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SERIES F: NON-TELEPHONE TELECOMMUNICATION
SERVICES

Mobile service – Mobile services and multideestination
satellite services

**Service features and operational provisions in
IMT-2000**

ITU-T Recommendation F.116

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION F.116

SERVICE FEATURES AND OPERATIONAL PROVISIONS IN IMT-2000

Summary

IMT-2000 systems are third generation mobile systems, which may be terrestrial, or satellite-based and may be characterized as networks in terms of service provision. This Recommendation describes service features and operational provisions that apply to IMT-2000 systems. It defines a set of service features and capabilities to standardize service presentation and to facilitate global mobility for users across network boundaries. Some of these services features and capabilities are essential whilst others are optional.

Source

ITU-T Recommendation F.116 was prepared by ITU-T Study Group 2 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 13 March 2000.

FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Introduction

IMT-2000 are third generation mobile systems, which may be terrestrial or satellite-based. These systems may be characterized as networks in terms of service provision. They may be utilized as stand-alone mobile systems or as part of the fixed network.

Recommendation F.116

SERVICE FEATURES AND OPERATIONAL PROVISIONS IN IMT-2000

(Geneva, 2000)

1 Introduction

IMT-2000 are third generation mobile systems, which may be terrestrial or satellite-based. These systems may be characterized as networks in terms of service provision. They may be utilized as stand-alone mobile systems or as part of the fixed network.

2 Scope

This Recommendation describes service features and operational provisions that apply to IMT-2000 systems. It defines a set of service features and capabilities, some of which are essential and some optional. The intent is to standardize service presentation and to facilitate global mobility for users across network boundaries.

3 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation F.111 (1991), *Principles of service for mobile systems*.
- ITU-T Recommendation F.115 (1995), *Service objectives and principles for future public land mobile telecommunication systems*.
- ITU-T Recommendation F.700 (2000), *Framework Recommendation for audiovisual/multimedia services*.
- ITU-T Recommendation Q.1701 (1999), *Framework for IMT-2000 networks*.
- Recommendation ITU-R M.816-1 (1997), *Framework for services supported on International Mobile Telecommunications 2000 (IMT-2000)*.
- Recommendation ITU-R M.1078 (1993), *Security principles for International Mobile Telecommunications 2000 (IMT-2000)*.
- Recommendation ITU-R M.1223 (1997), *Evaluation of security mechanisms for IMT-2000*.

4 Terminology

This Recommendation defines the following terms:

4.1 mobile terminal: For the purpose of this Recommendation, this term includes both the radiocommunication equipment, specific service equipment (e.g. telephone (handset), fax machine) and user identity module (UIM). Several types of terminal equipment (e.g. ISDN TE) may be connected to a mobile terminal.

4.2 User Identity Module (UIM): A standard device or functionality providing secure procedures in support of user or terminal registration, authentication, and privacy for wireless access to IMT-2000. It may also contain application data to be used to facilitate telecommunication services and other services (e.g. UPT, banking).

4.3 virtual home environment: Virtual home environment (VHE) is a capability whereby a user is offered the same service experience in a visited network as in his home network.

The degree to which the VHE matches the actual home environment may, for example, be subject to the degree of cooperation between the visited and home network, their relative technical capabilities and the compatibility of the user terminal.

5 Mobility concept

5.1 Terminal mobility

The ability of the terminal to access telecommunication services from different locations while in motion and the capability of the network to identify and locate that terminal.

NOTE – The term "motion" includes the stationary state. This mobility aspect does not preclude the concept of fixed terminals participating in IMT-2000.

5.2 Standard terminal equipment portability

The ability to connect terminal equipment to IMT-2000 mobile terminals.

5.3 IMT-2000 user mobility

IMT-2000 user mobility is a feature which enables an IMT-2000 user to transfer his/her identity between IMT-2000 mobile terminals.

The IMT-2000 user mobility affords the IMT-2000 user, with the application of a user identity module (e.g. "smart card"), to make an IMT-2000 mobile terminal his/her own mobile terminal. In this manner, the IMT-2000 user can access telecommunication services specified in their service profile with any IMT-2000 mobile terminal.

6 Support of flexible service provision

In IMT-2000, services should be offered in a flexible way so that the preferences of each user can be fulfilled but without unduly constraining interoperability of, and roaming between, networks. For example, the user might be offered a choice of language in which to receive network prompts and announcements. The concept of Virtual Home Environment (VHE) has been proposed as a means of facilitating such an approach.

When VHE is applied, depending on appropriate business arrangements and agreements, the following options exist:

- the service profile of a user and the MMI (Man Machine Interface) which he is accustomed to are recorded, so that they can be transferred electronically from the home network to the visited network;
- the service profile of a user and/or the MMI which he is accustomed to are partially stored in the UIM and the remaining information stored in the appropriate databases in the home network;
- the service profile of a user and the MMI which he is accustomed to are stored completely in the UIM.

For users who roam from their home network, each visited network can provide the same service-related functions in the same way as the home network, provided sufficient information has been supplied by the home network.

7 Universal bearer capability handling

IMT-2000 systems should support services based on digital transmission in an efficient, economical and user-friendly way. The service requester should have maximum freedom in communicating the characteristics of the requested service to the network. These characteristics might include a combination of service types and their quality of service. The network should try to fulfill the requirement or propose a reasonable alternative to the requester.

The universal bearer services should allow for the emulation of, and interworking with, existing second generation services, e.g. 3.1 kHz audio UDI, Multicast, Group Broadcast, Voice Broadcast, Groupcall.

The following service types may be provided using ITU defined protocols or using IETF (Internet Engineering Task Force) defined protocols (IP). In the specific case of IP, both static and dynamic IP-based addressing capabilities may be used to provide associated mobility support for services.

Multiple concurrent session controls may also be provided as a service provider option to avoid routing ambiguities.

7.1 Data service types

The data service types supported by IMT-2000 are classified as follows:

Communication configurations

- PTP: Point-to-point service.
- PTM-B: Point-to-multipoint broadcast service.
- PTM-M: Point-to-multipoint multicast service.
- MTM: Multipoint-to-multipoint (e.g. needed for multimedia services with different sources of content).

Area selection

- geographical area selection;
- address domain selection;
- multicast group selection;
- static and dynamic addressing in IP.

Communication modes for network services

- CLNS: Connectionless network service;
- CONS: Connection oriented network service;
- via ITU protocols or via IETF protocols.

Timing relationship

- timing relationship between source and destination required;
- timing relationship between source and destination not required.

Bit rate

- constant bit rate;
- variable bit rate;
- asymmetry.

7.2 Quality of service categories

The quality of service that a user can request is described by categories such as:

- Best effort

or:

- QoS guaranteed with parameters such as:
 - bit rate;
 - throughput;
 - delay characteristics;
 - Maximum Bit Error Rate.

7.3 Example combinations

Depending on the attributes, Timing Relationship, Bit rate and Communication mode, different bearer classes can be distinguished, which can occur within different communication configurations and area selections. They are further qualified by the set of QoS parameters.

8 Support of multimedia services in IMT-2000

Multimedia services combine two or more media into a single integrated service. From the user's point of view, a multimedia telecommunication service is the combination of IMT-2000 telecommunication capabilities required to support a particular multimedia application. From the IMT-2000 provider's point of view, a multimedia telecommunication service is a combination or set of combinations of two or more media components (e.g. audio, video, graphics, etc.).

Examples of IMT-2000 multimedia services which could be supported by one or several multimedia communication tasks are:

- mobility services (specifically related to the mobility of the user, like location service);
- conference services (providing bidirectional and synchronized real-time transfer of voice and possibly moving pictures);
- conversation services (allowing bidirectional dialogue communication with real-time end-to-end information transfer);
- distribution services (providing continuous flow of information from a central source);
- retrieval services (allowing to retrieve information from one source at a time);
- collection services (allowing to retrieve information from several sources in parallel);
- message services (offering user-to-user communications with store-and-forward capabilities).

9 IMT-2000 service capabilities

9.1 Privacy and fraud prevention

Security mechanisms for the protection of the IMT-2000 user, service provider and network operator should provide for the following features in order to guarantee a maximum of privacy and fraud prevention, that are at least as good as in second generation wireless systems.

The special security issues that arise from user/terminal mobility and inter-PLMN roaming shall be considered:

- confidentiality of user messages;
- privacy of user/subscriber related data;
- privacy of billing data;
- authentication of user to UIM, UIM to the network, network to UIM, service provider to network operator, visited network to home network, etc.;
- event reporting and event limitation.

The features above should be fulfilled in a way that is transparent to the user or is at least user-friendly. The impact on the quality of service in normal operation should be kept to a minimum.

Service-related security features shall operate when roaming.

The home network is informed if the visited network cannot provide the security functions deemed essential by the home network operator, who shall then be enabled to take the appropriate action and assure the integrity of the service.

Some security features could be an integral part of the services and should be defined by the service provider.

For further details on security features and security mechanisms for IMT-2000, refer to Recommendations ITU-R M.1078 and M.1223.

9.2 Emergency call support service

Any IMT-2000 mobile terminal should be allowed to make a call attempt to an emergency call centre.

The emergency call centre should be able to infer that the call was initiated by a mobile terminal (e.g. based on trunk group). The current location of the mobile terminal, if available, is to be supplied to the emergency call centre. Upon answering the call, the emergency call centre shall be able to communicate with the caller over a normal voice connection. After establishment of the call with the emergency call centre, the caller may allow a party or parties previously put on "hold" to join the conversation. Release occurs when either the caller or the emergency call centre disconnects. The emergency call centre should be supplied with sufficient information to enable it to re-establish the call to the caller after the emergency call is released.

The emergency call concept is applicable to voice and Telecommunications Device for the Deaf/Text Telephony (TDD/TTY).

National and/or service provider options include:

- a) the concept of access for emergency call attempts to be given preferential or priority access to the scarce radio resources compared with normal call attempts;
- b) the facility to permit call attempts to an emergency call centre to be subjected to a reduced level of authentication and validation. For example, a call may be made without a UIM in the terminal.

9.3 Man-Machine Interface (MMI) functions

MMI plays a role of the user's terminal access, network access, call setup, and service control. It should be possible for the user to customize certain aspects of the MMI. The presentation of a familiar MMI to the user should form a central part of the Virtual Home Environment (VHE). The service provider may be able to offer tailored MMI solutions using VHE. The MMI should meet the requirements to support the VHE to allow seamless service provision even across different types of networks and access terminals. This Recommendation is not intended to provide detailed MMI specifications, although it is desirable for the user to be offered a friendly MMI, integrating functions provided by the terminal manufacturer with those requested by the VHE.

9.4 User registration

User registration is a feature by which a user associates himself and his service profile with the terminal for the purpose of accessing telecommunication services (e.g. receiving incoming and originate outgoing calls) and by which a network becomes aware of the existence and location of a terminal and its associated user(s).

In order for an IMT-2000 user to be registered on an IMT-2000 terminal, a UIM associated with the user has to be physically present in the terminal.

User authentication should be executed at each user registration. A user may explicitly deregister.

IMT-2000 networks should provide a capability to support UPT and therefore UPT user registration.

9.5 Multiple profiles/subscriptions

It shall be possible for a user to obtain certain services from one service provider and some other services from another service provider using a single UIM. Where multiple subscriptions on a single UIM are in use the following principles shall apply:

- if there are several service providers subscriptions on a single UIM, then different numbers are to be used for each service provider, i.e. shared numbering shall not be used;
- for outgoing calls, the user shall be able to select which service provider to use on a per call basis or on a subscription basis;
- it shall be possible to have multiple subscriptions active simultaneously;
- there is a requirement for a terminal supported by one network operator to be able to have users from different service providers associated with that terminal. Such a capability infers that the service provider of each associated user will have an agreement with the service provider supporting that terminal.

9.6 IMT-2000 service profile management

9.6.1 IMT-2000 profile interrogation

This feature enables a user to interrogate the current status of their service profile (e.g. for location information, availability of services, charging information, etc.).

Some data included in the profile is restricted from view of the user. User authentication/validation security procedures should be executed at each profile interrogation.

9.6.2 IMT-2000 profile modification

This feature enables a user to modify their current service profile (e.g. for availability of services, changing of password, etc.).

Some data included in the profile is restricted from the view of the user. User authentication/validation security procedures should be executed at each profile interrogation.

9.6.3 IMT-2000 profile portability

The concept of VHE in IMT-2000 requires that the service profile of a user is used when roaming outside the home network. Technical or business constraints or other reasons may limit its full application.

9.7 Roaming capability

IMT-2000 networks may provide VHE support to facilitate roaming outside the home network in an environment of flexible service provision.

9.8 Addressing capabilities

IMT-2000 should be able to support the traditional addressing mechanisms that exist in existing networks, e.g. E.164 telephone number, X.121 address on packet data networks or X.400 or IP address or name for electronic mail. IMT-2000 should also support a more integrated approach, where multimedia calls can be set up without having to use all these mechanisms together.

Therefore, there is a general service requirement that the signalling capability of IMT-2000 systems should support the use of numeric, alpha and alphanumeric naming schemes.

9.9 Over-the-Air services

9.9.1 Over-the-Air service provisioning

This is a feature which allows a subscriber to IMT-2000 to negotiate an initial subscription with a service provider and subsequently amend that subscription using automatic procedures over the air. (The term "automatic procedures" is intended to convey the fact that no human intervention is required on the part of the service provider.)

9.9.2 Over-the-Air profile administration

This is a feature, which enables a service provider to automatically update the user profile data as required. For example, updating the system selection preference list for use when the user is roaming.

9.10 Priority access

As a service provider option and subject to national requirements it should be possible to create different classes of service to enable users to be offered Priority Access and Assignment. This feature functions when no radio channels are available. Users are placed in a queuing system until radio channels are available and then assigned channels on a first come first served basis subject to their class of service priority. Whilst in the queue awaiting channel assignment, a user is considered to be in the busy condition.

9.11 Services based on location

9.11.1 Position determination

Location allows an IMT-2000 user's position to be determined. Position determination may be initiated by the user, the network, or an external party (e.g. an Emergency Centre). Position determination may be subject to various restrictions based on capability, security, service profiles, etc.

9.11.2 Emergency calls

For the specific case of emergency calls, this capability is needed to identify the location of an IMT-2000 terminal from which an emergency call is being placed to within the limits specified by the appropriate national authority.

NOTE – In the United States of America, for example, this is to within a radius of 125 metres in 67 per cent of all cases or better.

The implementation of location services by satellite-based systems is not covered by this Recommendation.

9.11.3 Location registration

Services based on location registration will offer subscribers the opportunity to tailor their set of active services according to their current serving location. For example, there may be a specific set of active services for the residential location and a separate set of active services for the business location.

9.12 Identification services

For reasons of public safety and service, it should be possible to make available within the network and in some cases to an end user, IMT-2000 user parameters such as user identity, network address and location information.

For example, for emergency calls, the emergency call-handling centre may need all of these IMT-2000 user parameters to be able to:

- identify a calling party;
- re-establish a terminated call to a calling party;
- pass calling party location information, to an emergency service.

These IMT-2000 user parameters should be generated at the calling/originating end of the network, and be available for delivery as required.

Public safety and service needs may also require the same information for the called IMT-2000 party, i.e. the called IMT-2000 user identity, the IMT-2000 network address of the call termination, and the location information for the call recipient. These IMT-2000 user parameters should be generated at the called/terminating end of the network and be available for delivery as required.

9.13 Teleservice support capability

New teleservices as well as those that are supported in existing telecommunication systems should be supported by IMT-2000 (e.g. messaging, speech, facsimile, paging).

9.14 Supplementary service support capability

New and existing supplementary services should be supported by IMT-2000. Examples of such supplementary services are as follows:

- a) Identification Supplementary Services (e.g. Abbreviated Dialling, Calling Line Identification Presentation/Restriction, Connected Line Identification Presentation/Restriction Malicious Call Identification, Universal Access Number, Multiple Subscriber Number, Calling Name Identification Presentation/Restriction, Calling Number Identification Presentation/Restriction).
- b) Call Offering Supplementary Services (e.g. Call Distribution, Call Deflection, Call Forwarding Unconditional/Busy/No Reply/Not Reachable/default, Call Transfer, Destination Call Routing, Follow-Me Diversion, Mobile Access Hunting, Universal Access Number, Flexible Alerting).
- c) Call Completion Supplementary Services (e.g. Call Hold, Call Waiting, Completion of Calls to Busy Subscriber).
- d) Multiparty Supplementary Services (e.g. Conference Calling, 3-way calling).

- e) Community of Interest Supplementary Services (e.g. Closed User Group, Virtual Private Network).
- f) Charging Supplementary Services (Charge Card Calling, Advice of Charge, Credit Card Calling).
- g) Additional Information Transfer Supplementary Services (User-to-user signalling, Message Waiting Notification).
- h) Call Restriction Supplementary Services (e.g. Selective barring or screening of Incoming/outgoing Calls, Password and PIN restrictions).

9.15 Voice Recognition support capability

Voice Recognition will enable a user to control features and supplementary services using spoken commands: (e.g. call origination, activation and de-activation of features, registration operations, user identification, validation and authentication, creation of short text messages and access to the short message service).

9.16 Preferred language

This feature enables the subscriber to specify the language for network services. Network services, which could be offered in the subscriber's preferred language, include:

- recorded announcements;
- directory assistance;
- operator services;
- emergency services;
- "Help" lines;
- Message Waiting Notification;
- CLIP number not available;
- CLIP number restricted.

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