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Mobile Communication On Board Aircraft (MCOBA) systems; Harmonised Standard for access to radio spectrum

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI Standardisation Request deliverable Approval Procedure (SRdAP).

For non-EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.10] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A-1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document is part of a set of standards developed by ETSI that are designed to cover radio equipment within the scope of the Radio Equipment Directive 2014/53/EU [i.1]. The present document is produced following the guidance in ETSI EG 203 336 [i.2] as applicable.

Refer to annex C for the structure of this system and further technical explanations.

1 Scope

The present document specifies technical characteristics and methods of measurement for the following equipment types (which are parts of a Mobile Communication On Board Aircraft system):

1) The Onboard Base Transceiver Station (OBTS) supporting GSM and/or UMTS, and/or LTE, and/or NR communication protocols including specific functions for restricting the transmit power of the MSs or UEs, associated with the OBTS.

2) The Network Control Unit (NCU) preventing direct connection of the onboard mobile terminals with mobile networks on the ground by raising the noise floor in the cabin.

The OBTSs are capable of operating in all or any part of the frequency bands given in table 1-1.

Table 1-1: Base Station operating bands

RAT	Band	Direction of transmission	Base Station operating bands
UTRA	1	BS Transmit	2 110 MHz to 2 170 MHz (UMTS)
		BS Receive	1 920 MHz to 1 980 MHz (UMTS)
E-UTRA	3	BS Transmit	1 805 MHz to 1 880 MHz (LTE)
		BS Receive	1 710 MHz to 1 785 MHz (LTE)
GSM	3	BS Transmit	1 805 MHz to 1 880 MHz (GSM)
		BS Receive	1 710 MHz to 1 785 MHz (GSM)
NR	n3	BS Transmit	1 805 MHz to 1 880 MHz (NR)
		BS Receive	1 710 MHz to 1 785 MHz (NR)

The NCU is capable of operating in the frequency bands given in table 1-2.

Table 1-2: NCU operating bands

NCU operating bands	Comment
460 MHz to 470 MHz (see note)	
791 MHz to 821 MHz (see note)	LTE
925 MHz to 960 MHz	GSM
1 805 MHz to 1 880 MHz (see note)	GSM/LTE
2 110 MHz to 2 170 MHz	UMTS
2 570 MHz to 2 620 MHz (see note)	LTE
2 620 MHz to 2 690 MHz (see note)	LTE
NOTE: Implementation of this operating band in an NCU is not mandatory according to the EC Decision [i.4].	

The present document applies only to radio equipment using a transmitting antenna that forms part of the MCOBA system.

It applies to equipment for continuous and discontinuous transmission of data and digital speech.

Within the European Union, the Commission Decisions determine the operational requirements and applicability of the OBTS and NCU. This includes EC Decision 2013/654 [i.3], EC Decision 2016/2317/EU [i.4], which was updated for UMTS, LTE and changed NCU frequency bands, and EC Decision 2022/2324/EU [i.12], updated for 5G NR and further changes to NCU requirements.

The present document contains requirements to ensure that such Radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

The present document does not cover equipment compliance with relevant civil aviation regulations. In this respect, a MCOBA system, for its installation and operation on board an aircraft, is subject to additional national or international civil aviation airworthiness certification requirements, for example, to EUROCAE ED-14G [i.7].

NOTE: The relationship between the present document and the essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found in the ETSI docbox.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI EN 301 908-14 (V15.1.1) (09-2021): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS) Release 15".

[2] ETSI TS 145 005 (V14.7.0) (04-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); GSM/EDGE Radio transmission and reception (3GPP TS 45.005 version 14.7.0 Release 14)".

[3] ETSI TS 145 010 (V14.5.0) (04-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); GSM/EDGE Radio subsystem synchronization (3GPP TS 45.010 version 14.5.0 Release 14)".

[4] ETSI TS 145 008 (V14.10.0) (04-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); GSM/EDGE Radio subsystem link control (3GPP TS 45.008 version 14.10.0 Release 14)".

[5] ETSI TS 136 141 (V14.14.00) (03-2022): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 14.14.0 Release 14)".

[6] ETSI TS 151 021 (V14.8.0) (04-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); Base Station System (BSS) equipment specification; Radio aspects (3GPP TS 51.021 version 14.8.0 Release 14)".

[7] ETSI EN 301 908-3 (V13.1.1) (09-2019): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 3: CDMA Direct Spread (UTRA FDD) Base Stations (BS)".

[8] ETSI EN 301 908-18 (V15.1.1) (09-2021): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS) Release 15".

[9] ETSI TS 125 141 (V14.3.0) (10-2017): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 14.3.0 Release 14)".

[10] ETSI TS 125 331 (V14.5.0) (01-2018): "Universal Mobile Telecommunications System (UMTS); Radio Resource Control (RRC); Protocol specification (3GPP TS 25.331 version 14.5.0 Release 14)".

[11] ETSI TS 136 101 (V14.26.0) (10-2023): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 14.26.0 Release 14)".

[12] ETSI TS 136 331 (V14.18.0) (10-2024): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification (3GPP TS 36.331 version 14.18.0 Release 14)".

[13] ETSI TS 125 133 (V14.2.0) (04-2018): "Universal Mobile Telecommunications System (UMTS); Requirements for support of radio resource management (FDD) (3GPP TS 25.133 version 14.2.0 Release 14)".

[14] ETSI EN 301 908-24 (V15.1.1) (09-2023): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 24: New Radio (NR) Base Stations (BS) Release 15".

[15] ETSI TS 138 101-1 (V16.20.0) (08-2024): "5G; NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (3GPP TS 38.101-1 version 16.20.0 Release 16)".

[16] ETSI TS 138 331 (V16.18.0) (10-2024): "5G; NR; Radio Resource Control (RRC); Protocol specification (3GPP TS 38.331 version 16.18.0 Release 16)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (Radio Equipment Directive).

[i.2] ETSI EG 203 336 (V1.2.1) (05-2020): "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

[i.3] Commission Decision 2013/654/EU amending Decision 2008/294/EC to include additional access technologies and frequency bands for mobile communications services on aircraft (MCA services), 12.11.2013.

[i.4] Commission Decision 2016/2317/EU amending Decision 2008/294/EC and Implementing Decision 2013/654/EU, in order to simplify the operation of mobile communications on board aircraft (MCA services) in the Union, 16.12.2016.

[i.5] CEPT/ERC/REC 74-01 (01-2011) (equivalent to Recommendation ITU-R SM.329-12): "Unwanted emissions in the spurious domain".

[i.6] Void.

[i.7] EUROCAE ED-14G (05-2011): "Environmental Conditions and Test Procedures for Airborne Equipment".

[i.8] 3GPP2 C.S0011-C (V2.0): "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations".

[i.9] ETSI TS 125 104 (V14.2.0) (07-2017): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 14.2.0 Release 14)".

[i.10] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

[i.11] ETSI EN 301 908-1 (V15.2.1) (01-2023): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements; Release 15".

[i.12] Commission Decision 2022/2324/EU amending Decision 2008/294/EC and Implementing Decision 2013/654/EU and Implementing Decision 2016/2317/EU, to include additional access technologies and measures for the operation of mobile communications services on aircraft (MCA services) in the Union, 23.11.2023.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

Base Station class (BS class): classification of BS according to its intended use: micro-BTS, pico-BTS, wide area Base Station, medium range Base Station, local area Base Station or Home Base Station

Base Station System Test Equipment (BSSTE): functional tool for the purpose of acceptance testing of GSM, UMTS or LTE Base Station Systems

NOTE: The BSSTE functionally carries out all tests described in the OBTS specification.

environmental profile: declared range of environmental conditions under which equipment within the scope of the present document is required to be compliant

Mobile Communication On Board Aircraft system (MCOBA or MCA): system comprising the functions provided by the NCU and the OBTS

Network Control Unit (**NCU):** component of the Mobile Communication On Board Aircraft system preventing direct connection of the onboard mobile terminals with mobile networks on the ground by raising the noise floor in the cabin

Onboard Base Transceiver Station (OBTS): component of the Mobile Communication On Board Aircraft system responsible for radio transmission and reception to or from the onboard mobile terminals

RRC filtered mean power: mean power as measured through a root raised cosine filter with roll-off factor α and a bandwidth equal to the chip rate of the radio access mode

NOTE: The RRC filtered mean power of a perfectly modulated WCDMA signal is 0,246 dB less than the mean power of the same signal.

Special Test Equipment (STE): functional tool to enable and disable transmission, simulating the action performed when the aircraft changes geographical location

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Bw	Bandwidth of one band
dB	decibel
dBm	decibel relative to 1 mW
Fc	centre frequency of the band
P_{max}	Maximum output power (per band)
$P_{max,c}$	Maximum output power (per carrier)

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AAS	Active Antenna System
ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
ACU	Antenna Coupler Unit

AGL	Above Ground Level
BCCH	Broadcast Control CHannel
BCH	Broadcast Channel
BER	Bit Error Rate
BLER	Block Error Rate
BS	Base Station
BSC	Base Station Controller
BSSTE	Base Station System Test Equipment
BTS	Base Transceiver Station
BW	Bandwidth
CACLR	Cumulative Adjacent Channel Leakage Ratio
CW	Continuous Wave
DC	Direct Current
DCS	Digital Cellular System
DL-SCH	DownLink Shared Channel
DTM	Dual Transfer Mode
e.i.r.p.	equivalent isotropically radiated power
EC	European Commission
ECC	Electronic Communications Committee
EFTA	European Free Trade Association
EMC	ElectroMagnetic Compatibility
EU	European Union
FDD	Frequency Division Duplexing
FER	Frame Error Rate
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
IMT	International Mobile Telecommunications
LTE	Long Term Evolution
MCA	Mobile Communication on Aircraft
MCOBA	Mobile Communication On Board Aircraft
MS	Mobile Station
NCU	Network Control Unit
Non-AAS	Non-Active Antenna System
NR	New Radio (also known as 5G)
OBTS	Onboard Base Transceiver Station
OBUE	Operating Band Unwanted Emission
PBCCH	Packet Broadcast Control CHannel
RACH	Random Access CHannel
RBER	Residual BER
RBW	Resolution BandWidth
RF	Radio Frequency
RMS	Root Mean Square
RRC	Radio Resource Control
RX	Receive
SIB	System Information Block
STE	Special Test Equipment
TCH	Traffic CHannel
TX	Transmit
UE	User Equipment
UL	UpLink
UMTS	Universal Mobile Telecommunications System
UTRA	Universal Terrestrial Radio Access
UTRAN	Universal Terrestrial Radio Access Network
VBW	Video BandWidth
WCDMA	Wideband Code Division Multiple Access