INTERNATIONAL STANDARD

ISO 22951

First edition
2009-01-15

Data dictionary and message sets for preemption and prioritization signal systems for emergency and public transport vehicles (PRESTO)

Dictionnaire de données et ensembles de messages pour la préemption et la priorisation des systèmes de signaux pour les véhicules d'urgence et de transport public (PRESTO)

Reference number
ISO 22951:2009(E)

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Published in Switzerland

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22951 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

Introduction

It is very important that police cars, fire engines, and other emergency vehicles arrive at the scene to which they are dispatched as soon as possible in order to improve crime prevention rate, lifesaving rate etc. Therefore, various countries are using, or developing, preemption signal-systems to support the smooth travelling of such vehicles. In addition, some countries use these priority signal-controls for buses and other public transport vehicles to provide punctual and more convenient service. This International Standard standardizes communication messages in these preemption signal-systems for emergency and public transport vehicles, aiming to promote system introduction through developing a common infrastructure.

Data dictionary and message sets for preemption and prioritization signal systems for emergency and public transport vehicles (PRESTO)

1 Scope

This International Standard relates to systems that use priority signal control functions to help emergency vehicles operate. This type of system, as shown in Figure 1, is composed of a traffic management centre, in-vehicle units, roadside communication units, and roadside units. Public transport vehicles such as buses are also targeted to receive priority signal control service.

The scope of standardization includes message sets and data dictionary related to the communications as follows:

— between a roadside communication unit and each in-vehicle unit,

— between a roadside communication unit and other roadside units,

— between in-vehicle units and roadside units.

This International Standard concerns only information related to priority signal control and does not deal with information provision such as that of the situations at scenes. Since it is necessary to handle public transport vehicles in accordance with the conditions of individual cities and regions, the section in the messages and the data dictionary that are concerned with priority signal control for the vehicles are treated as an option. Furthermore, the standardization does not depend on the type of communication medium used.

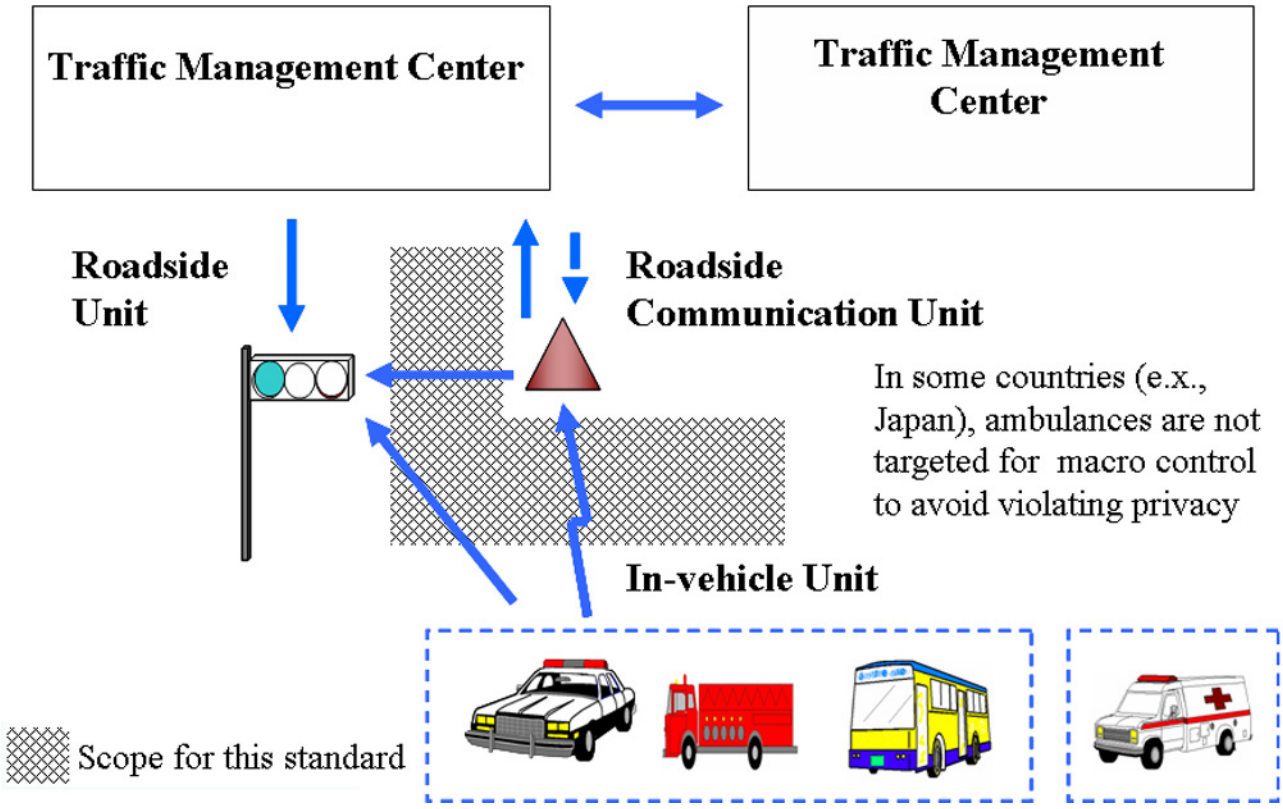


Figure 1 —Scope of standardization work

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14817, *Transport information and control systems — Requirements for an ITS/TICS central Data Registry and ITS/TICS Data Dictionaries*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14817 and the following apply.

3.1
antenna
roadside equipment that communicates with the roadside units such as signal controllers and the in-vehicle units using radio signals

3.2
beacon
roadside equipment that communicates with the roadside units such as the signal controllers and the in-vehicle units

3.3
data dictionary
listing of data elements (and their characteristics) that meets the information and functional needs of a system

3.4
data element
atomic element of information

NOTE A data element is a syntactically formal representation of some information of interest (such as a fact, proposition, observation, etc.) about some entity of interest (e.g. a person, place, process, property, object, concept, association, state, event).

3.5
in-vehicle unit
in-vehicle equipment that transmits/receives information to/from the roadside communication units and, in some cases, outputs information, for example, on its screen

3.6
message sets
set of basic messages that are normally used in business-oriented applications

3.7
roadside communication unit
roadside equipment that communicates with the in-vehicle units and the roadside units, e.g. beacons and antennas

3.8
roadside unit
roadside equipment that controls signals and provides information, e.g. the signal controllers and the information board controllers

3.9
signal controller
roadside equipment that controls the lighting timings of traffic lights

3.10
traffic management centre
central system that controls the functions of traffic data collection, signal control, and information service based on collected data, etc.

3.11
vehicle ID
identification number used for the identification of emergency and/or public transport vehicles

4 Symbols and abbreviated terms

PRESTO data dictionary and message sets for preemption and prioritization signal systems for emergency and public transport vehicles

5 Data dictionary and message sets for PRESTO

Tables 1 and 2 give the list of data dictionary and message sets within the scope of the standardization, in-line with the data concept specified in ISO 14817. Further details are given in Annex C.

5.1 Data dictionary

Table 1 — Data dictionary within the scope of the standardization

Data concept type	ASN.1 object identifier	ASN.1 name	Descriptive name
Data element concept	{iso standard presto concepts dec 1 10}	PSC.authority-classification	PSC.authorityClassification
Data element	{iso standard presto concepts de 1 20}	PSC.vehicle-code	PSC.vehicleCode
	{iso standard presto concepts de 1 30}	PSC-transport-mode	PSC.transportMode
	{iso standard presto concepts de 1 40}	PSC-priority-signal-request-flag	PSC.prioritySignalRequestFlag
	{iso standard presto concepts de 1 50}	PSC-request-intersection id	PSCrequestIntersectionID
	{iso standard presto concepts de 1 60}	PSC-direction-at-intersection	PSC.directionAtIntersection
	{iso standard presto concepts de 1 70}	PSC-spot-id	PSC.spotID
	{iso standard presto concepts de 1 80}	PSC-spot-passing-time	PSC.spotPassingTime
	{iso standard presto concepts de 1 90}	PSC-vehicle-speed	PSC.vehicleSpeed
	{iso standard presto concepts de 1 100}	PSC-vehicle-acceleration	PSC.vehicleAcceleration
	{iso standard presto concepts de 1 110}	PSC-travel-distance	PSC.travelDistance
	{iso standard presto concepts de 1 120}	PSC-transmission-time	PSC.transmissionTime
Data frame	{iso standard presto concepts df 1 130}	PscVehicleID	PscVehicleID:frame
	{iso standard presto concepts df 1 140}	PscPrioritySignalRequest	PscPrioritySignalRequest:frame
	{iso standard presto concepts df 1 150}	PscVehicleCurrentLocation	PscVehicleCurrentLocation:frame
	{iso standard presto concepts df 1 160}	PsctravelInformation	PsctravelInformation:frame
	{iso standard presto concepts df 1 170}	PscSpotLocation	PscSpotLocation:frame
	{iso standard presto concepts df 1 180}	PscSpotPassingPoint	PscSpotPassingPoint:frame

5.2 Message sets

Table 2 — Messages sets within the scope of the standardization

Data concept type	ASN.1 object identifier	ASN.1 name	Descriptive name
Message	{iso standard presto concepts mes 1 190}	PscVehicleInformation	PscVehicleInformation:message
	{iso standard presto concepts mes 1 200}	PscVehicleData	PscVehicleData:message
	{iso standard pi 11}	PiSchedAdherenceOffSched	PiSchedAdherenceOffSched:message

Annex A
(informative)

The concept of PRESTO

A.1 Purpose

PRESTO allows emergency vehicles such as police cars, fire engines and so forth to speedily and accurately respond to emergencies by carrying out traffic signal control with the highest priority and guiding optimal routes for these vehicles. In addition, this system draws the attention of general vehicles and pedestrians by indicating the approach of emergency vehicles on message boards. This system carries out priority signal control for public transport vehicles such as buses and trams. By providing travelling support to emergency vehicles and public transport vehicles in this way, the system intends to achieve the realization of the following effects.

a) Reduction in the response time of emergency vehicles:

   — early resolution of accidents and improvement of arrest rates;

   — support for speedy rescue activity and improvement of lifesaving rates.

b) Reduction of the number of traffic accidents associated with en-route emergency vehicles.

c) Improvement of convenience of public transport vehicles such as buses and trams by securing the regular time operation of them.

A.2 Basic function

This system has the functions of

— priority signal control,

— route guidance, and

— safety support.

The priority signal control function includes macro control function and micro control function.

The macro control function transmits signal parameters beforehand, for example, giving maximum green time in the direction of emergency vehicles and public transport vehicles to the group of traffic signals at intersections from the traffic management centre, so it is possible to reduce traffic jams and lines of vehicles waiting for a green signal, which are hindrance factors to a priority traffic route.

The micro control function extends the green time or reduces the red time by having the vehicle sensor detect approaching emergency vehicles and public transport vehicles in order to let those vehicles pass through the green light.

The route guidance function effectively supports an early arrival of emergency vehicles at the scene of an accident by guiding the emergency vehicles from their current position to the scene of the accident through the recommended route. The macro control function, as explained above, links to the route guidance function and minimizes disadvantages suffered by general vehicles and pedestrians.

The safety support function draws attention of the general vehicles and pedestrians to the approaching emergency vehicle via the message board.

Furthermore, the priority signal control function and safety support function carry out the above functions by managing the signal control computer[1)] and information-board control computer[2)] from the traffic management centre that takes the role of traffic control for general vehicles.

As stated above, the system covers public transport vehicles, including buses and trams (LRTs), in its priority signal control. This system will be put into service in road sections where it is expected to enhance the punctual operation of such vehicles and reduce adverse impact on general vehicles.

1) One of the central functions that controls the signal controllers through the transmission of signal parameters, etc.

2) Roadside equipment that controls the information boards that display traffic information through their instructions.

Annex B
(informative)

PRESTO architecture

B.1 Overview of PRESTO user services

A requirement analysis based on the concepts given in Annex A was conducted and used to define PRESTO user services shown in Table B.1. PRESTO user services are systematized by referring to user subservices in the system architecture for ITS in Japan, which are described in Annex E.

Table B.1 — PRESTO user services

Specific user subservices	Description
Provide signal priority to bus and tram	To assist the improvement of the functional efficiency of public transportation and the management of its safe and smooth operation, implements a signal control system. The system detects information sent from public transport vehicles that includes notification of their approach to signalized intersections, lane change sections, their proceeding into main roads from bus bays, etc. and control signals to prioritize their passage.
Guide emergency vehicles along the optimum routes	When an accident, etc. occurs, collects in real-time information regarding the current road traffic conditions including traffic backup, the effects of road work, etc. and guides emergency vehicles to their destinations to enable them to mount their rescue operations quickly and appropriately.
Control traffic signals for priority guidance of emergency vehicles	To provide support for the quick movement of emergency vehicles and improve their safety when they are mobilized in connection with an accident, etc. that have occurred, controls traffic signals appropriately so as to enable them, when they approach intersections, to pass through with priority and safely.
Inform vehicles of approaching emergency vehicles	When an accident, etc. occurs, provides the drivers of vehicles ahead with information about the approach of emergency vehicles so as to provide support for the quick passage of emergency vehicles and assure their safe passage.
Manage emergency and public transport vehicle operations	To provide support for quick and appropriate rescue operations when an accident, etc. occurs, collects in real-time information, etc. regarding the locations of emergency and public transport vehicles and proceeds to appropriate vehicle allocation taking into account the status of the site of the accident, etc., and the present locations of emergency and public transport vehicles.

B.2 Definition of functions and messages

The necessary functions and messages for each PRESTO user service have been analysed and extracted.

B.2.1 Function name

Function name is the name of the function.

B.2.2 Common function

Common function is a common number given to a group of elements that is categorized by function in several user services.

B.2.3 Message name

Message name is the name of the messages received and transmitted by the functional elements.

B.2.4 Common message

Common message is a common number given to each message in several functional elements.

B.2.5 Definition of words in messages

a) Information – information received and transmitted between this system and “object” (vehicles and information sources)

b) Data – data received and transmitted in this system.

c) Status – information received and transmitted between this system and the “object” (vehicles and information sources). The format is not specified.

d) Control – the practical order of control action based on control parameters.

B.3 Descriptions of functions

Table B.2 — PRESTO functions

No.	Function	Description	Corresponding physical device
F01	Roadway&Traffic_Status_ Collection	It gathers the PrtRoadwayStatus and the PrtTrafficStatus.	Traffic management centre / emergency vehicle management centre / public vehicle management centre
F02	Scene_Information_Collection&Call	It gathers the PrtSceneStatus and notifies it in response to the requests from emergency vehicles.	Emergency vehicle management centre
F03	Traffic_Prediction	It predicts the future traffic conditions from the PrtRoadway&TrafficStatusData and creates the PrtPredictedTrafficData.	Traffic management centre / emergency vehicle management centre / public vehicle management centre
F04	Destination_Identification	It identifies the destination from PrtIncidentInformation.	Emergency vehicle management centre
F05	Vehicle_Identification	It authenticates whether or not the emergency vehicles are subject to priority signal service from their PscVehicleData. This PscVehicleData includes the priority signal request, the vehicle ID, the current location, the passage (or the receiver ID), the vehicle travel information (speed, acceleration, mileage, GPS information, etc.), the destination, and the route information. It also tries to find the most probable current location based on the information included in the PscVehicleData, and then creates the PrtVehicleLocationData. This function may convert the passage, the receiver ID, or the vehicle travel information into the location information depending on the system. If the vehicles are identified as subject to priority signal service with this function, it will send the PrtVehicleLocationData to the Priority_Verification, the Route_Calculation, the Micro_Priority_Control_Adjudication, the Macro_Priority_Control_Adjudication, and the Vehicle_Approaching_Position_Adjudication.	Emergency vehicle management centre / public vehicle management centre / roadside communication unit (beacon, antenna) / roadside unit (signal controller)
F06	Route_Calculation	Under the traffic conditions indicated by the PrtRoadway&TrafficStatusData and the PrtPredictedTrafficData, it will calculate the PrtRouteData of the emergency vehicle's current location to the destination, and send the result to the Each Route_Verification.	Emergency vehicle management centre
F07	EachRoute_Verification	Under the situation where a number of emergency-vehicle-routes coexist, it will adjust the route for each emergency vehicle by following the Priority Level, then create the PrtRecommendedRouteData.	Traffic management centre
F08	Route_Information_Provision	It provides emergency vehicles with PrtRecommendedRouteData.	Traffic management centre
F09	Roadway&Traffic_Information_Call	It gives the PrtRoadway&TrafficStatusInformation in response to the requests from emergency vehicles.	Emergency vehicle management centre / roadside unit (beacon)

Table B.2 (*continued*)

No.	Function	Description	Corresponding physical device
F10	Micro_Priority_Signal_Control_Pattern_Generation	Following the instructions of the Micro_Priority_Signal_Adjudication, it generates the PrtMicroControlData based on the general signal data, and then transmits it to the Signal_Control.	Traffic Management Centre / Roadside Unit (Signal Controller)
F11	Signal_Control	It controls the Traffic_Signal and turns on the light	Roadside unit (signal Controller)
F12	Vehicle_Information_Reception	After receiving the PscVehicleInformation from emergency vehicles and carrying out the required processing, it creates PscVehicleData and sends it to the Vehicle_Identification. This PscVehicleInformation and PscVehicleData include the priority signal request, the vehicle ID, the location, the passage (or the receiver ID), the vehicle travel information (speed, acceleration, mileage, GPS information, etc.), the route, and the destination. This function may configure the receiver ID instead of the passage point depending on the system. Likewise, for public vehicles, it also receives the PscVehicleInformation and sends the PscVehicleData to the PublicVehicle_Identification. In addition, it receives the PiSchedAdherenceOffSched that includes the delay from the running schedule or the “planned” schedule, and then sends it to the PublicVehicle_Identification.	Traffic management centre / emergency vehicle management centre / roadside communication unit (beacon, antenna)
F13	Vehicle_Approaching_Position_Adjudication	It identifies the approaching emergency vehicles from the PrtVehicleLocatioinData.	Traffic management centre / roadside unit (information board controller)
F14	Vehicle_Approaching_Information_Warning	Notify the PrtWarningInformation, which warns the approaching emergency vehicles, to the warning boards, the information boards, and general vehicles.	Traffic management centre / roadside unit (information board controller)
F15	Vehicle_Operating_Status_Call	By analyzing the PrtRecommendedRouteData, the PRtVehicleLocationData and PiSchedAdherenceOffSched, it creates the route information, the management information, and the mileage trace information, of the emergency vehicles and the public vehicles. Such information will be sent to the emergency vehicle management centre or the public vehicle management centre upon their requests.	Traffic management centre

Table B.2 (*continued*)

No.	Function	Description	Corresponding Physical Device
F16	Priority_Verification	For emergency vehicles certified as subject to priority signal service, it decides the priority level and creates the PrtPriorityLevelData based on information included in PrtVehicleLocationData: the vehicle ID, the current location, and the estimated arrival time. For public vehicles, it will also take into account any running schedule delay, when creating the priority level. To calculate the delay extent, it could rely on the PrtVehicleLocationData, the running schedule included in PiSchedAdherenceOffSched (or the information sent by the public vehicle management centre), delay information included in the PiSchedAdherenceOffSched, or notice of delay given by the public transport vehicle management centre (through the traffic management centre when F16 belongs to the roadside unit). The priority level will be given considering both emergency vehicles and public vehicles in common. As well as notifying the PrtPriorityLevelData to the EachRoute_Verification, by notifying it to the Micro_Priority_Control_Adjudication and Macro_Priority_Control_Adjudication, it requests the priority signal service.	Traffic management centre / roadside unit (signal controller)
F17	PublicVehicle_Identification	It authenticates whether or not the public vehicles are subject to priority signal service from their PscVehicle_Data and PiSchedAdherenceOffSched. This PscVehicleData includes the priority signal request, the vehicle ID, the current location, the passage (or the receiver ID), the vehicle travel information (speed, acceleration, mileage, GPS information, etc.), the destination, and the route information. It also tries to find the most probable current location based on the information included in the PscVehicleData, and then creates the PrtVehicleLocationData. This function may convert the passage, the receiver ID, or the vehicle travel information into the location information depending on the system. If the vehicles are identified as subject to priority signal service with this function, it will send the PrtVehicleLocationData to the Priority_Verification, the Micro_Priority_Control_Adjudication, the Macro_Priority_Control_Adjudication, and the Vehicle_Approaching_Position_Adjudication.	Traffic management centre / public vehicle management centre / roadside communication unit (beacon, antenna) / roadside unit (signal controller)
F18	Macro_Priority_Signal_Control_Pattern_Generation	Following the instruction of Macro_Priority_Signal_Control_Pattern_Adjudication, it generates the PrtMacroControlData for the use of macro-priority-control based on the general signal-control data, and transmits it to the Signal_Control.	Traffic management centre

Table B.2 (*continued*)

No.	Function	Description	Corresponding physical device
F19	Micro_Priority_Signal_Control_Adjudication	It extracts the information of the intersection point, the moving direction at the intersection and the arrival time at the specified intersection from the PrtVehicleLocationData of the object vehicle and PrtRoadway&TrafficStatusData. It gives the start- and end-order of micro control pattern generation toward the Micro_Priority_Signal_Control_Pattern_Generation. In case there are multiple vehicles arriving at the same time, it will give the order by following the PrtPriorityLevelData.	Traffic management centre / roadside unit (signal controller)
F20	Macro_Priority_Signal_Control_Adjudication	If the object vehicle is an emergency vehicle, it extracts the information of the intersection point and the moving direction at the intersection indicated in the recommended route based on the PrtRecommendedRouteData. After calculating the arrival time at the specified intersection from the PrtVehicleLocationData, the PrtRoadway&TrafficStatusData, or the PrtPredictedTrafficData, it gives the start- and end-order of macro control pattern generation toward the Macro_Priority_Signal_Control_Pattern_Generation. When it gives such macro control pattern generation instructions, it also confirms the object vehicle to run the recommended route based on the PrtRouteSelectionInformation given by the object vehicle. In case there are multiple vehicles arriving at the same time, it will give the order by following the PrtPriorityLevelData. If the object vehicle is a public vehicle, it extracts the information of object intersection and moving direction based on the public vehicle's route information. This route information will be either received from the public vehicle management centre and registered as static information, or received from the approaching vehicle as information included in the PrtVehicleLocationData by this function. The following process will be the same as the case of emergency vehicles except that it does not perform the recommended route travel confirmation.	Traffic management centre
NOTE Public transport vehicle management centre: The central system that manages the service of public transport vehicles such as buses.			

B.4 List of messages

Table B.3 — PRESTO messages

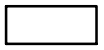
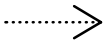
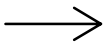
No.	Message name	Outline	Remarks	Scope
M01	PrtRoadwayStatus	Roadway information before editing / data processing.	Template for information is not defined.	
M02	PrtTrafficStatus	Traffic information before editing / data processing.	Template for information is not defined.	
M03	PrtRoadwayTrafficStatusData	Roadway and traffic information data after editing / data processing.		
M04	PrtSceneInformation	Information about target scene / location after editing / data processing.		
M05	PrtPredictedTrafficData	Predicted traffic flow.		
M06	PrtIncidentInformation	Incident related information.		
M07	PrtDestinationData	Information about incident location.		
M08	PrtVehicleLocationData	Current location of vehicle.		
M09	PscVehicleInformation	Location and other information about target vehicles.		Yes
M10	PrtRecommendedRoute Information	Recommended route information for emergency vehicles.		
M11	PrtSignalControl	Signal control.		
M12	PscVehicleData	Emergency vehicle data.		Yes
M13	PrtMicroControlData	Data for signal control at micro control level.		
M14	PrtMacroControlData	Data for signal control at macro control level.		
M15	PrtWarningInformation	Approaching information that other vehicle is approaching.		
M16	PrtRouteInformation	Information about a recommended route for related agencies.		
M17	PrtOperatingInformation	In-route information about the dispatched emergency vehicle.		
M18	PiSchedAdherenceOffSched	Operating schedule information for transit vehicles.		Yes
M19	PrtTracingInformation	In-route tracing information about dispatched emergency vehicles.		
M20	PrtRecommendedRouteData	Recommended route data after route calculation has been completed but before editing has been carried out.		
M21	PrtSceneStatus	Information about scene / location before editing / data processing.	Template for information is not defined.	
M22	PrtRouteSelectionInformation	Information about use or not of a recommended route, as well as a selection of routes.		
M23	PrtApproachingAdjudicationData	Information that emergency vehicle is approaching general vehicle.		
M24	PrtRoadwayTrafficStatus Information	Roadway and traffic status information which has been customized for emergency vehicles.		
M25	PrtPriorityLevelData	Data for signal priority control level.		
M26	PrtRouteData	Route data for emergency vehicle from the current location to the destination.		

B.5 PRESTO logical system architecture (SA) (functional models)

B.5.1 Definition of functional models

Functional models are categorized according to each user subservice. They are based on user-side specifications within the system.

The definitions of each sign are as follows.

	"Objects (vehicle and sources of information)" which input and output information into the system
	"Functions" in the system
	"Information", "Data" and "Status"
	"Control"
F00	Common function numbers
M00	Common message numbers
AB_CD [M00]	Messages within the scope of standardization (shown in Figures B.1 to B.5 bold and highlighted grey)

B.5.2 Logical architecture (functional models)

The following are the functional models (logical architecture).

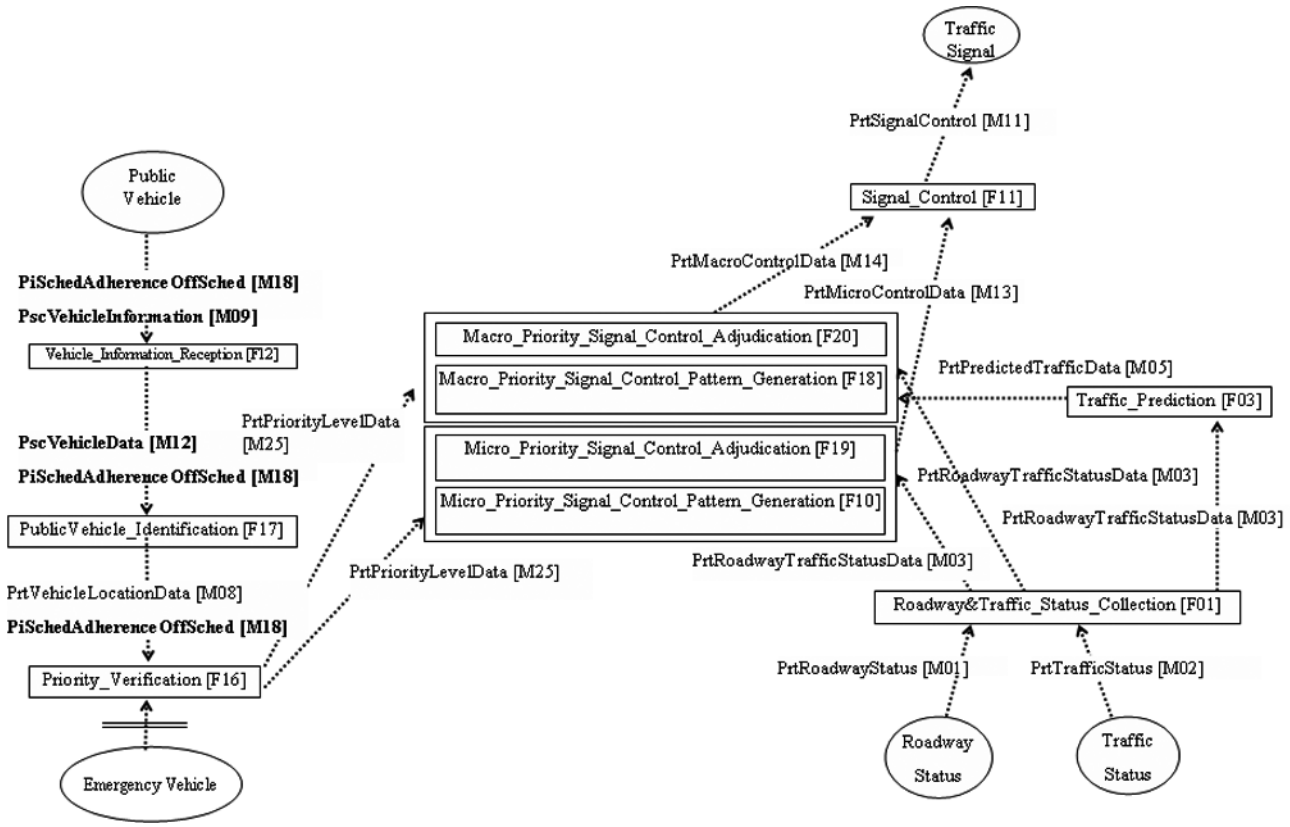


Figure B.1 — Provide signal priority to bus and tram

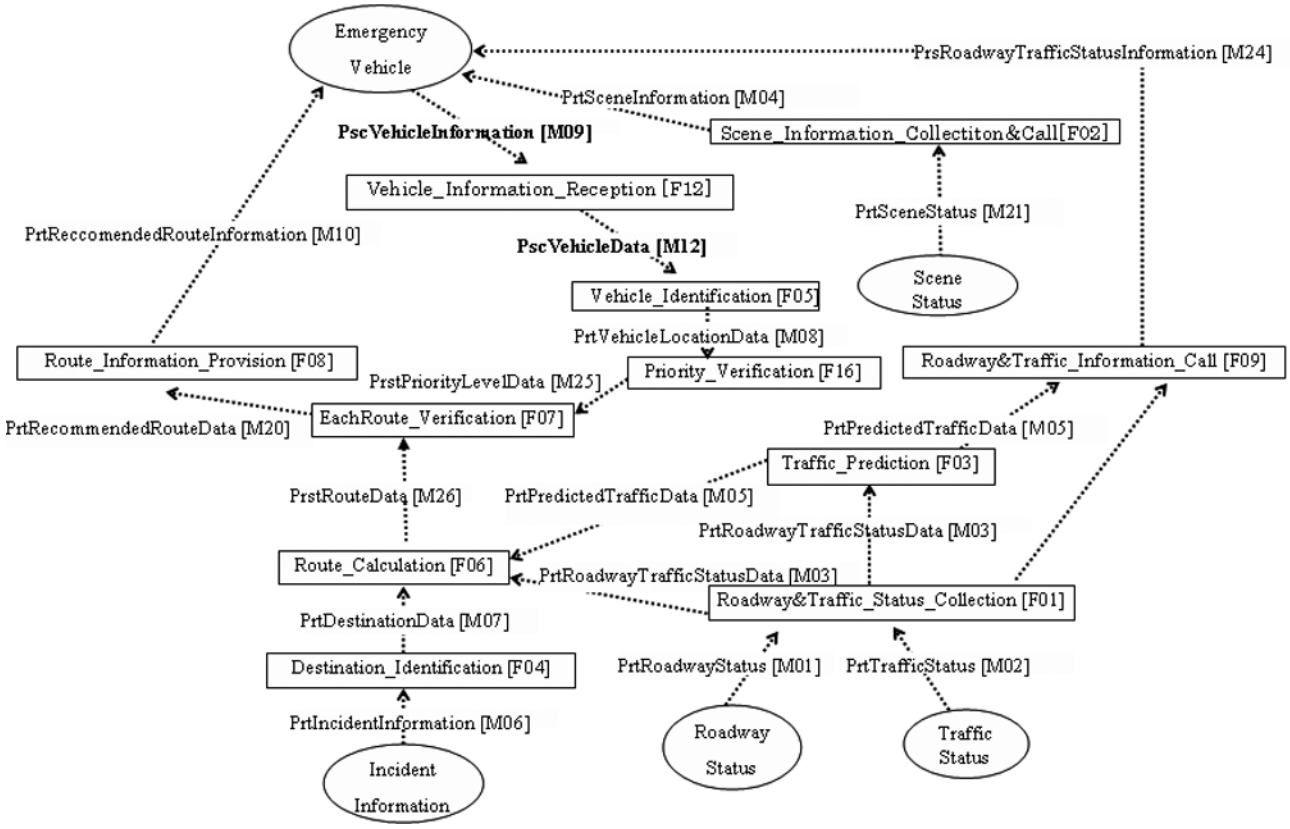


Figure B.2 — Guide emergency vehicles along the optimum routes

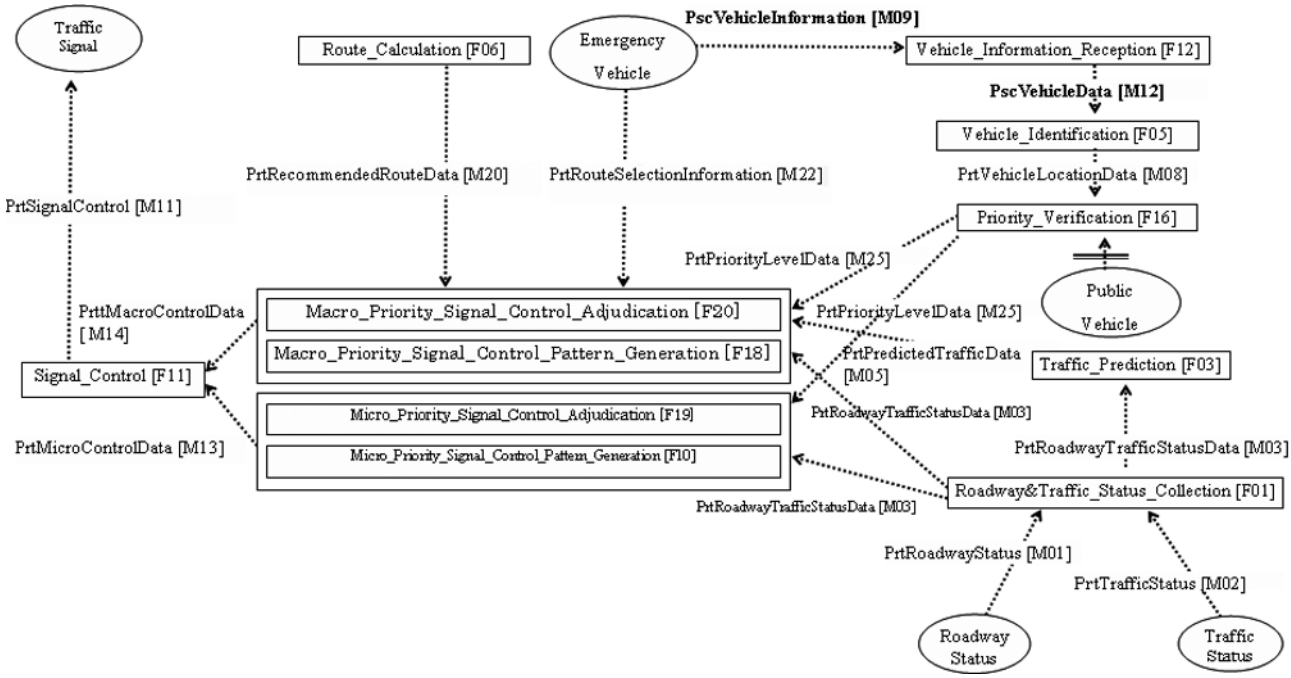


Figure B.3 — Control traffic signals for priority guidance of emergency vehicles

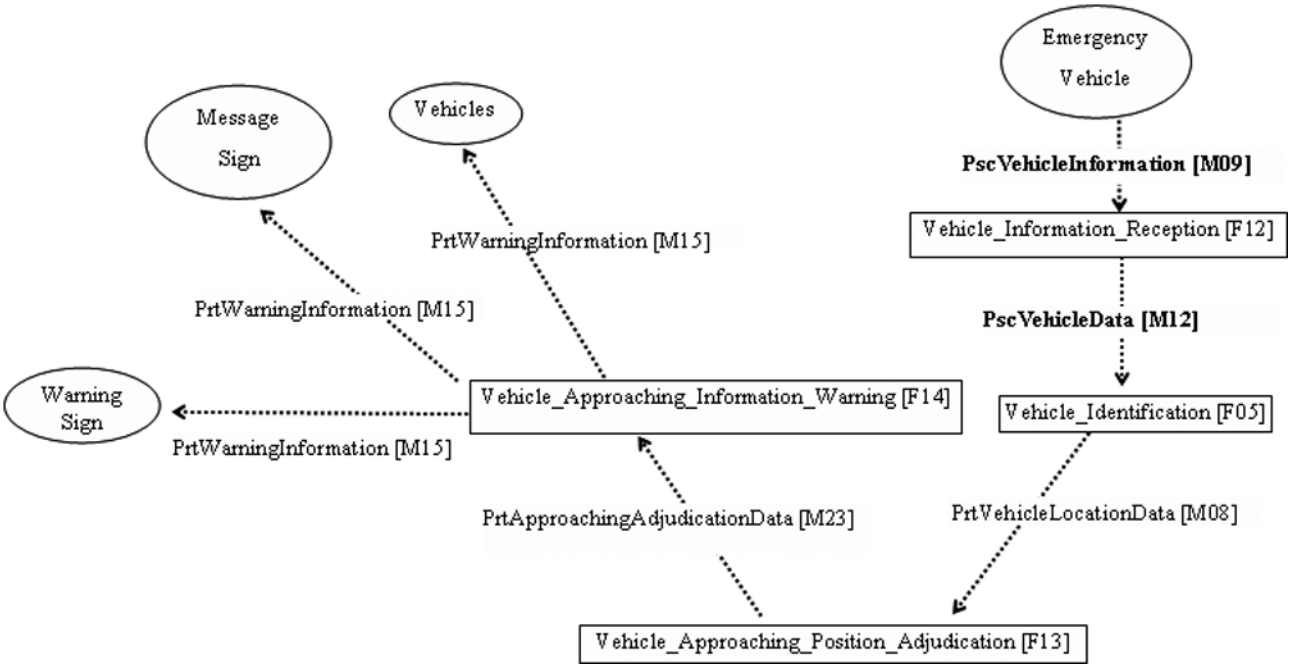


Figure B.4 — Inform vehicles of an emergency vehicle approaching

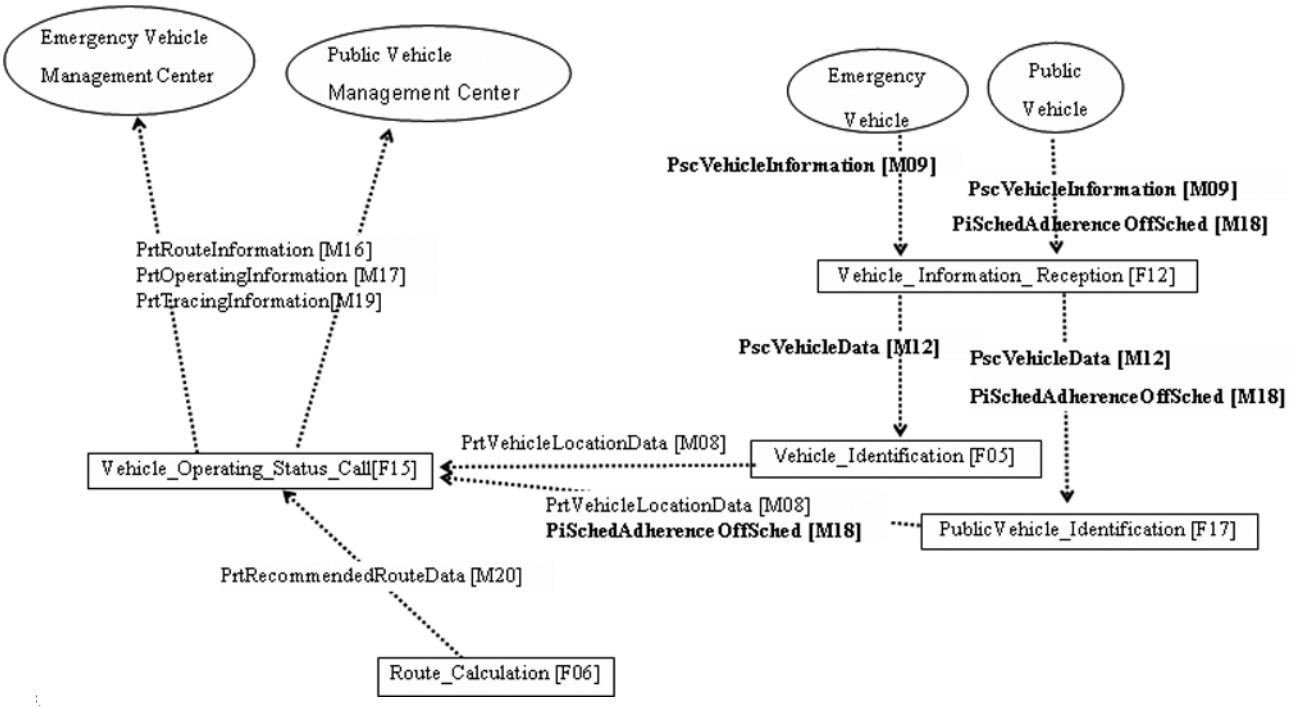


Figure B.5 — Manage emergency and public vehicles operations

Annex C
(normative)

PRESTO requirements list

This International Standard defines the messages and the data dictionary that are within the scope of the standardization, in-line with the data concept specified in ISO 14817. It should be noted that some of data elements that constitute the messages were taken from the ISO/CD 17686 [3)] Public Transport Communications Interface Profiles (TCIP) Version 2.1.

As for the priority signal control for public transport vehicles, the following definitions should be treated as options.

3) The project ISO 17686 has been deleted without publication.

C.1 Data element concepts

Data concept type	Data element concept
ASN.1 object identifier	{iso standard presto concepts dec 1 10}
Descriptive name	PSC.authorityClassification
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	A unique code indicating an authority body responsible for emergency and public transport vehicles. This code is assigned to each organization controlling vehicles such as buses, police cars, fire engines, etc.
Context	It is a component of PscVehicleID:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. Its usage includes vehicle authentication for the priority signal control service.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data is expected to enumerate Police, Fire, etc. However, its value details shall be left undefined to allow discretional definition by each country.
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

C.2 Data elements

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 20}
ASN.1 name	PSC-vehicle-code
Descriptive name	PSC.vehicleCode:nbr
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	A code uniquely assigned to each emergency or public transport vehicle. This code indicates a fleet management number of a vehicle within a department of a local municipality or a vehicle operator.
Context	It is a component of PscVehicleID:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. Its usage includes vehicle authentication for the priority signal control service.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	Value details shall be left undefined to allow discretional definition by each country.
Data type	Presto-1-20 {iso standard presto types de 1 20} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-vehicle-code; PSC-vehicle-code::=UTF8String (SIZE (8)) END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 30}
ASN.1 name	PSC- transport-mode
Descriptive name	PSC.transportMode:cd
Source	
Standard	ISO 22951
Descriptive name context	Public transport
Definition	A code indicating a public transportation mode such as lane, airport, commuter, and long distance.
Context	It is a component of PscVehicleInformation:message that is sent to roadside communication units or signal controllers by public transport vehicles or of PscVehicleData:message that is sent to signal controllers or other data processing facilities by roadside communication units. It is used for identifying different services and applications applied to different public transportation modes.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	Value details shall be left undefined to allow discretional definition by each country.
Data type	Presto-1-30 {iso standard presto types de 1 30} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-transport-mode; PSC-transport-mode::=NumericString (SIZE (1..4)) END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 40}
ASN.1 name	PSC-priority-signal-request-flag
Descriptive name	PSC.prioritySignalRequestFlag:cd
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	A flag indicating whether the priority signal control service is requested or not.
Context	It is a component of PscPrioritySignalRequest:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. It is used for clearly specifying the intention to request the priority signal control service.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: (20) Route guidance for emergency vehicles and support for relief activities Subservice: (156) Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	
Data type	Presto-1-40 {iso standard presto types de 1 40} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-priority-signal-request-flag; PSC-priority-signal-request-flag::=BOOLEAN END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 50}
ASN.1 name	PSC-request-intersection-id
Descriptive name	PSC.requestIntersectionID:nbr
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	A numerical ID of an intersection for which the priority signal control service is requested.
Context	It is a component of PscPrioritySignalRequest:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of estimated route and location” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	Value details shall be left undefined to allow discretional definition by each country.
Data type	Presto-1-50 {iso standard presto types de 1 50} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-request-intersection-id; PSC-request-intersection-id ::=INTEGER END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 60}
ASN.1 name	PSC-direction-at-intersection
Descriptive name	PSC.directionAtIntersection:cd
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The moving direction of an emergency or a public transport vehicle specified in a 16 compass point at an intersection.
Context	It is a component of PscPrioritySignalRequest:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. Notification of the vehicle's moving direction at an intersection allows the vehicle to receive the priority signal control service predefined respectively for through traffic, right-turn, left-turn, etc.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow "Vehicle identification and location information" from a subsystem "(V) Collection of bus identification and location information" to a subsystem "(C) Calculation of recommended speed" Reference site: information flow "Vehicle identification and location information" from a subsystem: "(V) Collection of tram identification and location information" to the subsystem "(C) Calculation of recommended speed" User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow "Estimated route and location information" from a subsystem: "(V) Collection of estimated route and location" to the subsystem "(R) Provision of signal control plan"
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	N/A
Data type	Presto-1-60 {iso standard presto types de 1 60} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-direction-at-intersection; PSC-direction-at-intersection ::=ENUMERATED {North, North-northeast, Northeast, East-northeast, East, East-southeast, Southeast, South-southeast, South, South-southwest, Southwest, West-southwest, West, West-northwest, Northwest, North-northwest} END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 70}
ASN.1 name	PSC-spot-id
Descriptive name	PSC.spotID:nbr
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	A numerical ID identifying a beacon, a tag or other device installed by the road or on the road surface.
Context	It is a component of PscSpotLocation:frame and PscSpotPassingPoint:frame that are sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. A beacon, a tag or other device notifies the vehicle that passes its installation point of its ID to make it available for the vehicle to incorporate the transmit data to roadside communication units. In a system where the beacon, tag or other device itself is a roadside communication unit, it may add its ID to the transmit data. By referencing the ID and location data matrix table, it is possible to identify the location of the vehicle.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of estimated route and location” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	Value details shall be left undefined to allow discretional definition by each country.
Data type	Presto-1-70 {iso standard presto types de 1 70} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-spot-id; PSC-spot-id ::=INTEGER END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data element
ASN.1 object identifier	{iso standard presto concepts de 1 80}
ASN.1 name	PSC-spot-passing-time
Descriptive name	PSC.spotPassingTime:tm
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The time that a vehicle passes a beacon, a tag or other device installed by the road or on the road surface.
Context	It is a component of PscSpotPassingPoint:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. A clock built in to an in-vehicle unit or a roadside communication unit such as a beacon measures this time.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of estimated route and location” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	Value details shall be left undefined to allow discretional definition by each country.
Data type	Presto-1-80 {iso standard presto types de 1 80} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-spot-passing-time; PSC-spot-passing-time ::=UTCTime END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data Element
ASN.1 object identifier	{iso standard presto concepts de 1 90}
ASN.1 name	PSC-vehicle-speed
Descriptive name	PSC.vehicleSpeed:qty
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The velocity of a vehicle
Context	It is a component of PscTravelInformation:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. Used for computing the current location of a specific vehicle. This data may also be used for predicting the vehicle's travel time from the current location to an intersection performing priority signal control.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow "Vehicle identification and location information" from a subsystem "(V) Collection of bus identification and location information" to a subsystem "(C) Calculation of recommended speed" Reference site: information flow "Vehicle identification and location information" from a subsystem "(V) Collection of tram identification and location information" to the subsystem "(C) Calculation of recommended speed" User service: 20.Route guidance for emergency vehicles and support for relief activities Subservice: 156.Control traffic signals for priority guidance of emergency vehicles Reference site: information flow "Estimated route and location information" from a subsystem "(V) Collection of estimated route and location" to a subsystem "(R) Provision of signal control plan"
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	N/A
Data type	Presto-1-90 {iso standard presto types 1 90} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-vehicle-speed; PSC-vehicle-speed::=INTEGER END
Format	N/A
Valid value rule	INTEGER (0..255)
Unit of measure	km/h
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data Element
ASN.1 object identifier	{iso standard presto concepts de 1 100}
ASN.1 name	PSC-vehicle-acceleration
Descriptive name	PSC.vehicleAcceleration:qty
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The acceleration velocity of a vehicle
Context	It is a component of PscTravelInformation:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. Used for computing the current location of a specific vehicle. This data may also be used for predicting the vehicle's travel time from the current location to an intersection performing priority signal control.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow "Vehicle identification and location information" from a subsystem "(V) Collection of bus identification and location information" to a subsystem "(C) Calculation of recommended speed" Reference site: information flow "Vehicle identification and location information" from a subsystem "(V) Collection of tram identification and location information" to the subsystem "(C) Calculation of recommended speed" User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow "Estimated route and location information" from a subsystem "(V) Collection of estimated route and location" to the subsystem "(R) Provision of signal control plan"
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	N/A
Data type	Presto-1-100 {iso standard presto types 1 100} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-vehicle-acceleration; PSC-vehicle-acceleration::=REAL END
Format	N/A
Valid value rule	N/A
Unit of measure	m/sec^2
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data Element
ASN.1 object identifier	{iso standard presto concepts de 1 110}
ASN.1 name	PSC-travel-distance
Descriptive name	PSC.travelDistance:qty
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	Travel distance of a vehicle.
Context	It is a component of PscTravelInformation:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication. Used for computing the current location of a specific vehicle.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of estimated route and location” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	N/A
Data type	Presto-1-110 {iso standard presto types 1 110} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-travel-distance; PSC-travel-distance::=INTEGER END
Format	N/A
Valid value rule	INTEGER (0..65535)
Unit of measure	m
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data Element
ASN.1 object identifier	{iso standard presto concepts de 1 120}
ASN.1 name	PSC-transmission-time
Descriptive name	PSC.transmissionTime:tm
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The time that a vehicle sent the vehicle data.
Context	It is a component of PscVehicleInformation:message that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or of PscVehicleData:message that is sent to signal controllers or other data processing facilities by roadside communication units. It is used, for example, for determining the priority in priority signal control services concurrently requested by multiple vehicles for one signal controller or other data processing facilities.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan” Reference site: information flow “(V) Estimated route and location information” from a subsystem “(R) Collection of estimated route and location” to the subsystem “Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	Value details shall be left undefined to allow discretional definition by each country.
Data type	Presto-1-120 {iso standard presto types 1 120} DEFINITIONS AUTOMATIC TAGS ::= BEGIN EXPORTS PSC-transmission-time; PSC-transmission-time::=UTCTime END
Format	N/A
Valid value rule	N/A
Unit of measure	N/A
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone umber	T.B.D.
Submitter phone number	T.B.D.

C.3 Data frames

Data concept type	Data frame
ASN.1 object identifier	{iso standard presto concepts df 1 130}
ASN.1 name	PscVehicleID
Descriptive name	PscVehicleID:frame
Source	ISO/CD 17686 Ver2.1
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	An ID that identifies an emergency or a public transport vehicle requesting the priority signal control service. This ID is an aggregate of an authority body code, a municipality or operator code, the fleet management code of the vehicle and other data.
Context	It is a component of PscVehicleInformation:message that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or of PscVehicleData:message that is sent to signal controllers or other data processing facilities by roadside communication units. It is used for identifying an emergency or public transport vehicle subject to the priority signal control service.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan” Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle estimated route” to the subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data frame is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented.

Data type	Presto-1-130 {iso standard presto types df 1 130}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscVehicleID;
	IMPORTS PSC-authority-classification FROM Presto-1-10
	SP-county FROM Tcip-1
	PSC-vehicle-code FROM Presto-1-20;
	PscVehicleID ::= SET {
	authority [0] PSC-authority-classification,
	jurisdiction [1] SP-County OPTIONAL, -- referred to TCIP Ver2.1
	code [2] PSC-vehicle-code OPTIONAL
	}
	END

Referenced data frames	
Referenced data elements	{iso standard spdd 8}, {iso standard presto concepts de 1 20}

Data concept type	Data frame
Referenced data element concepts	{iso standard presto concepts dec 1 10},
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.
ASN.1 object identifier	{iso standard presto concepts df 1 140}
ASN.1 name	PscPrioritySignalRequest
Descriptive name	PscPrioritySignalRequest:frame
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The data sent by an emergency or a public transport vehicle requesting the priority signal control service. This data is an aggregate of the flag indicating the intention to request the priority signal control service, the numerical ID of the intersection and the moving direction of the vehicle.
Context	It is a component of PscVehicleInformation:message that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or of PscVehicleData:message that is sent to signal controllers or other data processing facilities by roadside communication units. This is used for authenticating the vehicle subject to the priority signal control service and identifying the intersection and the direction at the intersection subject for prioritization.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data frame is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented.

Data concept type	Data frame

Data type	Presto-1-140 {iso standard presto types df 1 140}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscPrioritySignalRequest;
	IMPORTS PSC-priority-signal-request-flag FROM Presto-1-40
	PSC-request-intersection-id FROM Presto-1-50
	PSC-direction-at-intersection FROM Presto-1-60;
	PscPrioritySignalRequest ::= SET {
	request [0] PSC-priority-signal-request-flag OPTIONAL,
	intersection [1] PSC-request-intersection-id OPTIONAL,
	direction [2] PSC-direction-at-intersection OPTIONAL
	}
	(WITH COMPONENTS {..., request PRESENT}|
	WITH COMPONENTS {...,intersection PRESENT}|
	WITH COMPONENTS {..., direction PRESENT})
	END

Referenced data frames	
Referenced data elements	{iso standard presto concepts de 1 40}, {iso standard presto concepts de 1 50}, {iso standard presto concepts de 1 60}
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.
ASN.1 object identifier	{iso standard presto concepts df 1 150}
ASN.1 name	PscVehicleCurrentLocation
Descriptive name	PscVehicleCurrentLocation:frame
Source	ISO/CD 17686 Ver2.1
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The current location data of an emergency or a public transport vehicle.
Context	It is a component of PscVehicleInformation:message that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or of PscVehicleData:message that is sent to signal controllers or other data processing facilities by roadside communication units. Used for identifying the current location of an emergency or public transport vehicle and predicting the arrival time at an intersection performing the priority signal control.

Data concept type	Data frame
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle estimated route” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data frame is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented. The frame consists of a discretional combination of data of different specifications.

Data type	Presto-1-150 {iso standard presto types df 1 150}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscVehicleCurrentLocation;
	IMPORTS PscSpotLocation FROM Presto-1-170
	SpLocationclass FROM Tcip-2
	PscSpotPassingPoint FROM Presto-1-180;
	PscVehicleCurrentLocation ::= CHOICE {
	prstLocation PscSpotLocation,
	tcipLocation SpLocationclass, -- referred to TCIP Ver2.1
	standardLocationReference NULL, -- referred to ISO TC204 WG3
	passingPoint, PscSpotPassingPoint
	}
	END

Referenced data frames	{iso standard presto concepts df 1 170}, {iso standard sp 2}, {iso standard presto concepts df 1 180}
Referenced data elements	
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data frame
ASN.1 object identifier	{iso standard presto concepts df 1 160}
ASN.1 name	PscTravelInformation
Descriptive name	PscTravelInformation:frame
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	Travel data of an emergency or public transport vehicle. This data is an aggregate of the speed, the accelerated velocity and the travel distance data measured by an emergency or public transport vehicle itself.
Context	It is a component of PscVehicleInformation:message that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or of PscVehicleData:message that is sent to signal controllers or other data processing facilities by roadside communication units. Used for computing the current location of a specific vehicle. Speed and accelerated velocity data contained in this data frame may be used to predict the travel time of the vehicle from its current location to the intersection performing priority signal control.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle estimated route” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data frame is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented.

Data type	Presto-1-160 {iso standard presto types df 1 160}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscTravelInformation;
	IMPORTS PSC-vehicle-speed FROM Presto-1-90
	PSC-travel-acceleration FROM Presto-1-100
	PSC-travel-distance FROM Presto-1-110;
	PscTravelInformation ::= SET {
	speed [0] PSC-vehicle-speed OPTIONAL,
	acceleration [1] PSC-vehicle-acceleration OPTIONAL,
	distance [2] PSC-travel-distance
	}
	END

Referenced data frames	
Referenced data elements	{iso standard presto concepts de 1 90}, {iso standard presto concepts de 1 100}, {iso standard presto concepts de 1 110}
Registration status	Draft

Data concept type	Data frame
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.
ASN.1 object identifier	{iso standard presto concepts df 1 170}
ASN.1 name	PscSpotLocation
Descriptive name	PscSpotLocation:frame
Source	ISO/CD 17686 Ver2.1
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The location data that an emergency or a public transport vehicle obtains when passing a beacon, a tag or other device installed by the road or on the road surface. This includes a beacon, a tag or other devices of ID and an ID of the link that it is installed at, which is collected when an emergency or public transport vehicle passes the beacon, tag or other device.
Context	It is a component of PscVehicleCurrentLocation:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. By referencing the ID and location data matrix table, it is possible to identify the location of the vehicle.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle estimated route” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data frame is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented.

Data concept type	Data frame

Data type	Presto-1-170 {iso standard presto types df 1 170}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscSpotLocation;
	IMPORTS SP-LinkID FROM Tcip-3
	PSC-spot-id FROM Presto-1-170;
	PscSpotLocation ::= SET {
	linkID [0] SP-LinkID OPTIOANAL, -- referred to TCIP Ver2.1
	spotID [1] PSC-spot-id OPTIONAL
	}
	(WITH COMPONENTS {..., linkID PRESENT}|
	WITH COMPONENTS {..., spotID PRESENT})
	END

Referenced data frames	
Referenced data elements	{iso standard spdd 21}, {iso standard presto concepts de 170}
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Data frame
ASN.1 object identifier	{iso standard presto concepts df 1 180}
ASN.1 name	PscSpotPassingPoint
Descriptive name	PscSpotPassingPoint:frame
Source	
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The location and time data collected when an emergency or a public transport vehicle passes a beacon, a tag or other devices installed by the road or on the road surface. This includes the beacon, tag or other device ID and the time that the vehicle passed the particular point.
Context	It is a component of PscVehicleCurrentLocation:frame that is sent to roadside communication units or signal controllers by emergency or public transport vehicles or to signal controllers or other data processing facilities by roadside communication units. This frame is used for identifying the time and the location of the vehicle, which is derived by referencing the database of the ID and the location data.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle estimated route” to a subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This data frame is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented.

Data type	Presto-1-180 {iso standard presto types df 1 180}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscSpotPassingPoint;
	IMPORTS PSC-spot-id FROM Presto-1-70
	PSC-spot-passing-time FROM Preasto-1-80;
	PscSpotPassingPoint ::= SET {
	ID [0] PSC-spot-id,
	time [1] PSC-spot-passing-time
	}
	END

Referenced data frames	
Referenced data elements	{iso standard presto concepts de 1 70}, {iso standard presto concepts de 1 80}
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

C.4 Messages

Data concept type	Message
ASN.1 object identifier	{iso standard presto concepts mes 1 190}
ASN.1 name	PscVehicleInformation
Descriptive name	PscVehicleInformation.message
Source	ISO/CD 17686 Ver2.1
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The vehicle data of an emergency or a public transport vehicle that includes the country code that the vehicle and the road on which it is travelling belong to, the message transmit time, the vehicle identification data, the priority signal control service request data, current location data and vehicle travel data.
Context	Emergency or public transport vehicles transmit this message to roadside communication units or signal controllers. A signal controller or other data processing facility uses the message for authenticating an emergency or a public transport vehicle subject to priority signal control and for identifying the intersection, direction and timing for priority signal control.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference: “ID information” from a subsystem “(V) Detection of emergency vehicle ID” to a subsystem “(R) Provision of signal control plan” Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle estimated route” to the subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This message is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented. Data the detailed values of which are not defined shall conform to the regulations of the specific country that the vehicle or the road belongs to.

Data concept type	Message

Data type	Presto-1-190 {iso standard presto types mes 1 190}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscVehicleInformation;
	IMPORTS SP-Country FROM Tcip-1
	PscVehicleID FROM Presto-1-130
	PSC-transport-mode FROM Presto-1-30
	SCH-TripID FROM Tcip-4
	PscPrioritySignalRequest FROM Presto-1-140
	PscVehicleCurrentLocation FROM Presto-1-150
	PscTravelInformation FROM Presto-1-160
	PSC-transmission-time FROM Presto-1-120;
	PscVehicleInformation ::= SET{
	countryOfAVehicleFromVehicle [0] SP-Country OPTIONAL, -- referred to TCIP Ver2.1
	countryOfARoadFromVehicle [1] SP-Country OPTIONAL, -- referred to TCIP Ver2.1
	vehicleIDFromVehicle [2] PscVehicleID OPTIONAL,
	transportModeFromVehicle [3] PSC-transport-mode OPTIONAL,
	RouteNoFromVehicle [4] SCH-TripID OPTIONAL, -- referred to TCIP Ver2.1
	requestFromVehicle [5] PscPrioritySignalRequest OPTIONAL,
	LocationFromVehicle [6] PscVehicleCurrentLocation OPTIONAL,
	TravelInformationFromVehicle [7] PscTravelInformation OPTIONAL,
	timeFromVehicle [8] PSC-transmission-time OPTIONAL
	}
	(WITH COMPONENTS {..., vehicleIDFromVehicle PRESENT}|
	WITH COMPONENTS {..., requestFromVehicle PRESENT})
	END

Referenced data frames	{iso standard presto concepts df 1 130}, {iso standard presto concepts df 1 140}, {iso standard presto concepts df 1 150}, {iso standard presto concepts df 1 160}
Referenced data elements	{iso standard spdd 8}, {iso standard presto concepts de 1 30}, {iso standard schdd 59}, {iso standard presto concepts de 1 120}
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Message
ASN.1 object identifier	{iso standard presto concepts mes 1 200}
ASN.1 name	PscVehicleData
Descriptive name	PscVehicleData.message
Source	ISO/CD 17686 Ver2.1
Standard	ISO 22951
Descriptive name context	Public transport Emergency
Definition	The vehicle data of an emergency or a public transport vehicle that includes the country code that the vehicle and the road on which it is travelling belong to, the message transmit time, the vehicle identification data, the priority signal control service request data, current location data and vehicle travel data.
Context	Roadside communication units create this message by deleting unnecessary data from the PscVehicleInformation:messege transmitted by emergency or public transport vehicles or adding data such as beacon ID or the time data, as necessary and then send it to signal controllers or other data processing facilities. The signal controller or other data processing facility use the message for authenticating an emergency or a public transport vehicle subject to priority signal control and for identifying the intersection, direction and timing for priority signal.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed” User service: 20. Route guidance for emergency vehicles and support for relief activities Subservice: 156. Control traffic signals for priority guidance of emergency vehicles Reference: “ID information” from subsystem “(V) Detection of emergency vehicle ID” to subsystem “(R) Provision of signal control plan” Reference site: information flow “Estimated route and location information” from a subsystem “(V) Collection of emergency vehicle’s estimated route” to the subsystem “(R) Provision of signal control plan”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This message is not used for public transport vehicles in case the priority signal control for these vehicles is not implemented. Data the detailed values of which are not defined shall conform to the regulations of the specific country that the vehicle or the road belongs to.

Data concept type	Message

Data type	Presto-1-200 {iso standard presto types mes 1 200}
	DEFINITIONS AUTOMATIC TAGS ::=
	BEGIN
	EXPORTS PscVehicleData;
	IMPORTS SP-Country FROM Tcip-1
	PscVehicleID FROM Presto-1-130
	PSC-transport-mode FROM Presto-1-30
	SCH-TripID FROM Tcip-4
	PscPrioritySignalRequest FROM Presto-1-140
	PscVehicleCurrentLocation FROM Presto-1-150
	PscTravelInformation FROM Presto-1-160
	PSC-transmission-time FROM Presto-1-120;
	PscVehicleData::= SET{
	countryOfAVehicleFromRoad [0] SP-Country OPTIONAL, -- referred to TCIP Ver2.1
	countryOfARoadFromRoad [1] SP-Country OPTIONAL, -- referred to TCIP Ver2.1
	vehicleIDFromRoad [2] PscVehicleID OPTIONAL,
	transportModeFromRoad [3] PSC-transport-mode OPTIONAL,
	RouteNoFromRoad [4] SCH-TripID OPTIONAL, -- referred to TCIP Ver2.1
	requestFromRoad [5] PscPrioritySignalRequest OPTIONAL,
	locationFromRoad [6] PscVehicleCurrentLocation OPTIONAL,
	travelInformationFromRoad [7] PscTravelInformation OPTIONAL,
	timeFromRoad [8] PSC-transmission-time OPTIONAL
	}
	(WITH COMPONENTS {..., vehicleIDFromRoad PRESENT}|
	WITH COMPONENTS {..., requestFromRoad PRESENT})
	END

Referenced data frames	{iso standard presto concepts df 1 130}, {iso standard presto concepts df 1 140}, {iso standard presto concepts df 1 150}, {iso standard presto concepts df 1 160}
Referenced data elements	{iso standard spdd 8}, {iso standard presto concepts de 1 30}, {iso standard schdd 59}, {iso standard presto concepts de 1 120}
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.

Data concept type	Message
ASN.1 object identifier	{iso standard pi 11}
ASN.1 name	PiSchedAdherenceOffSched
Descriptive name	PiSchedAdherenceOffSched:message
Source	ISO/CD 17686 Ver2.1
Standard	ISO 22951
Descriptive name context	Public transport
Definition	The schedule-related data of a public transport vehicle that includes information such as the travel route identification code, the delay in the operational timetable, etc.
Context	Public transport vehicles transmit this message to roadside communication units or signal controllers. A signal controller or other data processing facility that receives a request for the priority signal control service sent by a public transport vehicle performs priority signal control only when the delay time obtained from this message exceeds a predetermined threshold.
Architecture reference	User service: 14. Assistance for public transport operations and management Subservice: 127. Provide signal priority to bus and tram Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of bus identification and location information” to a subsystem “(C) Calculation of recommended speed” Reference site: information flow “Vehicle identification and location information” from a subsystem “(V) Collection of tram identification and location information” to the subsystem “(C) Calculation of recommended speed”
Architecture name	System architecture for ITS in Japan
Architecture version	Edited in November, 1999
Remarks	This message is registered in TCIP and not used in case the priority signal control for public transport vehicles is not implemented.
Data type	Referred to TCIP Ver2.1
Referenced data frames	Referred to TCIP Ver2.1
Referenced data elements	Referred to TCIP Ver2.1
Registration status	Draft
Registrar organization name	ISO/TC 204
Registrar phone number	T.B.D.
Steward organization name	ISO/TC 204/WG 1
Steward phone number	T.B.D.
Submitter phone number	T.B.D.
Related groups	T.B.D.

Annex D
(informative)

Needs for standardization

The priority and preemption system for emergency and public transport vehicles is a system that supports *en route* vehicles such as police cars, fire engines, buses and so forth. There are usually several agencies that have jurisdiction over these vehicles. If each agency tries to construct a priority control system separately, this will create a situation that greatly burdens the infrastructure, in which the roadside communication units and signal controllers will receive information through different interfaces from target vehicles with priority control carried out through different algorithms. As shown in Annex E, various countries are developing or preparing for the operation of similar systems. Considering the case of international incidents where emergency vehicles take an active role by crossing borders between countries or operations of international buses, the above-described risks become higher. In order to avoid such situations and make it possible to use a common infrastructure for all targeted vehicles in various countries, international standardization is indispensable. Furthermore, we can expect the following benefits from such standardization.

— Unification of the interface between subsystems can promote competition between device suppliers and lead to reductions in total costs. Also, this allows related agencies to introduce the system easily.

— Standardization of the units mounted on vehicles can lead to the simplification of the operations of in-vehicle units.

— Popularization of the system is promoted by standardization and society will quickly be able to enjoy the fruits of the system such as described in Clause A.1.

Annex E
(informative)

Background of constructing PRESTO system architecture (SA)

E.1 Necessities of constructing PRESTO SA

a) It is essential to coordinate activities among all related government bodies, both in Japan and in Western countries. This will serve to effectively promote the international standardization of PRESTO. To further this standardization, it would be most effective to make use of the system's concepts and its architecture (reference models) as the basis for development, as they have been designed with a multitude of public transport vehicles and emergency vehicles in mind. Therefore, PRESTO has been developing the system's concept and messages based on FAST (Fast Emergency Vehicle Preemption systems) that is one of the practical systems of PRESTO and has been developed by the Universal Traffic Management Society of Japan.

b) It is not the final objective of this International Standard to define the details of PRESTO SA. However, the standardization process should seek to focus on two major points: first, the practical regulation of the SA (reference models) and second, to conduct the standardization accurately in accordance with the SA. This will lead to its wider acceptance by all parties concerned, as well as prescribe the most suitable areas for the standardization.

c) The SA defines not only functions, but also messages (input and output of each function). It also specifies messages within the scope of the standardization.

E.2 Relationship with existing system architectures

SA as a comprehensive structure of ITS has already been defined in both Japan and Western countries, although its description varies from country to country. Its content includes items such as priority operation of public transport and emergency vehicles and priority signal control.

E.2.1 Analysis of "system architecture for ITS in Japan"

a) Table B.1 shows some of the user services from system architecture for ITS in Japan compiled by the four related government bodies. They are related to the system functions assumed in the standardization of PRESTO Nos. 6 and 9 from the table and include the basics of the system function.

b) The following are the SA defined for each field of development. It would be effective to use these models for the construction of the SA in the standardization of PRESTO.

- Logical architecture (information model).
- Logical architecture (control model).
- Physical architecture.

Table E.1 — Related user services from *system architecture for ITS in Japan*

Development field	User services	Specific user services	Specific user subservices
1. Advances in navigation systems	1) Provision of route guidance traffic information	(1) Provision of route guidance information for drivers	1. Provide optimum route information
			2. Provide road traffic information
			4. Guide along the selected route
			5. Exchange information between running vehicles
3. Assistance for safe driving	4) Provision of driving and road conditions information	(11) Provision of information on vehicles in the vicinity and others	35. Provide information on intersection in city
			36. Provide information on vehicles in the vicinity of expressway
4. Optimization for traffic management	8) Optimization of traffic management	(26) Assistance for police activities	81. Improve management of police vehicles
			82. Assist police activities
		(28) Optimization of traffic signal control	87. Control traffic signal at an intersection
			88. Control traffic signal at arterial roads
			89. Control wide-area traffic
			90. Control traffic signals at railroad crossing
			91. Control corresponding to a lane
		(29) Route guidance	92. Guide a route corresponding to the needs of traffic management
			93. Guide to a lane corresponding to a vehicle type
		(30) Dynamic lane control	95. Control bus lane dynamically
	9) Provision of traffic restriction information in case of incident	(31) Assistance for traffic management under usual conditions	99. Manage traffic when disaster occurs
			100. Manage traffic under typical traffic conditions
5. Increasing efficiency in road management	10) Improvement of maintenance operations		
	11) Management of specially permitted commercial vehicles		
6. Support for public transport	14) Assistance for public transport operations and operations management	(41) Implementation of priority passing for public transport	**127. Provide signal priority to bus and tram**
			128. Monitor operations on dedicated lanes such as for a bus
7. Increasing efficiency in commercial vehicle operations	15) Assistance for commercial vehicle operations management		
8. Support for pedestrians	18) Vehicle-pedestrian accident avoidance	(50) Ensuring safety of pedestrians and others in cooperation with vehicles	147. Warn pedestrians of approaching vehicles and others
9. Support for emergency vehicle operations	20) Route guidance for emergency vehicles and support for relief activities	(53) Guidance for emergency vehicles and support for relief activities	**155. Guide emergency vehicles along the optimum routes**
			156. Control traffic signals for priority guidance of emergency vehicles
			157. Inform vehicles of an emergency vehicle approaching
			158. Manage emergency vehicles operations
			159. Assist vehicles for restoration and rescue works during disasters

NOTE 1 Objects related to PRESTO are shown in bold.

NOTE 2 Numbering of objects corresponds to *System Architecture for ITS in Japan* [1], Fig. 2.3-1.

E.2.2 Other system architectures

It is necessary to consider the following SA in addition to the system architecture for ITS in Japan in order to specify the concept and the scope in the standardization of PRESTO.

a) JSK (Japan)

JSK (Japanese Association of Electronic Technology for Automotive Traffic and Driving) redefines ITS services from the perspective of in-vehicle equipment referring to the System architecture for ITS in Japan. The SA includes services subtitled “14. Assistance for public transport operations and operations management; [34] Priority operation of public transport”, “18. Assistance for relief activities of emergency vehicles; [42] Priority operation of emergency vehicles”.

b) United States of America (The National ITS Architecture)

Priority operations of public transport and emergency vehicles are included as requirements in the User Services subtitled “2.1 Public Transportation Management” and “5.2 Emergency Vehicle Management”. The SA is defined with these guidelines in mind.

c) Europe (Transport Telematics System architecture)

Priority operations of public transport and emergency vehicles are included in “5.2 Emergency Vehicle Management” and “10.1 Public Transport Management”. These items are included in the user needs analysis list compiled by KAREN (Keystone Architecture Required for European Networks).

Annex F
(informative)

Practical examples of PRESTO

Practical examples of PRESTO in various countries are introduced below. These systems perform the confirmation of service-target vehicles and adjustment of control priority that varies in accordance with the types of vehicles by using vehicle ID. Also, the systems utilize the vehicles' travelling information, which consists of vehicle position, travelling direction and speed, as well as vehicle ID, in order to sense the approaching target vehicles to conduct their functions with certainty and terminate their functions as soon as vehicles pass to minimize the negative influence on traffic. Various kinds of communication media are used. The OPTICOM and TSS systems have operated for many years. The FAST system was installed in Tokyo Metropolitan Administration in 2001 and its details were presented at the conference "ITS in EUROPE: e-Safety" (2002-09-16 to 2002-09-18, Lyon, France).

F.1 OPTICOM system (USA)

This system uses an emitter/detector rather than communication by wire to achieve simple communication through infrared propagation in space. The system radiates infrared rays that carry vehicle ID information from the emitter mounted on the emergency vehicle or bus toward the intersection ahead. A detector is established at the intersection and when it receives vehicle ID information, it carries out micro control depending on the permitted priority of the vehicle after confirming that this vehicle is a vehicle targeted by the system.

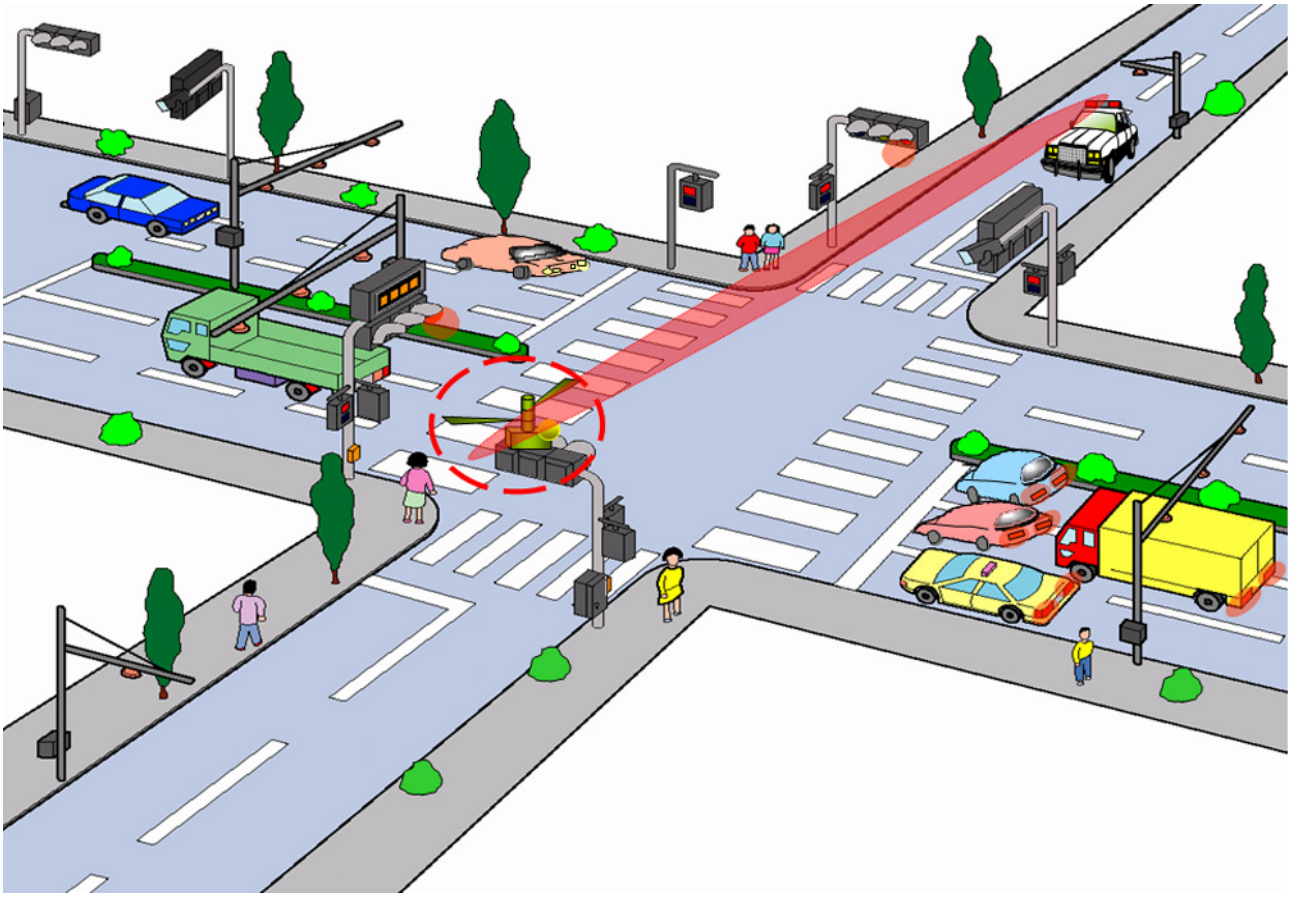


Figure F.1 — OPTICOM system

The system uses the reception level of the detector as the position information of the vehicle. Also, it distinguishes the travelling direction of the vehicle by the attachment angle of the detector. When the reception level reaches a certain level due to the approaching target vehicle, the priority signal control, determined by the direction of the attachment angle of the detector, starts. The priority signal control stops when the reception level reaches zero, passing through the detector position of the concerned vehicle.

F.2 FAST system (Japan)

This system uses the two-way communication function of an infrared beacon. The traffic management centre transmits, beforehand, the calculated results of the recommended routes from the point where the infrared beacon is installed to all the locations where incidents occurred. When the infrared beacon receives incident ID or vehicle ID from the passing emergency vehicle, the infrared beacon extracts and sends back the recommended route information leading to the scene of the incident the vehicle aims at after confirming that it is a system target vehicle. Since the communication range between an infrared beacon and an in-vehicle unit is short, it becomes possible to identify the position of the vehicle at the time of communication as the position where the infrared beacon is installed.

When emergency vehicles and buses pass the infrared beacon installed at the upstream point with the distance of several hundreds meters from the intersection inflow route, the beacon ID is transmitted as the vehicle's travelling information along with the received vehicle ID to the downstream intersection. At the intersection, micro control is carried out in accordance with the priority of the concerned vehicle by converting the beacon ID into information of the position of the vehicle and travelling direction through DB of the beacon installation point.

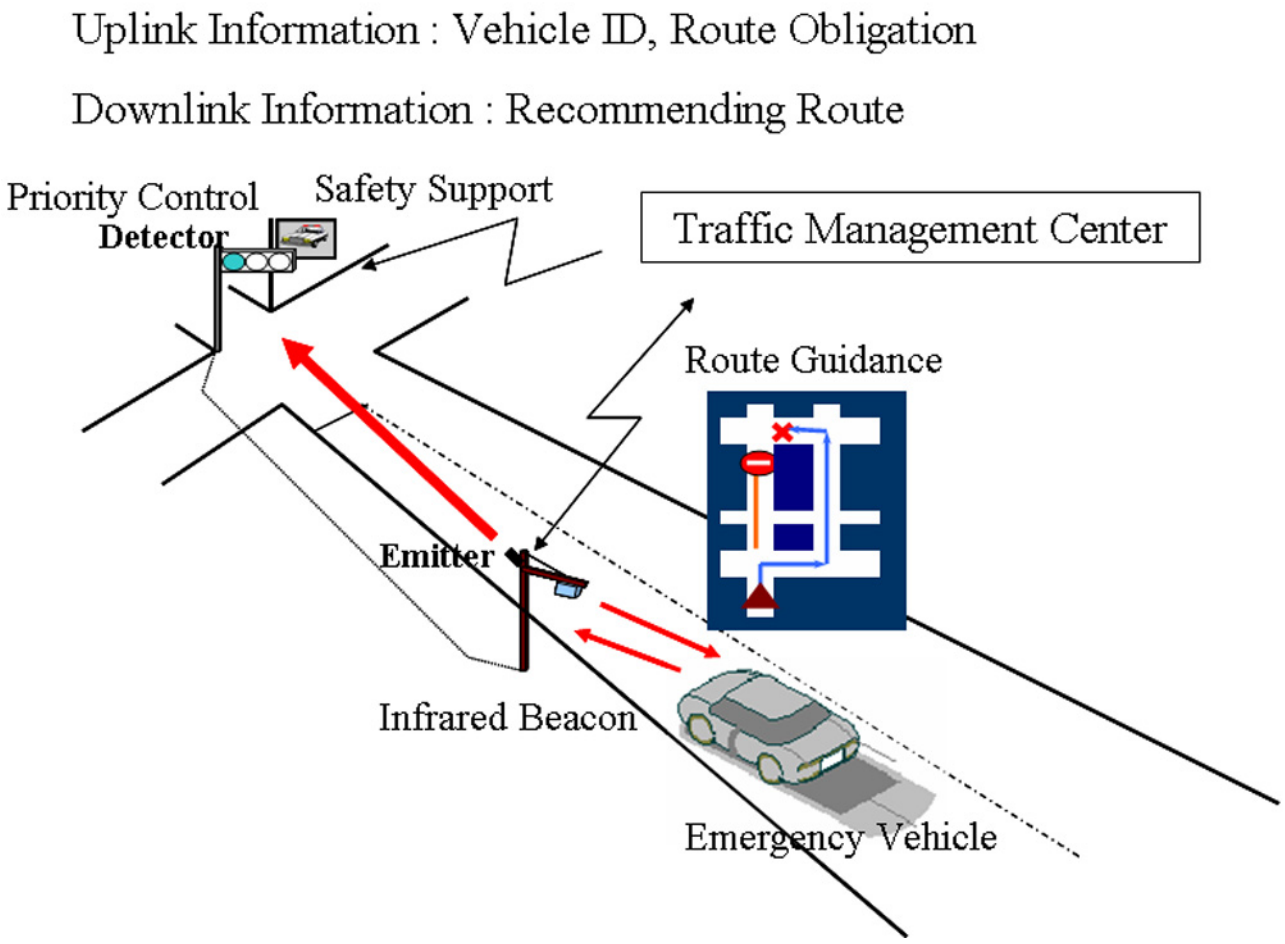


Figure F.2 — FAST system

For emergency vehicles, warning of the approaching emergency vehicle is shown on the message board. Also when the vehicle ID, which was received at the time the vehicle passed the infrared beacon installed immediately next to the exit of the intersection, agrees with the vehicle ID that was previously sent from the upstream infrared beacon, it judges that the concerned vehicle passed the point and terminates the micro control and the warning of approaching emergency vehicle. Furthermore, vehicle ID, beacon ID and route-observation information are sent out from the infrared beacon to the traffic management centre and macro control is carried out for the emergency vehicle that was confirmed to travel on the recommended route.

Furthermore, by introducing the emitter/detector of the OPTICOM System described previously, and by connecting the emitter with the infrared beacon at the upstream point and the detector with the signal controller and the message board, the communication between the infrared beacon and roadside units is established through the propagation of light through space.

F.3 TSS System (Denmark)

This system reads off the TagID recorded by the PositionTag via the RF antenna attached under the body of the vehicle when emergency vehicles or buses pass the PositionTag buried in the road. The vehicle sends the TagID, vehicle travelling information such as position, travelling speed, direction, etc., obtained by the odometer or other device and vehicle ID through various communication media to the traffic management centre. At the traffic management centre, the TagID is converted into tag installation position information through Tag installation point DB. It gains highly accurate information about the vehicle position in real-time by correcting the position information of vehicle travelling information through tag installation position information. The traffic management centre judges the arrival time at the intersection and the passage of time through the intersection from the vehicle position and speed after confirming that it is a system target vehicle from the vehicle ID. Moreover, the traffic control centre directs start/termination of micro control in accordance with the priority that can be given to the concerned vehicle by the signal controller.

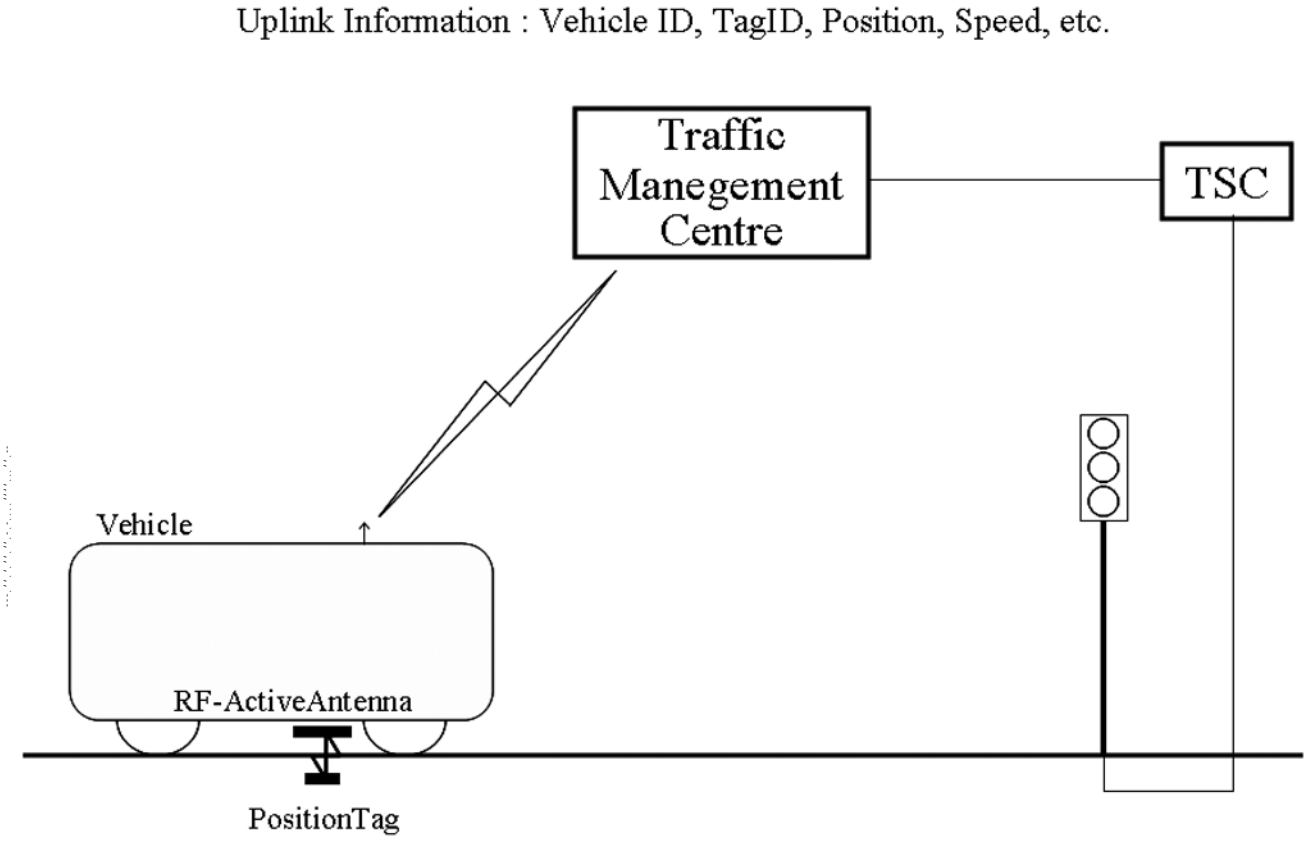


Figure F.3 — TSS system

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[1] *System Architecture for ITS in Japan*, November 1999, http://www.its-jp.org/english/arch_e/doc/main.pdf

ICS 03.220.01; 35.240.60

Price based on 50 pages