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Road vehicles — Automotive multimedia interface —

Part 3: System requirements

Véhicules routiers — Interface multimédia pour l'automobile —

Partie 3: Exigences du système

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Foreword

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

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

ISO 22902-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 22902 consists of the following parts, under the general title *Road vehicles — Automotive multimedia interface*:

— *Part 1: General technical overview*

— *Part 2: Use cases*

— *Part 3: System requirements*

— *Part 4: Network protocol requirements for vehicle interface access*

— *Part 5: Common message set*

— *Part 6: Vehicle interface requirements*

— *Part 7: Physical specification*

Road vehicles — Automotive multimedia interface —

Part 3:
System requirements

1 Scope

This system requirements document captures system-level requirements and defines the expected functional and physical capabilities of an AMI-C system.

2 Normative references

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

ISO 22902-1, *Road vehicles — Automotive multimedia interface — Part 1: General technical overview*

ISO 22902-2, *Road vehicles — Automotive multimedia interface — Part 2: Use cases*

ISO 22902-7, *Road vehicles — Automotive multimedia interface — Part 7: Physical specification*

3 Basis of system requirements

3.1 System attributes

When fully implemented, an system shall be characterized by the following attributes. The requirements contained within this document are intended to support these attributes:

— Scalability

— Configure-ability

— Expandability

— Upgradeability

— Commonality

— Operability

— Interoperability

— Modularity

— Security

— Testability

4 System requirements

4.1 General requirements

An AMI-C system is a collection of compliant components interconnected in a manner that provides the intended set of functions and services. Interoperability is achieved by specifying common interfaces, signals, network messages, physical environment and power management requirements.

4.1.1 A system shall be logically or physically separated from other vehicle subsystems in a manner that inhibits undesirable interactions with those systems while promoting interchange of pertinent vehicle data across the interfacing boundary.

4.1.2 A system shall support the capability to add or remove hardware and software components across multiple network technologies.

4.1.3 A system shall, through the use of vehicle interface and service APIs, allow the deployment of various telematics and infotainment services over the lifetime of the vehicle.

4.1.4 A system shall support a common message set across multiple wired and wireless network technologies.

4.1.5 A system shall provide a common method of power management.

4.1.6 A system shall provide a common method of diagnostics.

4.1.7 A system shall provide a common method of interconnection.

4.1.8 A system shall provide a standard interface to the vehicle's HMI.

4.1.9 A system shall provide a common method to identify and coordinate functional services in the system, service discovery, and power-moding mechanisms.

4.1.10 A system shall support a mechanism to recover from a non-operational state.

4.1.11 A system shall have access to a minimum set of vehicle services including the audio subsystem, power management and some pre-defined body control functions.

4.1.12 A system shall be configured within the guidelines and framework specified in ISO 22902-1 - system architecture.

4.1.13 A system shall maintain or enhance the safe operation of a vehicle.

4.2 Modularity

The elements of an system shall have standardized interfaces so the elements can be modified, upgraded or replaced without requiring a change to the other elements in the system.

4.3 Configure-ability

4.3.1 The system shall allow a configuration to be expanded by adding or deleting additional elements, in combination, to achieve different content levels. It is a typical practice that vehicle systems with many features have some features as options for end customer to select. Configure-ability enables scalability, expandability, and upgradeability.

4.4 Interoperability

The features and functions of a system require the coordinated effort by several components in a system to meet the intended performance levels of the manufacture.

4.4.1 A compliant components shall be compatible with all of the specifications related to the intended functions being provided.

4.4.2 A component placed on the network shall be compatible with the network message set, power-moding, device discovery and physical layer specifications. A component shall not interfere with the operation of an system.

4.5 Interchangeability

These elements of an AMI-C system shall be interchangeable with similar modules supplied by different manufacturers.

4.6 Security

The AMI-C system shall provide security from several perspectives:

4.6.1 A system shall support a mechanism to prevent a malicious attack for the purpose of modifying, degrading, corrupting or otherwise intentionally disrupting normal operation by the owner.

4.6.2 A system shall support a mechanism to limit access to vehicle services to authorized entities.

4.6.3 A system shall support a mechanism to limit access to stored information to authorized entities.

4.6.4 A system shall support a mechanism to restrict downloads to only trusted applications.

4.6.5 A system shall support a mechanism to prevent unauthorized wireless devices and services from accessing the system.

4.6.6 A system shall support a mechanism to protect private data during data transfer between local wired and wireless devices.

4.6.7 A system shall support a mechanism to protect data during data transfer between the system and an off-board system.

4.7 Serviceability and testing

An AMI-C system shall comply with the following serviceability and testing requirements:

4.7.1 A system shall be testable and comply with diagnostics service practices in the automotive industry.

4.7.2 A system shall provide mechanisms to allow a service technician to isolate faulty components of AMI-C systems for replacement or repair. These mechanism may be off-board, on-board or a combination of these methods

4.7.3 A system shall provide the capability for a service technician to determine the configuration of a system under test by interrogating the system through a diagnostic port and to determine the services provided by the system. Services must be identified with software and/or hardware version numbers.

4.7.4 A system shall provide mechanisms to assist in testing for correct operation at the time of vehicle assembly.

4.8 Service discovery requirements

The service discovery requirements for an AMI-C system include:

4.8.1 A system shall support service discovery mechanisms that identify active services available to the applications installed on the system.

4.8.2 The service discovery mechanism shall identify the services in a manner that is directly obtainable by controller running application programs.

4.8.3 The service being made available to controllers shall, at a minimum, provide the following information:

- name and version;
- features of service;
- device providing service.

4.8.4 The service discovery mechanism shall establish the services available when the system is initially powered and each time the system is reset.

4.8.5 The service discovery mechanism shall update the list of services available when a new service is added or deleted from the system.

4.8.6 In a system with a network, device discovery must be completed prior to service discovery.

4.8.7 If a component is capable of determining failure modes of services provided, it will, upon failure detection, remove the disabled services from the registry.

4.8.7.1 The component will restore the services to the registry when the service function is restored.

5 Architecture requirements

The architecture is the framework upon which the AMI-C system is formulated and configured. This framework defines how the various components of an system are interconnected, how the system logically operates, and how the system achieves all of AMI-C's business and technical objectives. The key elements of the architecture are the following:

— vehicle interface – an interface to other vehicle subsystems, information and signals;

— network – standard network and message sets to provide data interchange and control between components;

— host – a computer used to execute cross-platform, downloadable application code;

— Consumer Convenience Access (CCA) – an interface to external consumer device(s).

The actual implementation and use of these elements is dependent on the requirements by the individual carmakers. However, a vehicle interface must be present in a valid architectural implementation. The following are the general requirements for these key elements.

5.1 Vehicle interface

5.1.1 A system shall have a vehicle interface that allows signals or data to be passed between the system and the vehicle.

5.1.2 The vehicle interface shall use a common message set instantiated in network messages or software APIs when interacting with the vehicle.

5.1.3 The vehicle interface shall contribute to the safe operation of a vehicle by complying with the requirements in Sections 4.1 and 4.6 of this document.

5.2 Network requirements

An AMI-C network shall comply with the following set of requirements:

5.2.1 A network shall be capable of using the Transmission Control Protocol/Internet Protocol (TCP/IP).

5.2.2 A network shall be capable of expandability.

5.2.3 A network shall establish its access to the vehicle through a vehicle interface.

5.2.4 If there are two or more networks in a vehicle and if two networks need to jointly perform certain functions, there shall be a gateway between the two networks.

5.2.4.1 A network gateway between two networks shall manage message translation between the networks.

5.2.4.2 A multiple network configuration using gateways shall inhibit a "circular" passage of network messages that would result in errors or system failure.

5.2.5 A network shall contribute to the safe operation of a vehicle by complying with the requirements in Sections 4.1 and 4.6 of this document.

5.2.6 A network shall provide a device discovery service and support the service discovery requirements in Section 4.8 of this document.

5.3 Host requirements

An AMI-C host shall comply with the following set of requirements:

5.3.1 The host shall contain a common software platform that allows application portability.

5.3.1.1 The common software platform shall support libraries of software elements that support system and application functions.

5.3.1.2 The common software platform shall support execution of application software with the appropriate libraries. Several applications may co-exist on the platform at any time.

5.3.2 A host shall provide a uniform mechanism for provisioning of software components.

5.3.3 A host shall provide applications access to a pre-determined set of vehicle services.

5.3.4 A host shall contribute to the safe operation of a vehicle by complying with the requirements in of this document.

5.4 Consumer Convenience Access (CCA)

To provide compatibility with consumer devices, the system may provide an interface that allows an external device, such as a PDA, to connect to the system. Once connected, the device may share data with the vehicle, synchronize services, provide control functions or may use the vehicle's human machine interface. A CCA shall comply with the following requirements:

5.4.1 The interfacing device (gateway, bridge, converter, cable adaptor, local wireless access point, etc.) shall make provisions to isolate the operation and function of the personal device such that failure or incorrect operation or attachment will not permanently damage the system.

5.4.2 The CCA shall support device discovery and service discovery when it interfaces with an external device.

5.4.3 The CCA shall allow connection or removal of devices when the vehicle power is applied and operating normally. This feature shall not affect normal operation of features and functions not related to the device.

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