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| **Radiocommunication Study Groups** |  |
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| Annex 15 to Working Party 5A Chairman’s Report |
| PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.2009 |
| Radio interface standards for use by public protection and disaster relief operations in some parts of the UHF band in accordancewith Resolution 646 (Rev.WRC-12) |

*[Editor’s Note: Work is ongoing within WG 3 on developing a new Report on PPDR, which will include material from Report ITU-R M.2033 and may impact this Recommendation. Noting that references to Report ITU-R M.2033 can be retained until that document is superseded.]*

Summary of the revision

The broadband radio interface standards LTE-Advanced and SCDMA have been added as part of this Recommendation, LTE-Advanced being part of the evolution of the Evolved Universal Terrestrial Radio Access (E-UTRA) also referred to as the Long-Term Evolution (LTE). Annex 3 has also been deleted and replaced with a reference to Report ITU-R M.2033. Other editorial improvements have also been made, such as adding relevant ITU-R Recommendations to the list of references and amending the titles of some sections to better reflect the contents.

# 1 Scope

This Recommendation identifies radio interface standards applicable for public protection and disaster relief (PPDR) operations in some parts of the UHF band. The broadband standards included in this Recommendation are capable of supporting users at broadband data rates, taking into account the ITU-R definitions of “wireless access” and “broadband wireless access” found in Recommendation ITU-R F.1399.

This Recommendation addresses the standards themselves and does not deal with the frequency arrangements for PPDR systems, for which a separate Recommendation exists: Recommendation ITU-R M.2015.

# 2 Introduction

This Recommendation addresses radio interface standards for use for public protection and disaster relief operations. These standards are based on common specifications developed by standards development organizations (SDOs). Using this Recommendation, regulators, manufacturers and PPDR operators should be able to determine the most suitable standards for their needs.

# 3 Relevant Recommendations and Reports

The existing Recommendations and Reports that are considered to be of importance in the development of this particular Recommendation are as follows:

– [Recommendation ITU-R F.1399](http://www.itu.int/rec/R-REC-F.1399/en) – Vocabulary of terms for wireless access.

– [Recommendation ITU-R M.1457](http://www.itu.int/rec/R-REC-M.1457/en) – Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000).

– [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en) – Radio interface standards for broadband wireless access systems, including mobile and nomadic applications, in the mobile service operating below 6 GHz.

– [Recommendation ITU-R M.2012](http://www.itu.int/rec/R-REC-M.2012/en) – Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications Advanced (IMT-Advanced).

– [Recommendation ITU-R M.2015](http://www.itu.int/rec/R-REC-M.2015/en) – Frequency arrangements for public protection and disaster relief radiocommunication systems in UHF bands in accordance with Resolution **646 (WRC-03)**.

– [Report ITU-R M.2033](http://www.itu.int/pub/R-REP-M.2033) – Radiocommunication objectives and requirements for public protection and disaster relief.

# 4 Considering

*a)* that administrations can determine which technologies to deploy for PPDR operations;

*b)* that inclusion of standards in this Recommendation does not preclude the use of other standards for PPDR operations;

# 5 Noting

The PPDR user requirements outlined in Report ITU-R M.2033 and the acronyms and abbreviations listed in Annex 3.

# 6 Recognizing

*a)* that Resolution **646 (Rev. WRC-12)** encourages administrations to consider the following identified frequency bands/ranges or parts thereof when undertaking their national planning for the purposes of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions:

– in Region 1: 380-470 MHz as the frequency range within which the band
380-385/390-395 MHz is a preferred core harmonized band for permanent public protection activities within certain countries of Region 1 which have given their agreement;

– in Region 2[[1]](#footnote-1): 746-806 MHz, 806-869 MHz, 4 940-4 990 MHz;

– in Region 3[[2]](#footnote-2): 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, 4 940-4 990 MHz and 5 850-5 925 MHz;

*b)* that Recommendation ITU-R M.2015 – Frequency arrangements for public protection and disaster relief radiocommunication systems in UHF bands in accordance with Resolution
**646 (WRC-03)** provides guidance on frequency arrangements for public protection and disaster relief radiocommunications in certain regions in some of the bands below 1 GHz identified in Resolution **646**.

# 7 Recommendation

The ITU Radiocommunication Assembly,

recommends

that for PPDR operations the radio interface standards as contained in Annexes 1 and 2 should be used.

Annex 1

Broadband radio interface standards for use by PPDR operations
in accordance with Resolution 646 (Rev. WRC-12)

This Annex provides information on broadband standards for use by PPDR operations. References are provided to ITU texts which contain more detailed descriptions of these standards and their capabilities. It is recognized that these standards may not fulfil all the user requirements described in Report ITU-R M.2033, and that each administration and its PPDR organizations will have to analyse the information and determine which standard is most appropriate for their purposes.

# 1 IMT-2000 CDMA Multi-Carrier

The specifications for the radio interface standard IMT-2000 CDMA Multi-Carrier (IMT-2000 CDMA-MC) are developed within 3GPP2 (3rd Generation Partnership Project 2). A full description is available in Annex 2 of [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en). For additional information, see also § 5.2 of [Recommendation ITU R M.1457](http://www.itu.int/rec/R-REC-M.1457/en).

# 2 IMT-2000 CDMA Direct Spread

The specifications for the radio interface standard IMT-2000 CDMA Direct Spread (IMT-2000 CDMA-DS), specifically UTRA FDD, are developed within 3GPP (3rd Generation Partnership Project). A full description is available in Annex 2 of [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en). For additional information, see also § 5.1 of [Recommendation ITU R M.1457](http://www.itu.int/rec/R-REC-M.1457/en).

# 3 IMT-2000 OFDMA TDD WMAN

The radio interface standard IMT-2000 OFDMA TDD WMAN is developed within the IEEE. A full description is available in Annex 2 of [Recommendation
ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en). For additional information, see also § 5.6 of [Recommendation ITU R M.1457](http://www.itu.int/rec/R-REC-M.1457/en).

# 4 IMT-2000 TDMA Single-Carrier

The radio interface standard IMT-2000 TDMA Single-Carrier (TDMA-SC) is developed by ATIS utilizing 3GPP (3rd Generation Partnership Project) specifications. A full description is available in Annex 2 of [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en).
For additional information, see also § 5.4 of [Recommendation ITU R M.1457](http://www.itu.int/rec/R-REC-M.1457/en).

# 5 IMT-2000 CDMA TDD

The specifications for the radio interface standard IMT-2000 CDMA TDD, specifically UTRA TDD, are developed within 3GPP (3rd Generation Partnership Project). This radio interface is called the Universal Terrestrial Radio Access (UTRA) time division duplex (TDD), where three options, called 1.28 Mchip/s TDD, 3.84 Mchip/s TDD and 7.68 Mchip/s can be distinguished. A full description is available in Annex 2 of [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en). For additional information, see also § 5.3 of [Recommendation ITU-R M.1457](http://www.itu.int/rec/R-REC-M.1457/en).

# 6 E-UTRA (LTE)

The specifications for the radio interface standard E-UTRA (LTE) are developed within 3GPP (3rd Generation Partnership Project) for both FDD and TDD. This radio interface is called the Evolved Universal Terrestrial Radio Access (E-UTRA) also referred to as the Long-Term Evolution (LTE). LTE supports scalable carrier bandwidths, from
20 MHz down to 1.4 MHz, and supports both frequency division duplexing (FDD) and time division duplexing (TDD). LTE-Advanced represents the evolution of earlier releases of LTE, being developed by 3GPP as LTE Release 10 and Beyond (LTE-Advanced). A full description is available in Annex 2 and Annex 3 of [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1801/en). For additional information, see §§ 5.1 and 5.3 of [Recommendation ITU-R M.1457](http://www.itu.int/rec/R-REC-M.1457/en), and Annex 1 of Recommendation
ITU-R M.2012.

# 7 SCDMA

The radio interface standard SCDMA is developed within CCSA (China Communications Standards Association). The radio interface supports a channel bandwidth of a multiple of 1 MHz up to 5 MHz. Sub‑channelization and code spread, specially defined inside each 1 MHz bandwidth, provides frequency diversity and interference observation capability for radio resource assignment with bandwidth granularity of 8 kbit/s.
The channelization also allows coordinated dynamic channel allocations among cells to efficiently avoid mutual interference.

The system employs TDD to separate uplink and downlink transmission. For additional information, see Annex 7 of [Recommendation ITU-R M.1801](http://www.itu.int/rec/R-REC-M.1457/en).

Annex 2

Narrow-band radio interface standards for use by PPDR operations
in accordance with Resolution 646 (Rev. WRC-12)

This Annex provides information on narrow-band standards for use by PPDR operations. References are provided to ITU texts which contain more detailed descriptions of these standards and their capabilities. It is recognized that these standards may not fulfil all the user requirements described in Report ITU-R M.2033, and that each administration and its PPDR organizations will have to analyse the information and determine which standard is most appropriate for their purposes.

# 1 Project 25

Project 25 is developed by TIA TR-8 with input from the Project 25 steering committee made up of representatives from the Association of Public Safety Communications Officials International (APCO), the National Association of State Technology Directors (NASTD), selected federal agencies and the National Communications System (NCS). Project 25 operates in 12.5 kHz or 25 kHz channels.

For additional information on the technical and operational characteristics of Project 25, see [Report ITU-R M.2014](http://www.itu.int/publ/R-REP-M.2014/en) and Volume 3 of the Land Mobile Handbook.

# 2 Terrestrial Trunked Radio (TETRA)

The Terrestrial Trunked Radio (TETRA) system was developed in the European Telecommunications Standards Institute (ETSI) as ETSI Project TETRA (now known as ETSI Technical Committee (TC) TETRA) to deliver a digital trunked mobile radio set of standards, under a mandate from the European Commission, for a PMR communications system that could be deployed in Western Europe.

Besides meeting the needs of traditional PMR user organizations, the TETRA standard has also been developed to meet the needs of Public Access Mobile Radio (PAMR) operators.

For additional information on the technical and operational characteristics of TETRA, see [Report ITU-R M.2014](http://www.itu.int/publ/R-REP-M.2014/en).

# 3 Digital Mobile Radio (DMR)

The Digital Mobile Radio (DMR) system was developed by ETSI as a direct digital replacement for analogue PMR while imposing no fundamental changes in the architecture of either conventional or trunked systems.

DMR is a scalable system that can be used in unlicensed mode, and in licensed mode, subject to national frequency planning. It is developed in three “tiers”:

– tier 1 is the low-cost, licence-exempt “digital PMR446”;

– tier 2 is for the professional market offering peer-to-peer mode and repeater mode (licensed);

– tier 3 is for trunked operation (licensed).

DMR is a two slot time-division multiple access (TDMA) system offering digital voice and data solutions, and uses a 4FSK modulation scheme utilizing 6.25 kHz per channel. The standard is designed to operate within the existing 12.5 kHz channel spacing.

For additional information on the technical and operational characteristics of DMR, see ETSI Technical Report TR 102 398 that provides a useful introduction to DMR. Technical Specification TS 102 362 parts 1 to 3 covers DMR protocol conformance testing and test suites, and Technical Specification TS 102 490 defines the narrow-band or “digital PMR” protocol.

The System Reference Documents are ETSI Technical Report TR 102 335-1 (Tier 1 DMR) and TR 102 335-2 (licensed).

Annex 3

Acronyms and abbreviations

3GPP – 3rd Generation Partnership Project

3GPP2 – 3rd Generation Partnership Project 2

APCO – Association of Public Safety Communications Officials International

CDMA TDD – Code division multiple access time division duplex

CDMA-DS – Code division multiple access – Direct spread

CDMA-MC – Code division multiple access – Multi-carrier

DMR – Digital mobile radio

EMS – Enhanced messaging service

ETSI – European Telecommunications Standards Institute

E-UTRA – Evolved Universal Terrestrial Radio Access

FDD – Frequency division duplex

FDMA – Frequency division multiple access

IEEE – Institute of Electrical and Electronics Engineers

LTE – Long-Term Evolution

MMS – Multimedia messaging service

NASTD – National Association of State Technology Directors

NCS – National Communications System

OFDMA TDD WMAN – Orthogonal Frequency Division Multiple Access Time Division Duplex Wireless Metropolitan Area Network

PAMR – Public access mobile radio

PMR – Private mobile radio

PPDR – Public protection and disaster relief

SDO – Standards Developing Organization

SMS – Short-message service

SCDMA – Synchronous Code Division Multiple Access

TDMA – SC – Time division multiple access – Single carrier

TETRA – Terrestrial trunked radio

TIA – Telecommunications Industry Association

TR – Technical report

UHF – Ultra high frequency

UTRA – Universal terrestrial radio access

1. Venezuela has identified the band 380-400 MHz for public protection and disaster relief applications. [↑](#footnote-ref-1)
2. Some countries in Region 3 have also identified the bands 380-400 MHz and 746-806 MHz for public protection and disaster relief applications. [↑](#footnote-ref-2)