RECOMMENDATION 816*

FRAMEWORK FOR SERVICES SUPPORTED ON FUTURE PUBLIC LAND MOBILE TELECOMMUNICATION SYSTEMS (FPLMTS)

(Question 39/8)

(1992)

1. Scope

Future Public Land Mobile Telecommunication Systems (FPLMTS) are third generation mobile systems (TGMS) which are scheduled to start service around the year 2000. They will provide access, by means of one or more radio links, to a wide range of telecommunication services supported by the fixed telecommunication networks (e.g. PSTN/ISDN), and to other services which are specific to mobile users.

A range of mobile terminal types is encompassed, linking to terrestrial or satellite based networks, and the terminals may be designed for mobile or fixed use.

Key features of FPLMTS are:

– incorporation of a variety of systems;

– high degree of commonality of design worldwide;

– compatibility of services within FPLMTS and with the fixed networks;

– high quality;

– use of a small pocket terminal worldwide.

FPLMTS are defined by a set of interdependent CCIR Recommendations of which this one on services is a member. This Recommendation forms a framework for continued development towards detailed FPLMTS service descriptions such as the proposed CCITT draft Recommendation F.115.

A phased approach is adopted for the definition of FPLMTS. In this Recommendation the services required for Phase 1 (P1) are described, and an outline of the services for Phase 2 (P2) is also given. Phase 1 includes those services supported by user bit rates up to approximately 2 Mbit/s. Phase 2 is envisaged as augmenting Phase 1 with new services, some of which may require higher bit rates.

2. Considerations

The CCIR considers that FPLMTS will operate in a complex environment which requires recognition of the following factors:

– the involvement of a number of commercial interests (such as service providers, re-sellers, network operators, value-added service suppliers, etc.);

– the possible involvement of, or the cascading of, networks which may be of different types;

– increasing technical developments and opportunities;

– the changing regulatory framework for those involved in supplying services (e.g. competition for users and customers, and deregulation in various forms by administrations);

– the needs of many users for services which are not bounded by constraints of geography or operator;

– that the mobile user of the services may be a person/persons or a machine. That these users could have different service requirements by virtue of either the desires of the user or the economics of providing for that service to the users' mode of mobility;

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* This Recommendation should be brought to the attention of the CCITT.

– that service availability will be dependant on a number of factors which could include: mobile terminal type, speed of motion, and geographic factors; for example hand portable sized/vehicle mounted terminals, indoor/outdoor, residential or business areas, urban/suburban/rural areas etc;

– that it is to be expected that the number and content of the service offerings will change with time, and will not be the same in every location;

– the increasing importance of the various types of non-voice telecommunication services;

– that mobile terminals of FPLMTS may be used to access mobile satellite systems for use on land, ships and aircraft;

– that there is a need for mobile terminals to roam between public land mobile telecommunication networks in different countries and between networks in the same country;

– that a standardized radio interface would facilitate the roaming of mobile terminals between networks;

– that users may want to be able to use the same terminal equipment and procedures as in the fixed networks to access similar telecommunications services in FPLMTS.

3. General service objectives and requirements

3.1 Structure

The service recommendations for FPLMTS are achieved in three stages. The first gives general objectives and requirements. This provides an outline description of the services offered and can be used to provide a framework within which the services are defined. These objectives are given in this section.

The second stage lists, in descriptive form, the detailed services offered on FPLMTS. These are given in § 6, 7 and 8 of this Recommendation.

Third stage descriptions involve more quantitative definitions and also involve definitions produced by non-CCIR bodies (CCITT, etc.).

The CCIR recommends that the services supported by FPLMTS be in compliance with the following general objectives and requirements:

3.2 General service objectives

– To provide a wide range of telecommunications services to mobile or stationary users by means of one or more radio links;

– to ensure that these services shall, as far as possible, be identical to those offered to users of fixed telecommunications terminals (connected to fixed telecommunication networks) and with a comparable quality of service;

– to make these services available for mobile terminals located anywhere subject only to constraints of economic provision, and to limitations of implementation timing;

– to provide for flexibility of service provision, for example, between mobile terminal categories and on a geographical or user density basis;

– to promote the flexible introduction of telecommunication services;

– to ensure that the user of the personal station (PS) when roaming between networks shall have available (provided the PS has the necessary capabilities);

  – an indication of the service availability;

  – access to voice telephony;

  – Universal Personal Telecommunication (UPT), and

  – access to a selection of data services;

– to provide for services which will depend on mobile terminal type, location, and availability from the network operator;

– to provide the capability of supporting UPT;

– to provide data communications;

– to provide a temporary or permanent substitute to fixed networks in rural or urban areas under conditions approved by the appropriate national or regional regulatory authority.

3.3 General service requirements

– To provide validation and authentication procedures to facilitate billing and accounting (see CCITT Recommendation X.509);

– to provide for additional levels of security for telecommunication services;

– to provide privacy of location of a roaming user when desired by the called or calling party.

3.4 General access requirements

– *For access to the fixed networks:* FPLMTS may be either an adjunct to or an integral part of the PSTN/ISDN. Services offered in the PSTN/ISDN should, as far as possible, be offered to FPLMTS users;

– *for international operation:* FPLMTS should allow international operation and automatic roaming of mobile users and stations to the extent practical or permitted;

– *for maritime and aeronautical:* FPLMTS should allow operation in the maritime and aeronautical environment to the extent permitted by national and international regulatory authorities;

– *for satellite systems:* FPLMTS should allow operation either directly or indirectly via satellite.

3.5 Quality of service requirements

Quality of service is the subject of a separate Recommendation which is in preparation and will give the detailed requirements.

The quality of services offered over FPLMTS should be closely comparable to the quality of the same services achieved when using the contemporary fixed networks (e.g. PSTN/ISDN) alone.

4. UPT

Universal Personal Telecommunication (UPT) is a service concept which allows a user to access any suitably equipped terminal and obtain from it a range of telecommunications services which are specific to his/her requirements. UPT provides personal mobility as opposed to terminal mobility provided by FPLMTS. UPT is to be defined in CCITT Recommendation F.851.

The CCIR recommends that FPLMTS have the objective of supporting UPT and maintaining UPT's common presentation to users. It should be noted that the details of UPT, and the implications for FPLMTS, are dependant on the work currently being performed by the CCITT on the subject.

5. Support of fixed network services

FPLMTS will interwork or be integrated with fixed networks such as PSTN, ISDN, B-ISDN and others.

5.1 PSTN

FPLMTS should support PSTN services.

5.2 ISDN

The Integrated Services Digital Network (ISDN) is a fixed network which provides digital highways, digital signalling channel(s), and associated services to users' terminals. ISDN is defined in the CCITT I-Series of Recommendations.

FPLMTS will operate in an era when ISDN will be widely available; ISDN will provide users with high quality speech and data connections and services. Since FPLMTS has the objective of matching the quality of the then contemporary fixed network, then the quality reference will be that of the ISDN. In addition, commonality of the technical elements of FPLMTS, for example, speech codecs, RF components, etc., enables cost benefits to be passed on to network operators and users.

The CCIR recommends that the design of FPLMTS be conducted such that the maximum compatibility possible is achieved with the ISDN (see Recommendation 687). However, considering spectrum limitations and efficient spectrum usage, it is recognized that the FPLMTS user may not in all cases have available the full extent and quality of ISDN services.

6. FPLMTS service categories

Three main service categories have been identified from a user's perspective which form a part of or are supported by FPLMTS:

– mobility services,

– interactive services,

– distribution services.

An example overview of service categories and their application is given in Annex 1.

6.1 Mobility services

Mobility services are those services which are directly related to mobility of the user including terminal mobility (see also UPT in § 4). A particular mobility service is the location service.

Location information can be provided to authorized users by FPLMTS or to relevant authorities in cases of emergency calls or for vehicular traffic management. In order to protect the privacy of the user, the access to location information must be restricted to specific applications authorized by the customer and the administration concerned. The location information accuracy is subject to system limitation and user requirement.

6.2 Interactive services

Interactive services for FPLMTS are closely aligned to those defined by the CCITT for fixed networks. These are separated into three categories, conversational services, messaging services, and retrieval and storage services.

– Conversational services are to provide the means for bidirectional dialogue communication with real-time end-to-end information transfer from user to user or between user and host (e.g. for data processing).

– Messaging services offer user-to-user communication between individual users via storage units with store-and-forward, mailbox and/or message handling (e.g. information editing, processing and conversion) functions.

– The retrieval and storage services can retrieve and/or store information in information centres.

6.3 Distribution services

Distribution services provide a continuous flow of information which is distributed from a central source to an unlimited number of authorized receivers connected to the network. They include broadcast services. The user may or may not be able to control the presentation and the information may be broadcast to all receivers or addressed to one or more specific receivers.

7. FPLMTS telecommunication services

The CCIR recommends that FPLMTS should support the services listed below. Most of the services listed are based on CCITT E- and F-Series Recommendations and the relevant technical and interworking constraints.

7.1 Network services

7.1.1 Telephone

The telephone service is a public telecommunication service primarily intended for the exchange of information in the form of speech, whereby users can communicate directly and temporarily between themselves in conversational mode, and should be provided in accordance with the International Telecommunication Regulations (Melbourne, 1988), and the relevant CCITT Recommendations. The international telephone service can also support a number of non-voice services or applications such as facsimile and data transmission (CCITT Recommendation E.105).

7.1.2 Programme sound

The programme sound service provides users of FPLMTS with the ability to deliver information with sound programme quality.

7.1.3 Message handling service

Message handling services are outlined in CCITT Recommendation F.400.

7.1.4 Teletex

The Teletex service provides users of FPLMTS with the ability to exchange office correspondence in the form of documents containing Teletex coded information on an automatic memory-to-memory basis (CCITT Recommendation F.200).

7.1.5 Paging

FPLMTS should be able to provide paging services integrated with telephone and data services, to the extent provided by individual administrations. Mobile satellites may offer wide area paging beyond the range of terrestrial systems.

FPLMTS should be able to provide paging services in several different modes:

– “open loop transmission” (i.e. page sent to a device that does not transmit any acknowledgement upon reception of the message);

– “closed loop transmission” or “with network acknowledgement” (i.e. page sent to a device that will acknowledge reception);

– “with user acknowledgement” (i.e. the acknowledgement will be sent when the user indicates to the device that he has received the message).

The sender of the page should have the possibility of choosing the preferred mode (whether the sender will receive an acknowledgement or not will depend on the pager design and the propagation conditions).

7.1.6 Telefax

The Telefax service will enable users to exchange correspondence in the form of documents containing coded information on an automatic memory-to-memory basis via FPLMTS (CCITT Recommendations F.160 – Fax General and F.180 – Telefax).

7.1.7 Point-to-multipoint

FPLMTS should provide this service for dispatch, group calling, closed user groups and other applications, to the extent permitted by individual administrations.

7.1.8 Data

Several synchronous and asynchronous data services are standardized on the PSTN including 300, 1 200, 2 400, 4 800 and 9 600 bit/s. FPLMTS should be designed so that under favourable circumstances, services requiring bit rates up to 20 Mbit/s in both connection oriented and connectionless modes can be provided.

7.1.9 Videotex

The Videotex service will provide a retrieval service for text and image information (CCITT Recommendation F.300).

7.1.10 Video telephone

The video telephone service will provide users of FPLMTS with the ability for real-time, two-way combined speech and video conversation via the network. It is likely that all video telephone carried via FPLMTS will involve compressed video.

7.1.11 Programme video

The programme video service will enable FPLMTS users to deliver video via the network. It is likely that all programme video carried via FPLMTS will be compressed.

7.1.12 Audiovisual

The audiovisual service will provide users with the ability for real-time, two-way speech, data and/or video between two or more locations simultaneously. It is likely that all video information carried via FPLMTS will be compressed (CCITT Recommendation F.710).

7.1.13 Short messages

These connectionless services allow the exchange of messages of limited length (e.g. one or several 32 byte blocks) between a storage system and a mobile station, or between mobile stations in real time. It can be a point-to-point or point-to-multipoint service.

7.1.14 Location

The provision of information to the calling or called party as to the location of the corresponding FPLMTS user. In order to protect the privacy of the FPLMTS user, access to location information must be restricted to specific applications authorized by the FPLMTS user and the administration concerned.

7.1.15 Multimedia

FPLMTS should be designed so that provision of voice, video and data simultaneously to a user, will be supported.

7.2 Supplementary services

The following supplementary services among others may be supported by FPLMTS:

7.2.1 Separation of answering from alerting

In current public telecommunication systems, the alerting function resides in the same terminal used to answer the call. However, in FPLMTS, it is envisaged that the device on which the alert is received, e.g. pager or personal station, is not necessarily the one used to answer the call. The called FPLMTS user will be able to use any terminal of their choice (e.g. telephone or personal station) to answer the incoming call. This implies that the delivery of a signal to an alerting device is not a completed activity, rather, just a part of the total activity associated with establishing a call.

This service concept could have implications on the sequence of call-establishment signals as well as call completion time delays. The details of this service as well as user acceptability need further study.

7.2.2 Advice of charging

The paying party (or parties) should be able to receive the respective charge information before, during, or after each call.

7.2.3 End-to-end encryption

The FPLMTS should support the use of end-to-end encryption associated with any service that uses an unrestricted circuit-mode or packet-mode bearer service. As a supplementary service, FPLMTS should also support end-to-end encryption of speech by the use of an unrestricted circuit-mode bearer via the ISDN. This service may have an impact on the ISDN and requires further study.

7.2.4 Automatic message box status indication

Automatic message box status indication (e.g. new message, urgent message, empty) reduces loss of communication whilst a user is moving.

8. Services to be considered for later phases of FPLMTS

The CCIR recognizes that it is important to consider emerging and new requirements of services to be included within FPLMTS. However, to enable Phase 1 of FPLMTS to be implemented in the near future, its scope is limited to those services requiring user bit rates up to approximately 2 Mbit/s.

Phase 2 is envisaged as augmenting Phase 1 with new services some of which may require user bit rates higher than 2 Mbit/s.

The following are new service objectives identified for inclusion in Phase 2:

– support of the high data rate needs of portable computing users, and

– support of enhanced multimedia communications requirements (e.g. providing voice, video and data simultaneously to a user).

Other service objectives may be identified in the future work of the CCIR and CCITT.

ANNEX 1

FPLMTS service categories
(user perspective)

Service category ([1])	Type of information ([1])	Service examples	FPLMTS application example
1. Mobility services			
1.1 Locating	Voice	Voice announcement indicating location of user	([2])
	Audio	([2])	([2])
	Text	Text information indicating location of user	Location information to dispatcher
	Image	Image data indicating location of user	Mobile navigation to vehicle or dispatch
	Video	([2])	([2])
	Signalling	Signalling information based on user location	Presentation of location specifics to enable user to reconfigure equipment or service profile
2. Interactive services			
2.1 Conversational ([3])	Voice	End-to-end 2-way voice connection	2-person telephone call Conference call
	Audio	End-to-end 2-way audio connection	Audio conference Interactive data using modems or DTMF tones Control and monitoring or medical data instruments with A/D and D/A conversion
	Text	End-to-end data connection for 2-way presentation of text/data	2-person data call for screen sharing Data conference call Connectionless short message conversation
	Image	End-to-end 2-way image connection	2-way fax
	Video	End-to-end 2-way video connection	2-way compressed video
	Signalling	End-to-end 2-way signalling connection	Remote control and status acquisition

ANNEX 1 (*cont.*)

Service category (1)	Type of information (1)	Service examples	FPLMTS application example
2.2 Messaging (store and forward)	Voice	Store and forward voice	Voice mail box
	Audio	Store and forward voice	(2)
	Text	Store and forward data/text	E-mail Text-paging
	Image	Store and forward images	Fax mailbox
	Video	Store and forward video	Video mail
	Signalling	Store and forward signalling	Call alert Calling No. identification
2.3 Retrieval and storage services	Text	Text-based data storage/retrieval	Document sharing
	Binary data	Exchange of computer data	Database, software exchange
	Image	Exchange of stored images	Computer image storage and retrieval
	Audio	Exchange of stored audio	Audio document annotation, and shared audio libraries
	Video	Exchange of stored moving pictures	Video database Shared video libraries
3. Distribution services	Audio	(2)	
	Voice	Voice message	Voice paging individual or group call
	Text	Text message	Radio paging with text display individual or group calls
	Image	Addressed image	Telefax, point-to-point or point to multipoint
	Video	(2)	
	Signalling	Signalling message	Radio paging alerting only

(1) There may also be combinations of services and types of information in a given use of telecommunication services (e.g. multimedia).

(2) For further study to determine potential new FPLMTS user service.

(3) There may be various combinations of services which are not symmetric in both directions but which together constitute a conversational service.