



Recommendation ITU-R F.1105-4
(01/2019)

**Fixed wireless systems for disaster
mitigation and relief operations**

F Series
Fixed service



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Foreword

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Series of ITU-R Recommendations

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Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R F.1105-4*

Fixed wireless systems for disaster mitigation and relief operations

(Question ITU-R 248/5)

(1994-2002-2006-2014-2019)

Scope

This Recommendation provides characteristics of fixed wireless systems (FWS) used for disaster mitigation and relief operations. Several types of such systems including transportable equipment are specified according to channel capacity, operating frequency bands, transmission distance and propagation path conditions.

Detailed descriptions of these systems are also given in Annex 1 as guidance.

Keywords

Fixed service, land mobile service, disaster mitigation, relief operation, backhaul link, transportable system

Related ITU-R Recommendations and Reports

Recommendation ITU-R M.2015 – Frequency arrangements for public protection and disaster relief radiocommunication systems in accordance with Resolution **646 (Rev.WRC-15)**

Report ITU-R F.2061 – HF fixed radiocommunications systems

Report ITU-R F.2087 – Requirements for high frequency (HF) radiocommunication systems in the fixed service

Abbreviations

ATM	Asynchronous transfer mode
BER	Bit error rate
CS	Central station
FS	Fixed Service
FWS	Fixed wireless system
OS	Outdoor terminal station
OFDM	Orthogonal frequency division multiplex
P-MP	Point to Multi Point
P-P	Point to Point
QAM	Quadrature amplitude modulation
QPSK	Quaternary phase shift keying/Quadrature phase shift keying
PPDR	Public protection and disaster relief
SHF	Super High Frequency

* This Recommendation should be brought to the attention of Telecommunication Development Sector Study Group 2 and relevant ITU-T Study Groups.

STM	Synchronous transfer mode
TDD	Time division duplex
TDMA	Time division multiple access
UHF	Ultra High Frequency
VHF	Very High Frequency

The ITU Radiocommunication Assembly,

considering

- a) that rapidly deployable telecommunications are essential for disaster mitigation and relief operations in the event of natural disasters, epidemics, famines and similar emergencies;
- b) that measures to mitigate the effects of natural disasters should be made available as much as possible;
- c) that high speed data and high capacity information are available due to the popularity of fibre-to-the-home, digital subscriber line, mobile phones, etc. in the form of voice, character data, image, or through a variety of Internet Protocol (IP)-based services;
- d) that transportable fixed wireless equipment may be used for relief operation of either radio or cable links and may involve multi-hop applications with digital and analogue equipment;
- e) that fixed wireless equipment for disaster mitigation and relief operations may be operated in locations with differing terrain and in differing climatic zones, uncontrolled environmental conditions and/or unstable power sources;
- f) that fixed wireless equipment for disaster mitigation and relief operations may be used in areas with an unfavourable interference environment;
- g) that interoperability and internetworking between fixed *wireless* system for disaster mitigation and relief operations and other networks would be beneficial in emergency situations as stated in *considering a)*;
- h) that communication recovery in disaster situations could be facilitated if both a transportable mobile backhaul link and a transportable mobile base station could be deployed in a vehicle and carried to the disaster hit area when the mobile backhaul link and the base station for normal operation are both damaged by a disaster,

recognizing

- a) that Resolution **646 (Rev.WRC-15)** invites ITU-R to continue its technical studies and to make recommendations concerning technical and operational implementation, as necessary, to meet the needs of public protection and disaster relief radiocommunication applications, taking into account the capabilities, evolution and any resulting transition requirements of the existing systems, particularly those of many developing countries, for national and international operations;
- b) that Resolution **647 (Rev.WRC-15)** invites ITU-R to continue conducting studies as necessary, in accordance with its *resolves* 1 and in support of developing and maintaining appropriate spectrum management guidelines applicable in emergency and disaster relief operations;
- c) that Resolution ITU-R 55 requests the concerned ITU-R Study Groups to undertake studies and develop guidelines related to the management of radiocommunications in disaster prediction, detection, mitigation and relief collaboratively and cooperatively within ITU and with organizations external to the Union;

d) that Resolution ITU-R 55 also requests the relevant ITU-R Study Groups to continue studies on new emerging technologies which could support disaster prediction, detection, mitigation and relief;

e) that Recommendation ITU-R M.2015 provides guidance on frequency arrangements for public protection and disaster relief radiocommunication systems in accordance with Resolution **646 (Rev.WRC-15)**;

f) that Reports ITU-R F.2061 and ITU-R F.2087 address the role of HF radiocommunication systems in public protection and disaster relief (PPDR) operations,

recommends

1 that for disaster mitigation and relief operations in devastated areas or restoration of a break in transmission links the following types of fixed wireless systems (FWS) as given in Table 1 should be considered;

TABLE 1

Types of fixed wireless systems for disaster mitigation and relief operations

Type	Feature	Application
A	A simple wireless link which can be established rapidly for telephone communication with a governmental or international headquarters	(1) (2)
B	One or more local networks which connect a communications centre and up to about 10 or 20 end-user stations with telephone links	(1)
C	A telephone link for between about 6 and 120 channels or a data link up to the 6.3/8 Mbit/s over a line-of-sight or near line-of-sight path	(1) (2)
D	A telephone link between 12 and 480 channels or a data link up to 34/45 Mbit/s over a line-of-sight or obstacle or trans-horizon path	(2)
E	A high-capacity telephone link (more than 480 channels) or high-speed data link up to STM-1	(2)
F	Simultaneous individual or group radiocommunications using point-to-multipoint individual radiocommunications between a central station and a number of terminals in a region	(1), (3)

Types A to E: Transportable system.

Application (1): For devastated areas.

Application (2): For breaks in transmission links.

Application (3): For mitigation of disaster effects.

2 that interconnection of transportable FWS with analogue and digital cable systems at repeater stations should be made at baseband;

3 that interconnection of transportable FWS with fibre-optic systems at repeater stations may be made at points with a significant level of optical power;

4 that for system characteristics, the information contained in § 1 of Annex 1 can be referred to as a guide for administrations and system planners;

5 that performance objectives of links that use transportable fixed wireless equipment as well as separate links formed by the transportable fixed wireless equipment during restoration should have transmission performance values sufficient for normal service (see § 3 of Annex 1);