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

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ITh STANDARD PREVIEW
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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG).

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.

National transposition dates

Date of adoption of this EN:	20 September 2021
Date of latest announcement of this EN (doa):	31 December 2021
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2022
Date of withdrawal of any conflicting National Standard (dow):	30 June 2023

Modal verbs terminology

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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.

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

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[ETSI EN 302 480 V2.2.1 \(2021-09\)](#)

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1 Scope

The present document specifies technical characteristics and methods of measurements 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 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

Band designation	Direction of transmission	Base Station operating bands
UTRA I	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)
DCS 1800	BS Transmit	1 805 MHz to 1 880 MHz (GSM)
	BS Receive	1 710 MHz to 1 785 MHz (GSM)

The NCU is capable of operating in all of 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 a NCU is not mandatory according to the EC Decision [i.4].

The present document applies only to radio equipment using a dedicated transmitting antenna that is designed as an indispensable part of the system for usage on board an aircraft.

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

Within the European Union, the system covered by the present document operates in accordance with the operational requirements as outlined in the Commission Decision 2016/2317/EU [i.4] based on the former Decision 2013/654 [i.3]. In relation the NCU, some frequency bands are now optional while they were mandatory before. Due to this difference the present document had to be reviewed.

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.

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the Radio Equipment Directive [i.1] may apply to equipment within the scope of the present document.

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 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.

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

- [1] ETSI EN 301 908-14 (V13.1.1) (09-2019): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)".
- [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 (V14.13.0) (04-2021): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 14.13.0 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 (V13.1.1) (09-2019): "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)".
- [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 (V14.17.0) (02-2021): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 14.17.0 Release 14)".

- [12] ETSI TS 136 331 (V14.16.0) (01-2021): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification (3GPP TS 36.331 version 14.16.0 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)".

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 (V13.1.1) (11-2019): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements".

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): micro-BTS, pico-BTS, wide area Base Station, medium range Base Station, local area Base Station or Home Base Station, as declared by the manufacturer

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

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
F _c	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:

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
BSSTE	Base Station System Test Equipment
BTS	Base Transceiver Station
BW	Bandwidth
CACLR	Cumulative Adjacent Channel Leakage Ratio
CW	Continuous Wave
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
GGW	Ground GateWay
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
IMT	International Mobile Telecommunications
ITU-R	International Telecommunication Union - Radiocommunication sector
LTE	Long Term Evolution
MCOBA	Mobile Communication On Board Aircraft
MS	Mobile Station
MSC	Mobile Switching Centre
NCU	Network Control Unit
OBTS	Onboard Base Transceiver Station
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
SGSN	Serving GPRS Support Node
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

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4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be in accordance with its intended use. The equipment shall comply with all the technical requirements of the present document, at all times when operating within the boundary limits of the operational environmental profile defined by its intended use.

The operational environmental profile shall at least contain all environmental conditions in the test environments referenced from the essential radio test suites in clause 5.

4.2 Conformance requirements

4.2.1 Introduction

The requirements in the present document are based on the assumption that the operating band (see table 1-1) is shared between systems of the IMT family or systems having compatible characteristics.

To meet the essential requirement under article 3.2 of Directive 2014/53/EU [i.1] for IMT Base Stations (BSs), a set of essential parameters in addition to those in ETSI EN 301 908-1 [i.11] have been identified. Table 4.2.1-1 provides a cross reference between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document.

Table 4.2.1-1: Cross references

Essential parameter	Corresponding technical requirements	Corresponding test suite
Transmitter spectrum mask	4.2.2.2 GSM-OBTS output RF spectrum	Note
Transmitter unwanted emissions in the out-of-band domain	4.2.3.2 UTRA-OBTS Spectrum Mask	Note
	4.2.3.3 UTRA-OBTS Adjacent Channel Leakage power Ratio (ACLR)	Note
	4.2.4.2 E-UTRA-OBTS operating band unwanted emissions	Note
	4.2.4.3 E-UTRA-OBTS Adjacent Channel Leakage power Ratio (ACLR)	Note
	4.2.5.3 NCU out-of-band emissions	5.2.5.1
	4.2.6.1 MCOBA Unwanted emissions in the out-of-band domain	5.2.5.1
Transmitter unwanted emissions in the spurious domain	4.2.2.6 GSM-OBTS spurious emissions	Note
	4.2.3.4 UTRA-OBTS Transmitter spurious emissions	Note
	4.2.4.4 E-UTRA-OBTS transmitter spurious emissions	Note
	4.2.5.4 NCU spurious emissions	5.2.5.2
	4.2.6.2 MCOBA Unwanted emissions in the spurious domain	5.2.5.2
Transmitter power accuracy	4.2.6.3 MCOBA Cessation of emission	5.2.5.3
	4.2.2.1 GSM-OBTS maximum output power	Note
	4.2.2.4 GSM-OBTS controlled MS RF power	5.2.1
	4.2.3.5 UTRA-OBTS maximum output power	Note
	4.2.3.11 UTRA-OBTS controlled UE RF power	5.2.2
	4.2.4.5 E-UTRA-OBTS maximum output power	Note
	4.2.4.11 E-UTRA-OBTS controlled UE RF power	5.2.3
Transmitter frequency stability	4.2.5.1 NCU maximum mean power spectral density	5.2.4.1
	4.2.5.2 NCU power flatness	5.2.4.2
Transmitter frequency stability	4.2.2.3 GSM-OBTS radio frequency tolerance	Note
Transmitter intermodulation attenuation	4.2.3.6 UTRA-OBTS Transmit intermodulation	Note
	4.2.4.6 E-UTRA-OBTS transmit intermodulation	Note
Receiver unwanted emissions in the spurious domain	4.2.3.7 UTRA-OBTS Receiver spurious emissions	Note
	4.2.4.7 E-UTRA-OBTS receiver spurious emissions	Note
Receiver blocking	4.2.3.8 UTRA-OBTS Blocking characteristics	Note
Receiver desensitization	4.2.4.8 E-UTRA-OBTS Blocking characteristics	Note
Receiver radio-frequency intermodulation	4.2.3.9 UTRA-OBTS Receiver intermodulation characteristics	Note
	4.2.4.9 E-UTRA-OBTS receiver intermodulation characteristics	Note
Receiver adjacent signal selectivity	4.2.3.10 UTRA-OBTS Receiver adjacent channel selectivity	Note
	4.2.4.10 E-UTRA-OBTS Adjacent Channel Selectivity (ACS) and narrow-band blocking	Note
Receiver sensitivity	4.2.2.5 GSM-OBTS reference sensitivity level	Note
	4.2.3.12 UTRA-OBTS reference sensitivity level	Note
	4.2.4.12 E-UTRA-OBTS reference sensitivity level	Note

NOTE: Conformance of technical requirements not defined in this table are defined in table 4.2.1-2.

The manufacturer shall declare the following:

- The operating band(s) supported by the Base Station according to table 1-1.

- The intended class of the BS under test, as specified in applicable specification:
 - GSM: clause 4.1 in ETSI TS 151 021 [6], or clause 4.1 in ETSI TS 145 005 [2]
 - UTRA: clause 4.3A in ETSI TS 125 141 [9]
 - E-UTRA: clause 4.2 in ETSI TS 136 141 [5]

Table 4.2.1-2: Test suites for demonstrating BS conformance

Corresponding technical requirements	Corresponding test suite
4.2.2.2 GSM-OBTS output RF spectrum	6.5.1.2 of ETSI TS 151 021 [6] 4.2.2 of ETSI TS 145 005 [2]
4.2.3.2 UTRA-OBTS Spectrum Mask	5.3.1 of ETSI EN 301 908-3 [7]
4.2.3.3 UTRA-OBTS Adjacent Channel Leakage power Ratio (ACLR)	5.3.2 of ETSI EN 301 908-3 [7]
4.2.4.2 E-UTRA-OBTS operating band unwanted emissions	5.3.1 of ETSI EN 301 908-14 [1]
4.2.4.3 E-UTRA-OBTS Adjacent Channel Leakage power Ratio (ACLR)	5.3.2 of ETSI EN 301 908-14 [1]
4.2.2.6 GSM-OBTS spurious emissions	7.9.2 of ETSI TS 151 021 [6]
4.2.3.4 UTRA-OBTS Transmitter spurious emissions	5.3.3 of ETSI EN 301 908-3 [7]
4.2.4.4 E-UTRA-OBTS transmitter spurious emissions	5.3.3 of ETSI EN 301 908-14 [1]
4.2.2.1 GSM-OBTS maximum output power	6.3.2 of ETSI TS 151 021 [6]
4.2.3.5 UTRA-OBTS maximum output power	5.3.4 of ETSI EN 301 908-3 [7]
4.2.4.5 E-UTRA-OBTS maximum output power	5.3.4 of ETSI EN 301 908-14 [1]
4.2.2.3 GSM-OBTS radio frequency tolerance	6.2.2 of ETSI TS 151 021 [6]
4.2.3.6 UTRA-OBTS Transmit intermodulation	5.3.5 of ETSI EN 301 908-3 [7]
4.2.4.6 E-UTRA-OBTS transmit intermodulation	5.3.5 of ETSI EN 301 908-14 [1]
4.2.3.7 UTRA-OBTS Receiver spurious emissions	5.3.6 of ETSI EN 301 908-3 [7]
4.2.4.7 E-UTRA-OBTS receiver spurious emissions	5.3.6 of ETSI EN 301 908-14 [1]
4.2.3.8 UTRA-OBTS Blocking characteristics	5.3.7 of ETSI EN 301 908-3 [7]
4.2.4.8 E-UTRA-OBTS Blocking characteristics	5.3.7 of ETSI EN 301 908-14 [1]
4.2.3.9 UTRA-OBTS Receiver intermodulation characteristics	5.3.8 of ETSI EN 301 908-3 [7]
4.2.4.9 E-UTRA-OBTS receiver intermodulation characteristics	5.3.8 of ETSI EN 301 908-14 [1]
4.2.3.10 UTRA-OBTS Receiver adjacent channel selectivity	5.3.9 of ETSI EN 301 908-3 [7]
4.2.4.10 E-UTRA-OBTS Adjacent Channel Selectivity (ACS) and narrow-band blocking	5.3.9 of ETSI EN 301 908-14 [1]
4.2.2.5 GSM-OBTS reference sensitivity level	7.3.2 of ETSI TS 151 021 [6]
4.2.3.12 UTRA-OBTS reference sensitivity level	5.3.11 of ETSI EN 301 908-3 [7]
4.2.4.12 E-UTRA-OBTS reference sensitivity level	5.3.13 of ETSI EN 301 908-14 [1]

4.2.2 GSM-OBTS performance

4.2.2.1 GSM-OBTS maximum output power

4.2.2.1.1 Definition

Output power refers to the measure of the power when averaged over the useful part of the burst (see clause 4.1.2 of ETSI TS 145 005 [2]).

4.2.2.1.2 Limits

The limit for the OBTS maximum output power shall conform to the maximum limit in clause 4.1.2 of ETSI TS 145 005 [2] for the DCS 1800 BTS power class P1.

NOTE: Conformance to the power limits in clause 4.1.2 of ETSI TS 145 005 [2] for the BTS power class P1 should not be interpreted as conformance of e.i.r.p. authorization limits as defined in the Decision 2016/2317/EU [i.4].

4.2.2.1.3 Conformance

Conformance tests described in clause 6.3.2 of ETSI TS 151 021 [6] shall be carried out.