForPRG        SCP-StatusCodeForPRG,   --1octet
intersectionID          TSP-TMS-IntersectionID          OPTIONAL,
intersectionModem       TSP-ModemPhoneNum              OPTIONAL,
intersectionDropAddr    TSP-DropAddr                    OPTIONAL,
intersectionIP          CPT-IP-Address                  OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber     OPTIONAL,
intersectionIdentifier  TMDD.Intersection-identifier    OPTIONAL
}
```

Message

Name ScpStatusBufferResponse

Identifier Tsp 2005

Purpose Provide the status to the PRG of a previously sent priority request.

Usage For transmission from the PRS, this is an Octet Encoding Rules (OER) string of size 23. The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID               SCP-PriorityRequestID, --1octet
vehicleID               CPT-VIN,               --17octets
vehicleClassType        SCP-VehicleClassType, --1octet
vehicleClassLevel       SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber   SCP-PriorityStrategyNumber,        --1octet
statusForPRG            SCP-StatusForPRG,          --1octet
statusCodeForPRG        SCP-StatusCodeForPRG,   --1octet
intersectionID          TSP-TMS-IntersectionID        OPTIONAL,
intersectionModem       TSP-ModemPhoneNum            OPTIONAL,
intersectionDropAddr    TSP-DropAddr                  OPTIONAL,
intersectionIP          CPT-IP-Address                OPTIONAL,
intersectionPort        CPT-UDP-TCP-PortNumber        OPTIONAL,
intersectionIdentifier  TMDD.Intersection-identifier  OPTIONAL
}
```

Message

Name ScpStatusControl

Identifier Tsp 2007

Purpose Request the PRS to prepare to provide status for a previously sent priority request.

Usage For transmission to the PRS, this is an Octet Encoding Rules (OER) string of size 21. This message equates to the prgPriorityStatusControl defined in NTCIP 1211.The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID                SCP-PriorityRequestID, --1octet
vehicleID                CPT-VIN,               --17octets
vehicleClassType         SCP-VehicleClassType, --1octet
vehicleClassLevel        SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber    SCP-PriorityStrategyNumber,         --
1octet,intersectionAddress CPT-IP-address              OPTIONAL,
intersectionID           TSP-TMS-IntersectionID        OPTIONAL,
intersectionModem        TSP-ModemPhoneNum            OPTIONAL,
intersectionDropAddr     TSP-DropAddr                  OPTIONAL,
intersectionIP           CPT-IP-Address                OPTIONAL,
intersectionPort         CPT-UDP-TCP-PortNumber        OPTIONAL,
intersectionIdentifier   TMDD.Intersection-identifier  OPTIONAL
}
```

Message

Name ScpStatusControlAck

Identifier Tsp 2006

Purpose Acknowledge a request to prepare to provide status for a previously sent priority request.

Usage For transmission from the PRS this is an Octet Encoding Rules (OER) string of size 25.The optional fields are for use ONLY between the CC and the PRG in Scenario #1 only. These fields are not included in messages to and from the PRS.

Definition

```
SEQUENCE {
requestID                SCP-PriorityRequestID, --1octet
vehicleID                CPT-VIN,               --17octets
vehicleClassType         SCP-VehicleClassType, --1octet
vehicleClassLevel        SCP-VehicleClassLevel,     --1octet
serviceStrategyNumber    SCP-PriorityStrategyNumber,          --
1octet,intersectionAddress CPT-IP-address              OPTIONAL,
intersectionID           TSP-TMS-IntersectionID        OPTIONAL,
intersectionModem        TSP-ModemPhoneNum            OPTIONAL,
intersectionDropAddr     TSP-DropAddr                  OPTIONAL,
intersectionIP           CPT-IP-Address                OPTIONAL,
intersectionPort         CPT-UDP-TCP-PortNumber        OPTIONAL,
intersectionIdentifier   TMDD.Intersection-identifier  OPTIONAL
}
```

Message

Name TspBusinessRules

Identifier Tsp 2017

Purpose Provide business rules associated with a PTV's use of TSP to the PRG responsible for that vehicle. The PRG may be vehicle-borne or fixed.

Usage If the PRG is not on the vehicle, the rules do not include the "schedules" field. Boundaries may be identified in either the intersections or strategies field. If not present in either location, then boundary constraints do not apply.

Definition

```
SEQUENCE {
fileHeader     CPTLoadFileHeader,
schedules      SEQUENCE(SIZE(1..10000)) OF  TSPScheduleEntry              OPTIONAL,
boundaries     SEQUENCE(SIZE(1..10000)) OF  TSPBoundaryEntry              OPTIONAL,
strategies     SEQUENCE(SIZE(1..10000)) OF  TSPStrategyEntry          OPTIONAL,
intersections  SEQUENCE(SIZE(1..10000)) OF  TSPIntersectionEntry          OPTIONAL,
type-fives     SEQUENCE (SIZE(1..10000)) OF TSPScenario5Intersection OPTIONAL
}
```

Message

Name TspEventLogUnload

Identifier Tsp 2013

Purpose Provide the history of SCP events from a PRG to the control center or data repository.

Usage

Definition

```
SEQUENCE {
fileHeader      CPTUnloadFileHeader,
vehicleId       CPT-VehicleID,
event-log       SEQUENCE(SIZE(1..100000)) OF TSPEventLogEntry
}
```

Message

Name TspPRGInputsCC

Identifier Tsp 2020

Purpose Used by the CAD/AVL System to provide operating status information to an external, fixed PRG.

Usage The only instance where the inputsToPRG field may be absent is upon receipt of a balid subscription request and there are no current inputs to provide resulting in an echo back of the request information indicating the subscription was accepted.

Definition

```
SEQUENCE {
subscriptionInfo      CPTSubscriptionHeader,
subscriptionInfo      CPTSubscriptionHeader,
intersections-tsp     SEQUENCE(SIZE(1..100000))OF TSP-TMS-IntersectionID     OPTIONAL,
intersections-tmdd    SEQUENCE(SIZE(1..100000))OF TMDD.Intersection-identifier OPTIONAL,
inputsToPRG           SEQUENCE (SIZE(1..500)) OF TSPPRGInputsCCEntry         OPTIONAL
}
```

Message

Name TspPRGInputsCCSub

Identifier Tsp 2019

Purpose Used by a fixed Priority Request Generator (PRG) external to the CAD/AVL System to subscribe to required operating information.

Usage Normally only one type of intersection identifier type will be included based on local requirements.

Definition

```
SEQUENCE {
subscriptionInfo      CPTSubscriptionHeader,
intersections-tsp     SEQUENCE(SIZE(1..100000))OF TSP-TMS-IntersectionID      OPTIONAL,
intersections-tmdd    SEQUENCE(SIZE(1..100000))OF TMDD.Intersection-identifier OPTIONAL,
}
```

Message

Name TspPRGInputsPTV

Identifier Tsp 2018

Purpose Used by the VLU to provide operating status information to an onboard PRG, external to the VLU.

Usage

Definition

```
SEQUENCE {
subscriptionInfo   CPTSubscriptionHeader,
currentStatusTSPStatus
}
```

Message

Name TspPRGInputsPTVSub

Identifier Tsp 2016

Purpose Used by an onboard Priority Request Generator (PRG) external to the vehicle Logic Unit to subscribe to required operating information.

Usage

Definition

```
SEQUENCE {
subscriptionInfo   CPTSubscriptionHeader
}
```

Message

Name TspPTVStatus

Identifier Tsp 2021

Purpose Send information about the state of the PTV to a wayside-based Priority Request Generator (PRG) for Scenario #5.

Usage

Definition

```
SEQUENCE {
vehicleID               CPT-VIN,
vehicleClassType        SCP-VehicleClassType,
vehicleLocation         SPGeoDynamicPoint,
scheduleStatus          PI-OffSchedule,
intersectionTSP         TSP-TMS-IntersectionID          OPTIONAL,
intersectionTMDD        TMDD.Intersection-identifier    OPTIONAL,
expected-arrival-time   CPT-DateTime
}
```

Load TSP Business Rules

TCIP Dialog Definition Page 1

Dialog Name: Load TSP Business Rules

Business Area: TSP

Dialog Pattern: Load

Purpose: Provide information to a Transit Signal Priority logical entity PTVTSP (which may include a PRG) onboard the PTV. This information is required by PTVTSP+ to generate and manage priority requests.

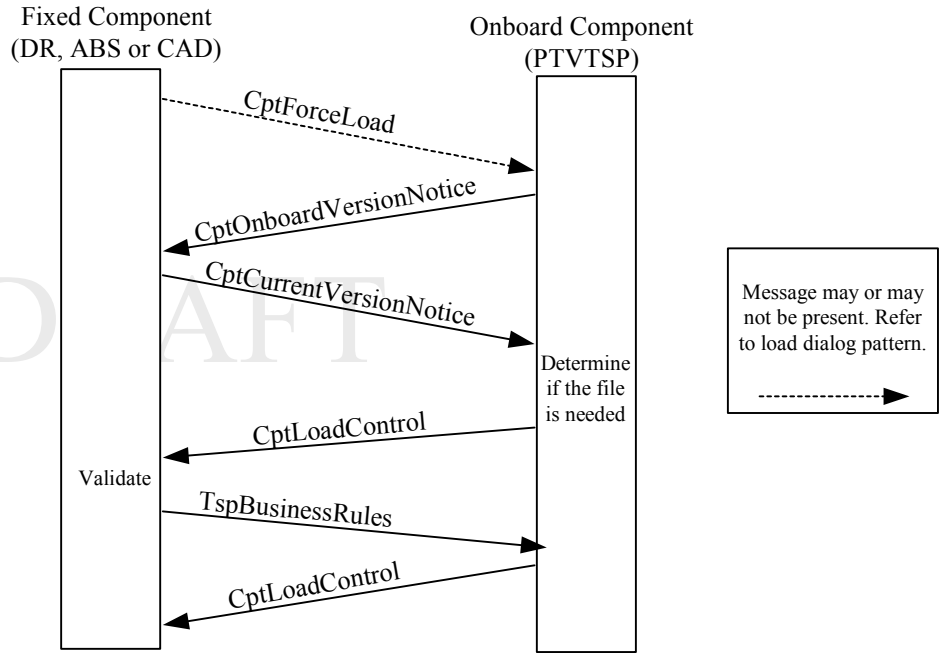
Assumptions:

1. The publisher component is responsible for determining the correct current version to be used by each PRG.
2. The publisher can be a Data Repository (DR), Authorized Business System (ABS), or a CAD/AVL System (CAD).
3. The subscriber can be PTV Manage Transit Signal Priority (PTVTSP).

Narrative:

1) PTVTSP triggers the dialog (based on the state of the wireless LAN, internal timers, and/or CptForceLoad message from the publisher component), by initiating a CptOnboardVersionNotice/CptCurrentVersionNotice exchange with the publisher component. PTVTSP determines if a new data load is required.
2) If the data on hand is current, PTVTSP sends a CptLoadControl message ending the dialog.
3) If the data on hand is not current, PTVTSP sends a CptLoadControl message requesting the current version.
4) The publisher component validates the request and terminates the dialog with a CptBadLoadRequest message (if the file request is invalid), or sends the current TSPBusinessRules message to PTVTSP.
5) PTVTSP receives and validates the TSPBusinessRules message and sends a CptLoadControl message terminating the dialog.

Message Sequence Diagram Page 2



Normal Execution of the "Load TSP Business Rules" Dialog

TCIP Dialog Definition Page 3

Dialog Name: Load TSP Business Rules

Business Area: Tsp

Dialog Pattern: Load

Message Name	Message Identifier	Role
CptForceLoad	Cpt 2011	Used by the fixed component to force the PTVTSP to initiate the load.
CptOnboardVersionNotice	Cpt 2010	Used by the PTVTSP to notify the fixed component of the ScpSignalData version number on hand.
CptCurrentVersionNotice	Cpt 2009	Used by the fixed component to notify the PTVTSP of the current version of the ScpSignalData.
CptLoadControl	Cpt 2007	PRG controls the load process with this message.
ScpSignalData	Tsp 2000	Conveys the data necessary for the PTVTSP to function.
CptBadLoadRequest	Cpt 2008	Fixed component aborts the dialog with an error notice to the PTVTSP with this message.

Notes:

Scp Priority Request Scenario 1

TCIP Dialog Definition Page 1

Dialog Name: Scp Priority Request Scenario 1

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Purpose: This dialog defines the generation and processing of priority requests by an onboard vehicle Priority Request Generator (PRG), with the CAD/AVL System as an intermediary according to NTCIP 1211 Scenario #1.

Assumptions:

1) The PTVTSP has already received data via the "Load TSP Business Rules" dialog.
2) Either the PTVTSP:
    a. Is part of the Vehicle Logic Unit (VLU) and has access to data such as location, speed, bearing and schedule, or
    b. Has subscriber to the necessary data from the VLU using the "Subscribe Onboard PRG Inputs" dialog.

Narrative:

1) The PTVTSP determines that the vehicle is approaching an SCP-equipped Scenario #1 intersection, and that the criteria are met to initiate a priority request. The PTVTSP sends a ScpPriorityRequest message to the Priority Request Publisher (PRS) via the Control Center (CC).
    a. The control center performs local housekeeping actions and forwards the priority request to the PRS.
    b. The PRS validates the request and sends a ScpPriorityRequestAck to the PTVTSP via CAD.
    c. CAD performs local housekeeping and forwards the acknowledgement to the PTVTSP.
    d. If the acknowledgement contains an error indication, the dialog ends, otherwise the PTVTSP may optionally initiate any of items 2-5 below.
2) The PTVTSP determines that it requires a status update on the priority request. The PTVTSP sends a ScpStatusControl to the PRS via CAD.
    a. CAD performs local housekeeping actions and forwards the status control to the PRS.
    b. The PRS validates the status control and returns a ScpStatusControlAck message to the PTVTSP via CAD.
    c. CAD performs local housekeeping and forwards the acknowledgment to the PTVTSP.
    d. If the acknowledgement contains no error indication, the PTVTSP sends a ScpStatusBuffer to the PRS via CAD.
    e. CAD performs local housekeeping and forwards the status buffer to the PRS.
    f. The PRS fills the status buffer and returns it to the PTVTSP via CAD as a ScpStatusBufferResponse message.

g. CAD performs local housekeeping and forwards the status buffer response to the PTVTSP.

3) The PTVTSP determines that the priority request needs to be changed as a result of changed arrival time at the intersection and/or changes to the criteria matching. The PTVTSP sends a ScpPriorityUpdate message to the PRS via CAD.

   a. CAD performs local housekeeping actions and forwards the priority update to the PRS.

   b. The PRS processes the update and sends a ScpPriorityUpdateAck message to the PTVTSP via CAD.

   c. CAD performs local housekeeping actions and forwards the acknowledgement to the PTVTSP.

4) The PTVTSP determines that the priority request needs to be canceled as the vehicle is not progressing towards the stop bar as planned, or has deviated from its route, or the operator manually initiates a cancel (if so equipped), or the vehicle is taken out of service, or experiences another locally defined state change requiring a cancellation. The PTVTSP sends a ScpPriorityCancel to the PRS via CAD.

   a. CAD performs local housekeeping actions and forwards the priority cancel to the PRS.

   b. The PRS processes the cancellation and sends a ScpPriorityCancelAck to the PTVTSP via CAD.

   c. CAD performs local housekeeping actions and forward the acknowledgment to the PTVTSP and the dialog ends.

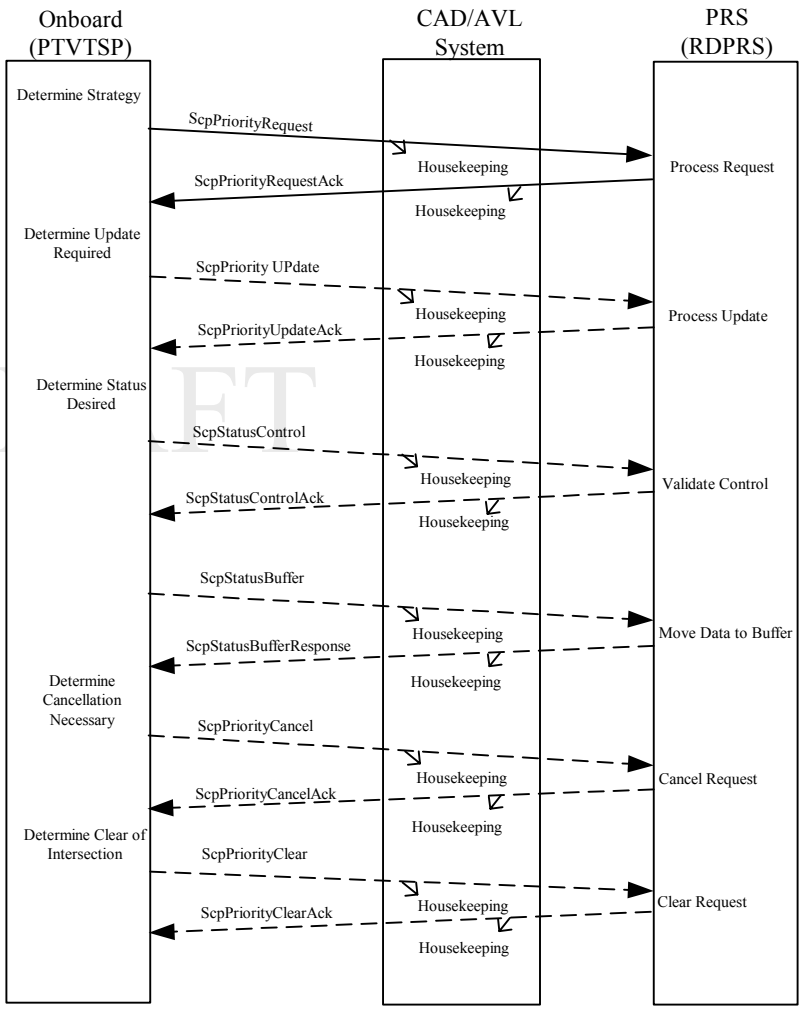
5) The PTVTSP determines that the vehicle is clear of the intersection, and the intersection requires explicit clears. The PTVTSP sends a ScpPriorityClear message to the PRS via CAD.

   a. CAD performs local housekeeping actions and forwards the priority clear to the PRS.

   b. The PRS clears the request and sends a ScpPriorityClearAck to the PTVTSP via CAD.

   c. CAD performs local housekeeping actions and forwards the acknowledgement to the PTVTSP and the dialog ends.

Message Sequence Diagram Page 3



Normal Execution of "Scp Priority Request Scenario 1" Dialog

TCIP Dialog Definition Page 4

Dialog Name: Scp Priority Request Scenario 1

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Message Name	Message Identifier	Role
Scp Priority Request	2011	Request a priority strategy from the PRS.
ScpPriorityRequestAck	2010	Acknowledge the priority request.
ScpPriorityUpdate	2009	Request that a previous priority request be modified.
ScpPriorityUpdateAck	2008	Acknowledge the priority update.
ScpStatusControl	2007	Request the PRS to prepare to provide status for a precious priority request.
ScpStatusControlAck	2006	Acknowledge the status control
ScpStatusBuffer	2004	Provide a buffer to obtain a priority request status
ScpStatusBufferResponse	2005	Return the status of the priority request to the PRG
ScpPriorityCancel	2002	Request the PRS to cancel a previous priority request
ScpPriorityCancelAck	2003	Acknowledge the priority cancellation
ScpPriority Clear	2012	Request the PRS to clear a completed priority request
ScpPriorityClearAck	2001	Acknowledge the priority clear.

Notes:

1) The PRG to PRS messages contain optional fields to convey intersection identifiers consistent with the Institute of Traffic Engineers Traffic Management Data Dictionary. These fields maybe used by the CAD/AVL System to direct the ongoing message to the proper PRS, however the CAD/AVL System is then responsible for removing the optional fields from the message, and forwarding a message to the PRS that complies with NTCIP 1211. Similarly, an agency may elect to use TCIP narrowband encoding, or XML encoding between the PRG and the CAD/AVL System, however, the CAD/AVL System is then responsible for format the outgoing messages to the PRS consistent with NTCIP 1211, and to reformat incoming messages from the PRS consistent with its local policy. Reformatting, if required, should be considered part of the CAD/AVL System housekeeping function.

2) If the vehicle clears the intersection and the PTVTSP is not configured to generate a priority clear to the PRS, the dialog ends from the PTVTSP view point, and ends from the CAD/AVL System and PRS view points after a local timeout.

3) The criteria for determining when a priority update, status update, or priority cancel should be initiated are agency/vendor defined.

Scp Priority Request Scenario 2

TCIP Dialog Definition Page 1

Dialog Name: SCP Priority Request Scenario 2

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Purpose: This dialog defines the generation and processing of priority requests by a transit control center based Priority Request Generator (PRG), according to NTCIP 1211 Scenario #2.

Assumptions:

1) The Control Center-based PRG has access to near-real-time vehicle information, such as vehicle location, schedule etc., either by virtue of being integrated with the CAD/AVL System, or via the Subscribe "Control Center PRG Inputs" dialog.
2) The PRG may be a CAD/AVL System (CAD), or other Authorized Business System (ABS).
3) The PRS may be Priority Request Publisher (RDPRS) (Roadside or TMC).

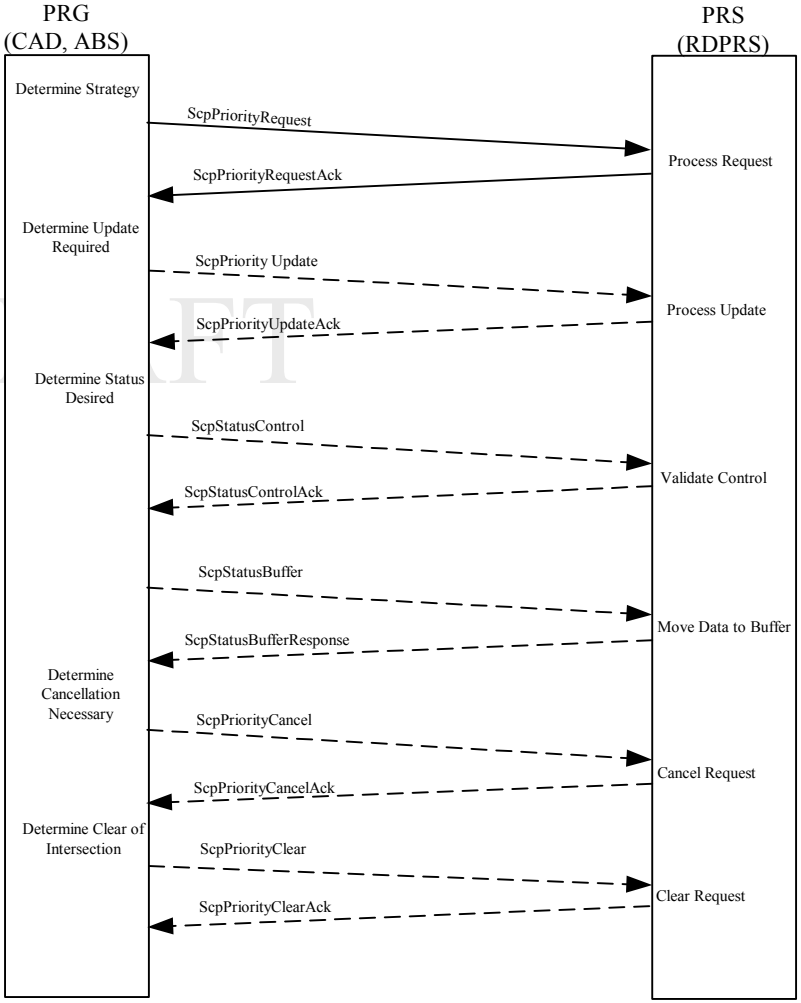
Narrative:

1) The PRG determines that the vehicle is approaching an SCP-equipped Scenario #2 intersection, and that the criteria are met to initiate a priority request. The PRG sends a ScpPriorityRequest message to the Priority Request Publisher (PRS).
    a. The PRS validates the request and sends a ScpPriorityRequestAck to the PRG.
    b. If the acknowledgement contains an error indication, the dialog ends, otherwise the PRG may optionally initiate any of items 2-5 below.
2) The PRG determines that it requires a status update on the priority request. The PRG sends a ScpStatusControl to the PRS.
    a. The PRS validates the status control and returns a ScpStatusControlAck message to the PRG.
    b. If the acknowledgement contains no error indication, the PRG sends a ScpStatusBuffer to the PRS.
    c. The PRS fills the status buffer and returns it to the PRG as a ScpStatusBufferResponse message.
3) The PRG determines that the priority request needs to be changed as a result of changed arrival time at the intersection and/or changes to the criteria matching. The PRG sends a ScpPriorityUpdate message to the PRS. The PRS processes the update and sends a ScpPriorityUpdateAck message to the PRG.
4) The PRG determines that the priority request needs to be canceled as the vehicle is not progressing towards the stop bar as planned, or has deviated from its route, or the vehicle is taken out of service, or experiences another locally defined state change requiring a cancellation. The PRG sends a ScpPriorityCancel to the PRS. The PRS processes the cancellation and sends a ScpPriorityCancelAck to the PRG, and the dialog ends.

    The PRG determines that the vehicle is clear of the intersection, and the intersection requires explicit clears. The PRG sends a ScpPriorityClear

message to the PRS. The PRS clears the request and sends a ScpPriorityClearAck to the PRG and the dialog ends.

Message Sequence Diagram Page 2



Normal Execution of "SCP Priority Request Scenario 2" Dialog

TCIP Dialog Definition Page 3

Dialog Name: SCP Priority Request Scenario 2

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Message Name	Message Identifier	Role
Scp Priority Request	2011	Request a priority strategy from the PRS.
ScpPriorityRequestAck	2010	Acknowledge the priority request.
ScpPriorityUpdate	2009	Request that a previous priority request be modified.
ScpPriorityUpdateAck	2008	Acknowledge the priority update.
ScpStatusControl	2007	Request the PRS to prepare to provide status for a previous priority request.
ScpStatusControlAck	2006	Acknowledge the status control
ScpStatusBuffer	2004	Provide a buffer to obtain a priority request status
ScpStatusBufferResponse	2005	Return the status of the priority request to the PRG
ScpPriorityCancel	2002	Request the PRS to cancel a previous priority request
ScpPriorityCancelAck	2003	Acknowledge the priority cancellation
ScpPriorityClear	2012	Request the PRS to clear a completed priority request
ScpPriorityClearAck	2001	Acknowledge the priority clear.

Notes:

1) If the vehicle clears the intersection and the PRG is not configured to generate a priority clear to the PRS, the dialog ends from the PRG view point. The dialog ends from the PRS view point after a local timeout.

2) The criteria for determining when a priority update, status update, or priority cancel should be initiated are agency/vendor defined.

Scp Priority Request Scenario 4 – Message Based

TCIP Dialog Definition Page 1

Dialog Name: SCP Priority Request Scenario 4-Message Based

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Purpose: This dialog defines the generation and processing of priority requests by an onboard vehicle Priority Request Generator (PRG), inside the PTVTSP entity with direct communication to the Priority Request Server (PRS) according to NTCIP 1211 Scenario #4.

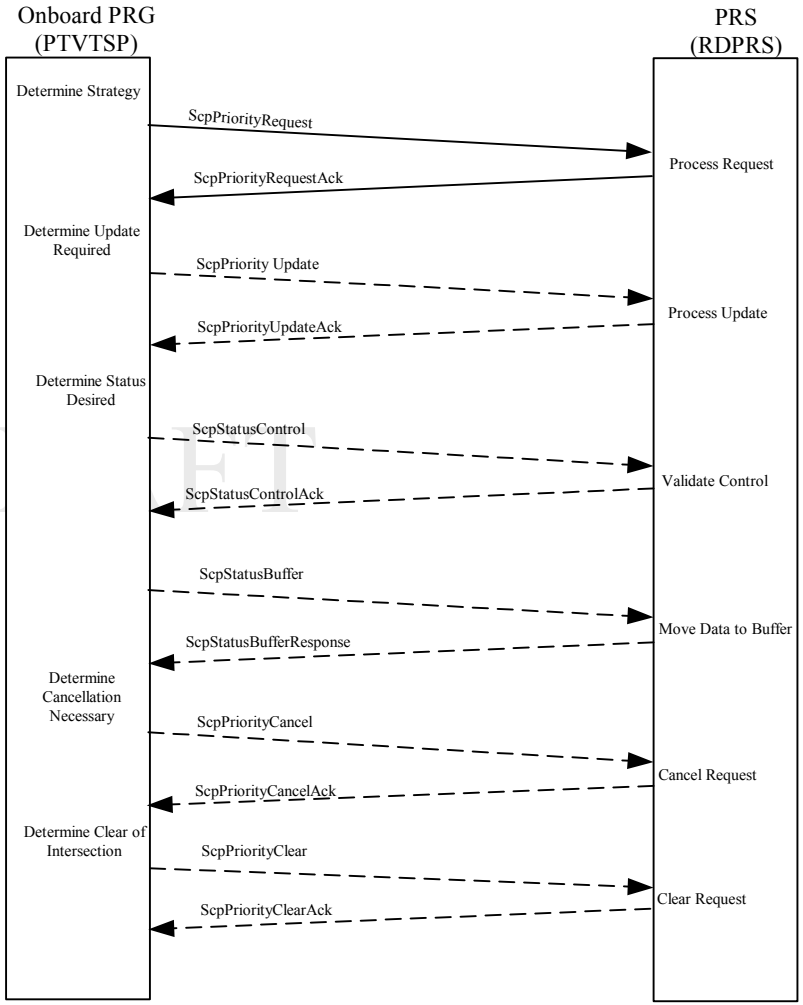
Assumptions:

1) PTVTSP has already received SCP data via the "Load TSP Business Rules" dialog.
2) PTVTSP has access to data resident in the vehicle logic unit (VLU)such as vehicle location, speed, bearing, schedule, and passenger count (if so equipped), or has subscriber to such data using the "Subscribe Onboard PRG Inputs" dialog.
3) The PRS may be Priority Request Publisher (RDPRS) (Roadside or TMC).

Narrative:

1) PTVTSP determines that the vehicle is approaching an SCP-equipped Scenario #4 intersection, and that the criteria are met to initiate a priority request. PTVTSP sends a ScpPriorityRequest message to the Priority Request Publisher (PRS).
   a. The PRS validates the request and sends a ScpPriorityRequestAck to PTVTSP.
   b. If the acknowledgement contains an error indication, the dialog ends, otherwise PTVTSP may optionally initiate any of items 2-5 below.
2) PTVTSP determines that it requires a status update on the priority request. PTVTSP sends a ScpStatusControl to the PRS.
   a. The PRS validates the status control and returns a ScpStatusControlAck message to PTVTSP.
   b. If the acknowledgement contains no error indication, PTVTSP sends a ScpStatusBuffer to the PRS.
   c. The PRS fills the status buffer and returns it to PTVTSP as a ScpStatusBufferResponse message.
3) PTVTSP determines that the priority request needs to be changed as a result of changed arrival time at the intersection and/or changes to the criteria matching. PTVTSP sends a ScpPriorityUpdate message to the PRS. The PRS processes the update and sends a ScpPriorityUpdateAck message to PTVTSP.
4) PTVTSP determines that the priority request needs to be canceled as the vehicle is not progressing towards the stop bar as planned, or has deviated from its route, or the operator manually initiates a cancel (if so equipped), or the vehicle is taken out of service, or experiences another locally defined state change requiring a cancellation. PTVTSP sends a ScpPriorityCancel to the PRS. The PRS processes the cancellation and sends a ScpPriorityCancelAck to PTVTSP and the dialog ends.
5) PTVTSP determines that the vehicle is clear of the intersection, and the intersection requires explicit clears. PTVTSP sends a ScpPriorityClear message to the PRS. The PRS clears the request and sends a ScpPriorityClearAck to PTVTSP and the dialog ends.

Message Sequence Diagram Page 3



Normal Execution of "SCP Priority Request Scenario 4 - Message Based" Dialog

TCIP Dialog Definition Page 4

Dialog Name: SCP Priority Request Scenario 4-Message Based

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Message Name	Message Identifier	Role
Scp Priority Request	2011	Request a priority strategy from the PRS.
ScpPriorityRequestAck	2010	Acknowledge the priority request.
ScpPriorityUpdate	2009	Request that a previous priority request be modified.
ScpPriorityUpdateAck	2008	Acknowledge the priority update.
ScpStatusControl	2007	Request the PRS to prepare to provide status for a previous priority request.
ScpStatusControlAck	2006	Acknowledge the status control
ScpStatusBuffer	2004	Provide a buffer to obtain a priority request status
ScpStatusBufferResponse	2005	Return the status of the priority request to the PRG
ScpPriorityCancel	2002	Request the PRS to cancel a previous priority request
ScpPriorityCancelAck	2003	Acknowledge the priority cancellation
ScpPriorityClear	2012	Request the PRS to clear a completed priority request
ScpPriorityClearAck	2001	Acknowledge the priority clear.

Notes:

1) If the vehicle clears the intersection and PTVTSP is not configured to generate a priority clear to the PRS, the dialog ends from PTVTSP view point, and ends from the PRS view point after a local timeout.

2) The criteria for determining when a priority update, status update, or priority cancel should be initiated are agency/vendor defined.

Unload PRG Event Log

TCIP Dialog Definition Page 1

Dialog Name: Unload PRG Event Log

Business Area: TSP

Dialog Pattern: Unload

Purpose: Unload data on the history signal priority events from the PRG to the CAD/AVL system or a data repository.

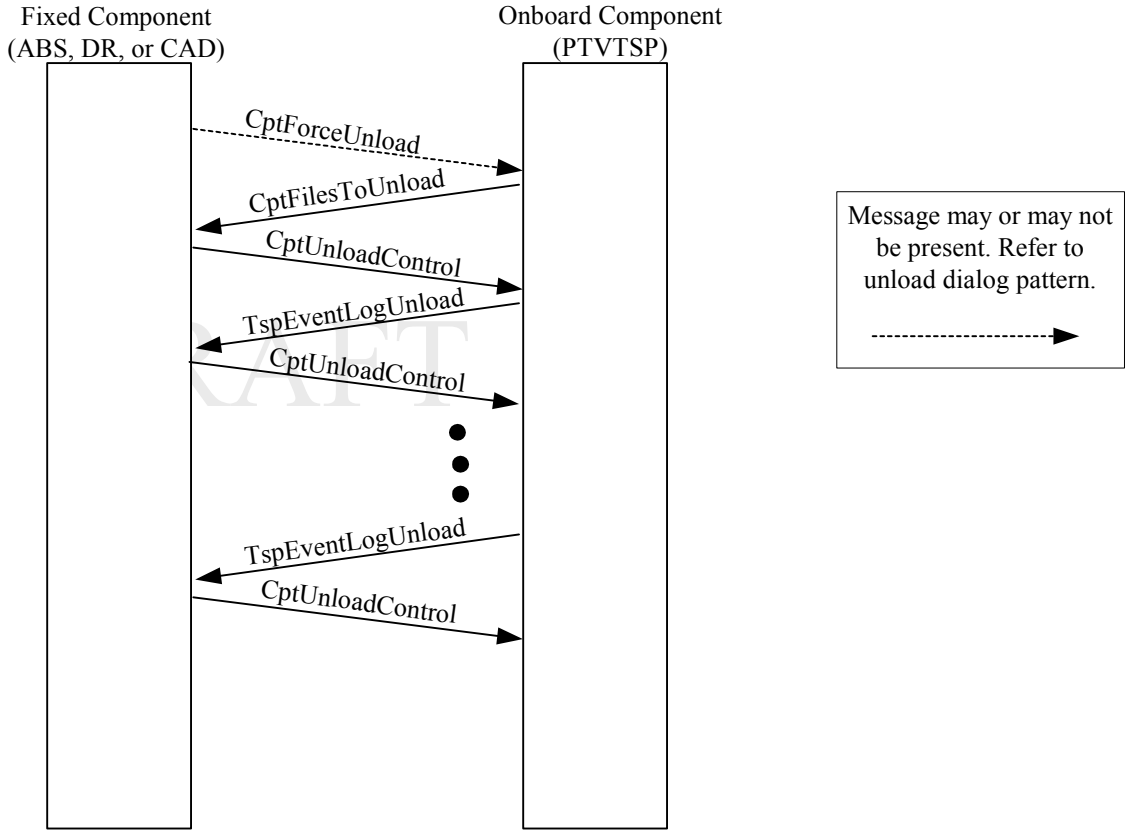
Assumptions:

1. The onboard component may be a PTVTSP.
2. The fixed component may be an Authorized Business System (ABS), Data Repository (DR), or a CAD/AVL System (CAD),

Narrative:

1. PTVTSP initiates the dialog based on a CptForceUnload message, or available files to unload combined with WLAN or ground network availability, and sends a CptFilesToUnload message.
2. CAD, DR, or ABS (fixed component) determines what files are available, needed, or eligible for deletion and sends a CptUnloadControl message to PTVTSP.
3. PTVTSP deletes any files specified for deletion.
4. If there is no file specified to unload the dialog ends. If the specified file is not available, PTVTSP sends a CptUnloadRequestError message and the dialog ends. If there is a file specified and it is available, PTVTSP sends the specified TSPEventLogUnload (file) to the CAD/AVL System or data repository.
5. The fixed component receives and validates the TSPEventLogUnload message and goes to step 2 above.

Message Sequence Diagram Page 2



Normal Execution of the "Unload PRG Event Log" Dialog.

TCIP Dialog Definition Page 3

Dialog Name: Unload PRG Event Log

Business Area: TSP

Dialog Pattern: Unload

Message Name	Message Identifier	Role
CptForceUnload	Cpt 2017	Trigger PRG to initiate a unload process. Primary use is to unload via a laptop instead of a wireless LAN.
CptUnloadControl	Cpt 2014	Used by fixed component to control the unload process.
CptUnloadRequestError	Cpt 2015	Used by PTVTSP to notify fixed component of a file request error.
TSPEventLogUnload	Tsp	Conveys Scp History data from PTVTSP to fixed component.
CptFilesToUnload	Cpt 2013	Identifies files stored in a PRG that are ready for unload to the corresponding Fixed component.

Notes:

Subscribe PRS Event Log

TCIP Dialog Definition Page 1

Dialog Name: Subscribe PRS Event Log

Business Area: TSP

Dialog Pattern: Subscription

Purpose: Provide a mechanism for a CAD/AVL System (CAD) or a transit Data Repository (DR) (subscriber) or other Authorized Business System (ABS) to obtain a historical record of signal priority events from a suitably equipped Traffic Management Center (publisher).

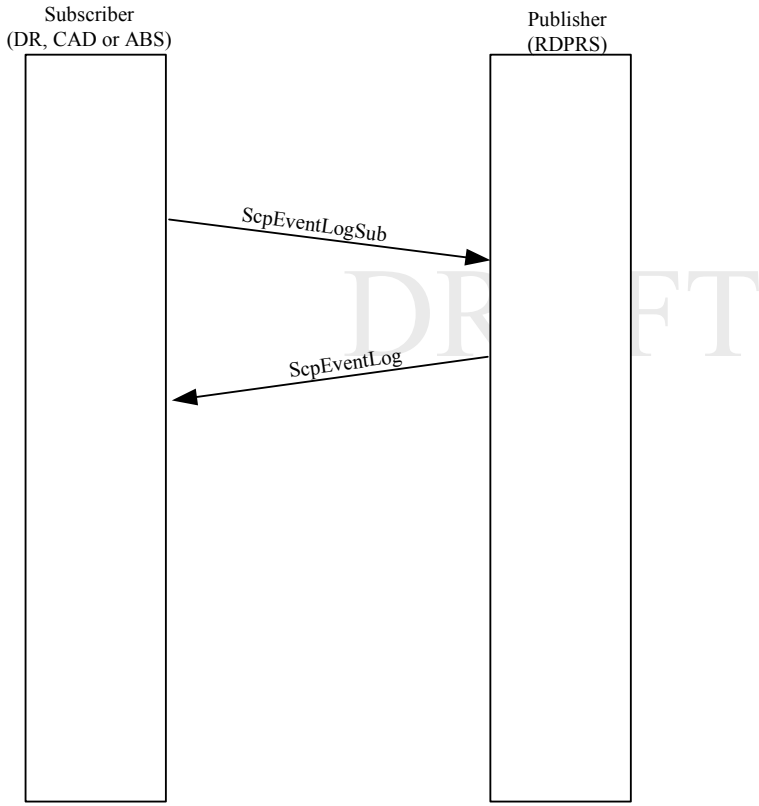
Assumptions:

1. The subscription may be a query or periodic type.
2. The subscriber may be CAD, DR, or ABS.
3. The publisher is RDPRS (Roadside or TMC).

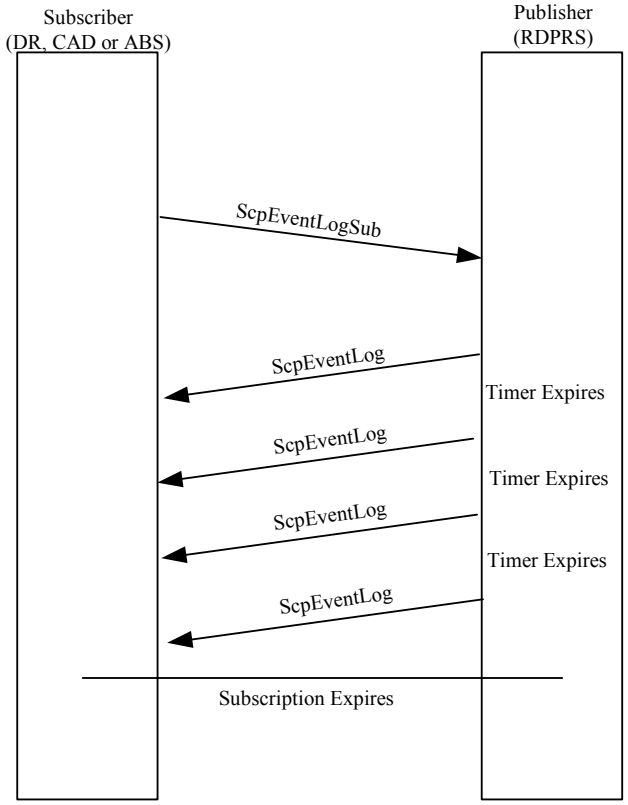
Narrative:

1) The subscriber determines the intersections of interest, and forwards a ScpHistoryDataSub message (subscription request) . If the subscription is an ongoing periodic subscription, the reporting interval and subscription duration are also specified in the subscription request.
2) The publisher validates the subscription request.
    a. If the subscription request is invalid, the publisher sends a CptSubErrorNotice message to the subscriber and the dialog ends.
    b. If the subscription request is a valid query, the publisher sends a ScpHistoryData message to the subscriber and the dialog ends.
    a. If the subscription request is a valid periodic subscription request, the publisher sends a ScpHistoryData message to the subscriber, containing history data currently on hand, and sends new ScpHistoryData messages at the interval specified in the subscription request.
3) The periodic subscription ends when:
    a. The subscription expires.
    b. The subscriber sends a new HistoryDataSub message requesting a cancellation.
    c. The publisher sends a CptSubErrorNotice to the subscriber.

Message Sequence Diagram Page 2



Normal Execution of the Query "Subscribe PRS Event Log" Query Subscription.



Normal Execution of the "Subscribe PRS Event Log" Periodic Subscription .

TCIP Dialog Definition Page 3

Dialog Name: Subscribe PRS Event Log

Business Area: TSP

Dialog Pattern: Subscription

Message Name	Message Identifier	Role
ScpEventLogSub	SCP 2015	Used by the subscriber to request signal priority history data from the publisher.
ScpEventLog	SCP 2014	Used by the publisher to provide signal priority history data to the subscriber.
CptSubErrorNotice	CPT 2000	Used by the publisher to notify the subscriber that the subscription is terminated with an error status.

Notes:

TCIP Dialog Definition Page 1

Dialog Name: Subscribe CC PRG Inputs

Business Area: TSP

Dialog Pattern: Subscription

Purpose: Provide information on transit vehicle approaches to signal priority-equipped intersections to the Traffic Management Center. This subscription is required for NTCIP 1211 Scenario #3 generation of priority requests by the Traffic Management Center-based PRG.

Assumptions:

1. The subscription may be of the event-driven or periodic type. Event-driven will result in more frequent, smaller messages to the TMC, while a periodic subscription would allow in formation to be buffered for several seconds and "batched" in a larger message.
2. The CAD/AVL System knows the locations of intersections, and stop bars as part of its configuration.
3. The publisher may be a CAD/AVL System (CAD),
4. The subscriber may be Priority Request Generator (RDPRG).

Narrative:

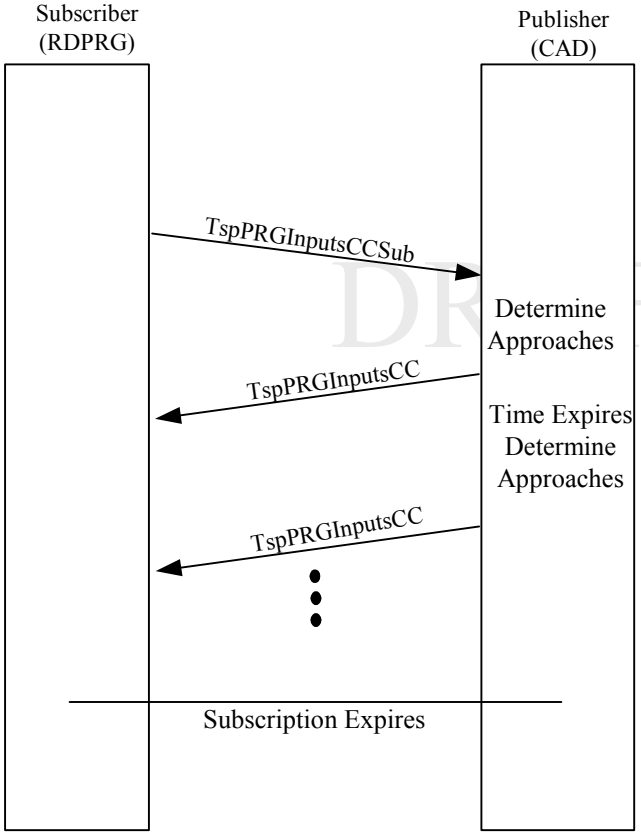
1. The subscriber sends a TspPRGInputsCCSub message to CAD.
2. CAD responds with a TspPRGInputsCC message containing current approach information.

a. If the subscription type is event, CAD waits for an approach to an SCP-equipped intersection, or abandonment of an approach to be detected and then reports it with a TspPRGInputsCC message.

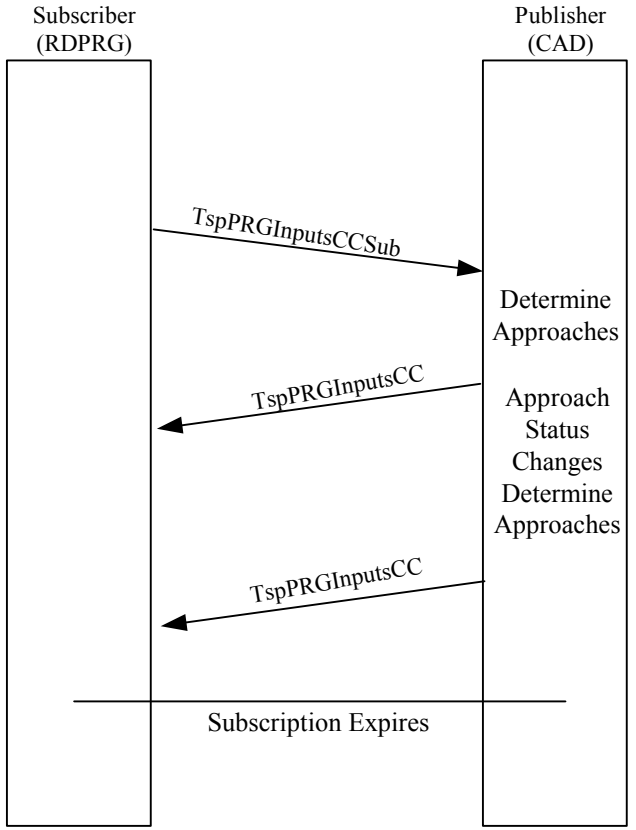
b. If the subscription type is periodic, CAD waits for the time to expire and then sends a TspPRGInputsCC message.

3. The dialog ends when the subscriber sends a new TspPRGInputsSub message indicating "cancel", or the subscription expires.

Message Sequence Diagram Page 2



Normal Execution of the "Subscribe CC PRG Inputs" Periodic Subscription



Normal Execution of the "Subscribe CC PRG Inputs" Event Subscription.

TCIP Dialog Definition Page 3

Dialog Name: Subscribe CC PRG Inputs

Business Area: TSP

Dialog Pattern: Subscription

Message Name	Message Identifier	Role
TspPRGInputsCCSub	Scp 2016	Used by the TMC or roadside PRG to establish the subscription and request the approach information for SCP-equipped intersections.
TspPRGInputsCC	Scp 2017	Provides the information on transit fleet vehicle approaches to SCP-equipped intersections.

Notes:

Subscribe Onboard PRG Inputs

TCIP Dialog Definition Page 1

Dialog Name: Subscribe Onboard PRG Inputs

Business Area: TSP

Dialog Pattern: Subscription-Periodic

Purpose: This dialog allows an onboard Signal Priority Request Generator (PRG) external to the Vehicle Logic Unit (VLU), to obtain real-time vehicle status information necessary to generate situation-appropriate signal priority requests.

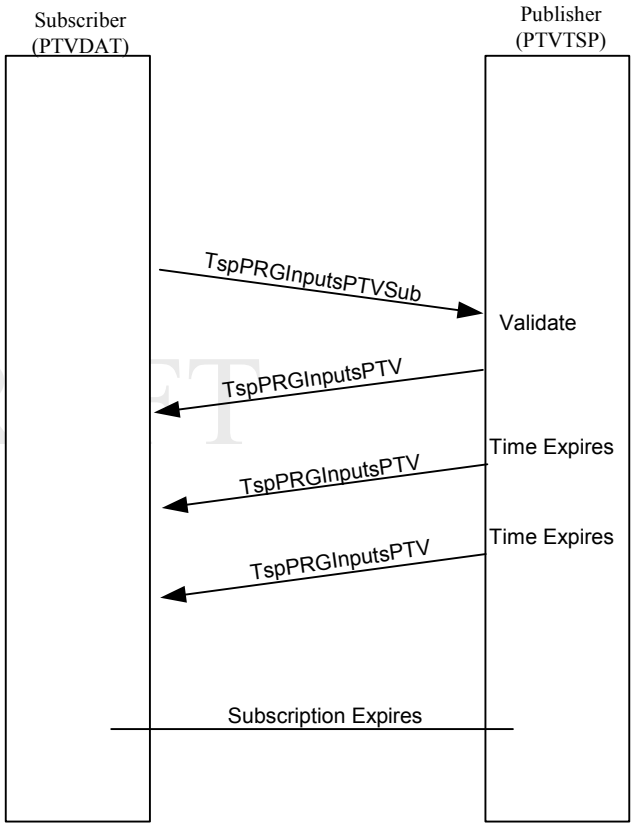
Assumptions:

1. The PRG separately has obtained the necessary contextual information (intersections, strategies, schedules, boundaries) via the "Load TSP Business Rules" dialog.
2. If the PRG operates within the VLU, the data transfer is internal and this dialog is not required.
3. The publisher may be PTV Manage VLU Data (PTVDAT).
4. The subscriber may be PTV Manage Transit Signal Priority (PTVTSP).

Narrative:

1. PTVTSP (subscriber)sends a TspPRGInputsPTVSub message to PTVDAT (publisher).
2. The publisher validates the TspPRGInputsPTVSub message and:
    a. If the message is invalid, sends a CptSubErrorNotice to the subscriber and the dialog ends.
    b. If the message is valid, the VLU sends a TspPRGInputsPTV message to the subscriber.
3. The publisher waits for the periodic interval to expire and sends a TspPRGInputsPTV message.
4. The dialog ends when the subscription expires, is cancelled by the subscriber, or the is shutdown.

Message Sequence Diagram Page 2



Normal Execution of the "Subscribe Onboard PRG Inputs" Dialog

TCIP Dialog Definition Page 3

Dialog Name: Subscribe Onboard PRG Inputs

Business Area: TSP

Dialog Pattern: Subscription Periodic

Message Name	Message Identifier	Role
TspPRGInputsPTVSub	2019	Request a subscription to PRG inputs.
TspPRGInputsPTV	2018	Provide real-time PRG input information.
CptSubErrorNotice	2000	Report an error with the PRG input subscription.

Notes:

SCP Priority Request Scenario 4 – Optical Based

TCIP Dialog Definition Page 1

Dialog Name: SCP Priority Request Scenario 4 – Optical Based

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Purpose: This dialog defines the generation and processing of priority requests by an onboard vehicle Priority Request Generator (PRG), inside the PTVTSP entity with direct communication to the Priority Request Publisher (PRS) using an optical emitter on the PTV.

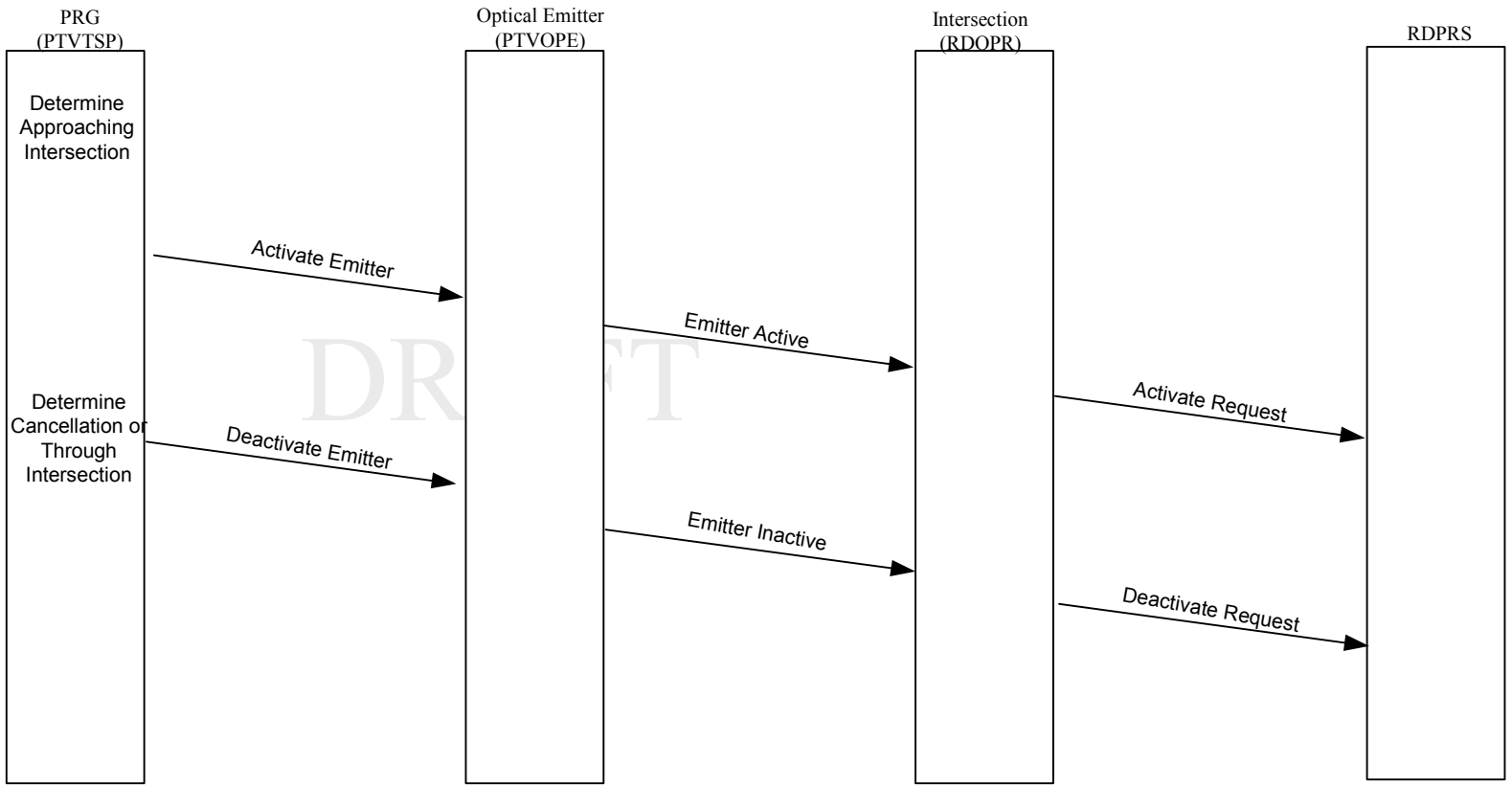
Assumptions:

1. PTVTSP has already received data via the "Load TSP Business Rules" dialog.
2. PTVTSP has access to data resident in the Vehicle Logic Unit (VLU) such as vehicle location, speed, bearing, schedule, and passenger count (if so equipped), or has subscribed to such data using the "Subscribe Onboard PRG Inputs" dialog.

Narrative:

1. PTVTSP determines that the vehicle is approaching an SCP-equipped Scenario #4 intersection, and that the criteria are met to initiate a priority request. PTVTSP send a priority activation request (PID=500) to the emitter via the Vehicle Area Network (VAN).
2. The optical emitter receives and processes the message. If the emitter is unable to process the request, the emitter responds with an error message (PID=500) via the VAN, and the dialog ends.
3. PTVTSP determines that the request needs to be cancelled, or the vehicle has cleared the intersection. PTVTSP sends a priority deactivation request (PID=500) to the emitter via the VAN.

Message Sequence Diagram Page 2



Normal Execution of the "SCP Priority Request Scenario 4 - Optical Based" Dialog

TCIP Dialog Definition Page 3

Dialog Name: SCP Priority Request Scenario 4 – Optical Based

Business Area: TSP

Dialog Pattern: Signal Control & Prioritization

Message Name	Message Identifier	Role
IntersectionStatus Pre-emption and Configuration	SAE J1587 PID=500	This message conveys all signal priority information between the VLU and the optical emitter.

Notes:

Signal Priority Request Scenario 5

TCIP Dialog Definition Page 1

Dialog Name: Signal Priority Request Scenario 5

Business Area: TSP

Dialog Pattern: Blind Notification

Purpose: Send a notification to a Scenario #5 equipped intersection of a PTV approach.

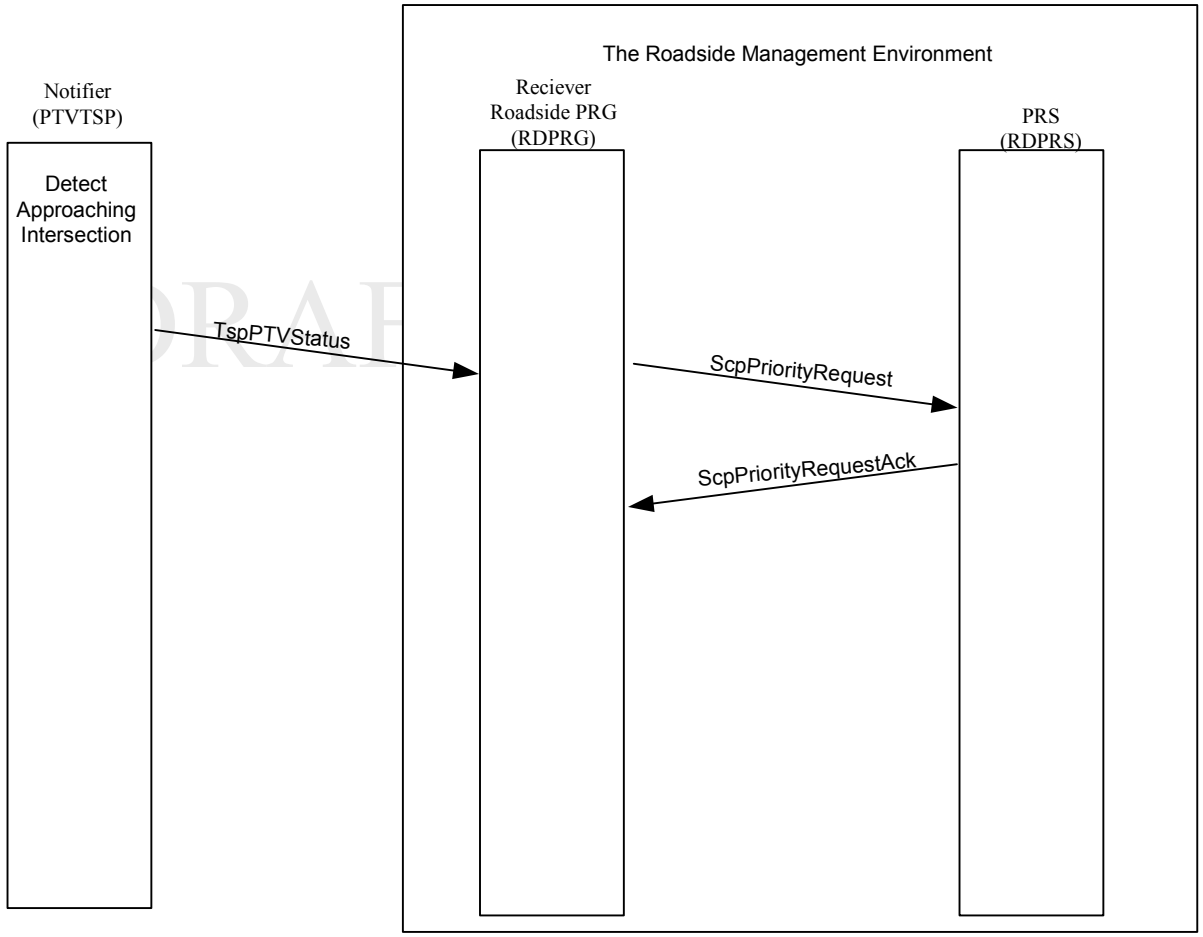
Assumptions:

1. PTVTSP has previously received information about he scenario 5 equipped intersection via the Load TSP Business Rules dialog.

Narrative:

1. PTVTSP determines that the PTV is approaching a scenario 5 equipped intersection.
2. PTVTSP sends a TspPTVStatus message to the roadside PRG (RDPRG). From the VLU perspective the dialog ends.
3. RDPRG receives the TspPTV Status message and determines whether a priority request is appropriate.
    a. If a request is not deemed appropriate the dialog ends.
    b. If a request is appropriate, the PRG initiates a ScpPriorityRequest/ScpPriorityRequestAck exchange with the PRS.

Message Sequence Diagram Page 2



Normal Execution of the "Signal Priority Request 5" Dialog

TCIP Dialog Definition Page 3

Dialog Name: Signal Priority Request Scenario 5

Business Area: TSP

Dialog Pattern: Blind Notification

Message Name	Message Identifier	Role
TspPTVStatus	TSP 2021	Notify a scenario 5 equipped intersection of a PTV approach.

Notes: