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Intelligent transport systems — Communications access for land mobiles (CALM) — 3G Cellular systems

Systèmes de transport intelligents — Accès de communication pour services mobiles terrestres (CALM) — Systèmes cellulaires 3G

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

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

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

ISO 21213 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

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Introduction

This International Standard is part of a family of International Standards for communications access for land mobiles (CALM) which specify a common architecture, network protocols and communications interface definitions for wireless communications using different bearer technologies, e.g. second and third generation cellular, 5 GHz microwave, 60 GHz millimetre-wave, mobile wireless broadband, and Infra-red communications. Other air interfaces may be added at a later date. These wireless communications interfaces are designed to provide parameters and protocols for broadcast, point-point, vehicle-vehicle, and vehicle-point communications in the ITS Sector.

This International Standard determines the air interface parameters for CALM communications via 3G cellular networks.

CALM standards are explicitly designed to enable quasi-continuous communications as well as communications of protracted duration between vehicles and service providers, and between vehicles.

The fundamental advantage of the CALM concept over traditional systems is the ability to support media independent handover (MIH), also referred to as heterogeneous handover, between the various media supported by CALM (e.g., cellular, microwave, mobile wireless broadband, infra-red, DSRC). Selection policies are supported that include user preferences and media capabilities in making decisions as to which media to use for a particular session, and when to handover between media or between service providers on the same medium. These handover mechanisms are defined within the CALM architecture International Standard (ISO 21217), the CALM networking protocols International Standard (ISO 21210), the CALM medium service access points International Standard (ISO 21218) and the CALM interface manager International Standard (ISO 24102). Handovers between access points using the same technology and service provider use mechanisms that are defined within the particular medium specific CALM Standard.

ITS applications include the update of roadside telemetry and messaging, internet, image and video transfer, infotainment, multimedia multicast, traffic management, monitoring and enforcement in mobile situations, route guidance, car-to-car and point-to-multipoint safety messaging, maintenance management, and “yellow page” services among others.

This International Standard provides definitions and procedures for the establishment and maintenance of an ITS communications session within a CALM system environment using 3G cellular communications.

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Intelligent transport systems — Communications access for land mobiles (CALM) — 3G Cellular systems

1 Scope

This International Standard determines the air interface options applicable to CALM using third generation (3G) cellular networks. In particular, this International Standard specifies protocols and parameters that 3G systems shall include to support prolonged, long-range, high data rate wireless communication links in ITS environments where heterogeneous handovers or media independent handovers (MIH) are either necessary to maintain the link, or desirable, as determined by media selection policies.

This International Standard provides protocols and parameters for long range, medium speed wireless communications in the ITS sector using third generation cellular communications.

Wherever practicable, this International Standard has been developed by reference to suitable extant Standards, adopted by selection. Required regional variations are provided.

Specifically, for this International Standard, extant 3G systems, as defined by various international and national Standards, are adopted by reference.

Application specific upper layers are not included in this Standard, but will be driven by application standards (which may not be technology specific).

2 Conformance

In order to claim conformance with this International Standard, cellular communication shall be established in full compliance with local telecommunications procedures and protocols for the appropriate 3G standards, and shall comply with the requirements of ISO 21217 (CALM System architecture), ISO 21210 (CALM Networking protocols), ISO 21218 (CALM medium service access points), and CALM interface manager (ISO 24102).

3 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 21210, *Intelligent transport systems — Communications access for land mobiles (CALM) — Networking Protocols*

ISO 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO 21218, *Intelligent transport systems — Communications access for land mobiles (CALM) — Medium service access points*

ANSI/TIA-136-A, *Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems*

TIA/EIA/IS-54-C, *Cellular System Dual-Mode Mobile Station-Base Station Compatibility Standard*

3GPP/3GPP2, *3GPP/3GPP2 Standards as they relate to 2G/2.5G*

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4 Terms and definitions

For the purposes of this document, the terms and definitons given in ISO 21217 apply.

5 Abbreviated terms

Abbreviated terms used in this document are listed below. Reference should also be made to ISO 14817.

CALM	communications access for land mobiles
CDMA	code division multiple access
Cdma2000	code division multiple access 2000
DSRC	dedicated short range communication
GSM	global system for mobile communications
MMAE	media management adaption entity
TDD	time division duplex
TIA	telecommunications industry association
UMTS	universal mobile telecommunications system
ULTRA	UMTS terrestrial radio access
W-CDMA	wideband code division multiple access
3GPP	third generation partnership project
3GPP2	third generation partnership project two

6 Requirements

6.1 Adoption of other standards and internationally adopted practices

Equipment and systems complying to this International Standard shall operate in the environment of, and to the parameters defined for, 3G systems in one of the following sets of Standards and Internationally adopted practices:

— 3GPP Active specifications

— 3GPP2 Active specifications

— GSM-MAP

— W-CDMA

— cdma2000

— ANSI/TIA-41

— ULTRA-TDD

— ANSI/TIA-136.

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The equipment and systems shall operate within the limits and parameters defined in regional and national regulations.

6.2 Non packet-switching cellular networks

Non packet-switched cellular networks shall not be used for CALM communication sessions, except to transmit non time-critical emergency messages from the vehicle to predetermined numbers or assistance centres.

NOTE "Non time critical" in this context does not imply that it is not important to transmit the message as quickly as possible, but implies that the time taken to establish communication with the target number is non time critical and can follow predetermined dial up protocols according to normal dialling procedures.

6.3 CALM architecture

Equipment and systems complying to this International Standard shall operate in the environment of, and to the parameters defined within, ISO 21217.

6.4 CALM networking protocols

Equipment and systems complying to this International Standard shall operate in the environment of, and to the parameters defined within, ISO 21210.

6.5 CALM service access points

Equipment and systems complying to this International Standard shall operate in the environment of, and to the parameters defined within, ISO 21218.

6.6 CALM interface manager

Equipment and systems complying to this International Standard shall operate in the environment of, and to the parameters defined within, ISO 24102.

6.7 CALM using public wireless networks

Equipment and systems complying to this International Standard shall operate in the environment of, and to the parameters defined within, ISO 25111.

6.8 Establishment of a medium specific session

6.8.1 "User Controlled" sessions

Equipment and systems complying to this International Standard shall utilise procedures determined in ISO 25111, 6.1.3.

6.8.2 Establishment and termination of a "Continuous" session

Equipment and systems complying to this International Standard shall utilise procedures determined in ISO 25111, 6.1.4.

6.8.3 Establishment and termination of a "Time Controlled" session

Equipment and systems complying to this International Standard shall utilise procedures determined in ISO 25111, 6.1.5.

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6.8.4 Establishment and termination of a “User Controlled” session

Equipment and systems complying to this International Standard shall utilise procedures determined in ISO 25111, 6.1.6.

6.9 Interface medium management

Shall be conducted in accordance with the specifications of ISO 25111, 6.5 to 6.7.

7 Medium access control (MAC)

Shall be conducted in accordance within the specifications of ISO 25111, Clause 7.

7.1 CALM 3G cellular communications MMAE service primitives

CALM compliant 3G cellular communications MMAE shall support following service primitives:

- MMAE-SetParam.request
  int interfaceId,
  uchar paramNumber, // 128
  uchar paramValue; // 1: connect, 2: disconnect

- MMAE-SetParam.confirm
  int interfaceId, uchar paramNumber, uchar paramValue, uchar result;

- MMAE-GetParam.request
  int interfaceId, uchar paramNumber;

- MMAE-GetParam.confirm
  int interfaceId, uchar paramNumber, uchar ifStatus, struct ifChar, uchar result;

- MMAE-Notify.indication
  int interfaceId
  uchar status; // 1: disconnected, 2: connected

7.1.1 CALM Session connection

The sequence of session initiation shall be as determined in 6.8.

In order to establish a CALM 3G cellular communications session the MMAE shall perform the following procedure:

On receipt of *MMAE-SetParam.request* (int interfaceId, uchar paramNumber = 128, uchar paramValue = 1) service, the 3G cellular communications MMAE on the mobile station side shall attempt to connect to the 3G cellular communications base station.

Subsequently, the CALM 3G cellular communications MMAE shall send to IME the 3G cellular communications *MMAE-SetParam.confirm* (ok) primitive.

The parameter “result” in *MMAE-SetParam.confirm* represents the processing result of connection request service and shall be as follows:

1: OK - 3G cellular communications MMAE shall attempt to connect
2: Fail - try later
3: System error

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7.1.2 Successful CALM session establishment

Once the 3G cellular communications connection is established, the 3G cellular communications MMAE shall notify to the interface management entity (IME) the changed status of the medium using *MMAE-Notify.indication* service.

7.1.3 CALM session disconnection

On receipt of *MMAE-SetParam.request* (int interfaceId, uchar paramNumber = 128, uchar paramValue = **2**) service, the 3G cellular communications MMAE on the mobile station side shall try to disconnect to 3G cellular communications base station. 3G cellular communications MMAE shall then send to IME the *MMAE-SetParam.confirm* primitive.

The parameter "result" in *MMAE-SetParam.confirm* represents the processing result of connection request service:

1: OK - 3G cellular communications MMAE has completed disconnection
2: Fail - try later
3: System error

And on receipt of *MMAE-SetParam.request* (int interfaceId, uchar paramNumber = 128, uchar paramValue = 1) service, the 3G cellular communications MMAE on the mobile station side shall attempt to connect to the 3G cellular communications base station.

7.1.4 Change of 3G cellular communications connection state

If the 3G cellular communications connection state changes during the session, the 3G cellular communications MMAE in the mobile station shall immediately notify this to the IME using *MMAE-Notify.indication* primitive.

7.1.5 Retrieval of the medium status

The IME can check the status of a specific medium. On receipt of *MMAE-GetParam.request* (int interfaceId, uchar paramNumber), the 3G cellular communications MMAE on the mobile station side shall inquire to MAC on the mobile station the status of the medium.

- MMAE-GetParam.req
  - int interfaceId;
  - uchar paramNumber
    - 1: Request for interface status
    - 2: Request for interface characteristics

- MMAE-GetParam.confirm
  - int interfaceId;
  - uchar paramNumber
  - uchar ifStatus
  - struct ifChar
  - uchar result

The parameter "result" in MMAE-GetParam.confirm represents the processing result of request service.

1: OK - successful reply
2: Error - no such medium
3: Unknown error.

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7.2 CALM 3G cellular communications MMAE functionality

The function of the CALM 3G cellular communications manager is to support and provide the functionality offered by the management SAP and is defined in ISO 24102.

7.2.1 3G Cellular communications specific connection aspects

The sequence of session initiation shall be as determined in 6.8.

Beyond the CALM MMAE requirements defined in 7.1, it is necessary to follow the connection establishment procedures defined in 3G cellular communications, and the procedures defined in the relevant 3G cellular communications protocols shall be followed.

Once the 3G cellular communications connection procedure is successfully completed, the medium connection is established.

7.2.2 3G cellular communications session disconnection

In accordance with the relevant 3G cellular communications standards, the 3G cellular communications connection can be closed through any one of the methods defined in the 3G Standards.

Once the appropriate procedures defined in 3G cellular communications standards to close the connection are completed, the 3G cellular communications MMAE shall be notified through *MMAE-Notify.indication* service to IME.

8 Test and conformance requirements

As defined in ISO 25111, Clause 10.

9 Marking, labelling and packaging

All transmitting equipment shall be clearly and permanently marked stating with which national regulations it complies.

All transmitting equipment shall be provided with clear instructions as to tuning and adjustment to meet the regulations of the country in which it is to be used.

All transmitting equipment shall be clearly and permanently marked to indicate which CALM interfaces it supports.

All transmitting equipment shall be clearly and permanently marked to instruct that it shall only be used when adjusted to meet national radio regulations pertaining to the frequencies at which it operates.

10 Declaration of patents and intellectual property

Patents and intellectual property used in 3G cellular communications may be obtained by reference to the Standards and recommendations provided in 6.8, and their subsidiary and associated Standards.

Any patents and intellectual property associated with CALM Architecture can be found in ISO 21217.

Any patents and intellectual property associated with CALM networking protocols can be found in ISO 21210.

Any patents and intellectual property associated with CALM lower layer SAPs can be found in ISO 21218.

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