

RECOMMENDATION ITU-R F.1103-1*

**Basic requirements and technologies for fixed wireless access systems
operating in bands below 3 GHz for the provision of wireless
subscriber connections in rural areas**

(Question ITU-R 125/9)

(1994-2007)

Scope

This Recommendation provides basic requirements and technologies for fixed wireless access (FWA) systems operating in bands below 3 GHz for use for wireless connections in rural areas. The requirements include service aspects as well as performance/availability objectives. The Annexes describe technical and operational information specifically required for FWA applications used in rural areas.

Vocabulary

RCS Radio Concentrator System

A wireless system in which the radio resource (e.g. a time slot in the time domain or a frequency channel in the frequency domain) is commonly used by more than one subscriber by applying a multiple access technique.

Abbreviations

ADPCM Adaptive differential pulse code modulation

CDMA Code division multiple access

E&M Electrical & magnetic

FDD Frequency division duplexing

PCM Pulse-code modulation

P-MP Point-to-multipoint

P-P Point-to-point

TDD Time division duplexing

TDMA Time division multiple access

TF Time frame

TS Time slot

* This Recommendation should be brought to the attention of ITU-D Study Group 2 (Q.10).

The ITU Radiocommunication Assembly,

considering

- a) that there is an urgent need for the provision of economic telecommunication subscriber connections in rural areas, especially in developing countries;
- b) that the equipment for such links should be simple and reliable for reduction of establishment costs, and for ease of maintenance and operation;
- c) that in the provision of such links, the calling rate allows the use of such methods as fixed wireless access (FWA) systems using point-to-multipoint (P-MP) applications;
- d) that FWA systems operating in bands below 3 GHz are suitable for the provision of such links and it is necessary to provide technical information on these systems for the system designers;
- e) that in rural areas it is often difficult to implement metallic lines or other cable systems economically, however various telecommunication services provided by metallic lines or other cable systems should, as far as possible, be available also in rural areas;
- f) that Recommendation ITU-R F.1490 specifies generic requirements for FWA systems;
- g) that Recommendation ITU-R F.757 provides basic system requirements and performance objectives for FWA systems using mobile-derived technologies offering telephony and data communication services,

recommends

- 1** that FWA systems used for rural subscriber links should provide services also available by metallic lines. These services may include:
 - 2-wire individual telephone service;
 - payphone service of various kinds;
 - 4-wire service with and without E&M signalling;
 - the capability to carry voiceband data including facsimile and other telematic services up to a bit rate of at least 9.6 kbit/s;
- 2** that, in many cases, the above FWA systems should:
 - carry data at rates up to and including 64 kbit/s;
 - provide, integrated services digital network (ISDN) basic rate access, 2B+D;
- 3** that giving due regard to economical considerations:
 - 3.1** the grade of service (lost call probability) offered by such a system to a subscriber should not normally be worse than 1% and should be calculated employing ITU-T E-series Recommendations (e.g. E.506 and E.541) (see Note 1);
 - 3.2** the error performance and availability objectives should be in accordance with Recommendations ITU-R F.697 and ITU-R F.1400;
- 4** that for the effective use of frequency spectrum, radio concentrators and other digital multiple access techniques are preferred and for detailed technical information on TDMA P-MP systems Annex 1 be referred to (see Note 2);
- 5** that for equipment general characteristics and operational environments, information contained in Annex 2 be referred to as a guide for administrations and system designers;
- 6** that voice encoding methods employed in digital systems be such that the integration of the system into the switched network is straightforward and introduces as few limitations as possible.

Recommended encoding methods are 64 kbit/s PCM and 32 kbit/s ADPCM in accordance with ITU-T Recommendations G.711 and G.726, respectively.

NOTE 1 – Some administrations may adopt other values for the grade of service, e.g. as much as 5%, depending on local conditions.

NOTE 2 – Other technologies such as CDMA and orthogonal frequency division multiplex (OFDM) can be found in the Fixed Wireless Access Handbook (Volume 1 of the Land Mobile Handbook).

References

ITU-R Recommendations

Recommendation ITU-R F.382 – Radio-frequency channel arrangements for fixed wireless systems operating in the 2 and 4 GHz bands

Recommendation ITU-R F.697 – Error performance and availability objectives for the local-grade portion at each end of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems

Recommendation ITU-R F.701 – Radio-frequency channel arrangements for point-to-multipoint radio systems operating in frequency bands in the range 1.350 to 2.690 GHz (1.5, 1.8, 2.0, 2.2, 2.4 and 2.6 GHz)

Recommendation ITU-R F.746 – Radio-frequency arrangements for fixed service systems

Recommendation ITU-R F.757 – Basic system requirements and performance objectives for fixed wireless access using mobile-derived technologies offering telephony and data communication services

Recommendation ITU-R F.1242 – Radio-frequency channel arrangements for digital radio systems operating in the range 1 350 MHz to 1 530 MHz

Recommendation ITU-R F.1243 – Radio-frequency channel arrangements for digital radio systems operating in the range 2 290-2 670 MHz

Recommendation ITU-R F.1400 – Performance and availability requirements and objectives for fixed wireless access to public switched telephone network

Recommendation ITU-R F.1401 – Considerations for the identification of possible frequency bands for fixed wireless access and related sharing studies

ITU-T Recommendations

ITU-T Recommendation E.506: Forecasting international traffic

ITU-T Recommendation E.541: Overall grade of service for international connections (subscriber-to-subscriber)

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)