International Telegraph and Telephone   COM I-
    Consultative Committee   November 1991
            (CCITT)   Original: English

        Period 1989-1992

Question: 8/I

                STUDY GROUP I - CONTRIBUTION
        ====================================

SOURCE: Special Rapporteur on Question 8/I (Mr. S. Engelman)

TITLE : Rapporteur's Report on Question 8/I (Mobile Services)

1.0   Interim Meeting Results

        Between May 1991 and November 1991, there was one joint
Rapporteurs meeting with CCIR Task Group 8/1. The meeting took
place in both Dallas, Texas and London, England, on September 25 &
26, 1991, with representatives from Question 8/I and CCIR Task
Group 8/1 at both locations. Roger Fudge of BT chaired the London
group, while I chaired the Dallas Group. Each day there was a
telephone conference call between the two groups to coordinate the
work.

        The purpose of this joint meeting was to advance the work on
draft Recommendation F.FPLMTS (Operational and Services Provisions
for the Future Public Land Mobile Telecommunication Systems
[FPLMTS]) which was drafted at our May 1991 meeting. Contributions
to the joint meeting were received from BT, MCI, ARINC, BNR, Apple
Computer, NTT and Telecom Australia, and these were distributed to
the attendees at London and Dallas.

        The following people were in Dallas:
            Stephen Engelman - MCI
            Melanie Jones - BNR
            Ben Levitan - ARINC
            Asok Chatterjee - Pacific Bell
            Dick Allen - Apple Computer
            Dhawal Mogue - BNR
            Aydin Ulkucu - BNR

The following people were in London:
        Roger Fudge - BT
        Amitabha Sen - Motorola
        Rolyn Callahan - Bellcore
        Douglas O'Neil - BellSouth
        Colin Smith - BT
        Sabah Towaij - BNR
        Vic Hayes - NCR
        Leslie Homan - Cable & Wireless
        R. C. French - BNR
        Masami Yabusaki - NTT

During the first day, after reviewing all the contributions, both groups agreed to work on various sections of the draft Recommendation. The Dallas Group faxed their result to London for their input on the second day. London's final output was faxed back to Dallas and the Dallas Group completed the work. The results of both groups are included in the revised version of draft Rec. F.FPLMTS which is annexed to this report.

2.0   November 1991 Work Plan

The following in the tentative work plan for the November meeting on issues relating to Question 8/I:

a.   Final review of F.AERO

b.   Continue to review and improve upon draft Recommendation F. FPLMTS based on the September meeting (Specifically, Sections 4, 6 and 8 need additional work.

c.   Respond to any liaisons

d.   Work on revising Question 8/I for the next Plenary Period.

e.   Future meetings of Question 8/I and another possible meeting with CCIR Task Group 8/1

A complete agenda will be issued at the Working Party I meeting.

ANNEX 1

DRAFT RECOMMENDATION F.FPLMTS
OPERATIONAL AND SERVICE PROVISIONS FOR THE [FUTURE
PUBLIC LAND MOBILE TELECOMMUNICATION SYSTEMS (FPLMTS)]

1. Considering

- that the future public land mobile telecommunication systems (FPLMTS) encompasses the development of a number of different systems

- that Recommendation F.111 defines the principles of service of mobile systems

- the growth of the various types of non-voice services

- the services need to achieve compatibility with those services offered on the fixed networks

- the quality of service should be comparable with those services offered on the fixed networks

- there may be advantages to users if it were possible to use the same access procedures and terminals when roaming between different networks and environments

- that FPLMTS is further described in CCIR Recommendation 687 and Report 1153 and 1155

2. Scope

This Recommendation describes operational and service provisions for the FPLMTS which are relevant to interconnection with the fixed public telecommunication networks. This Recommendation applies to international roaming and interconnection across national boundaries. With a view to worldwide interconnectivity and interoperability, and to the extent that Administrations consider appropriate and the relevant national regulations allow, it should also apply to national roaming and interconnection with the fixed network.

3. Definitions

3.1 Future Public Land Mobile Telecommunication Systems (FPLMTS)

FPLMTS are systems which will provide telecommunication services to mobile or stationary users by means of one or more radio links. 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 and, in addition, will support a range of services particular to mobile radio systems. (CCIR Rec. 687 and Report 1153 and 1155)

3.2 Terminal Mobility

Terminal mobility involves the ability of the user to be in continuous motion whilst accessing and using telecommunication services and the capability of the network to keep track of the user's terminal. This requires the telecommunication services to be available throughout a spatial volume and ideally at all times.

3.3 Personal Mobility

Personal mobility is conferred by flexibility of the user's access to telecommunication service provision which is available at any terminal, in such a way that the user identifies with, and may configure any one of these terminals, fixed or mobile, to meet the user's requirements. These requirements may then be relocated from terminal to terminal without restriction or extent. Personal mobility involves the network capability to locate the user on the basis of a unique personal telecommunication identity (i.e., UPT number) for the purposes of addressing, routing and charging of the user's calls.

3.4 Universal Personal Telecommunications (UPT)

UPT enables access to telecommunication services by 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 unique, personal, network-independent UPT number across multiple networks at any terminal, fixed, movable or mobile, irrespective of geographic location, limited only by terminal and network capabilities and restrictions imposed by the network provider. (CCITT Rec. F.851)

3.5 UPT Number

A UPT number uniquely identifies each UPT user and is used by the caller to reach that user. A UPT user may have more than one UPT number for different applications. (CCITT Rec. F.851)

3.6 Service Profile

The service profile is the information relative to one particular UPT number which is needed for the network to be able to complete the call processes involved with that UPT number. UPT service profiles complement any other network profiles or discriminations. (CCITT Rec. F.851)

3.7 Personal Station

A light-weight, pocket-sized FPLMTS terminal. (CCIR Report 1153)

3.8 Mobile Station

Typically thought of as a vehicular FPLMTS terminal. (CCIR Report 1153)

4. General

4.1 General Service Objectives

-   To provide use with continuous access to their subscribed telecommunication services regardless of their mobility state, geographic location, or network access on a global basis.

-   To provide telecommunications of high quality and integrity comparable to the fixed network.

-   To accomodate a variety of mobile terminals ranging from those which are small enough to be carried (personal pocket radio) to those whicha are mounted in vehicles or otherwise used in conjunction with a mobile network.

-   The ability to provide service to users over different facilities.

-   To provide a wide range of telecommunication services to mobile or stationary users by means of one or more radio links.

-   To provide user transparency of services

-   To provide for flexibility of the service provisions. For example, between mobile terminal categories and on a geographical or user density basis.

-   To provide additonal services, taking into account the special nature of mobile communications.

3

4.2 General Service Requirements

-   A set of services, as defined herin, will be available to all users of the mobile/personal station.

-   Provide validation and authenticaiton procedures to facilitate billing and accounting (See CCITT Rec. X.509)

-   Provide for additional levels of security for telecommunication services.

-   Provide privacy of location of a roaming user when desired by the called or calling party.

4.3 General Access Requirements

-   ISDN: Personal communications services 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 personal communication service users.

-   International Operation: Personal communications services should allow international operation and automatic roaming of mobile users and stations to the extent practical or permitted.

-   Maritime and Aeronautical: Personal communications services should allow operation in the maritime and aeronautical environment to the extent permitted by national and international regulatory authorities.

-   Satellite Systems: Access to personal communications services should be allowed (directly or indirectly) via satellite.

5. Mobility Concept

The concept of a service conferring mobility is one which may be desired by users whether they are served by a mobile or a fixed network. Thus, it is part of the future fixed networks and the FPLMTS. The degree of mobility is different between the networks/systems. The fixed network will enable personal mobility while FPLMTS will enable personal mobility and terminal mobility within a coverage area; thus, FPLMTS will afford FPLMTS users the greatest form of mobility, i.e., the combination of personal mobility and terminal mobility.

4

6. Telecommunication Services

6.1 Introduction

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

Section 6 defines the range of services and supplementary services to be supported by FPLMTS.

6.2 Set of Services

Each FPLMTS provider will determine what services will be provided to its users. However, it is recommended that the following services be considered as of primary importance:

   i)   voice communication, with UPT capabilities, with other
        users of fixed or mobile terminals (telephone) connected
        to private or public networks; and

   ii) data communications with other fixed or mobile terminals

It should be noted that this set of services for the does not prevent other services being offered in particular service areas (e.g., ISDN and messaging).

6.3 Service Classification by User Perspective

In this section the services are firstly classified from the user perspective in terms of the categories and classes of services and types of information to be communicated.

Three main service categories have been identified: mobility services, interactive services and distribution services as shown in Fig.1. As indicated in this figure, these three service categories are further subdivided into eight service classes.

Table I provides an overall view of the FPLMTS services from the Users perspective.

6.3.1 Mobility Services

Are those services which are directly related to user mobility and are classified as follows.

5

6.3.1.1 Location Services

Location information to be provided to authorized users by FPLMTS, on 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. The access to location information could be voice, audio, text, image, video, or signalling.

6.3.1.2 UPT

UPT has been defined in CCITT Recommendation F.851 to provide flexible access to either the fixed network or FPLMTS as part of user mobility requirements.

6.3.2 Interactive Services

Interactive Services are closely aligned to those defined by CCITT for fixed networks.

6.3.2.1 Conversational Services

Conversational services are to provide the means for bidirectional dialogue communication with real-time (no store-and-forward) end-to-end information transfer from user to user or between user and host (e.g. for data processing). The flow of the user information may be bidirectional symmetric, bidirectional asymmetric and in some specific cases (e.g. such as video surveillance), the flow of information may be unidirectional combined with a signalling/control link in the reverse direction.

6.3.2.2 Messaging Services

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.

6.3.2.3 Retrieval Services

The user retrieval services can retrieve information stored in information centers and in general provide for public use. This information will be sent to the user on his demand only. The information can be retrieved on an individual......

6

6.3.3.1 Distribution Services Without User Control of Presentation

These services provide a continuous flow of information which is distributed from central source to an unlimited number of authorized receivers connected to the network. They include broadcast services. The user can access this flow of information without the ability to determine at which instant the distribution of a string of information will be stated. The user cannot control the start and order of the presentation of the broadcast information. Depending on the point of time of the user's access, the information may or may not be presented from its beginning.

6.3.3.2 Distribution services with control of presentation

Services of this class also distribute information from a central source to a large number of users. However, the information is provided as a sequence of information entities (e.g. frames) with cyclical repetition. So, the user has the ability of individual access to the cyclical distributed information and can control the start and order of presentation. Due to the cyclical repetition, the information entities selected by the user will always be presented from its beginning.

6.4.3.3 Addressed One-way Services

Services of this class distribute information from a control source to a large number of users. However each message is addressed to one or more users in the group.

6.4 Range of Service to be Supported by FPLMTS

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

    a)   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 Rec. E.105)

7

b)   Programme Sound

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

c)   Message Handling Service

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

d)   Teletex

The teletex service provides users of the 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 Rec. F.200)

e)   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 acknowledgment upon reception of the message);

-   "closed loop transmission" or "with network acknowledgment" (i.e., page sent to a device that will acknowledge reception);

-   "with user acknowledgment" (i.e., the acknowledgment 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 acknowledge or not will depend on the pager design and the propagation conditions).

8

f)   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 the FPLMTS. (CCITT Rec. F.160 - FAX General and F.180 - Telefax)

g)   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.

h)   Data

Several synchronous and asynchronous data services are standardized on the PSTN including 300, 1200, 2400, 4800 and 9600 bit/s. The FPLMTS should be designed so that under favourable circumstances, services requiring bits rates up to 20 Mbit/s in both connection oriented and connectionless modes can be provided.

i)   Videotex

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

j)   Video Telephone

The video telephone service will provide FPLMTS users of the 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 the FPLMTS will involve compressed video.

k)   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 the FPLMTS will be compressed.

l)   Audio Visual

The audio visual 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 the FPLMTS will be compressed. (CCITT Rec. F.700)

9

m)   Short Messages

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

n)   Location

The provision of information to the calling or called
party as to the location of the corresponding FPMTS 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.

6   Supplementary Services

The following supplementary services may be supported by FPLMTS:

a)   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 the 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.

b)   Advice of Charging

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

10

c)   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.

d)   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.

7.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 CCIR Recommendation FPLMTS.QOS)

7.1 General

Consideration will need to be given to maintaining quality of service during handover between cells and any implications from this on cell size, frequency requirements, protocols, etc.

Mobile satellite systems can have a number of characteristics which are different from terrestrial mobile systems such as wide area coverage and propagation delays on the order of 0.3 s or more.

To maintain the quality of services for Group 3 and Group 4 telefax machines, additional error control facility for the radio communication path may be required.

7.2 Speech Quality

The quality of speech services in FPLMTS should be comparable to that of the PSTN/ISDN. Speech services are sensitive to delay need to be taken into consideration. (CCITT Rec. G.114)

The quality of speech supported within the FPLMTS should be nominally that recommended in the CCITT 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.

11

7.3 Traffic Engineering Aspects

As per CCITT E-series Recommendations on traffic engineering of mobile networks.

7.4 UPT Affect on Quality of Service

In general, services extended to users via UPT should conform to the quality-of-service provisions for the telecommunication services in use today. The transmission quality should not be influenced by the application of UPT. Other factors, such as traffic, connection processing delay and availability, may be affected by UPT, resulting in the provision of different levels of quality to meet different end-user needs.

8. FPLMTS and Fixed Network Services Relationship

8.1 Common Services

8.2 FPLMTS Specific Services

12

CATEGORIES   CLASSES

Mobility services

                                                    Location services

                                                    UPT

Interactive services

                                            Conversational services

                                            Messaging services

                                            Retrieval services

Distribution services

                                    Distribution services
                                    without user individual
                                    presentation control

                                    Distribution services with
                                    user   individual
                                    presentation control

                                    Addressed one-way services
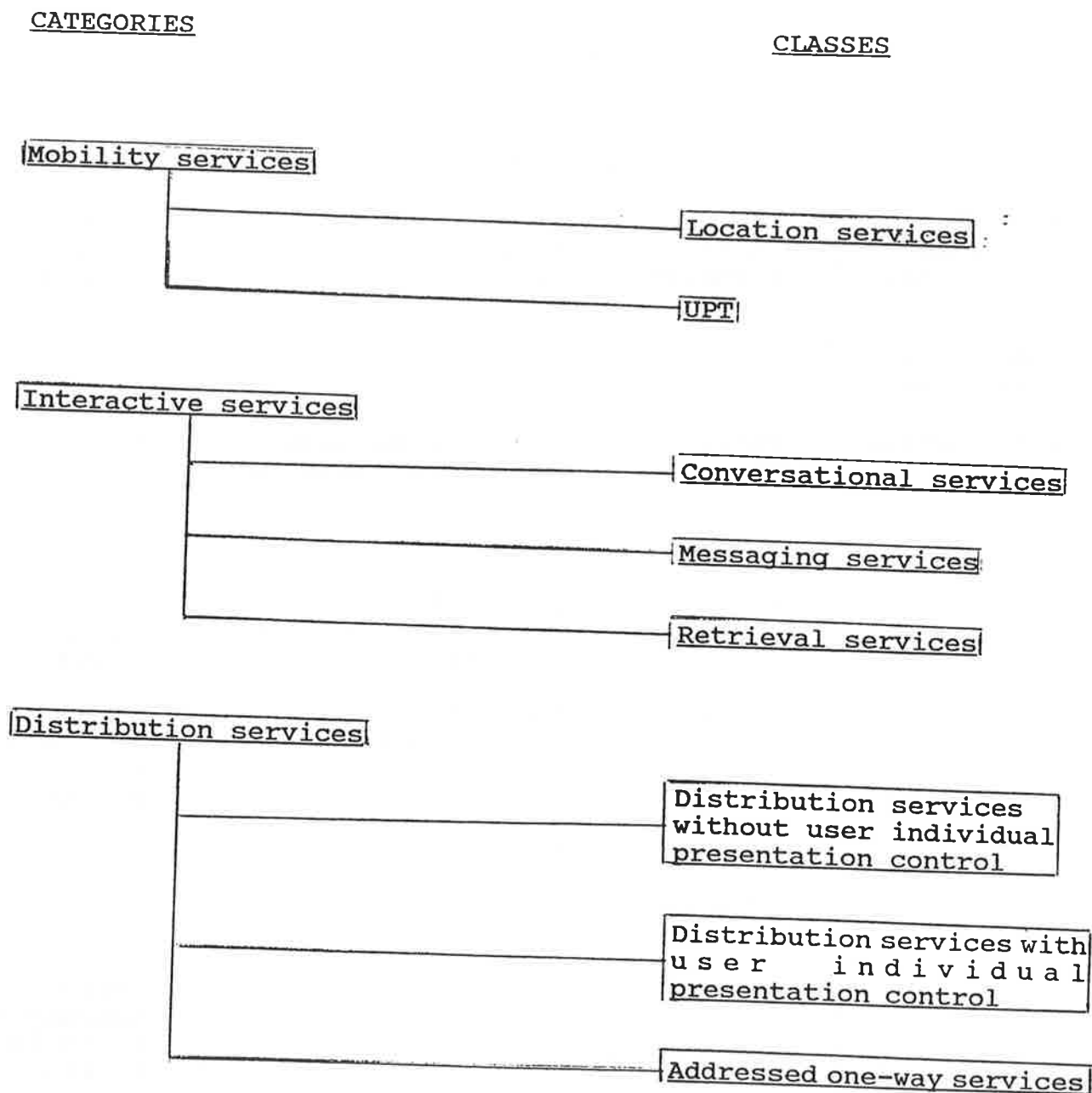
Fig. 1
Classification of mobile services

Table I
FPLMTS SERVICES

USER PERSPECTIVE

SERVICE CATEGORIES AND CLASSES	TYPE OF INFORMATION	SERVICE DESCRIPTION	FPLMTS APPLICATION EXAMPLE
1. Mobility Services			
1.1 Locating	Voice	Voice announcement indicating location of user	*
	Audio	*	*
	Text	Text information indicating location of user	- location info. to dispatcher
	Image	Image data indicating location of user	- Mobile navigation to vehicle or dispatch.
	Video	*	*
	Signaling	Signaling info. based on user location	- presentation of location specifies to reconfigure equipment of service profile
1.2 UPT	Voice	*	
	Audio	*	
	Text	*	
	Image	*	
	Video	*	

* For further study to determine potential new FPLMTS user service.

Table I (cont.)
FPLMTS SERVICES

USER PERSPECTIVE

SERVICE CATEGORIES AND CLASSES	TYPE OF INFORMATION	SERVICE DESCRIPTION	FPLMTS APPLICATION EXAMPLE
2 Interactive Services 2.1 Conversational (real-time, 2-way)	Signaling	Sending of users PTN or caller PTN for call routing	- dialing and personal I.D.
	Voice	End-to-end 2-way voice connection	- 2-person telephone call - conference call
	Audio	End-to-end 2-way audio connection	- audio conf. - 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	- 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

*For further study to determine potential new FPLMTS user service

Table I (cont.)
FPLMTS SERVICES

USER PERSPECTIVE

SERVICE CATEGORIES AND CLASSES	TYPE OF INFORMATION	SERVICE DESCRIPTION	FPLMTS APPLICATION EXAMPLE
	Video	End-to-end 2-way video connection	- 2-way compressed video
	Signaling	End-to-end 2-way signaling connection	- remote control and status acquisition

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

There may also be combinations of classes of services in a given use of telecommunication services.

2.2 Messaging (store & forward)	Voice	Store and forward voice	- voice mail box
	Audio	Store and forward audio	*
	text	Store and forward data/text	- e-mail - text paging
	Image	Store and forward images	- fax mailbox
	Video	Store and forward video	- video mail
	Signaling	Store and forward signaling	- call alert - calling # ID
	Audio	*	

*For further study to determine potential new FPLMTS user service

Table I (cont.)
FPLMTS SERVICES

USER PERSPECTIVE

SERVICE CATEGORIES AND CLASSES	TYPE OF INFORMATION	SERVICE DESCRIPTION	FPLMTS APPLICATION EXAMPLE
3.0 Addressed one-way (real time)	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	*	
	Signaling	Signaling message	- radio paging alerting only

* For further study to determine potential new FPLMTS user service.