

RECOMMENDATION ITU-R F.1490-1*

Generic requirements for fixed wireless access systems

(Questions ITU-R 125/9 and ITU-R 215/8)

(2000-2007)

Introduction

Today many technologies have been considered for fixed wireless access (FWA) applications, in particular, technologies from cellular platforms and specialized systems.

The application of FWA will benefit both developing and developed countries. Many countries are planning to deploy FWA systems for the primary delivery of telecommunication services. In this Recommendation, two different FWA platforms are considered – one based on a public mobile network and the other based on a PSTN network.

Scope

This Recommendation summarizes generic requirements needed to ensure that radio technologies can be applied to FWA applications and intended for the use by administrations and operators considering deployment of FWA systems.

Abbreviations

AMSC	Anchor mobile switching centre
BS	Base station
DTMF	Dual tone multi-frequency
FMC	Fixed mobile convergence
FS	Fixed station
LAN	Local area network
MAN	Metropolitan area networks
MPEG	Moving Picture Expert Group
MSC	Mobile services switching centre
PABX	Private automatic branch exchange
PCS	Personal communications systems
PSTN	Public switched telephone networks
P-MP	Point-to-multipoint
P-P	Point-to-point
RNC	Radio network controller
SDH	Synchronous digital hierarchy

* This Recommendation should be brought to the attention of Radiocommunication Study Group 8 (Working Party 8A).

SN	Service node
TDMA	Time division multiplexing access
TE	Terminal equipment

References

ITU-R Recommendations

Recommendation ITU-R F.757:	Basic system requirements and performance objectives for fixed wireless access using mobile-derived technologies offering basic telephony services.
Recommendation ITU-R M.819:	International Mobile Telecommunications-2000 (IMT-2000) for developing countries.
Recommendation ITU-R F.1400:	Performance and availability requirements and objectives for fixed wireless access to public switched telephone network.
Recommendation ITU-R F.1399:	Vocabulary of terms for wireless access.

ITU-T Recommendations

ITU-T Recommendation G.173:	Transmission planning aspects of the speech service in digital public land mobile networks.
ITU-T Recommendation G.174:	Transmission performance objectives for terrestrial digital wireless systems using portable terminals to access the PSTN.
ITU-T Recommendation G.175:	Transmission planning for private/public network interconnection of voice traffic.
ITU-T Recommendation G.711:	Pulse code modulation (PCM) of voice frequencies.
ITU-T Recommendation G.726:	40, 32, 24, 16 kbit/s adaptive differential pulse code modulation (ADPCM).
ITU-T Recommendation G.728:	Coding of speech at 16 kbit/s using low delay-code excited linear prediction.
ITU-T Recommendation I.430:	Basic user-network interface – Layer 1 specification.
ITU-T Recommendation G.965:	V-interfaces at the digital local exchange (LE) – V5.2 interface (based on 2048 kbit/s) for the support of access network (AN).

Recommendations

The ITU Radiocommunication Assembly recommends that the following requirements for FWA systems should be met.

1 Service requirements

Identified telephony-based requirements for FWA:

- FWA subscribers can have wireline (i.e. PSTN-like) numbers.
- FWA subscribers can have local area dialling capability (dial tone, etc.) similar to that of fixed PSTN subscribers.
- FWA subscribers' tariffing structure can be selected by the operator. Wireline-like (PSTN-like) tariffing scheme can be used if required.

- In order to achieve faster call set-up times, transparent mode is needed as an alternative option in FWA based on mobile network solution (see § 4).
- Fixed station (FS) terminal remote management (see § 5).
- Payphone support (see § 6).
- Group 3 facsimile support (see § 6).
- Charging capabilities (see § 6).
- Performance monitoring (see § 5).
- Power and lightning protection.
- Optional display for FWA terminal (in order to get use of supplementary services).
- Performance and availability objectives and requirements must meet those established in Recommendation ITU-R F.1400.

1.1 Applications of FWA

Likely applications or services for data rates higher than 64 kbit/s (based on report of survey responses for FWA), for those systems that are able to support these data rates:

- Internet access.
- Multimedia and interactive applications such as telemedicine and tele-education.
- Intranet.
- Videoconference.
- Videophone for banking, tourist agencies, etc.
- ISDN.
- File transfer.
- Leased lines.
- Banking.
- Tourist agencies.
- Remote host access.
- MPEG video.
- Ethernet.
- Wireless local area network (LAN).
- Broadband service delivery to homes and business.
- Wireless broadband for trunk configurations for mobile telecommunications systems (e.g. PCS and GSM) in backhaul links, metropolitan area networks (MANs), and synchronous digital hierarchy (SDH) rings.
- Private automatic branch exchange (PABX) (virtual, e.g. wireless Centrex).

1.2 Minimum bit rate for data services

Some requirements have indicated a minimum bit rate of 9.6 kbit/s. However, other requirements for data services will be equivalent to those for IMT-2000 in the mobile environment (144 kbit/s and above).

1.3 ISDN compatibility

Required in most cases (see Annexes 1 and 2 for more information).

2 FWA system capabilities

FWA applications could have the following capabilities:

- a) to rapidly deploy a fixed wireless technology to provide voice services in large segments of the market that do not have any telecommunication service;
- b) to meet a pent-up demand for high-end, broadband services, both in the business and residential markets;
- c) as a rural type, to achieve one of major goals in a country for the improvement of telephone density in rural areas;
- d) to provide the availability of desired added features besides local telephone service features for the customers;
- e) to provide the fixed wireless capabilities for service providers, for example; in order to deploy a wireless competitive local exchange carrier in competition with the incumbent local exchange carrier;
- f) to provide a second or third telephone for customers due to increased uses of fax machines, modems, and Internet access;
- g) to provide wireless Centrex and private branch exchange for business customers having a traffic requirement at the primary rate and above and searching for low cost alternatives;
- h) as an urban type, to provide as multimedia-compatible wireless access network in place of wired networks in the development of new commercial, industrial and residential areas on spot basis in urban area.

3 Types of FWA systems

FWA systems may be broadly categorized as three types, each addressing a different market:

- Wireline equivalent/replacement system applies where wireline services and equipment must be supported to the full extent: either due to the type of equipment to be supported or due to the expectations of the user. Capable of delivering toll quality speech and performance equivalent to wired access service.
- Fixed mobile convergence (FMC) system applies where the prime requirement is reduced cost and ease of installation, and the requirements for equipment support or customer service expectation are different than full wireline support.
- Broadband system applies where greater traffic throughput is required, such as business and interactive applications.

Because of these different target markets, FWA systems will have different service requirements. These three markets can be distinguished by some of their basic services as follows:

3.1 Wireline equivalent/replacement system

- a) Minimum capability to support fax and modem service with support for higher data rates desired.
- b) Optional support for ISDN.
- c) No mobility between the network and the subscriber premises network interface device.
- d) End user terminals may be mobile (e.g. cordless phone).

3.2 FMC system

- a) Capable of supporting wireline – like service.
- b) Capable of delivering performance equivalent to cellular voice quality.
- c) Capable of delivering fallback rate support for modem and fax service.
- d) Optional limited mobility support.
- e) Extension of existing cellular standards which may provide a higher level of wireline transparency.

3.3 Broadband system

- a) Capable of supporting greater speeds than wireline equivalent/replacement system.
- b) Fixed network and users supported.

4 FWA system configurations

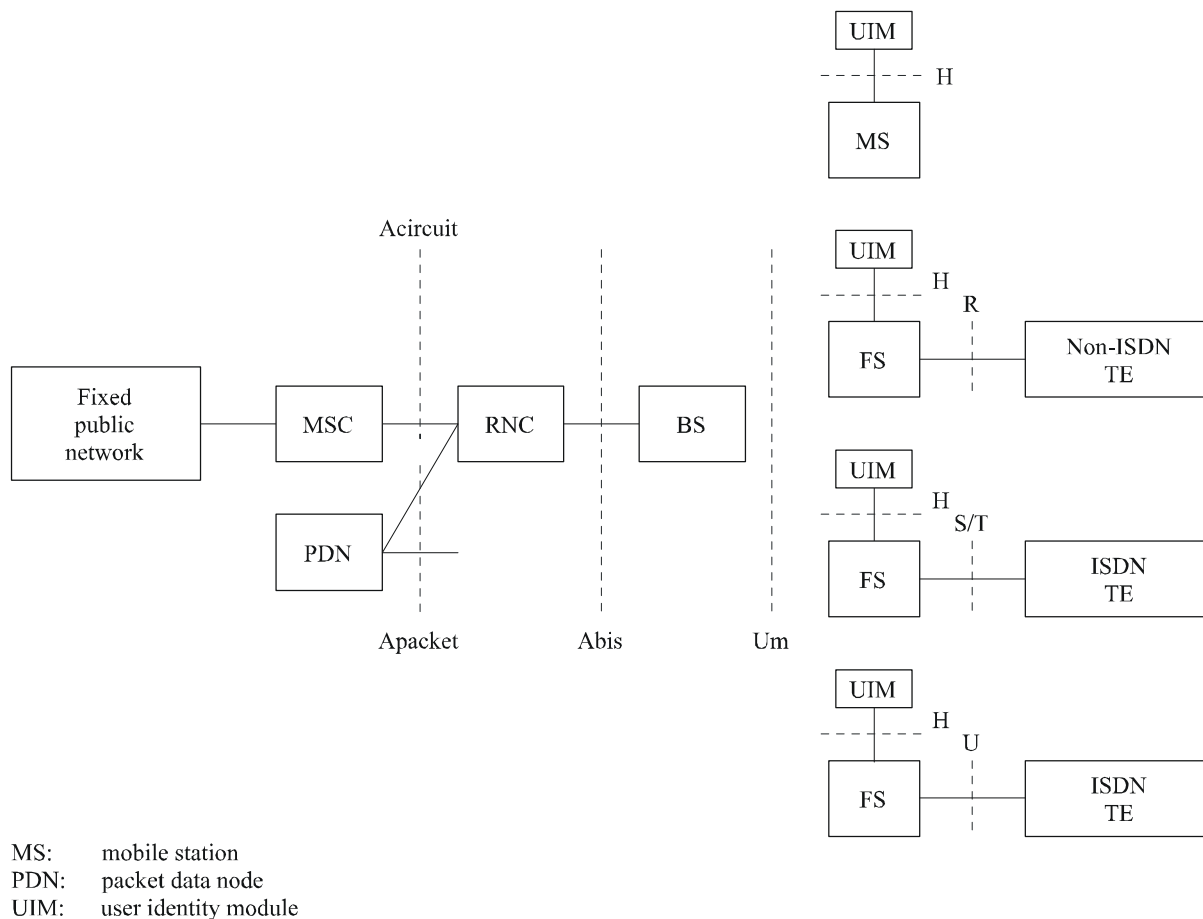
Due to the different needs in different environments two separate FWA network level solutions are needed. Those two systems are named here as FWA supported from a mobile network and FWA supported from a PSTN access network. It is believed that both network level solutions are needed in order to satisfy the needs of different operators and end-users.

4.1 FWA supported from a mobile network

The FWA supported from a mobile network could be based on the standard mobile network and mobile services switching centre (MSC). This solution basically comprises of the following network elements: MSC, radio network controller (RNC), base station (BS), fixed cellular subscriber units, known as FWA terminals and terminal equipment (TE). In this application handover between cells is not supported. From the system point of view, interfaces to the end-user terminals (e.g. telephone, facsimile machine, personal computer, etc.) and network management system are included. In this system solution, the MSC operates as a service node (SN). Figure 1 shows a reference model for this solution.

As can be seen from Fig. 1, the FWA system includes a possibility to provide services to both fixed and mobile users. This is an important requirement as already pointed out in Recommendation ITU-R M.819.

FIGURE 1
A reference model of the FWA supported from a mobile network



Reference points in Fig. 1

Abis: reference point between the RNC and the BS

Acircuit: reference point for circuit switched traffic between the RNC and the MSC

Apacket: reference point for packet data traffic between the RNC and the PDN

H: reference point between the MS and the UIM

R: non-ISDN terminal reference point. 2-wire interface is one example of such interface

S/T: standard ISDN reference point. For example ITU-T Recommendation I.430 or according to some other ISDN interface

U: standard ISDN reference point

Um: reference point between the FS (or MS) and the BS

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