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**F.115**

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**OPERATIONS AND QUALITY OF SERVICE  
MOBILE SERVICE**

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**SERVICE OBJECTIVES AND PRINCIPLES  
FOR FUTURE PUBLIC LAND MOBILE  
TELECOMMUNICATION SYSTEMS**

**ITU-T Recommendation F.115**

(Previously "CCITT Recommendation")

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## FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

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## 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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## **SUMMARY**

The introduction of third generation digital mobile systems known as FPLMTS, which are scheduled to start service around the year 2000 subject to market considerations, will result in mobile communication becoming available to mass markets for the purpose of global communication. This Recommendation defines the service objectives and principles for FPLMTS which will enable the development of FPLMTS into the future. These objectives and principles are produced to aid the intercommunication of services provided over both FPLMTS and the fixed telecommunication network and to provide guidance for further development of FPLMTS.

**SERVICE OBJECTIVES AND PRINCIPLES FOR FUTURE PUBLIC LAND MOBILE  
TELECOMMUNICATION SYSTEMS**

*(Geneva, 1994)*

## **1 Introduction**

**1.1** Future Public Land Mobile Telecommunication Systems (FPLMTS) will provide access, by means of one or more radio links, to a range of telecommunication services which are specific to mobile users and to telecommunication services supported by the fixed telecommunication network. FPLMTS are third generation mobile systems which may be terrestrial or satellite based and are scheduled to start service around the year 2000 subject to market considerations. They may be utilized as stand alone mobile systems or as part of the fixed network. The frequency bands 1885-2025 and 2110-2200 MHz have been identified by Radio Regulation WARC-92 (Footnote 746A) for use on a worldwide basis for implementation of FPLMTS. The high level description of FPLMTS and the framework of services are covered in ITU-R Recommendations M.687-1 and M.816 respectively.

**1.2** Key features of FPLMTS are expected to be:

- applicability to land mobile, aeronautical mobile, and maritime mobile environments;
- incorporation of a variety of systems;
- high degree of commonality of design;
- compatibility of services within FPLMTS and with the fixed network;
- quality of service comparable to that of the fixed network;
- security of communications comparable to that of the fixed network;
- worldwide intercommunication and interoperability;
- use of a lightweight, pocket-sized terminal.

**1.3** FPLMTS services may be divided into those which are specific to FPLMTS and those which are common to the fixed network.

## **2 Scope**

The purpose of this Recommendation is to identify and define the service objectives and principles for the Future Public Land Mobile Telecommunication Systems (FPLMTS) and to provide guidance for the further development of FPLMTS. This Recommendation is part of a family of Recommendations dealing with FPLMTS which are defined in clause 3.

## **3 References**

FPLMTS are defined by a set of related (FPLMTS and non-FPLMTS specific) Recommendations. Recommendations of general interest are listed in this clause while Recommendations of a more specific nature are referenced with the applicable text.

### **3.1 CCITT and ITU-T Recommendations**

- CCITT Recommendation E.164 (1991), *Numbering plan for the ISDN era*.
- ITU-T Recommendation E.750 (1993), *Introduction to E.750-Series of Recommendations on traffic engineering aspects of mobile networks*.
- ITU-T Recommendation E.751 (1993), *Reference connections for traffic engineering of land mobile networks*.

- ITU-T Recommendation E.770 (1993), *Land mobile and fixed network interconnection traffic grade of service concept*.
- ITU-T Recommendation E.771 (1993), *Network grade of service parameters and target values for circuit-switched land mobile services*.
- CCITT Recommendation F.111 (1991), *Principles of service for mobile systems*.
- ITU-T Recommendation F.850 (1993), *Principles of Universal Personal Telecommunication (UPT)*.
- ITU-T Recommendation F.851 (1995), *Universal Personal Telecommunication (UPT) – Service description (service set one)*.
- ITU-T Recommendation G.114 (1993), *One-way transmission time*.
- ITU-T Recommendation G.174 (1994), *Transmission performance objectives for terrestrial digital wireless systems using portable terminals to access the PSTN*.
- ITU-T Recommendation I.114 (1993), *Vocabulary of terms for Universal Personal Telecommunication*.

### 3.2 ITU-R Recommendations

Recommendation ITU-R M.687-1 (Future Public Land Mobile Telecommunication Systems) is the core document for the definition of FPLMTS.

- ITU-R Recommendation M.687-1, *Future Public Land Mobile Telecommunication Systems (FPLMTS)*.
- ITU-R Recommendation M.816, *Framework for services supported on Future Public Land Mobile Telecommunication Systems (FPLMTS)*.
- ITU-R Recommendation M.817, *FPLMTS network architectures*.
- ITU-R Recommendation M.818, *Satellite operation within FPLMTS*.
- ITU-R Recommendation M.819-1, *FPLMTS for developing countries*.
- ITU-R Recommendation M.[Doc. 8/154(+ Corr.1)], *Security principles for FPLMTS*.
- ITU-R Recommendation M.[Doc. 8/155], *Speech and voiceband data performance requirements for FPLMTS*.
- Recommendation FPLMTS.TMLG, *Vocabulary of terms for FPLMTS*.
- Recommendation FPLMTS.RSEL, *Procedures for selection of radio transmission technologies for FPLMTS*.
- Recommendation FPLMTS.NMG, *Framework of FPLMTS network management*.
- ITU-R Recommendation M.1034, *Requirements for the radio interface(s) for FPLMTS*.
- ITU-R Recommendation M.1035, *Framework for the radio interface(s) and radio subsystem functionality for FPLMTS*.
- ITU-R Recommendation M.1036, *Spectrum considerations for implementation of Future Public Land Mobile Telecommunication Systems (FPLMTS) in the bands 1885-2025 MHz and 2110-2200 MHz*.

NOTE – ITU-R Recommendation numbers will be checked and updated prior to the printing of this Recommendation.

## 4 Definitions

For the purposes of this Recommendation, the following specifications apply:

**4.1 Future Public Land Mobile Telecommunication Systems (FPLMTS):** FPLMTS are third generation mobile systems, which are scheduled to start service around the year 2000 subject to market considerations. They may be utilized as stand alone mobile systems or as part of the fixed network. They are systems which will provide telecommunication services to mobile or stationary users by means of one or more radio links. The frequency bands 1885-2025 and 2110-2200 MHz have been identified by Radio Regulation WARC-92 (Footnote 746A) for use on a

worldwide basis for implementation of FPLMTS. This mobility will be unrestricted in terms of location within the radio coverage area. FPLMTS will extend the telecommunication services of the fixed network to these users over wide geographic areas, subject to constraints imposed by spectrum allocation and radio propagation. In addition, FPLMTS will support a range of services particular to mobile radio systems (see Recommendation ITU-R M.687-1). Provision of services may be limited by the capabilities of the involved terminals and network.

**4.2 terminal mobility:** The ability of the terminal to access telecommunication services from different locations and while in motion, and the capability of the network to identify and locate that terminal (see Recommendation I.114).

**4.3 FPLMTS user mobility:** FPLMTS user mobility is a feature which enables a FPLMTS user to transfer his/her identity between FPLMTS mobile terminals.

**4.4 Universal Personal Telecommunication (UPT):** UPT enables access to telecommunication services while allowing personal mobility. It enables each UPT user to participate in a user-defined set of subscribed services and to initiate and receive calls on the basis of a personal, network-transparent, UPT number across multiple networks at any terminal, fixed or mobile, irrespective of geographic location, limited only by terminal and network capabilities and restrictions imposed by the network operator (see Recommendation F.850).

**4.5 privacy:** The right of individuals to control or influence what information related to them may be collected or stored and by whom and to whom that information may be disclosed.

**4.6 mobile terminal:** For the purposes of this Recommendation this term includes both the radiocommunication equipment and specific telecommunication service equipment, e.g. telephone (handset) and fax machine.

## 5 Service principles

**5.1** FPLMTS are intended to provide users with services which will be available globally. The provision of these services may involve cooperation between a number of operating entities (e.g. service providers, mobile network operators and fixed network operators).

**5.2** At any geographical location there may be more than one network operator or service provider.

**5.3** As an aid to users, it is desirable that any service offered should have a similarity of access interaction and operational procedures on a global basis.

**5.4** FPLMTS will integrate a terrestrial component and a satellite-based component (see Recommendations ITU-R M.687-1 and M.818). Satellite based services may however have some properties different from those provided terrestrially.

**5.5** To satisfy the need for call detail recording between different countries and service providers, there may be a requirement for FPLMTS to be able to include, in call records, the geographical location of the calling and called parties. In order to maintain the privacy of the FPLMTS user as the called party, the geographic location of the FPLMTS user should not appear on any bill or statement submitted to any party other than the FPLMTS subscriber or appropriate service provider. See 7.1.5.

**5.6** Interworking of FPLMTS with the fixed network should be in accordance with Recommendation F.111, Principles of service for mobile systems.

**5.7** Terminal mobility which enables a user to be in motion during all aspects of a call give rise to specific service requirements whether the service being used is a FPLMTS specific service or one of the services of the fixed networks. It will require authentication and validation procedures to verify the right of the user to access the service. The recording of call details may capture an indication of user location, network access point and called party location, in addition to other billing, charging and accounting information. See 5.5 concerning FPLMTS user privacy.

## **6 Overall service objectives**

- 6.1** To provide FPLMTS users with continuous availability of their subscribed telecommunication services regardless of their roaming situation, geographic location, or network access, on a global basis but subject to the terms and conditions under which the visited network offers service to roaming users.
- 6.2** To provide to FPLMTS users, where feasible, services which are identical, or similar, to those offered by the fixed telecommunication networks. (Refer to 7.1/F.111.)
- 6.3** To facilitate introduction of new customised services, in particular for multimedia applications, which allow the use of modular reusable service components in accordance with ITU-T Recommendations.
- 6.4** To provide telecommunications of high quality that is comparable to that of the fixed network.
- 6.5** To accommodate a variety of mobile terminals ranging from those which are small enough to be carried to those which are mounted in vehicles or otherwise used in conjunction with a mobile network.
- 6.6** To provide commonality of service presentation and operation (the means by which the service and the user interact) among FPLMTS.
- 6.7** To provide for forward compatibility with developing telecommunication services.
- 6.8** To support a range of telecommunication services in various configurations such as point-to-point, multipoint and point-to-multipoint.
- 6.9** To provide for backward compatibility with services provided by existing mobile systems to the extent practicable.

## **7 Service requirements**

### **7.1 General service requirements**

- 7.1.1** Provide for service availability such that the users of one service provider may request service in real time from another service provider without the need for prior arrangements or agreements on both an international and national basis, where national regulations and implementations permit.
- 7.1.2** Provide for the secure and timely communication of billing, charging and accounting information.
- 7.1.3** Provide for the secure authentication and validation of mobile terminals and users.
- 7.1.4** Provide for appropriate levels of security for telecommunication services to ensure that the user perceives the security of the communication as being comparable to that of the fixed network.
- 7.1.5** Provide for optional location privacy at the request of the user.
- 7.1.6** Provide for the secure and accurate creation of appropriate data records to facilitate charging, billing, accounting and network management functions in accordance with the relevant D- and M-Series Recommendations.
- 7.1.7** Provide a capability for UPT support (i.e. personal mobility aspects, see Recommendation F.851).
- 7.1.8** Provide for FPLMTS terminal mobility and FPLMTS user mobility both within and among FPLMTS.

### **7.2 General access requirements**

- 7.2.1** Features and facilities of FPLMTS should, to the extent feasible, enable mobile users of one service provider to access and utilize the system of a service provider in another country, on an automatic basis when visiting that country. Such international, automatic roaming would be subject to national regulation, international agreement and any limitations imposed by service providers.



**7.2.2** In a similar manner to international operation, access to FPLMTS should be available in the maritime and aeronautical environments to the extent permitted by national and international regulatory authorities, the characteristics of the system used and any limitations imposed by service providers.

**7.2.3** Access to FPLMTS satellite services should be available to the extent permitted by national and international regulatory authorities, the characteristics of the system used and any limitations imposed by service providers.

**7.2.4** The FPLMTS support of access to UPT will have the objective of maintaining UPT's common presentation functionality to users.

### **7.3 Numbering considerations**

**7.3.1** A FPLMTS user requires a number formatted in accordance with Recommendation E.164 by which he/she can be addressed by callers.

**7.3.2** FPLMTS users may participate in closed user groups utilizing non-E.164 numbers as closed user group identities.

## **8 Services supported**

### **8.1 Introduction**

The services to be supported by FPLMTS reflect the needs of users to communicate in a mobile environment.

Each FPLMTS provider will determine what services will be offered to its users. However, it is recommended that the following be offered:

- i) voice communication with other users of fixed or mobile terminals (telephone service) connected to private or public networks; and
- ii) data communications with other fixed or mobile terminals.

It should be noted that this does not prevent other services being offered.

Figure 1 illustrates the service relationships.

### **8.2 Common FPLMTS services**

The services which are applicable to the common area shown in Figure 1 are those of the fixed network. The definitions, service and operational provisions relating to these services may be found in the relevant E-, F- and I-Series Recommendations as listed in Appendix I. This list is not intended to be exclusive.

### **8.3 FPLMTS specific services**

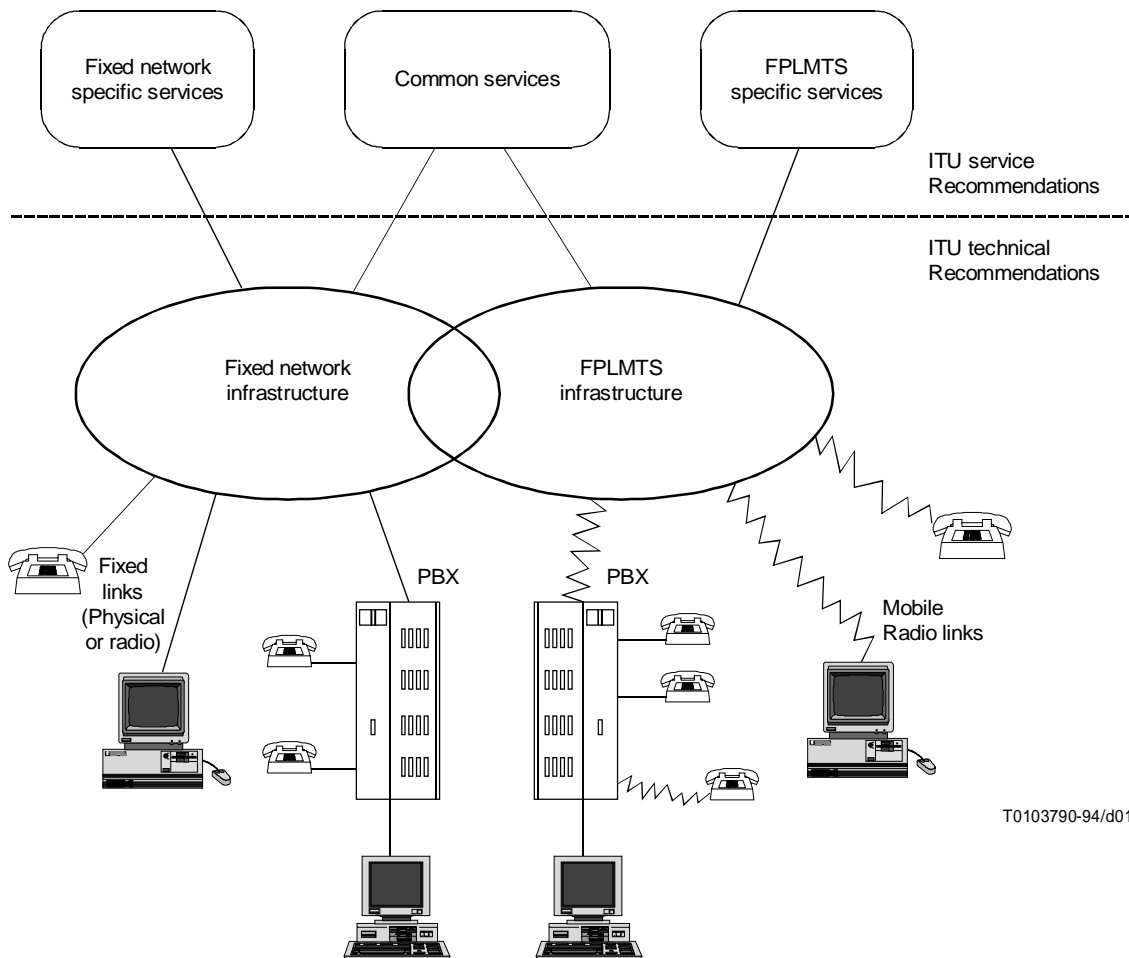
The following services are applicable to the FPLMTS specific area as shown in the diagram above. This list is not intended to be exclusive.

- Location services.
- Paging service.
- Short message services.
- Traffic and navigation services.

## **9 Quality of Service**

The Quality of Service offered by the FPLMTS should be comparable to that of the PSTN/ISDN and public data networks as far as practicable. [See ITU-R M.(Doc. 8/155), Recommendation FPLMTS.PRQ and Recommendation G.174.]

NOTE – ITU-R Recommendation numbers will be checked and updated prior to the printing of this Recommendation.



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FIGURE 1/F.115

**Conceptual model of network infrastructures and their services relationship**

## 9.1 General

Consideration will need to be given to maintaining Quality of Service during handover between cells and to any implications in relation to cell size, frequency requirements, protocols, etc.

To maintain the Quality of Service for data services, additional error control facilities for the radiocommunication path may be required (e.g. for facsimile machines).

## 9.2 Speech quality

The quality of speech services in FPLMTS should be comparable to that of the PSTN/ISDN. Speech services are sensitive to delay and this needs to be taken into consideration (see Recommendation G.114).

The quality of speech supported within FPLMTS should be nominally that recommended in the P-Series Recommendations. However, it is acknowledged that in some applications where low bit rate coding is employed, some minimal degradation of speech quality may occur.

### 9.3 Traffic engineering aspects

As per the E.700-Series Recommendations on traffic engineering of mobile networks.

## Appendix I

### Recommendations relevant to common services

(This appendix does not form an integral part of this Recommendation)

As noted in 8.2, this list is not intended to be exclusive.

- F.110 *Operational provisions for the maritime mobile service.*
- F.111 *Principles of service for mobile systems.*
- F.113 *Service provision for aeronautical passenger communications supported by mobile satellite systems.*
- F.122 *Operational procedures for the maritime satellite data transmission service.*
- F.160 *General operational provisions for the international public facsimile services.*
- F.180 *General operational provisions for the international public facsimile service between subscribers stations.*
- F.182 *Operational provisions for the international public facsimile service between subscriber stations with groups 2 and 3 facsimile machines.*
- F.184 *Operational provisions for the international public facsimile service between subscriber stations with group 4 facsimile machines.*
- F.200 *Teletex service.*
- F.300 *Videotex service.*
- F.310 *Broadband Videotex services.*
- F.600 *Service and operational principles for public data transmission services.*
- F.701 *Teleconference service.*
- F.710 *General principles for audiographic conference services.*
- F.711 *Audiographic conference teleservice for ISDN.*
- F.720 *Videotelephony services general.*
- F.721 *Videotelephony service for ISDN.*
- F.722 *Broadband videotelephony services.*
- F.730 *Videoconference service general.*
- F.732 *Broadband videoconference services.*
- F.740 *Audiovisual interactive services.*
- F.761 *Service-oriented requirements for telewriting applications.*
- F.811 *Broadband connection-oriented bearer services.*
- F.812 *Broadband connectionless data bearer service.*
- F.813 *Virtual path service for reserved and permanent communications.*
- F.821 *Broadband TV distribution services.*
- F.822 *Broadband HDTV distribution services.*
- F.850 *Principles of UPT.*
- F.851 *Universal Personal Telecommunications (UPT) service description (service set one).*

- F.400 *Message handling system and service overview.*
- F.401 *Message handling services: Naming and addressing for public message handling services.*
- F.410 *Message handling services: The public message transfer service.*
- F.415 *Message handling services: Intercommunication with public physical delivery services.*
- F.420 *Message handling services: The public interpersonal messaging service.*
- F.435 *Message handling: EDI messaging service.*
- F.440 *Message handling services: The voice messaging service.*
- F.450 *Asynchronous group communication.*
- F.500 *International public directory services.*
- F.16 *Global Virtual Network Service.*
- I.241.8 *Teleaction stage one service description.*
- E.105 *International telephone service.*
- E.116 *International telecommunications charge card service.*
- E.140 *Operator-assisted telephone service.*
- E.152 *International freephone service.*
- E.330 *User control of ISDN-supported services.*

#### **ISDN supplementary services**

- I.230 *Definition of bearer service categories.*
- I.231 *Circuit-mode bearer service categories.*
- I.232 *Packet mode bearer service categories.*
- I.240 *Teleservices supported by ISDN.*
- I.241.7 *Telephony 7 kHz teleservice.*
- I.250 *Definition of supplementary services.*
- I.251 *NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES.*
- I.251.1 *Direct-Dialling-In.*
- I.251.2 *Multiple Subscriber Number.*
- I.251.3 *Calling Line Identification Presentation.*
- I.251.4 *Calling Line Identification Restriction.*
- I.251.5 *Connected Line Identification Presentation.*
- I.251.6 *Connected Line Identification Restriction.*
- I.251.7 *Malicious Call Identification.*
- I.251.8 *Sub-addressing.*
- I.252 *CALL OFFERING SUPPLEMENTARY SERVICES.*
- I.252.1 *Call Transfer (normal).*
- I.252.2 *Call Forwarding Busy.*
- I.252.3 *Call Forwarding No Reply.*
- I.252.4 *Call Forwarding Unconditional.*
- I.252.5 *Call Deflection.*
- I.252.6 *Line Hunting.*
- I.252.7 *Call Transfer (explicit).*
- I.252.8 *Call Transfer (single step).*
- I.253 *CALL COMPLETION SUPPLEMENTARY SERVICES.*
- I.253.1 *Call Waiting.*
- I.253.2 *Call Hold.*

- I.253.3 *Completion of calls to busy subscribers.*
- I.253.4 *Completion of calls to no reply.*
- I.254 *MULTIPARTY SUPPLEMENTARY SERVICES.*
- I.254.1 *Conference Calling.*
- I.254.2 *Three-Party Service.*
- I.254.3 *Preset Conference Calling Service.*
- I.254.4 *Conference Call, Booked add-on.*
- I.254.5 *Conference Call, Meet me.*
- I.255 *COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES.*
- I.255.1 *Closed User Group.*
- I.255.2 *Support of Private Numbering Plans.*
- I.255.3 *Multi-level precedence and pre-emption service.*
- I.255.4 *Priority service.*
- I.255.5 *Outgoing call barring.*
- I.256 *CHARGING SUPPLEMENTARY SERVICES.*
- I.256.1 *Credit Card Calling.*
- I.256.2 a) *Advice of Charge: Charging information at call set-up time.*
- I.256.2 b) *Advice of Charge: Charging information during the call.*
- I.256.2 c) *Advice of Charge: Charging information at the end of the call.*
- I.256.3 *Reverse charging.*
- I.256.4 *ISDN freephone service.*
- I.257 *ADDITIONAL INFORMATION TRANSFER.*
- I.257.1 *User-to-user signalling.*

NOTE – This list will be checked and updated, if required, prior to the printing of this Recommendation.