

ENGLISH TRANSLATION

**Operation Management Guideline
for
Driver Assistance Communications System**

ITS FORUM RC-008 Ver. 1.0

Established on April 27, 2011

ITS Info-communications Forum

of Japan



General Notes to the English Translation of ITS Info-communications Forum Guidelines

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Chapter 1: Outline of Operation Management Model and Scope of Operation Management

1.1 Purpose

This guideline is intended to describe the functions required of an operation management organization tasked with managing the operation of a driver assistance communications system. The document comprises an outline of the operation management model and a definition of the operation management scope. The document also describes details of services and systems, and the functions and procedural steps to be implemented by the management organization before operation and during operation of the system.

The guideline document contains a comprehensive description of all functions and procedures that are thought to be necessary for operating the driver assistance communications system. Depending on actual services to be provided, the operation management organization will select the required elements. However, matters related to risk and threat analysis of actual security measures for services and content management, as well as methods and system characteristics related to security are dealt with in the Security Guideline [1].

1.2 Operation management model

The main entities involved in operation of the driver assistance communications system and their respective relationships are outlined in the diagram below.

(1) Entities and their relationship

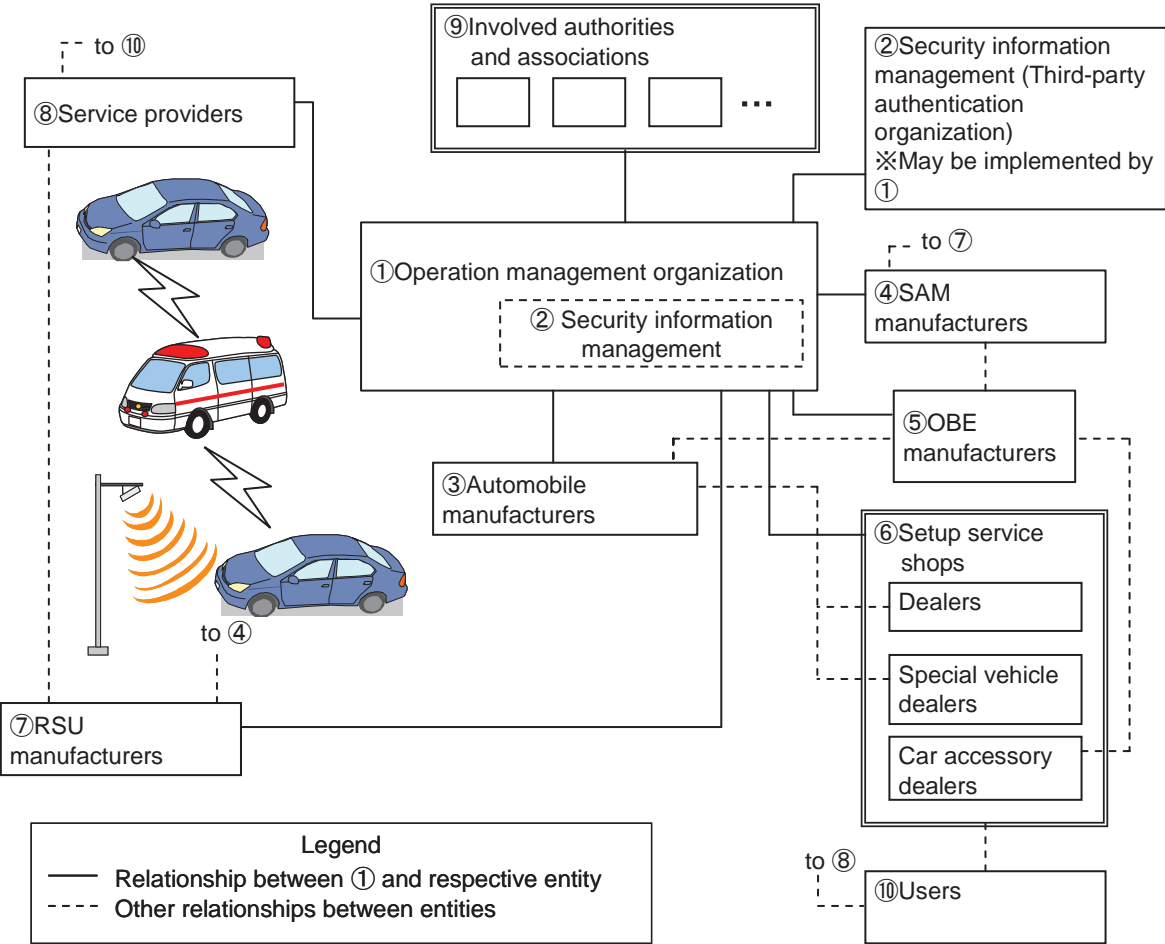


Figure 1-1: Operation management organization and other entities

(2) Role of each entity

The proposed major roles of each entity are listed below. The names used for the entities are for convenience and express their function. A single enterprise or organization may fulfill the roles of several entities.

① Operation management organization

Management of RSUs, OBE, and other hardware

Radio management within system and with regard to other systems

Management of roadside-to-vehicle communications and inter-vehicle communications

Management of system security and other services and content aspects

User support, system promotion activities, and other tasks

② Security information management (may be implemented by operation management organization)

Authentication of RSUs and OBE

③ Automobile manufacturer

Manufacture and marketing of vehicles with OBE

④ SAM manufacturer

Development and manufacture of SAM (Secure Application Module) for RSUs and OBE

⑤ OBE manufacturer

Development and manufacture of OBE

⑥ Setup service shop (dealer, special vehicle dealer, car accessory dealer)

Set up equipment and store the necessary information for operation (emergency vehicles at special vehicle dealers only)

⑦ RSU manufacturer

Development and manufacture of RSUs

⑧ Service provider

Provide information distribution services and other services for driver assistance in inter-vehicle communication (Note 1: When only inter-vehicle communication services are provided)

OBE user management

Provide information collection and distribution services and other services for driver assistance in roadside-to-vehicle communication

Ownership of RSUs

Operation checking of RSUs

⑨ Involved authorities and associations

Accreditation, linking to other safety related systems.

⑩ Users

Benefit from services

(3) Entity registration and management

The operation management organization must perform registration of entities such as service providers, manufacturers, setup service shops, and dealers that were contracted for the service, in order to ensure proper entity management. Besides implementing the registration function, the operation

management organization must establish an operation framework and define entity management regulations that clearly describe and define the roles, rights, and obligations of registered entities.

1.3 Application scope

Among the functions of the operation management organization, this guideline covers the scope shown in the diagram below:

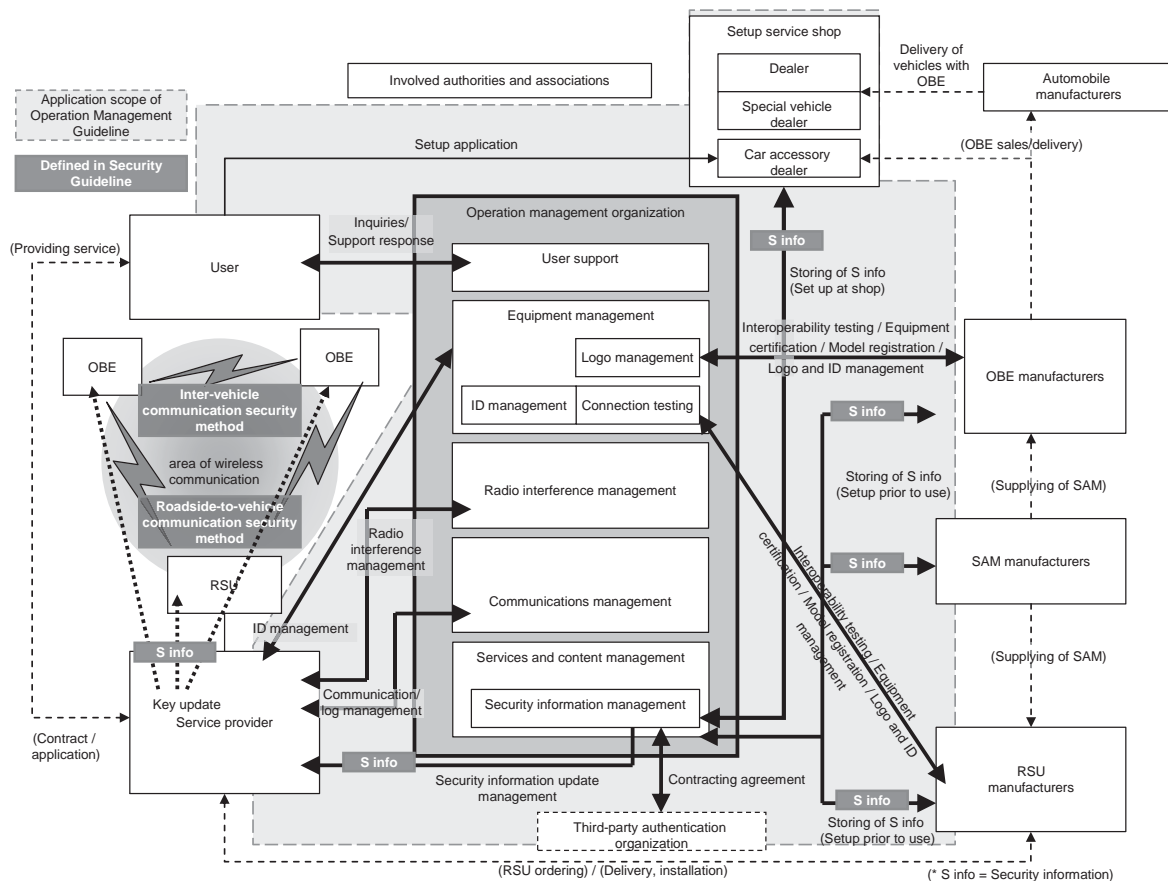


Figure 1-2: Application scope of Operation Management Guideline

(1) Role of Operation management organization

< Equipment management >

- Provide an environment for RSU and OBE interoperability testing
- Perform RSU and OBE interoperability testing and certify equipment compatibility
- Perform RSU and OBE model registration and logo management
- Perform RSU and OBE ID management
- Manage correct operation of RSU and OBE during use

< Radio management >

- Perform radio interference management (prevent and manage interference with systems using adjacent frequency bands, other driving safety related systems, etc.)

- Liaise with other systems (conclude agreements for example on cost distribution for interference prevention with adjacent frequency systems and other driving safety related systems)

- Manage normal operation of the radio (while system is operating)

< Communications management >

- Manage correct operation of equipments

- Manage communication logs

< Services and content management >

- Provide and maintain an environment that ensures system security

- Establish and operate a security-related setup environment for equipment

- Security information update management

- Elimination of security information

(Note: For details regarding security, refer to the Security Guideline [1])

< Other items >

- Entity registration and management

- User support

- Establish and maintain a framework, promote acceptance and use of the system, etc.

1.4 Definition of terms

The terms used in this document are defined as follows:

Table 1-1: Definition of terms

Term	Definition
OBE	Radio equipment that can directly and efficiently communicate with other vehicles or RSUs with the aim of providing driver assistance. Must have all or some of the following functions: ①Ability to exchange information with other equipment on board the vehicle ②Ability to detect the state of the current vehicle ③Ability to alter the state of the current vehicle ④Ability to provide information to the occupants of the current vehicle In particular, the term refers to OBE registered for the current system.
RSU	Stationary radio equipment installed at the roadside that uses detected information about traffic conditions (from roadside sensors or similar) and infrastructure information about traffic signal status, etc. to efficiently provide assistance to vehicles traveling within the communication area. In particular, the term refers to roadside equipment registered for the current system.
SAM	Short for Secure Application Module. A module storing information and using encryption or other means to make such information held within OBE or RSUs secure and tamper-proof.
Security information	In order to enable secure exchange of data in inter-vehicle communication and roadside-to-vehicle communication, means such as keys, certificates, and digital signatures are used. These are globally referred to as security information. In the diagrams and tables of this document, the term is abbreviated as "security information".
Negated list	A list of IDs and public key certificates of invalid equipment (OBE and RSUs)

1.5 Reference materials

- [1] "Security Guideline for Driver Assistance Communications System"
- [2] "Experimental Guideline for Vehicle Communication System Using 700 MHz Band", ITS FORUM RC-006, Version 1.0

Chapter 2: Services Envisioned by This Guideline

2.1 Driving safety assistance service using inter-vehicle communication

Concrete examples of service scenarios envisioned by this guideline are shown below.

2.1.1 Prevention of collision when making a left turn

- Service outline

At an intersection, information about two-wheeled vehicles or similar approaching from the rear on the left is provided to the driver of a vehicle attempting to make a left turn.

- Service scenario

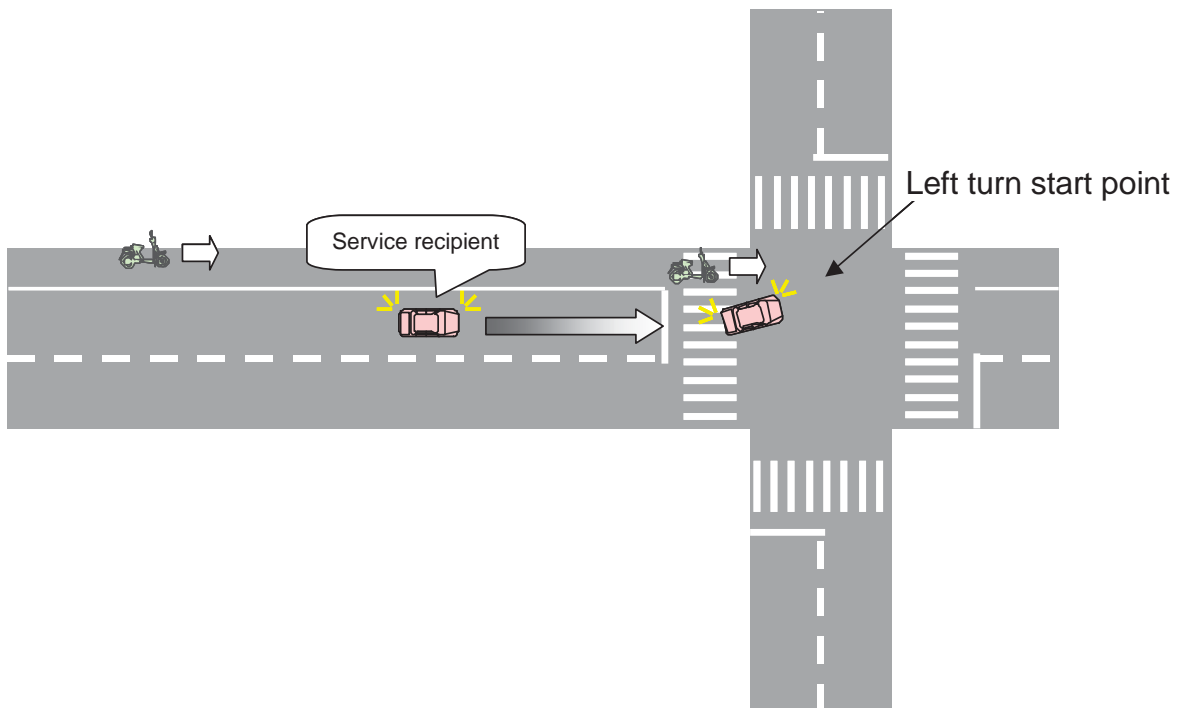


Figure 2-1: Service scenario for prevention of collision during left turn

2.1.2 Prevention of collision when making a right turn

- Service outline

At an intersection, information about oncoming vehicles or similar is provided to the driver of a vehicle waiting to make a right turn.

- Service scenario

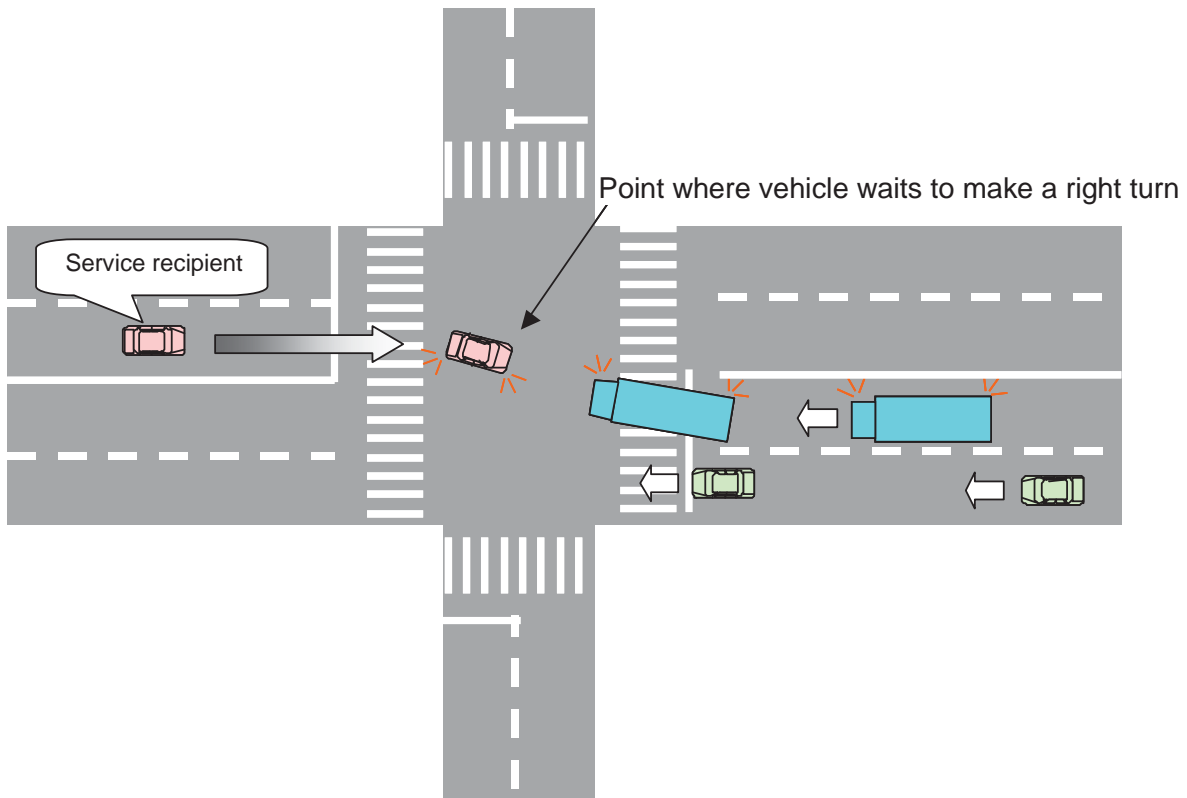


Figure 2-2: Service scenario for prevention of collision during right turn

2.1.3 Prevention of collision at intersection (no stop sign on either road, intersection in built-up area)

- Service outline

At an intersection without stop signs, information about vehicles in the intersecting road is provided to the driver of a vehicle approaching the intersection.

- Service scenario

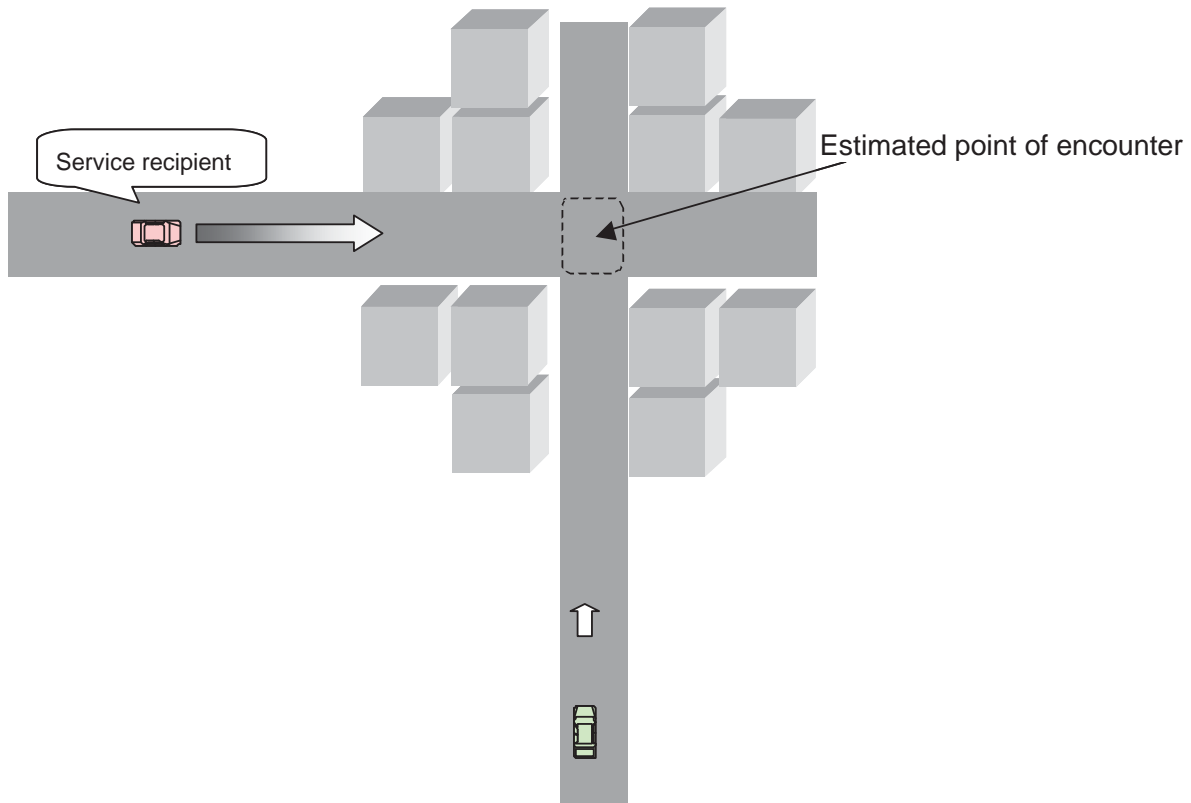


Figure 2-3: Service scenario for prevention of collision at intersection
(no stop sign on either road, intersection in built-up area)

2.1.4 Prevention of collision at intersection (assistance for stopping, stop sign present, no line of sight)

- Service outline

At an intersection with a stop sign but no clear line of sight to the intersecting road, information about vehicles in the intersecting road is provided to the driver of a vehicle approaching the intersection.

- Service scenario

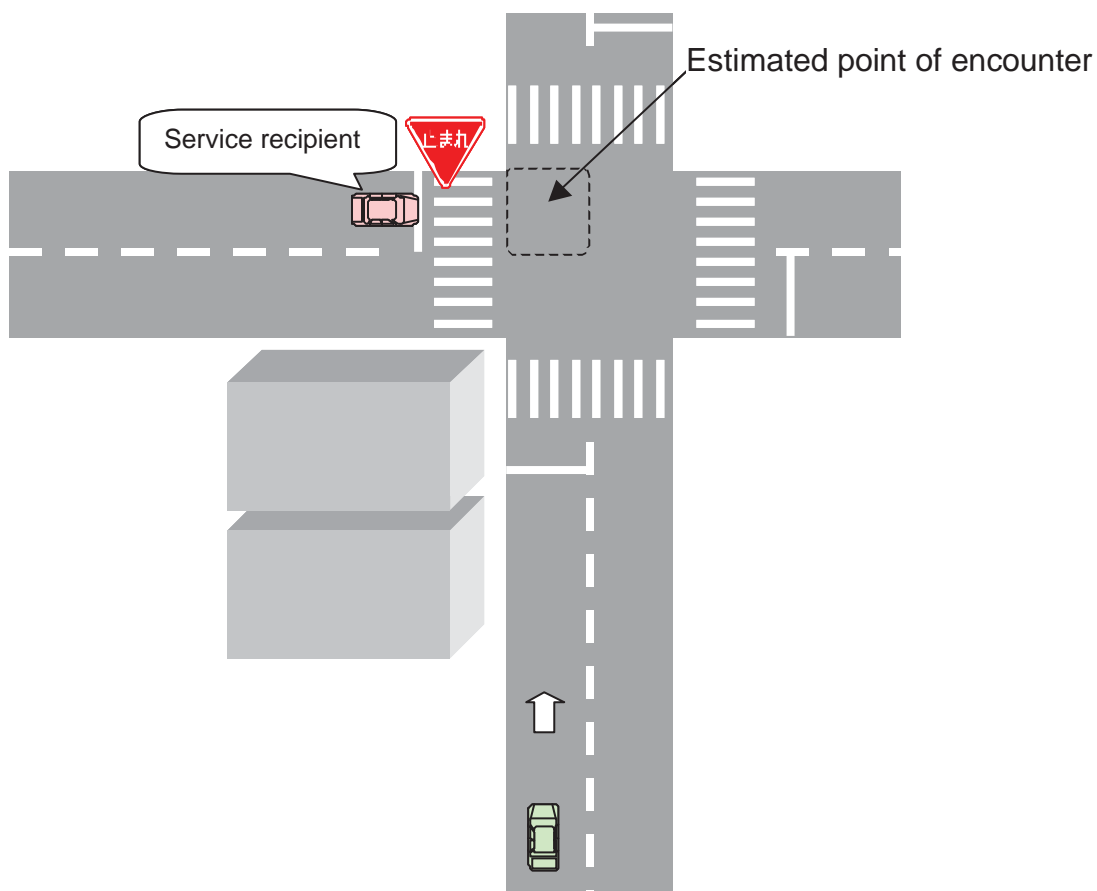


Figure 2-4: Service scenario for prevention of collision at intersection
(stop sign present, no line of sight)

2.1.5 Prevention of rear end collision

- Service outline

At a location such as a curve with bad visibility, information about a slow or stopped vehicle ahead is provided to the driver of a vehicle following in the same lane.

- Service scenario

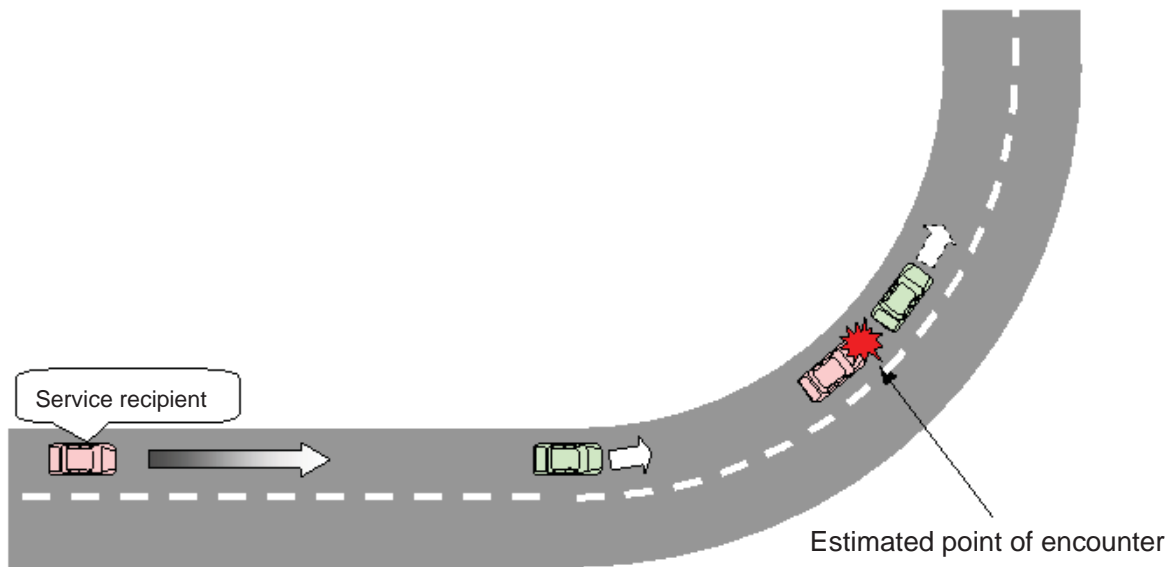


Figure 2-5: Service scenario for prevention of rear end collision

2.1.6 Provision of emergency vehicle information

- Service outline

Information about a vehicle on emergency duty is provided to drivers of vehicles in the vicinity.

- Service scenario

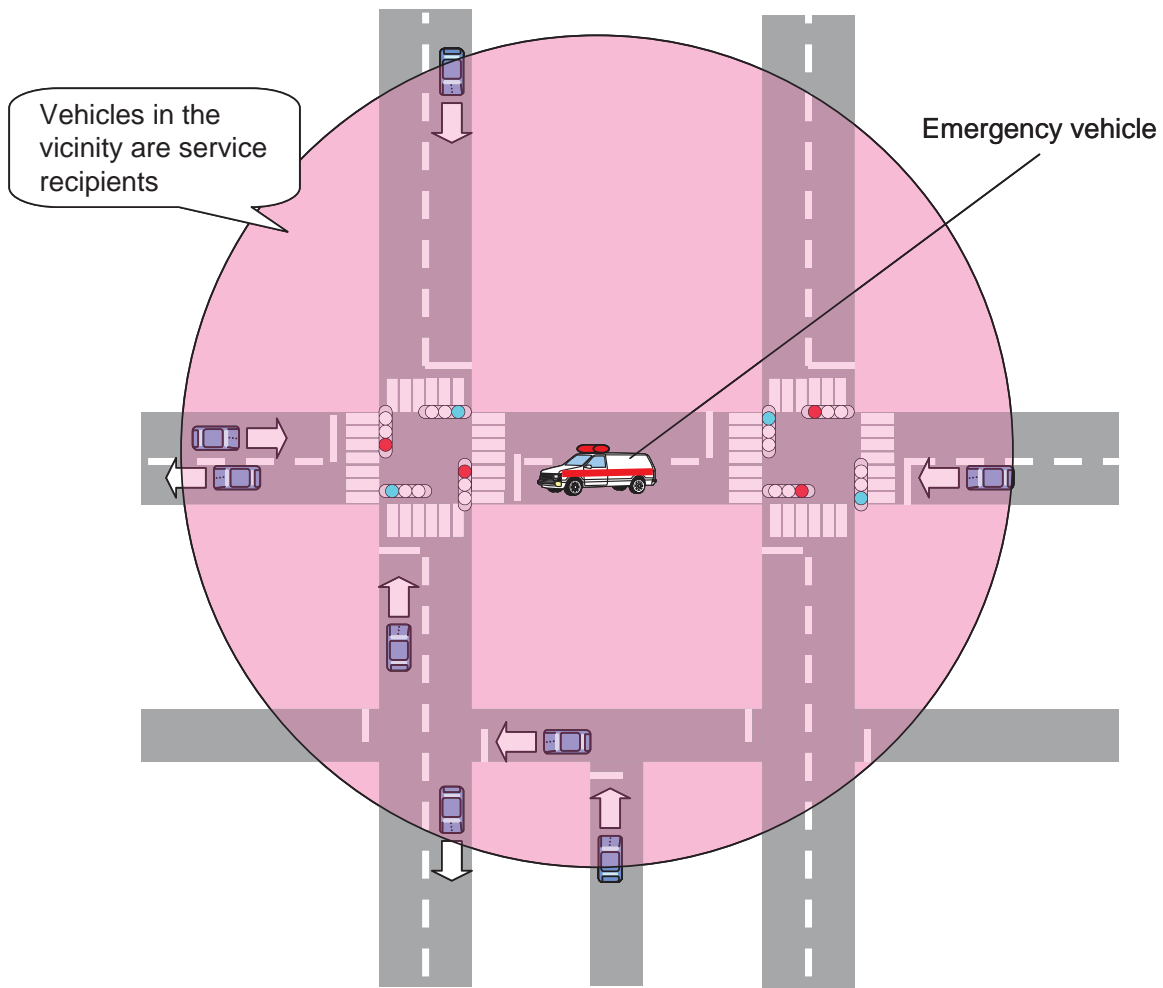


Figure 2-6: Service scenario for providing emergency vehicle information

2.2 Driving safety assistance service using roadside-to-vehicle communication

Concrete examples of service scenarios for roadside-to-vehicle communication envisioned by this guideline are shown below.

2.2.1 Prevention of collision at intersection

- Service outline

At an intersection without traffic signals, a roadside sensor or similar detects vehicles in the intersecting road, and the information is provided to the driver of a vehicle approaching the intersection.

- Service scenario

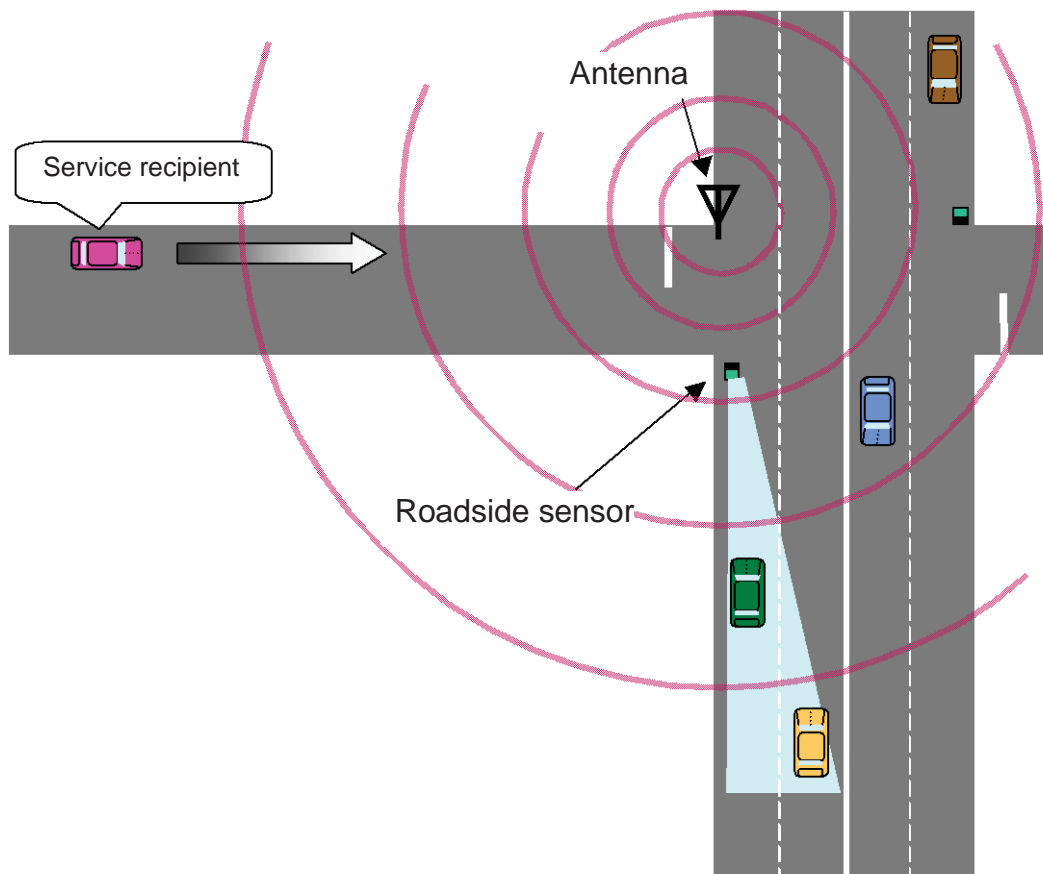


Figure 2-7: Service scenario for prevention of collision at intersection

2.2.2 Prevention of collision when making a right turn

- Service outline

At an intersection, a roadside sensor or similar detects oncoming vehicles or similar, and the information is provided to the driver of a vehicle attempting to make a right turn.

- Service scenario

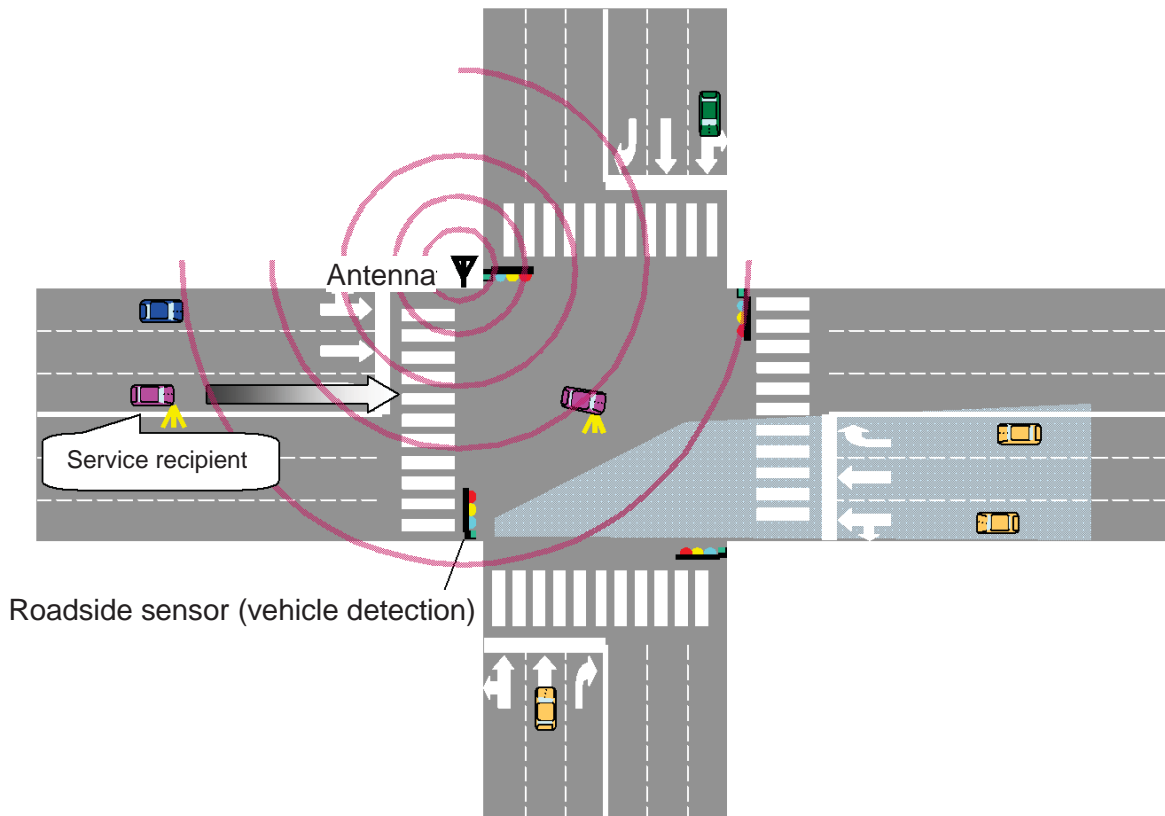


Figure 2-8: Service scenario for prevention of collision during right turn

2.2.3 Prevention of collision when making a left turn

- Service outline

At an intersection, a roadside sensor or similar detects two-wheeled vehicles or similar approaching from the rear on the left, and the information is provided to the driver of a vehicle attempting to make a left turn.

- Service scenario

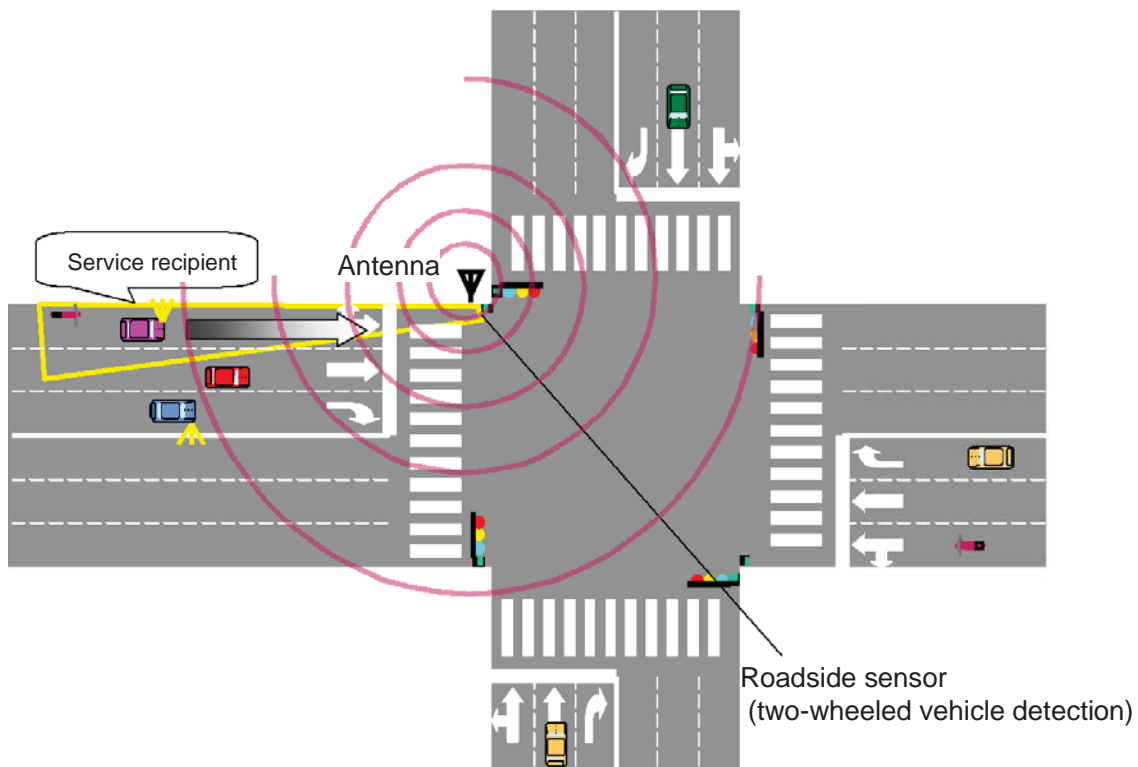


Figure 2-9: Service scenario for prevention of collision during left turn

2.2.4 Prevention of rear end collision

- Service outline

At a location such as a curve with bad visibility, a roadside sensor or similar detects the presence of vehicles ahead, and the information is provided to the driver of a vehicle following in the same lane.

- Service scenario

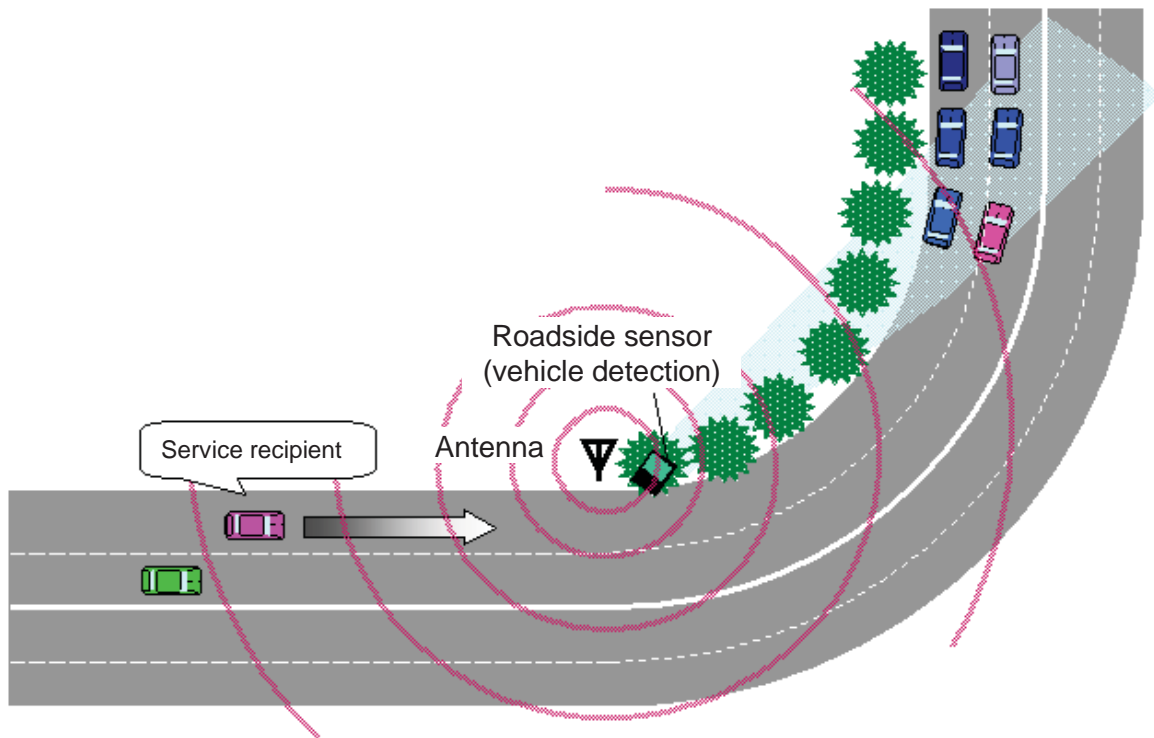


Figure 2-10: Service scenario for prevention of rear end collision

2.2.5 Prevention of failure to notice pedestrians at a crossing

- Service outline

A roadside sensor or similar detects the presence of pedestrians at a crossing, and the information is provided to the drivers of vehicles attempting to make a right or left turn.

- Service scenario

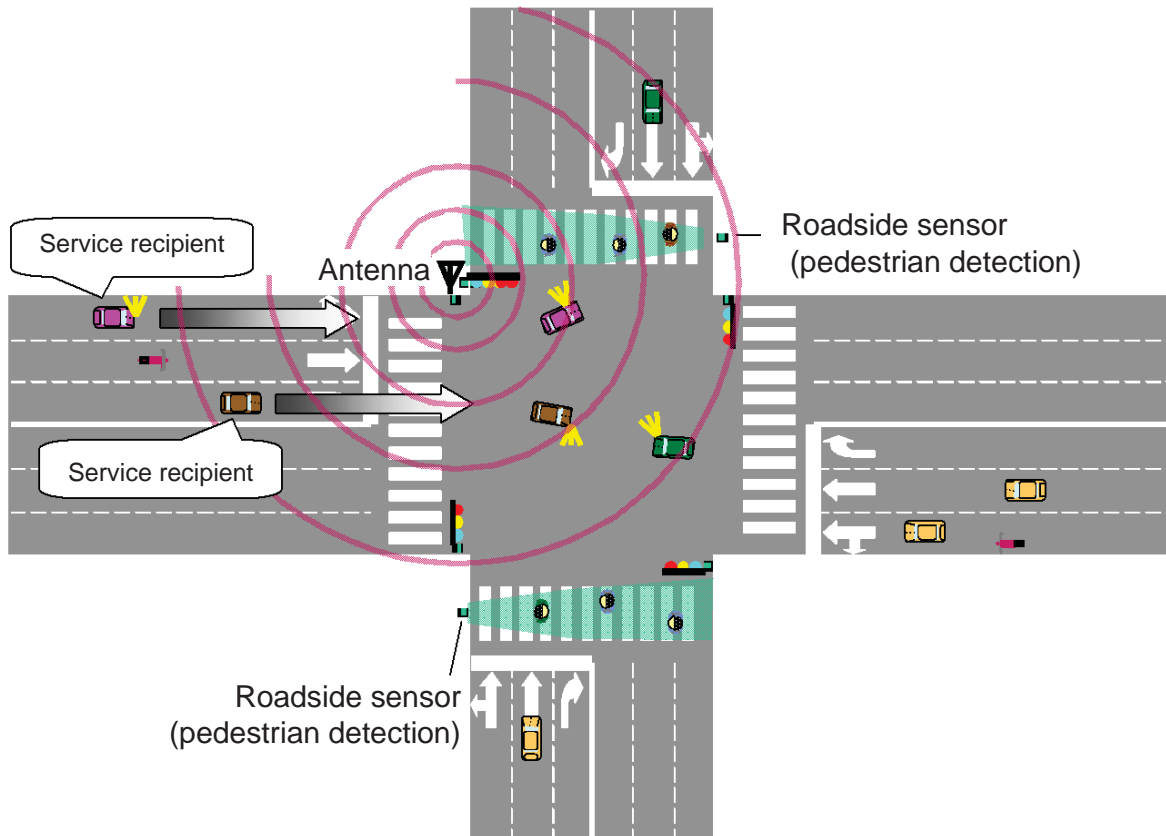


Figure 2-11: Service scenario for prevention of failure to notice pedestrians at a crossing

2.2.6 Prevention of failure to notice traffic signals

- Service outline

At an intersection with traffic signals, information about the signal light state is provided to vehicle drivers, to prevent accidents due to failing to notice a red light.

- Service scenario

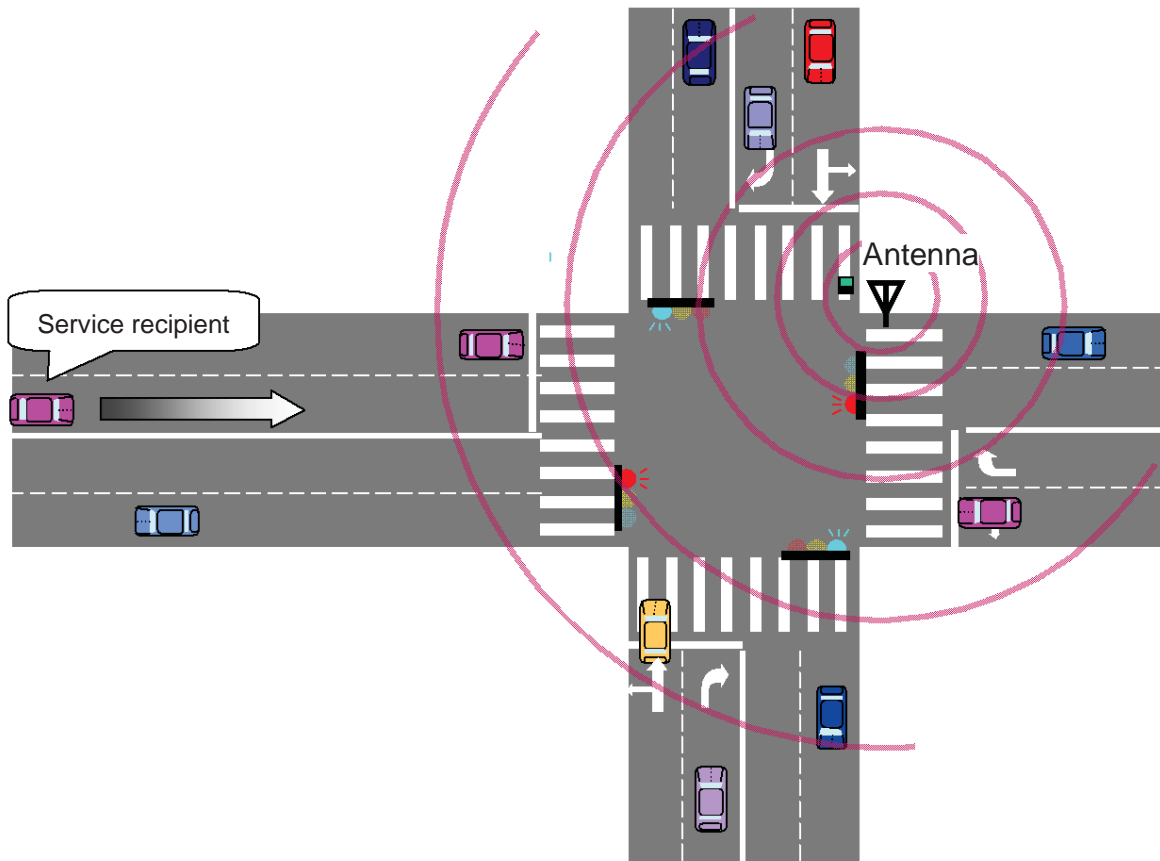


Figure 2-12: Service scenario for prevention of failure to notice traffic signals

2.2.7 Prevention of failure to notice a stop sign

- Service outline

At an intersection without traffic signals, information about the stopping requirement or other rule is provided to vehicle drivers, to prevent accidents due to failing to notice the stop sign.

- Service scenario

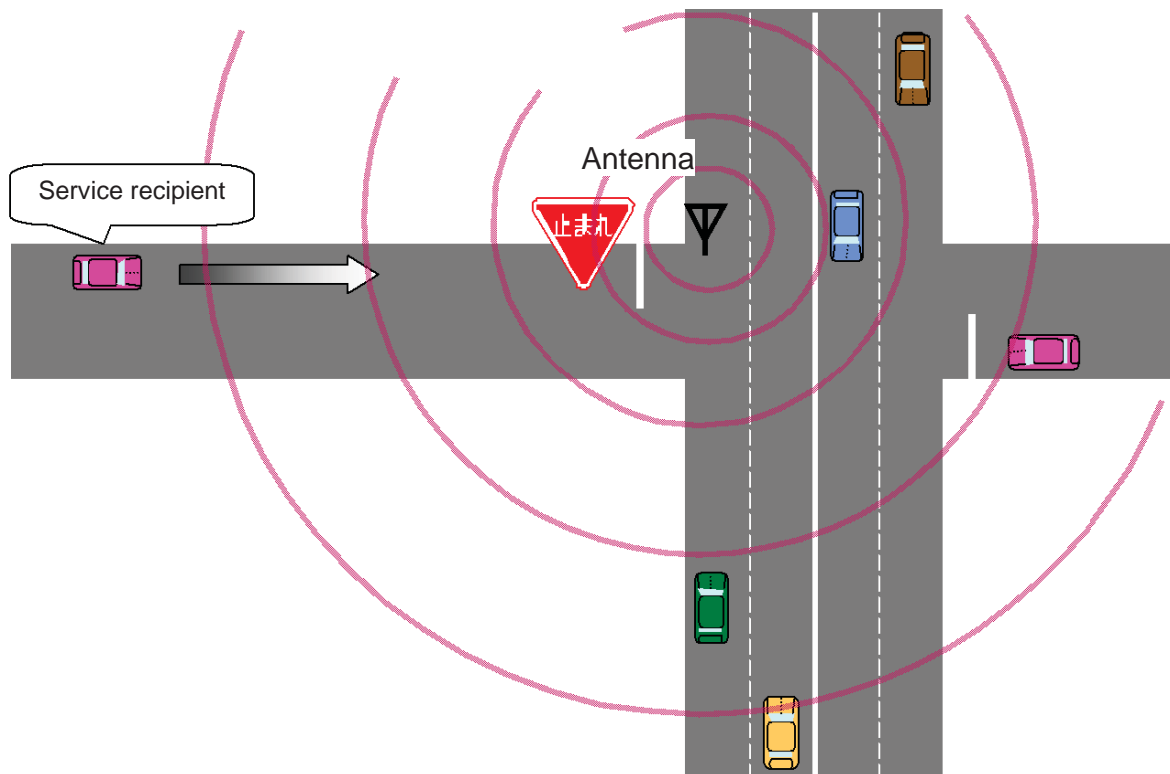


Figure 2-13: Service scenario for prevention of failure to notice stop sign

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Chapter 3: Operation Management System Configuration

The diagram below shows the configuration of a system comprising the elements required to realize the practical services listed in the preceding chapter. The general concept of the system envisioned by this guideline is also represented here, with multiple service providers owning different RSUs, and the equipment and servers used to manage these being linked to the respective equipment of the operation management organization. Also belonging to the configuration is OBE owned by users and connected to the infrastructure equipment. The elements required by service providers not using RSUs and operating solely through OBE are grouped in the section of the configuration diagram enclosed by a broken line. (See Figure 3-1 below.)

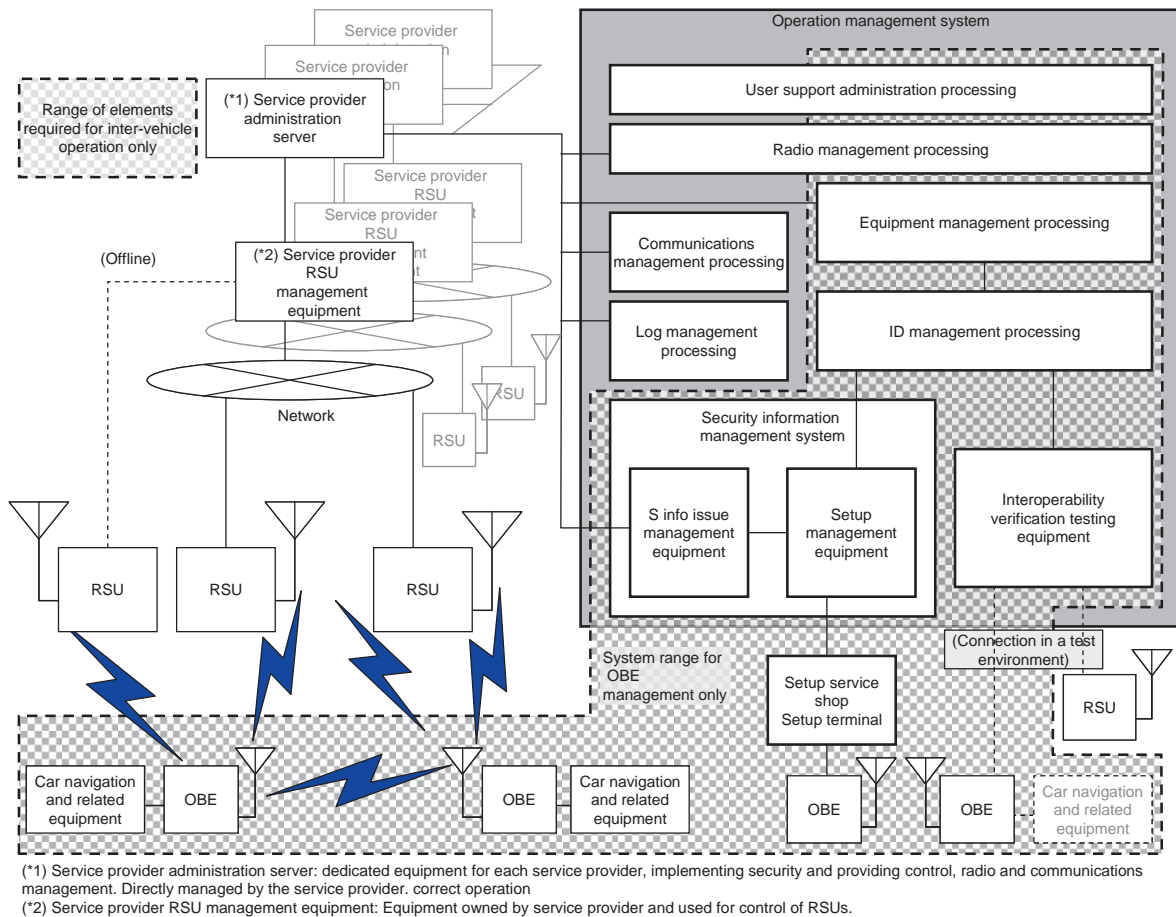


Figure 3-1: System Configuration Diagram

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Chapter 4: Functions of Operation Management Organization

4.1 Management Type

According to the results of deliberations by the SIG for the realization of a driver assistance communications system, the management tasks to be implemented and maintained by the operation management organization can be classified into four main hierarchical categories.

From the top, these are “Services and content management,” “Communications management,” “radio management,” and “Equipment management.” Each higher management function block encompasses the lower ones, meaning that the lower levels are a prerequisite for the higher levels. For example, services and content management is not possible without communications management. In addition, user support is necessary on all levels.

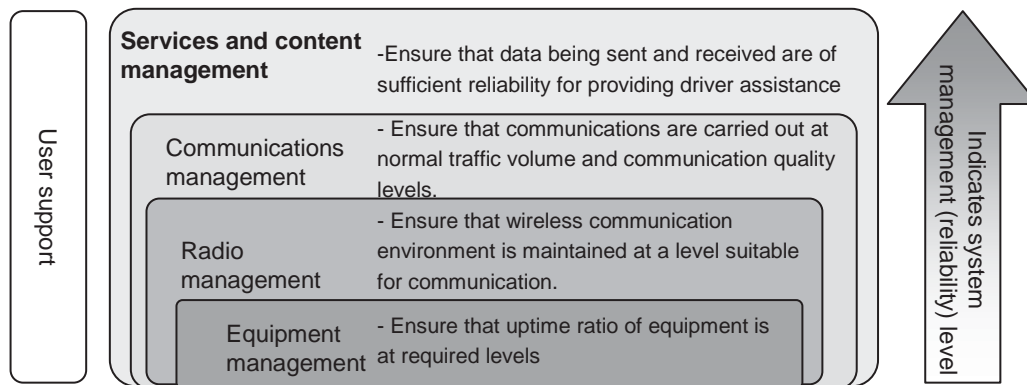


Figure 4-1: Outline of hierarchical management levels

Table 4-1: List of functions at each phase for operation management organization

		Equipment management	Radio management	Communications management	Services and content management
RSU	Development	<ul style="list-style-type: none"> - Interoperability verification testing - Equipment certification - Equipment model registration - Logo management 			
	Manufacturing	<ul style="list-style-type: none"> - ID management (Management of RSU control number during manufacturing) (Management of security information related ID during manufacturing) 			<ul style="list-style-type: none"> - Pre-storing of security information
	Installation	<ul style="list-style-type: none"> - ID management (Management of RSU control number during installation) (Security information related ID management) 	<ul style="list-style-type: none"> - Radio interference management 		<ul style="list-style-type: none"> - Storing and setup of security information during installation
	Operation	<ul style="list-style-type: none"> - Viewing/search of RSU control number - Management of normal communications operation 	<ul style="list-style-type: none"> - Management of normal operation of the radio 	<ul style="list-style-type: none"> - Management of correct operation of equipments - Log management 	<ul style="list-style-type: none"> - Security information update management (Security information version management) (Security information update function) (Security information re-setup function) (Content management function)
	User support (responding to inquiries)				
	Disposal	<ul style="list-style-type: none"> (elimination) (Elimination of RSU control number and security information related ID) 			<ul style="list-style-type: none"> Security information elimination
		Equipment management	Radio management	Communications management	Services and content management
OBE	Development	<ul style="list-style-type: none"> - Interoperability verification testing - Equipment certification - Equipment model registration - Logo management 			

	Manufacturing	- ID management (Management of OBE control number during manufacturing) (Management of security information related ID during manufacturing)	Lifecycle management			- Pre-storing of security information
	Marketing	- ID management (Management of OBE control number during manufacturing) (Security information related ID management) - Registration management of vehicle information				- Storing and setup of security information at time of sale
	Operation	Viewing/search of OBE control number - Management of correct operation of equipments		- Management of normal radio operation	- Management of correct operation of equipments - Log management	- Security information update management (Security information update function)
	User support (responding to inquiries)					
Selling off/ Disposal	- ID management (elimination) (Elimination of OBE control number and security information related ID) - Elimination of vehicle information				- Security information elimination	

* Security information: Abbreviation of security information. Refers to keys and similar used to implement secure communications.

4.2 Functions for equipment management

Among the functions of the operation management organization, the functions listed below relate to equipment management.

4.2.1 Development and manufacturing phase

4.2.1.1 Interoperability verification testing

The testing equipment and testing environment provided by the operation management organization is to be used to verify that new OBE and RSUs enable proper interoperability both for roadside-to-vehicle and inter-vehicle communication.

(1) Preconditions for testing

To be accepted for interoperability verification testing, OBE and RSUs newly developed by manufacturers must fulfill the following preconditions: certified compliance with technical standards of the radio Law and certified compliance with applicable ARIB STD for wireless devices. Evidence of the above must be submitted by the OBE manufacturer or RSU manufacturer to the operation management organization at the time of applying for interoperability verification testing.

(2) Outline of testing process

The interoperability verification testing environment provided by the operation management organization must comprise the following elements.

a) Test management

For OBE, interoperability verification testing is to be performed under management of the operation management organization. For RSUs, self-managed interoperability verification testing is to be performed by the RSU manufacturer. The operation management organization will allocate an interoperability verification number to the OBE or RSU that has passed the respective test.

b) Establishment of test procedure instructions and guideline for test application

The operation management organization shall prepare the required documents, including procedure instructions for interoperability verification testing and a guideline for how to undergo testing.

c) Testing equipment

The operation management organization shall prepare the necessary equipment for performing OBE testing, in anticipation of applications by manufacturers to undergo testing. For RSU testing, reference OBE shall be produced, for use by RSU manufacturers in self-managed testing.

d) Equipment type categories for testing

The equipment type categories for interoperability verification testing of OBE and RSUs shall be established by the entity undertaking the test. Regardless of model name, serial number, or other appellation of the OBE (RSU), categories can be established for products that are expected to provide similar communication performance and basic performance, and testing can be performed for the respective category.

e) Handling of security information for interoperability verification testing

To perform interoperability verification testing for OBE and RSUs, special security information must be stored. The handling of this security information for interoperability verification testing must comply with the functions of the operation management organization for issuing and storing security information, as described further below. After completion of interoperability verification testing, the no longer required security information must be returned by the OBE manufacturer or RSU manufacturer to the operation management organization according to the prescribed procedure. The operation management organization manages the security information used for interoperability verification testing.

4.2.1.2 Equipment certification

Equipment (OBE, RSU) that has passed the interoperability test as administered by the operation management organization is issued an interoperability certification number.

- ① The operation management organization evaluates the results of interoperability verification testing and assigns the certification number if the results clear the passing requirement.
- ② The interoperability certification number does not guarantee to any party the quality or other performance aspects of the OBE or RSU.
- ③ As a means of ascertaining interoperability without the above described testing, the manufacturer of the OBE or RSU may submit documentation that proves that the model of OBE or RSU in question provides interoperability performance on a level equal or better than the requirements applied in testing. If the operation management organization accepts this document, the interoperability certification number may be issued.

4.2.1.3 Equipment model registration

In order to manufacture equipment that has been certified, the equipment model must be registered with the operation management organization. The operation management organization performs management of registered models.

4.2.1.3.1 Model registration

- ① The operation management organization assigns a model registration number based on the application from the respective manufacturer.
- ② The operation management organization may issue security information for a RSU or OBE whose model has been registered.
- ③ The model registration number does not guarantee to any party the quality or other performance aspects of the OBE or RSU.

4.2.1.3.2 Model registration changes and elimination

- ① If a manufacturer wants to cancel a model registration, an application to this effect shall be made to the operation management organization, also stating the reason.
- ② When a registered equipment has undergone a model change or version upgrade or similar, resulting in a change to the registered content, an application for change of registration shall be

made to the operation management organization. Depending on the degree of change due to the model change or version upgrade or similar, a new model registration application may be preferable. The decision of whether to apply for a change in registration or a new registration rests with the manufacturer.

4.2.1.3.3 Model registration revocation, etc.

- ① The operation management organization may cancel the model registration in any of the cases listed below:
 - If a manufacturer is found to have displayed a model registration name or model registration number on a RSU or OBE model other than the one for which registration was performed.
 - If registration is found to have been based on incorrect documentation.
 - If a manufacturer has not paid the stipulated registration fees or has otherwise violated the terms of the registration agreement.
- ② If the operation management organization plans to cancel model registration due to one of the above causes, the involved RSU or OBE manufacturer must be consulted beforehand.

4.2.1.4 Logo management

The operation management organization provides a function for allowing manufacturers of OBE or RSUs for which model registration has been performed the use of an approved and registered logo symbol.

(1) Application for use of logo

Parties wishing to use the logo that has been approved and registered by the operation management organization on OBE or RSUs for which model registration has been completed must submit an application for logo use to the operation management organization.

(2) Permission for use of logo

The operation management organization will issue a permission certificate for use of the logo if it is deemed that such use serves to promote acceptance of the service and if the following conditions are met:

- The party to be granted use of the logo must be a manufacturer of OBE or RSUs, and model registration must have been completed.
- The logo must be used for a purpose that conforms either to safe and smooth operation of the service, promotes its wider use, or enhances the convenience of users.

(3) Limitations regarding use

When using the logo, the terms of a separately concluded agreement must be strictly adhered to, and the use of the logo must be appropriate. The party that has been granted permission to use the logo, besides using the logo on its own products, may allow retailers, setup service shops, and other parties to which the pertaining products are being supplied to use the logo. In such a case, the original party that has been granted permission to use the logo must ensure that such retailers and other third parties also strictly adhere to the conditions of the separately concluded and any instructions pertaining to use of the logo.

4.2.1.5 ID management

(1) Management of OBE control number during manufacturing

The operation management organization shall establish a system for allocating control numbers to OBE with the aim of managing correct operation of equipment and managing radio and communication conditions. OBE manufacturers shall obtain such OBE control numbers at the time of manufacture, according to the number allocation system. If OBE manufacturers produce equipment with pre-stored security information, the OBE control number of equipment with pre-stored security information shall be registered with the operation management organization. The operation management organization shall provide a function for keeping track of registered OBE control numbers separately by manufacturers. The operation flow of the registration system must be designed in such a way that OBE manufacturers can easily register OBE control numbers.

(2) Management of RSU control number during manufacturing

The operation management organization shall establish a system for allocating control numbers to RSUs with the aim of managing correct operation of the units and managing radio and communication conditions. RSU manufacturers shall obtain such RSU control numbers at the time of shipping, according to the number allocation system. If RSU manufacturers produce RSUs with pre-stored security information, the RSU control number of the unit with pre-stored security information shall be registered with the operation management organization. The operation management organization shall provide a function for keeping track of registered RSU control numbers separately by manufacturers. The operation flow of the registration system must be designed in such a way that RSU manufacturers can easily register RSU control numbers.

(3) Security information related ID management during manufacturing

The operation management organization shall provide a function for keeping track of various security-related IDs (*) in correlation with OBE control numbers and RSU control numbers. These security-related IDs refer to security information that is pre-stored by SAM manufacturers, OBE manufacturers, and RSU manufacturers. The management of security information related IDs must be implemented in a secure environment.

(* Possible IDs are setup ID, setup key ID, key ID, key update management ID, key table ID, negated list ID, etc.)

4.2.2 RSU installation and OBE marketing phase

4.2.2.1 ID management

(1) Management of OBE control number during marketing

The operation management organization shall establish a system for allocating control numbers to OBE with the aim of managing correct operation of equipment and managing radio and communication conditions. OBE manufacturers shall obtain such OBE control numbers at the time of manufacture, according to the number allocation system. When OBE is being sold at a setup service shop, the shop uses the setup system (for details, refer to section 4.5.2.1) to store security information in the equipment before installing it in the vehicle of the user. The OBE control number of the OBE in which the security

information was stored is then to be registered with the operation management organization. The operation management organization shall provide a function for keeping track of registered OBE control numbers separately by manufacturers. The operation flow of the registration system must be designed in such a way that setup service shops can easily register RSU control numbers.

(2) Registration and management of vehicle information (unique vehicle ID, etc.)

At the time of sale of the OBE, the setup service shop stores vehicle specific information (unique vehicle ID, etc.) in all OBE. The operation management organization shall provide a function that allows registration of vehicle information (unique vehicle ID, etc.) stored in OBE. (For details on storing vehicle information in OBE, see section 4.5.2.1 (3).) The operation management organization shall provide a function for correlating registered vehicle information (unique vehicle ID, etc.) with registered OBE control numbers and user information. The operation flow of the registration system must be designed in such a way that setup service shops can easily register vehicle information (unique vehicle ID, etc.) at the time of setup.

(3) Management of RSU control number during installation

If a RSU was shipped from the RSU manufacturer without pre-storing security information, and an entity is performing setup on-site at the time of installation, the entity performing setup must register the RSU control number supplied by the RSU manufacturer with the operation management organization. The operation management organization shall provide a function for keeping track of registered RSU control numbers separately by manufacturers. The operation flow of the registration system must be designed in such a way that service providers administering the RSU or RSU manufacturer contracted by the service provider to perform the installation can easily register RSU control numbers.

(4) Security information related ID management

The operation management organization shall provide a function for keeping track and correlating various security related IDs (*) issued at the time when a setup service shop, service provider, or RSU manufacturer has performed setup with OBE control numbers and RSU control numbers. The management of security information related IDs must be implemented in a secure environment.

(* Possible IDs are setup ID, setup key ID, key ID, key update management ID, key table ID, negated list ID, etc.)

4.2.3 Operation phase

4.2.3.1 Viewing /search of OBE control number

In order to ensure correct operation of OBE in use, the operation management organization shall provide a function for equipment management, allowing viewing and search of OBE control numbers, linked to security information, as required for other types of management (RF management, communications management, services and content management, user support).

4.2.3.2 Viewing /search of RSU control number

In order to ensure correct operation of RSUs in use, the operation management organization shall provide a function for unit management, allowing viewing and search of RSU control numbers, linked

to security information, as required for other types of management (RF management, communications management, services and content management, user support).

4.2.3.3 Management of correct operation of equipments

The operation management organization shall provide the following functions to ensure that equipment is operating normally while the service is in operation. Details of the detection/collection/notification functions available during operation for RSUs owned by the service provider and OBE managed by the user are given in Table 4-2.

Table 4-2: Functions of OBE and RSUs for equipment management during operation

Functions of Operation Management Organization		Vehicle→Roadside				Service provider administration server	Operation management system		Roadside →Vehicle	
		OBE		RSU					RSU	OBE
		Detection	Notification	Collection	Detection	Collection	Accumulation	Evaluation (Control)	Notification	Reception, evaluation, etc.
Management of correct operation of equipments	Management of OBE count and type		○	○		○	○			
	Detection of OBE correct operation		○	○	○	○	○			
	Detection of RSU correct operation				○	○	○			
	OBE malfunction response						○	○	○	

(1) Management function for count and type of OBE in operation

The operation management organization shall provide a function for assessing how many pieces of OBE of which type are in operation. The function must be able to collect the information, analyze it, and accumulate the results.

(2) Function for detection of OBE correct operation

The operation management organization shall provide a function for collecting and utilizing equipment management data output by OBE and detected by RSUs owned by the service provider, in order to detect error conditions in OBE currently in operation. The function must be able to collect the information, analyze it, and accumulate the results.

(3) Function for detection of RSU correct operation

The operation management organization shall provide a function for collecting and utilizing operation status information about RSUs of the service provider that are online. The function must be able to analyze the information to determine whether the RSU is operating normally, and accumulate the results.

(4) Function for OBE malfunction response

The operation management organization shall provide a function that uses the functions (1) and (2) described above to take measures such as sending an error notification, user alert, or service stop indication to OBE that has been deemed faulty based on collected and analyzed operation status

information and error information.

4.2.3.4 User support (handling inquiries)

The operation management organization, besides handling inquiries from OBE users, shall also act as a contact point for queries from manufacturers and other entities, accepting applications, and working out solutions for problems that users may have. For each of the functions of the operation management organization, namely equipment management, radio management, communications management, and services and content management, information databases shall be maintained and made available for reviewing and searching, with the capability for lateral linking.

Because the various information utilized for implementing user support includes information that can be directly linked to personal information about users, the handling, storage, and retaining period of such information must conform to separately defined regulations about information management.

4.2.4 Selling off /disposal phase

4.2.4.1 ID management (elimination)

(1) Elimination of OBE control number, security information, and other ID information

The operation management organization shall provide a function for managing and supervising the elimination of the registered OBE control numbers in the event of selling or disposal, to prevent the re-use or unauthorized use of such numbers. Any security-related ID information linked to the OBE control number shall also be cancelled, and a function for managing and supervising the elimination shall be provided, to prevent the re-use or unauthorized use of such information.

(2) Elimination of RSU control number, security information, and other ID information

The operation management organization shall provide a function for managing and supervising the elimination of the registered RSU control numbers, to prevent the re-use or unauthorized use of such numbers in the event of selling or disposal. Any security-related ID information linked to the RSU equipment control number shall also be cancelled, and a function for managing and supervising the elimination shall be provided, to prevent the re-use or unauthorized use of such information. For the event that the RSU is being moved to another location, a function for managing and supervising the RSU control number and security-related ID information shall be provided to prevent their re-use or unauthorized use until the date where the RSU resumes operation in the new location (as per the application by the RSU manufacturer).

(3) Elimination of vehicle information

For the event of selling off or disposal of the OBE of a vehicle, the operation management organization shall provide a function for canceling (deleting) vehicle information (vehicle specific ID, etc.) that was stored in OBE during setup when the equipment was sold, and also deleting the information from the database maintained by the operation management organization.

4.2.5 Other phases

4.2.5.1 Lifecycle management

The operation management organization shall provide the following functions to enable lifecycle management of OBE from manufacture until disposal.

(1) Management of expected service life

The operation management organization, in consultation with OBE manufacturers, RSU manufacturers, SAM manufacturers, and service providers, shall establish figures for the expected service life of the hardware and software of OBE and RSUs in number of years. Based on these figures, regular maintenance and updating plans shall be established, and the operation flow for implementing these shall be determined. The operation management organization, in consultation with service providers, shall establish usage regulations and an operation flow aimed at maintaining the quality of products over the entire expected service life.

(2) Management of re-use of decommissioned equipment

The operation management organization, in consultation with OBE manufacturers, RSU manufacturers, and service providers, shall establish a framework as well as operation regulations and an operation flow for recycling decommissioned equipment, recovering parts and materials that can be re-used, and managing such re-use. The operation management organization shall provide a function for recycling management with the aim of environmental protection, allowing lifecycle circulation of OBE and RSUs.

4.3 Functions related to radio management

Among the functions of the operation management organization, the functions listed below relate to radio management.

4.3.1 RSU installation and OBE marketing phase

4.3.1.1 Radio interference management

In order to prevent interference with existing RSUs and other systems, the operation management organization shall provide the following function if the service provider is the main entity for RSU installation: obtain information (listed below) as specified by the Radio Law and other related legal regulations from the service provider and other involved entities about the RSUs, compile, analyze and utilize such information, to manage the installation of new RSUs.

< Information to be obtained from service provider >

- Detailed information about application for establishment of a new base station submitted to the authorities in charge
- Information regarding passive and active interference with/by existing base stations
- Installation information about existing base stations, etc.

< Information to be obtained from authorities in charge >

- Information about radio usage by other systems, etc.

< Information to be managed by operation management organization >

- Information about installation status of RSUs by other service providers, etc.

4.3.2 Operation phase

4.3.2.1 Management of normal operation of the radio

The operation management organization shall provide the following functions in accordance with legal regulations to ensure that the wireless facilities of the system during operation are emitting radio signals correctly.

In order to implement these functions, the RSUs owned by the respective service providers must have the capability to detect radio problems and radio infringement, as well as interference from other systems. Details of the detection/collection/notification functions available during radio management for RSUs owned by the service provider and OBE managed by the user are given in Table 4-3.

Table 4-3: Functions of OBE and RSUs for radio management during operation

Functions of Operation Management Organization		Vehicle – Roadside				Service provider administration server	Operation management system		Roadside – Vehicle	
		OBE		RSU			Accumulation	Evaluation (Control)	RSU	OBE
		Detection	Notification	Collection	Detection	Collection			Notification	Reception, evaluation, etc.
Management of normal operation of the radio	Detection of OBE normal operation of the radio		○	○	○	○				
	OBE radio problem handling						○	○	○	
	Function for preserving radio environment in case of RSU radio disturbance	○		○	○	○	○			

(1) Function for detection of OBE normal operation of the radio

The operation management organization shall provide a function for collecting and compiling information about correct operation status indicated by the OBE, as well as information about abnormal or illegal radio emissions by OBE detected by RSUs owned by the service provider. Data about the radio status of OBE in operation shall be analyzed and results shall be accumulated.

(2) Function for OBE radio problem handling

The operation management organization shall provide a function for dealing with an radio problem in OBE. This function may involve using information about abnormal or illegal radio emissions by OBE detected by RSUs owned by the service provider to take measures such as displaying an radio error indication, displaying an alert notice to the user of the OBE to correct abnormal or illegal radio emissions, or a service stop indication. If the problem is not corrected although the above measures have been taken, the function also must provide the possibility to collect, accumulate, and analyze the information and enter the associated OBE control number and vehicle information into a negated list or a similar special information list.

(3) Function for preserving radio environment in case of RSU radio disturbance

The operation management organization shall provide a function for attempting to quickly restore the normal radio environment if abnormal or illegal radio emissions from RSUs managed by a service provider are causing a radio disturbance. The function shall allow for liaising with the service provider and

other entities, and shall comprise the following means for collecting, analyzing, and storing the results:

- Collect log information from OBE that has detected the radio problem
- Collect information from service provider, operators of other systems, and other radio monitoring entities

4.4 Functions related to communications management

Among the functions of the operation management organization, the functions listed below relate to communications management.

4.4.1 Operation phase

4.4.1.1 Management of correct operation of equipments

The operation management organization shall provide a function for ensuring correction communications operation while the service is active, suitable for the respective method of communications that is being used.

In order to implement this function, a function for detecting and collecting data on the equipment communication status of RSUs owned by the service provider is required. This includes data about communication quality degradation and signal congestion. Details of the detection/collection/notification functions available during communications management for RSUs owned by the service provider and OBE managed by the user are given in Table 4-4.

Table 4-4: Functions of OBE and RSUs for communications management during operation

Functions of Operation Management Organization		Vehicle–Roadside				Service provider administration server	Operation management system		Roadside–Vehicle	
		OBE		RSU					RSU	OBE
		Detection	Notification	Collection	Detection	Collection	Accumulation	Evaluation (Control)	Notification	Reception, evaluation, etc.
Management of correct operation of equipments	Multiplex communications management						○			
	Detection of OBE communication quality	○		○	○	○	○			
	Communication quality management						○	○	○	

(1) Function for multiplex communications management

When multiple RSUs exist within a single area used by service providers, the operation management organization shall provide a function for managing multiplex operation suitable for the communication method being used, and operation rules shall be established in consultation with

service providers.

(2) Function for detection of OBE communication quality

The operation management organization shall provide a function for obtaining and analyzing data about the quality status of inter-vehicle communication, detected by RSUs owned by the service provider, as well as the quality status of roadside-to-vehicle communication by collecting OBE logs or other means, and storing the results.

(3) Function for communication quality management

The operation management organization shall provide a function for responding to communication quality deterioration. The function shall be based on data collected as described above (4.4.1.1 (3)), and utilize for example analysis data such as an increase in error rate to determine the equipment that is causing quality deterioration, and send a quality alert notice to the equipment or cause the equipment to indicate malfunction/deterioration to the user.

4.4.1.2 Log management

The operation management organization shall provide a function for collecting, analyzing, and storing analysis result data of communication logs, with the aim of assessing malfunction, improper use, and other problems related to equipment while the service is in operation. Such communication logs include data collected by equipment owned by service providers about OBE and RSU diagnostics, inter-vehicle communication and roadside-to-vehicle communication status, exchanged equipment control numbers, vehicle IDs, and other ID information. The operation management organization shall also provide a function for reviewing and searching accumulated data.

Because the data accumulated by this function includes specific information that can be directly linked to users, the handling, storage, and retaining period of such information must conform to separately defined regulations about information management.

4.5 Functions related to services and content management

Among the functions of the operation management organization, the functions listed below relate to services and content management.

4.5.1 Development and manufacturing phase

4.5.1.1 Pre-storing security information in OBE

In order to ensure safe and correct operation of all equipment in the driver assistance communications system, communication between the various devices must be made secure, as required by the respective situation. (For details regarding security implementation methods, refer to the Security Guideline [1].)

To enable equipment to participate in secure communications, security information must be pre-stored individually in OBE, and later augmented by information necessary for operation such as vehicle information. This information must then be registered with the operation management organization, along with the OBE control number. This process is referred to as setup. This document explains the steps related to the functions for pre-storing of SAM (Secure Application Module) and

security information in the OBE during development and manufacture.

(1) Function for exchanging security information related documents and data

The operation management organization shall provide a secure transmission path and means of exchanging data between the operation management organization and SAM manufacturers, and between the operation management organization and OBE manufacturers. This secure transmission path shall be independent of the security method that is implemented and shall be used to exchange applications/acknowledgement forms for pre-storing of security information, security information and relevant media, as well as development programs and other data required for configuring the system. (See Figure 4-2.)

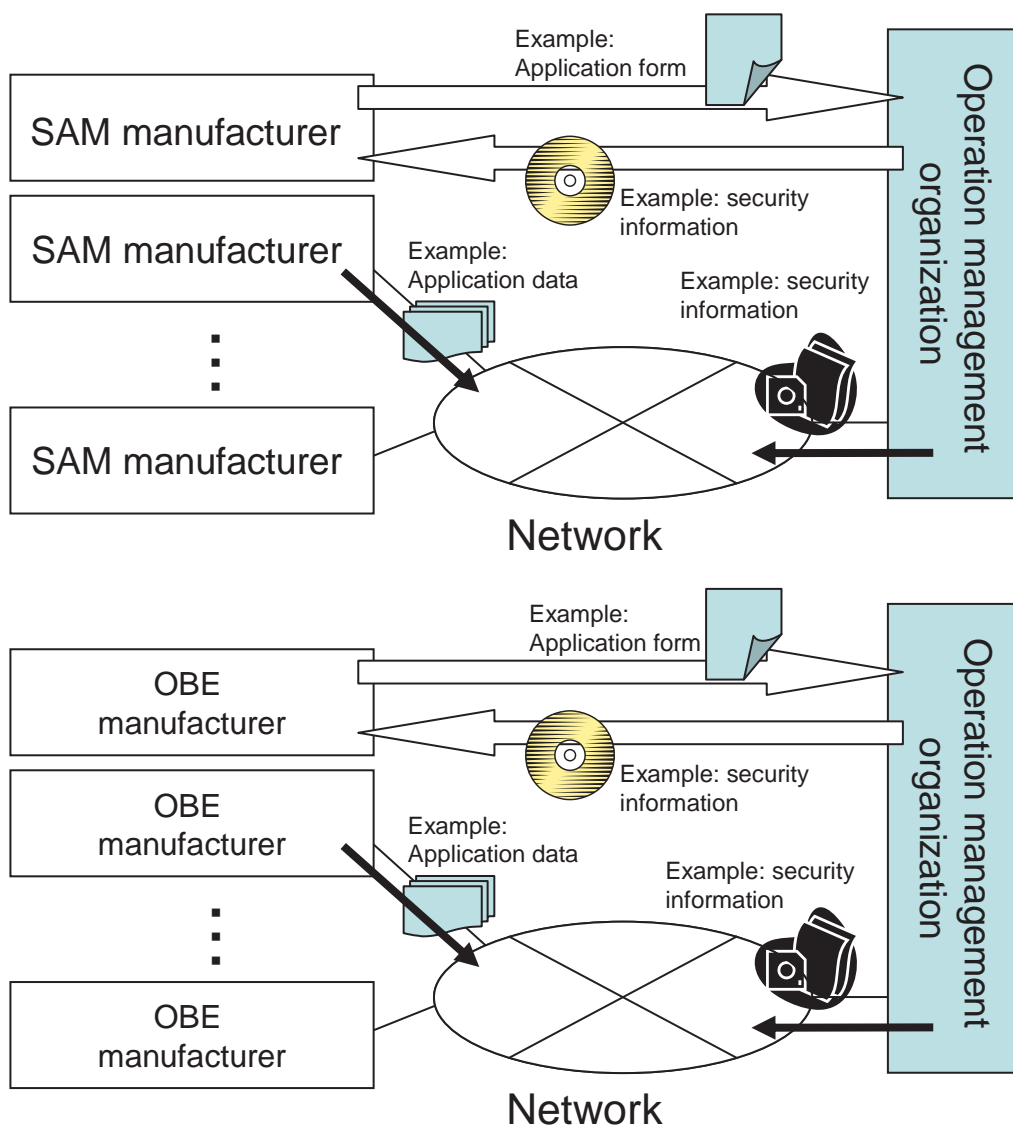


Figure 4-2: Example for data/document exchange path between operation management organization and SAM manufacturers/OBE manufacturers

(2) Function for performing setup of OBE with pre-stored security information

The operation management organization shall provide a function for performing setup of OBE with integrated SAM or OBE in which security information has been pre-stored by the manufacturer during the production stage. To allow users of such equipment to benefit from services of the driver assistance communications system, the OBE must be set up first, using vehicle and user specific information. This is performed using a setup system for equipment with pre-stored security information at setup service shops or dealers. For details regarding the setup function, see section 4.5.2.1 “Storing security information in OBE at the time of sale and performing setup.”

The operation management organization has a function for registering user based information such as OBE control number and vehicle information during setup, using the setup system at the setup service shop or dealer; but this is a different type of function. For details, see 4.2.1.5 “ID management.”

4.5.1.2 Pre-storing security information in RSUs

In order to ensure safe and correct operation of all equipment in the driver assistance communications system, communication between the various devices must use a secure method, as necessary. This applies also to RSUs (For details regarding security implementation methods, refer to the Security Guideline [1]). To enable equipment to participate in secure communications, security information must be pre-stored individually in RSUs, and later augmented by information necessary for operation (RSU information). This information must then be registered with the operation management organization, along with the RSU control number. This process is referred to as setup. This document explains the steps related to the functions for pre-storing of security information in the RSU during development and manufacture and the functions for setup of this RSU.

(1) Function for exchanging security information related documents and data

The operation management organization shall provide a secure transmission path and means of exchanging data between the operation management organization and RSU manufacturers. This secure transmission path shall be independent of the security method and shall be used to exchange applications/acknowledgement forms, security information and relevant media, as well as development programs and other data required for configuring the system. (See Figure 4-3.)

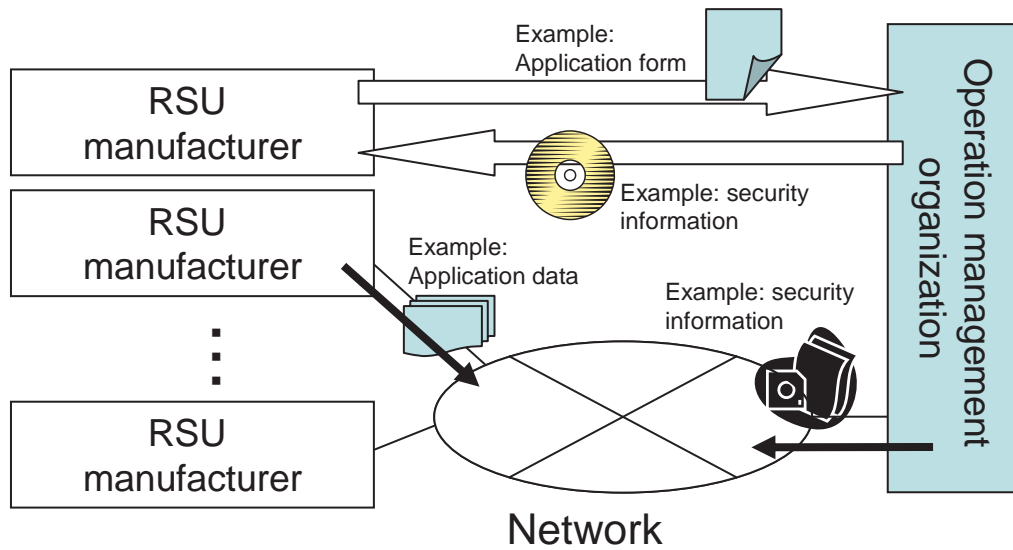


Figure 4-3: Example for data/document exchange path between operation management organization and RSU manufacturers

(2) Function for performing setup of RSU with pre-stored security information

The operation management organization shall provide a function for performing setup of RSUs with integrated SAM and RSUs in which security information has been pre-stored by the manufacturer during the production stage. To allow the RSU to provide services within the driver assistance communications system, the security information must be activated first, by storing RSU specific information using a setup procedure that is similar to the procedure by which the operation management organization has provided security information to the RSU manufacturer for pre-storing. The function of the operation management organization consists in issuing the RSU specific information that activates the security information. For details regarding the setup function, see section 4.5.2.2 “Storing security information in RSUs at the time of installation and performing setup.”

The operation management organization has a function for registering the RSU control number and other RSU information, either via a network or using a distribution system for prior security information handover, but this is a different type of function. For details, see 4.2.1.5 “ID management.”

4.5.2 RSU installation and OBE marketing phase

4.5.2.1 Storing security information in OBE at the time of sale and performing setup

The operation management organization shall provide a function for issuing security information and storing this information in OBE without pre-stored security information at the time of sale, either at a setup service shop or a dealer. The operation management organization shall also provide a function for storing of vehicle specific information along with the security information, and for

registration and management of this information, linked to the OBE control number. However, in future it will be necessary to establish standards for OBE that may affect the method of storing security information and vehicle information, as well as interface standards. This guideline therefore does not discuss details in this area. The operation management organization will establish and define concrete specifications, interface, and setup procedures for OBE subsequently, in accordance with the evolving operation patterns of the service.

(1) Function for issuing security information for OBE

The operation management organization shall provide a function for issuing and managing security information and for storing various information in OBE. For this purpose, a setup system linked online with the security information management function of the operation management organization shall be established for setup service shops and dealers, and this system shall be used to issue and manage security information.

(2) Function for storing security information in OBE

The procedures and operation flow to be used by setup service shops and dealers to store security information issued by the operation management organization in OBE need to be determined. The procedures and operation flow will then allow the setup service shops and dealers to store security information in OBE at the time of sale.

(3) Function for storing vehicle information, etc. in OBE

The operation management organization shall provide a function to allow setup service shops and dealers to store user based information (vehicle information and other information) in the OBE at the time of sale, in order to enable correct and beneficial use of the service. This function is valid and required for all OBE, including equipment for which security information was pre-stored using the function described in 4.5.1.1 and equipment for which security information was stored by the setup service shop or dealer at the time of sale. The procedure is called OBE setup.

(4) Registration and management of vehicle information, etc.

The operation management organization shall provide a function for registering user based information such as vehicle information, etc. stored in the OBE by the setup service shop at the time of sale. The information shall be registered together with the OBE control number. The operation management organization shall also provide a function for linking user based information such as vehicle information, etc. registered by the operation management organization with the OBE control number, for linked management of user and OBE information (For details, see 4.2.1.5 “ID management”). A system and operation flow must be established to facilitate the submission of user based information such as vehicle information, etc. by setup service shops and dealers when performing setup.

4.5.2.2 Storing security information in RSUs at the time of installation and performing setup

The operation management organization shall provide a function for issuing security information and storing this information in RSUs without pre-stored security information at the time of installation. At the same time, the function (setup function) shall also allow for the storing of information (a key) based

on RSU specific information to activate the security information and allow the RSU to provide services within the driver assistance system. The operation management organization shall also provide a function for management of RSUs, by registering the RSU control number during setup and linking it to RSU specific information.

(1) Function for issuing security information for RSUs

The operation management organization shall provide a function for issuing security information suitable for the security method (for example public key certificate, shared key, etc.) at the request of the RSU manufacturer.

(2) Function for storing security information in RSUs

In order to ensure safe and correct operation of all equipment in the driver assistance communications system, the operation management organization must be able to store security information in a RSU at the time of installation. Because this will be performed through a security setup procedure on site, at the location where the RSU will be providing services, the operation management organization, in consultation with the service provider managing the RSU and the RSU manufacturer, shall determine the storage procedure and operation flow, to enable the storing of security information at the installation location.

(3) RSU setup

In order for an installed RSU with stored security information to start providing services within the driver assistance system, the security information must be activated with information specific to that RSU (a key) through a setup procedure. The operation management organization shall provide a function for issuing and storing this security activation information (key). The storage method may either be manual, using a recordable media, or via a network to which the RSU is connected. The choice of method is to be determined after proper consideration.

(4) Registration and management of RSU information, etc.

The operation management organization and service provider shall provide a function for registering the RSU specific information used to activate the security information at the time of installation. This information shall be registered and managed together with the RSU control number. The operation management organization shall also provide a function for linking the registered RSU information with the OBE control number. (For details, see 4.2.1.5 “ID management.”)

4.5.3 Operation phase

4.5.3.1 Security information update management

The operation management organization shall provide a function for managing the updating of security information, according to a predetermined procedure for various possible scenarios, including updating due to expiry of a limited-period certificate or changing of security information due to externally caused security information leaks, etc.

(1) Function for security information version management

Regardless of the type of security method used for roadside-to-vehicle communication, inter-vehicle communication, and communication on other networks, the operation management organization shall

always perform version management for the security information, using a database that covers items such as validity limits, storage location, and version. Checking of these items must be implemented as necessary.

(2) Function for updating of security information

If the currently used security information has reached its validity limit, or has been compromised or otherwise become no longer fully usable, the operation management organization shall provide a function and procedure that allows prompt security information updating, regardless of the security method in use.

Possible update methods are listed in Table 4-5. The choice of actual procedures, requirements, and targets will differ depending on the type of service being provided. The operation management organization shall consult with the service provider on these matters and manage the security information in accordance with the security policy.

Table 4-5: Methods for updating security information in OBE and RSUs under operation

	Update method	Update location	Comments
OBE	<ul style="list-style-type: none"> - Online (roadside-to-vehicle communication) - Online (other communication channel) - Online (dealer, etc.) - Media based update (memory card, USB, etc.) 	<ul style="list-style-type: none"> - Directly under RSU (roadside-to-vehicle communication) - Hotspot (telematics) - Dealer, etc. - Collection by manufacturer 	Depending on security method, global updating may be required. Offline updating may result in temporary non-communication by OBE.
RSU	<ul style="list-style-type: none"> - Online (communication with control center) - Media based update (CD-R, memory card, USB, etc.) 	<ul style="list-style-type: none"> - Installation location (communication with control center) - On site - Returned to manufacturer 	Offline updating may result in temporary non-communication with OBE.

(3) Function for re-setup of security information

If a RSU owned by a service provider stops operating due to a power failure or other system problem, the security information in the RSU may be initialized by design, for reasons of security management. To ensure a prompt return to the operational state, the operation management organization shall provide a function for re-setup of security information in a RSU after it has become operational again. This function must be available regardless of the online or offline condition of the RSU.

(4) Content management function

The operation management organization shall provide a function for registering and managing the various types of content provided by multiple service providers, and for allocating and issuing IDs based on a content priority ranking, including for content requiring security management. This function shall be designed in consultation with service providers. The respective content services shall be provided to the users based on the registered type and priority ranking.

If new services are to be added or content is to be updated, inspection and validation shall be carried out to ascertain that there are no problems with regard to communications and security. The operation management organization shall provide a function for this purpose. The function shall be

designed in consultation with service providers, and the possibility for subcontracting a third-party entity to implement the function shall also be included.

4.5.3.2 User support (handling inquiries)

The operation management organization, besides handling inquiries from OBE users, shall also act as a contact point for queries from manufacturers and other entities, accepting applications, and working out solutions for problems that users may have.

For each of the functions of the operation management organization, namely equipment management, radio management, communications management, and services and content management, information databases shall be maintained and made available for reviewing and searching, with the capability for lateral linking of management information.

Because the various information utilized for implementing user support includes specific information that can be directly linked to users, the handling, storage, and retaining period of such information must conform to separately defined regulations about information management.

4.5.4 Selling off/disposal phase

4.5.4.1 Elimination of OBE security information

For use when OBE is being sold or decommissioned, the operation management organization shall provide a function for retrieving security information stored in the OBE and for canceling and deleting such information.

(1) Specifying the process flow for selling and disposal

The operation management organization shall define the operation flow for selling or disposal (discarding) OBE owned by a user. This shall be designed so as to ensure prompt elimination of security information stored in the OBE and to prevent duplication or unauthorized use. The actual operation flow for elimination is to be performed at a dealer or setup service shop capable of handling the setup process. The operation management organization should configure the system required for this purpose.

(2) Preparing a program for elimination of OBE security information

The operation management organization shall prepare a program for elimination of security information stored in OBE, and shall create a framework for performing elimination processing with this program at dealers or other shops or locations to be determined by the operation management organization.

(3) Elimination of security information in OBE

In order to prevent the re-use of cancelled security information, the operation management organization shall link the process to the security information management function and manage it in such a way that deletion from the database and re-use are not possible.

For information regarding stored vehicle IDs and other vehicle related information, see 4.2.4.1 “ID management (elimination).”

4.5.4.2 Elimination of RSU security information

The operation management organization shall provide a function for elimination of security information from a specific RSU, to be used when the RSU is decommissioned or relocated. The function shall comprise the following:

(1) Operation flow for disposal or relocating a RSU

The operation management organization shall prepare an operation flow for disposal or relocating a RSU owned by a service provider, which allows for prompt elimination of security information stored in the RSU and prompt return of any security information storage media that were provided according to a security information lease contract.

(2) Preparing a program for elimination of RSU security information

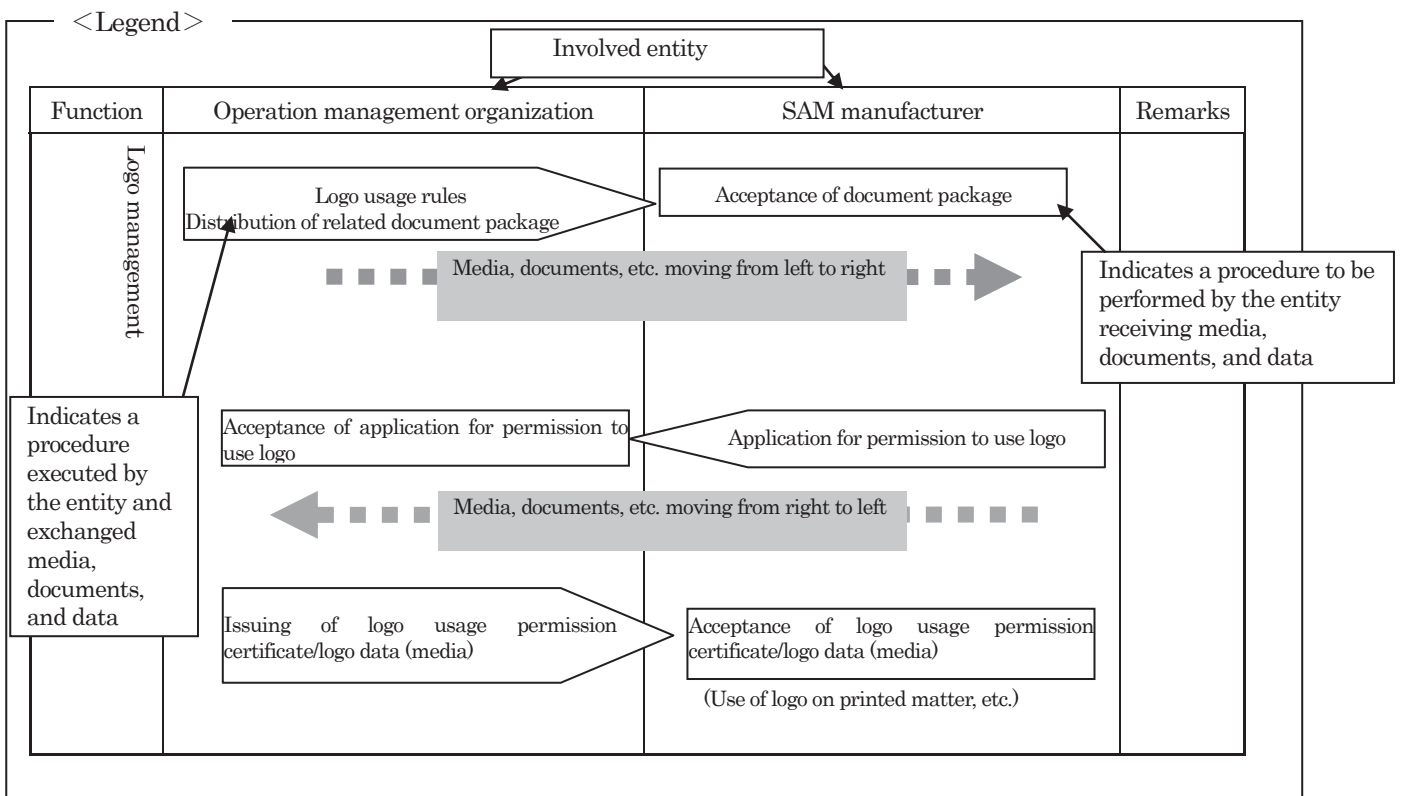
The operation management organization shall prepare a program for elimination of security information stored in a RSU, and shall create a framework for performing elimination processing either on site or online.

(3) Management (elimination) of security information in RSU

In order to prevent the re-use of cancelled security information, the operation management organization shall link the process to the security information management function and manage it in such a way that deletion from the database and re-use are not possible.

Chapter 5: Operation Management Procedures

The operation management organization shall comprehensively specify documents, data, operation flow, that must be prepared, adjusted, and executed not only for the operation management organization itself but also for each entity, in order to clarify the procedures taking place during each management phase between the operation management organization and the respective entities. The meaning of symbols and block diagram elements in the following tables is explained in the example below:



5.1 Procedures with SAM manufacturers

The various procedures to be implemented between the operation management organization and SAM manufacturers at the respective stages are listed below:

Function	Operation management organization	SAM manufacturer	Remarks
Entity registration	Entity contract	Entity contract	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure.
	Entity registration	Application for entity registration	
	Entity ID		
SAM development	SAM specifications disclosure, lease of document package	Acceptance of document package (SAM development)	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure. Specifications lease rules must be established separately.
	Acceptance of application for continued lease of document package	Application for continued lease of SAM specifications document package (At completion of development)	
	Acceptance of returned SAM specifications document package	Return of SAM specifications document package	
Pre-storing of security information	Lease of document package related to security information lease standard		Note: Procedure required for pre-storing of security information
	Acceptance of application for pre-storing of security information	Application for pre-storing of security information	
	Issuing of Security information (media)	Acceptance of security info (media) (Pre-storing of security info in SAM)	
	Acceptance of returned security information	Return of security information (media)	

5.2 Procedures with OBE manufacturers

The various procedures to be implemented between the operation management organization and OBE manufacturers at the respective stages are listed below:

Function	Operation management organization	OBE manufacturer	Remarks
(Entity registration)	Entity contract	Entity contract	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure.
	Entity registration	Application for entity registration	
	Entity ID		
(OBE development)	OBE specifications disclosure, lease of document package	Acceptance of document package (OBE development)	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure. The procedure at left refers to cases where lease is involved.
	Acceptance of application for continued lease of document package	Application for continued lease of OBE specifications document package (At completion of development)	
	Acceptance of returned document package	Return of OBE specifications document package	

Function	Operation management organization	OBE manufacturer	Remarks
Interoperability verification testing	Distribution of document package for interconnectivity verification testing procedure	Acceptance of document package (Prepare to undergo testing)	
	Acceptance of connectivity testing application	Application for interconnectivity verification testing	
	Interconnectivity verification testing certificate	[Appended] Technical compliance certificate	
	Acceptance of application for lease of security information for interconnection	Application for lease of security information for interconnection	
	Issuing of security information (media) for interconnection	Acceptance of security information (media) for interconnection	
	Verification of interconnectivity	Undergo interconnectivity verification testing	
	Interconnectivity verification number	(To equipment model registration)	
	Acceptance of returned security information for interconnection	Return of security information (media) for interconnection	
Equipment model registration	Acceptance of application for model registration	Model registration application	* When interoperability verification testing has not been done
	Model certification Model registration certificate	Interconnectivity verification number Documentation allowing verification of interconnectivity (*)	
	Acceptance of application for model registration change (elimination)	Acceptance of model registration certificate Application for model registration change (elimination)	
Management of OBE control number	Distribution of document package related to OBE control number allocation standard	Acceptance of document package (Allocation of OBE control number)	

Function	Operation management organization	OBE manufacturer	Remarks	
Logo management	Distribution of document package related to logo use rules	Acceptance of document package		
	Acceptance of application for permission to use logo	Application for permission to use logo		
	Logo use permission certificate - Issuing of logo data (media)	Logo use permission certificate - Acceptance of logo data (media)		
		(Use of logo on printed matter, etc.)		
Pre-storing of security information	Lease of document package related to security information lease standard	Acceptance of document package	Note: Procedure required for pre-storing of security information	
	Acceptance of application for pre-storing of security information	Application for pre-storing of security information		
	Issuing of security information (media)	Acceptance of security information (media)		
				(Pre-storing of security information in SAM)
	Acceptance of application for OBE control number, registration of number	Application for OBE control number registration		
Acceptance of returned (pre-store) security information	Return of security information (media)			
User support	User support contact point	Inquiry		
Life-cycle management	Acceptance of recycling record of disposal OBE	Disposal OBE reuse record certificate		
	Recycling incentive			

5.3 Procedures with RSU manufacturers

The various procedures to be implemented between the operation management organization and RSU manufacturers at the respective stages are listed below:

Function	Operation management organization	RSU manufacturer	Remarks
(Entity registration)	Entity contract	Entity contract	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure.
	Entity registration	Application for entity registration	
	Entity ID		
(RSU development)	RSU specifications disclosure, lease of document package	Acceptance of document package (RSU development)	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure. The procedure at left refers to cases where lease is involved.
	Acceptance of application for continued lease of document package	Acceptance of application for continued lease of RSU specifications document package (At completion of development)	
	Acceptance of returned document package	Return of RSU specifications document package	

Function	Operation management organization	RSU manufacturer	Remarks
Interoperability verification testing	Distribution of document package for interoperability verification testing procedure	Acceptance of document package (Prepare to undergo testing)	
	Acceptance of connectivity testing application	Application for interoperability verification testing [Appended] Technical compliance certificate	
	Lease of reference OBE for testing	Acceptance of reference OBE for testing	
	Acceptance of application for security information for interconnection	Application for security information for interconnection	
	Issuing of security information (media) for interconnection	Acceptance of security information (media) for interconnection (Interoperability verification testing)	
	Verification of interoperability	Interoperability verification testing document package	
	Interoperability verification number	(To equipment model registration)	
	Acceptance of returned security information for interconnection	Return of security information (media) for interconnection	
	Acceptance of returned reference OBE for testing	Return of reference OBE for testing	
Equipment model registration	Acceptance of application for model registration	Model registration application Interoperability verification number Documentation allowing verification of interconnectivity (*)	* When interoperability verification testing has not been done
	Model certification Model registration certificate	Acceptance of model registration certificate	
	Acceptance of application for model registration change (elimination)	Application for model registration change (elimination)	
Management of RSU control number	Distribution of document package related to RSU control number	Acceptance of document package	

Function	Operation management organization	RSU manufacturer	Remarks
Logo management	Distribution of document package related to logo use rules	Acceptance of document package	
	Acceptance of application for permission to use logo	Application for permission to use logo	
	Logo use permission certificate - Issuing of logo data (media)	Logo use permission certificate - Acceptance of logo data (media) (Use of logo on printed matter, etc.)	
Pre-storing of security information	Lease of document package related to security information lease standard	Acceptance of document package	Note: Procedure required for pre-storing of security information
	Acceptance of application for pre-storing of security information	Application for pre-storing of security information	
	Issuing of security information (media)	Acceptance of security information (media) (Pre-storing of security information in roadside SAM)	
	Acceptance of application for RSU control number, registration of number	Application for RSU control number registration	
	Acceptance of returned (pre-store, for installation) security information	Return of security information (media)	
User support	User support contact point	Inquiry	
Lifecycle management	Acceptance of recycling track record of decommissioned RSU s	Disposal RSU reuse record certificate	
	Recycling incentive		

5.4 Procedures with setup service shops

The various procedures to be implemented between the operation management organization and setup service shops at the respective stages are listed below:

Function	Operation management organization	Setup service shop	Remarks
(Entity registration)	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Entity contract</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Entity registration</div> <div style="border: 1px solid black; padding: 5px;">Entity ID</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Entity contract</div> <div style="border: 1px solid black; padding: 5px;">Application for entity registration</div>	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure.
(Setup terminal installation/return)	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Lease of setup related document package</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Acceptance of application for terminal installation</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Lease of setup terminal system</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Acceptance of returned document package</div> <div style="border: 1px solid black; padding: 5px;">Acceptance of returned equipment</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Acceptance of document package</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Application for setup terminal installation</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Return of setup related document package</div> <div style="border: 1px solid black; padding: 5px;">Return of setup related equipment</div>	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure. The procedure at left refers to cases where a setup terminal is installed.

Function	Operation management organization	Setup service shop	Remarks
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Storing and setup of security information in OBE at time of sale</p>	<p>Acceptance of setup application</p>	<p>(Sales of OBE, setup of customer-supplied equipment)</p> <p>Setup application</p>	
	<p>Issuing of security information (media/data) for interconnection</p>	<p>Acceptance of security information (media/data)</p> <p>(Storing of security information in OBE)</p>	
	<p>Acceptance of application for OBE control number registration</p>	<p>Application for OBE control number registration</p> <p>(Storing of vehicle information, etc.)</p>	
	<p>Registration of vehicle information</p>	<p>Application for registration of vehicle information</p>	
	<p>Acceptance of returned security information (media)</p>	<p>Return of security information (media)</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Security information update management</p>	<p>Security information update instruction</p>	<p>Acceptance of security information update instruction</p> <p>(Preparation of security information update instructions by setup service shop)</p> <p>(Request for security information update by user bringing own OBE)</p>	
	<p>Acceptance of application for security information update</p>	<p>Update application (by user)</p>	
	<p>Updated security information Issuing (media / data)</p>	<p>Acceptance of updated security information (media / data)</p> <p>(Updating of security information)</p>	
	<p>Acceptance of returned updated security information (media)</p>	<p>Return of updated security information (media)</p>	

Function	Operation management organization	Setup service shop	Remarks
Logo management	Distribution of document package related to logo use rules	Acceptance of document package	
	Acceptance of application for permission to use logo	Application for permission to use logo	
	Logo use permission certificate - Issuing of logo data (media)	Logo use permission certificate - Acceptance of logo data (media) (Use of logo on printed matter, etc.)	
User support	User support contact point	Inquiry	
Elimination of OBE security information	Acceptance of application for elimination	(Re-selling of OBE, customer-supplied equipment) Application for cancellation of security information	
	Issuing of eliminated information (media/data)	Acceptance of eliminated information (media/data) (Elimination of OBE security information)	
	Acceptance of application for elimination of OBE control number, cancellation of number	Application for elimination of OBE control number (Elimination of vehicle information, etc.)	
	Acceptance of application for elimination of vehicle information, elimination of information	Application for elimination of vehicle information	
	Acceptance of returned eliminated information (media)	Return of eliminated information (media)	

5.5 Procedures with service providers

The various procedures to be implemented between the operation management organization and service providers at the respective stages are listed below:

Function	Operation management organization	Service provider	Remarks
(Entity registration)	Entity contract	Entity contract	Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure.
	Entity registration	Application for entity registration	
	Entity ID		
Logo management	Distribution of document package related to logo use rules	Acceptance of document package	
	Acceptance of application for permission to use logo	Application for permission to use logo	
	Logo use permission certificate - Issuing of logo data (media)	Logo use permission certificate - Acceptance of logo data (media) (Use of logo on printed matter, etc.)	
Storing and setup of security information in RSU at time of installation	Lease of document package related to security information lease standard	Acceptance of document package	Note: Not required if services are provided via OBE only
	Acceptance of setup application (at time of installation)	Setup application (at time of installation)	
	Issuing of security information (media)	Acceptance of security information (media) (Setup performed at time of RSU installation)	
	Acceptance of application for RSU control number, registration of number	Application for RSU control number registration	
	Acceptance of returned security information	Return of security information (media)	

Function	Operation management organization	Service provider	Remarks
Radio interference management	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Collection/ accumulation of information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Acceptance of application for submission of new RSU installation conditions</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Installation status information about other RSU</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Information about radio usage status of other systems</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Submission of new RSU installation conditions, etc.</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Application information for new radio base station</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Information regarding passive and active interference to /by newly established radio base station</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Installation status information for existing RSU</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Application for submission of new RSU installation conditions</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Reviewing of information</div>	<p>Note: Not required if services are provided via OBE only</p>
Management of correct operation of equipments	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Instruction for submission of OBE information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Accumulation/management of OBE information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Instruction for submission of equipment management data</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Accumulation/management of equipment management data</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Instruction for submission of RSU operation status information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Accumulation/management of r RSU operation status information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Analysis/disclosure of equipment management information</div>	<div style="text-align: center; margin-bottom: 5px;">(Detection/collection of OBE information)</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Acceptance of instruction for submission of OBE information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Submission of OBE information</div> <div style="text-align: center; margin-bottom: 5px;">(Detection/collection of equipment management data)</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Acceptance of instruction for submission of equipment management data</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Submission of equipment management data</div> <div style="text-align: center; margin-bottom: 5px;">(Detection/collection of RSU operation status)</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Acceptance of instruction for submission of RSU operation status information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Submission of RSU operation status information</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Reviewing of equipment management information</div>	<p>Note: RSU related procedures not required if services are provided via OBE only</p>

Function	Operation management organization	Service provider	Remarks
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Management of correct operation of the radio</p>	<p>Instruction for submission of OBE radio problems/ radio infringement information</p>	<p>(Detection/collection of OBE radio problem/radio infringement information)</p> <p>Acceptance of instruction for submission of OBE radio problem/ radio infringement information</p>	<p>Note: RSU related procedures not required if services are provided via OBE only</p>
	<p>Accumulation/management of OBE radio problems/ radio infringement information</p>	<p>Submission of OBE radio problem/ radio infringement information</p>	
	<p>Instruction for dealing with OBE showing radio problems</p>	<p>Acceptance of instruction for dealing with OBE showing radio problems</p>	
	<p>(Collection of radio status information regarding other systems)</p>	<p>(Action instruction emitted by RSU)</p> <p>(Detection/collection of RSU radio operation status information)</p>	
	<p>Instruction for submission of RSU radio operation status information</p>	<p>Acceptance of instruction for submission of RSU radio operation status information</p>	
	<p>Accumulation/management of RSU radio operation status information</p>	<p>Submission of RSU radio operation status information</p>	
	<p>Analysis of information about RSU radio operation status and other system radio operation status</p>		
	<p>Instruction for improvement and protection of radio environment</p>	<p>Acceptance of instruction for improvement and protection of radio environment</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Management of correct operation of equipments</p>	<p>Instruction for submission of communication status information</p>	<p>(Detection/collection of OBE and RSU communication status information)</p> <p>Acceptance of instruction for submission of communication status information</p>	<p>Note: Not required if services are provided via OBE only</p>
	<p>Accumulation/management of communication status information</p>	<p>Submission of communication status information</p>	
	<p>Analysis of communication status information</p>		
	<p>Communication equipment failure/ degradation countermeasure instruction</p>	<p>Acceptance of instruction for failure/ degradation countermeasure instruction</p>	

Function	Operation management organization	Service provider	Remarks
Log management	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Instruction for submission of log data</div>	<p style="text-align: center;">(Log data collection)</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Acceptance of instruction for submission of log data</div>	
	<div style="border: 1px solid black; padding: 5px;">Accumulation/management of log data</div>	<div style="border: 1px solid black; padding: 5px;">Submission of communication logs</div>	
	<div style="border: 1px solid black; padding: 5px;">Analysis/disclosure of log information</div>	<div style="border: 1px solid black; padding: 5px;">Reviewing of log information</div>	

Function	Operation management organization	Service provider	Remarks
Security information update management	(Procedure for OBE)		Note 1: Procedures differ for OBE and RSUs
	Security information update instruction	Acceptance of security information update instruction (Announce update location and prepare update process for security information managed by user and service provider)	Note 2: When security information updating is not performed by setup service shops
	Acceptance of application for security information update	Application for update (from respective update location)	
	Issuing of updated security information (media / data)	Acceptance of updated security information (media/data) (at respective update location) (Store updated security information in OBE at respective update location)	
	Acceptance of application for BOE control number, registration of number	Application for OBE control number registration	
	Acceptance of returned updated security information (media)	Return of updated security information (media)	
	(Procedure for RSU)		
	Security information update instruction	Acceptance of security information update instruction (Announce for RSU manufacturers and prepare update process)	
	Acceptance of application for security information update	Update application for managed RSU	
	Issuing of updated security information (media/data)	Acceptance of updated security information (media / data) (Store updated security information in managed roadside unit)	
	Acceptance of application for RSU control number, registration of number	Application for RSU control number registration	
	Acceptance of returned updated security information (media)	Return of updated security information (media)	

Function	Operation management organization	Service provider	Remarks
Content management	Acceptance of application for new content (Consultation regarding priority ranking of content)	Application for registration of new content	
	Assign content ID	Acceptance of content ID (Content operation start)	
	Acceptance of application for content stopping/elimination (Content ID elimination)	Application for content stopping/elimination	
Elimination of RSU security information	Acceptance of application for elimination	(Disposal of RSU) Application for elimination of security information	Note: Not required if services are provided via OBE only
	Issuing of cancellation information (media / data)	Acceptance of elimination information (media/data) (Elimination of RSU security information)	
	Acceptance of application for elimination of RSU control number, elimination of number	Application for RSU control number elimination	
User support	User support contact point	Inquiry	
Lifecycle management	Acceptance of recycling track record of decommissioned RSU	Decommissioned RSU reuse record certificate	Note: Not required if services are provided via OBE only
	Recycling incentive		

5.6 Procedures with users

The various procedures to be implemented between the operation management organization and users at the respective stages are listed below:

Function	Operation management organization	User	Remarks
(User registration)	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">User information registration</div> <div style="border: 1px solid black; padding: 5px;">Registration/management of user IDs</div>	<p style="text-align: center;">(Conclusion of usage agreement with service provider)</p> <div style="border: 1px dashed black; padding: 5px; margin: 5px auto; width: 80%;">User information (from service provider)</div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px; width: 80%;">Application for use</div>	<p>Note: This function is not listed among the functions of the operation management organization, but it is included here as a required procedure.</p>
User support	<div style="border: 1px solid black; padding: 5px; width: 80%;">User support contact point</div>	<div style="border: 1px solid black; padding: 5px; width: 80%;">Inquiry</div>	

Chapter 6: Operation Target Points

Details of the driver assistance communications system that still need to be explored as well as target points and other aspects that could not be covered in depth in this guideline are identified and listed below.

6.1 Identification of target points of the Operation Management Guideline

The table below lists target points related to the functions described in the Operation Management Guideline.

These should be used for reference when considering how to approach the target points, along with media, documents, rules, and agreements necessary for the procedures listed in chapter 5.

Relevant function	Unresolved items, target points, etc.	Remarks
(a) Interconnectivity verification testing function	(1) Define scope of interconnectivity verification testing - Determine actions to be performed by operation management organization and by third parties (2) Configure management structure - Entity in charge of test equipment management (third-party outsourcing, etc.) (3) Define test procedure - Specifications of reference RSU and reference OBE - Create test procedure document, guideline for undergoing test - Establish technical standard compliant with Radio Law and other laws	
(b) Equipment certification function	(1) Certification criteria - Clarify certification criteria for interconnectivity not based on testing (2) Equipment certification regulations	
(c) Equipment model registration function	(1) Model registration regulations - Establish number allocation rules for model registration (2) Configure a model database (3) Scope of registered information disclosure	
(d) Logo management function	(1) Establish unified logo (2) Logo usage fees (3) Usage scope regulations (establish logo use rules)	

Relevant function	Unresolved items, target points, etc.	Remarks
(e) Function for storing security information in OBE	<p>(1) Method for storing security information</p> <ul style="list-style-type: none"> - Manage procedure, flow, technical validation, OBE specifications and other aspects of the various security information storage methods - Clarify the differences in procedure depending on the security method <p>(2) Explore OBE setup system</p> <ul style="list-style-type: none"> - Explore online system configuration - Prepare system installation manual for setup service shops - Prepare system equipment <p>(3) Security information version management during operation</p> <ul style="list-style-type: none"> - Version management for initial information to be pre-stored - Operation settings for OBE with stored initial information <p>(4) Operation regulations</p> <ul style="list-style-type: none"> - Discuss limit on number of OBE installed in a vehicle - Regulations for vehicle information registration and use, etc. <p>(5) Security information management cost</p>	
(f) Function for storing security information in RSUs	<p>(1) Method for storing security information</p> <ul style="list-style-type: none"> - Procedure, flow, and other aspects of pre-storing security information at manufacturer site - Procedure for setup during installation (Security information storing and RSU information storing) (Main entities for RSU management are service providers) - Explore required procedure and operation aspects of performing on-site setup during installation <p>(2) Operation regulations</p> <p>(3) Security information management cost</p>	
(g) ID management /ID management (elimination)	<p>(1) Management regulations</p> <ul style="list-style-type: none"> - Personal information management regulations - Define scope of disclosure to entities <p>(2) Establish management system</p> <ul style="list-style-type: none"> - Explore operation flow, database, various ID registration methods (auto/manual/via Internet ?) <p>(3) Management of eliminated information</p> <ul style="list-style-type: none"> - Regarding the elimination (erasure) of security information and personal information, strict operation regulations must be established, and the regulations must be made available for viewing by users and other entities as required. <p>(2) Preparation of various information elimination (erasure) tools</p>	

Relevant function	Unresolved items, target points, etc.	Remarks
(h) Radio interference management function	(1) Information collaboration with Regional Bureau of Telecommunications (2) Creation of a database with RSU information under the viewpoint of radio interference (3) Creation of a simple check sheet for radio interference or similar easy methods to implement evaluation	
(i) Function for management of correct operation of equipments	(1) Establishment of specifications for detection function, management function, and other functions of RSU (2) Handling of problems - Explore notification/commands to send to OBE if malfunction has been detected - Create emergency response manual/guideline - Devise measures to prevent serious accidents caused by equipment failure, establish an accident countermeasure framework - Establish a framework for handling and follow-up of malfunctions	
(j) Function for management of normal operation of the radio	(1) Establishment of specifications for detection function and management function - Prepare maintenance/service vehicles for detection of radio problems, etc. - Perform technical validation of detection functions to be incorporated in RSUs (2) Handling of radio radio disturbances - Create emergency response manual/guideline - Devise measures to prevent serious accidents caused by radio disturbances, establish an accident countermeasure framework (3) Problem of compensation for radio disturbances (4) Collaboration with authorities	
(k) Function for management of correct operation of equipments	(1) Maintaining communication quality - Consider a system configuration allowing congestion and communication status monitoring (2) Security measures - Explore security measures on communication line	
(l) Log management function	(1) Log collection method - Explore log collection method in inter-vehicle communication - Perform technical validation of online log collection by RSUs (2) Log data storage - Determine log disclosure scope, log storage location and storage period, and establish regulations for handling confidential information and operation	

Relevant function	Unresolved items, target points, etc.	Remarks
(m) Security information update management function	(1) Determine update method/update location - Security information updating method (OBE/RSU) - Update location and required facilities - Specifications of OBE required for update (communication/interface) (2) Update information management - Validity period of security information - Update cycle/frequency of security information - Regulations for handling security information with expired validity - Method of transmitting security information with expired validity (3) Security policy - Specify security level for updating - Reinforce security of update location and facilities - Create manual for update procedure - Create regulations for updating operations	
(n) Content management function	(1) Content priority ranking - Establish operation regulations for assigning a priority ranking to each provided content (service) - Establish regulations for handling emergency content in case of an emergency (2) Content quality management (3) Content security measures - Devise measures to guard against content tampering and unauthorized use	
(o) User support	(1) Support framework organization (2) Configuration of a support system - Consider measures such as creation of support tools and troubleshooting flowcharts for support staff (3) Preparation of FAQ	
(p) Lifecycle management	(1) Perform technical validation of recycling (2) Incentives - Consider incentives to promote recycling - Perform trend surveys regarding environmental protection and current eco businesses (3) Establish regulations for lifecycle management	

