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Generic Standard 7 – Electromagnetic Compatibility

This document details the minimum Electromagnetic Compatility (EMC) requirements for network equipment supplied to any part of BT.

About this document ...

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1 *Introduction*

This document details the minimum Electromagnetic Compatibility (EMC) requirements for the supply of network equipment containing electrical or electronic components ("**Equipment**") to any part of BT. Equipment may be stand alone, or as part of a larger system. The EMC requirements set out in this document relate to equipment that is primarily intended for use in the United Kingdom and the European Union. In other countries where it is to be used the equipment shall comply with the appropriate EMC requirements and laws for that region in addition to those defined in this document.

This document does not apply to software or firmware provided that such software or firmware does not change the EMC characteristics of the equipment. In such event the equipment will need to be rechecked for compliance with the requirements in this document.

Note: A "**System**" is defined as a combination of several items of equipment, finished products and/or components combined, designed and/or put together by a supplier and intended to be physically installed and operated together. It may also be known as a "**Fixed Installation**". For the avoidance of doubt, the individual items may be supplied by different suppliers. A System must comply with these requirements as a single entity and not just the individual items used to construct it.

2 *Electromagnetic Compatibility requirements*

	Applicable to:	**Requirements**
2.1	All	Equipment without any radio functions shall be compliant with the EU Electromagnetic Compatibility Directive (2014/30/EC, UK Statutory Instrument 2016 No. 1091). Equipment with radio functionality shall be compliant with Article 3.1(b) of the EU Radio Equipment Directive (2014/53/EU, UK Statutory Instrument 2017 No. 1206). The supplier shall confirm to BT which of the above directives is applicable to the Equipment being supplied.
2.2	All	Equipment shall be fully compliant with all applicable Harmonised EMC Standards as currently listed in the EU Official Journal for the relevant directive. The supplier shall provide a list of EMC standards that the equipment complies with. Where later versions of a standard have been

		published by the Standards Body the supplier shall indicate if the equipment also complies with the latest published version. For Equipment intended to be located in customer's premises or street furniture, it shall comply with emission requirements applicable for a residential environment (typically Class B emission limits). NOTE: EU Official Journal lists can be found at: **EMC Directive**: http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/electromagnetic-compatibility/ **Radio Equipment Directive:** https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/red_en
2.3	All	Where compliance with requirement 2.1 is not based on the full application of all applicable Harmonised EMC Standards then the manufacturer shall have a positive statement or EU type examination certificate from an appropriate Notified Body attesting that the essential requirements of the relevant directive have been met. NOTE: This approach is detailed in Annex III of the directives.
2.4	All	Equipment intended to be part of the BT network infrastructure and installed or operated in an operational BT building (including street cabinets) shall comply with the enhanced immunity requirements given in section 4 of this document. NOTE: These requirements: a) are higher than those required for CE marking; b) are not applicable to telephone or other service provider equipment located on the customer's premises; and c) shall be met when cabinet doors or shelf covers are open or removed, as would be the case during maintenance procedures.
2.5	Fixed Installations	Installers of "Fixed Installations" shall ensure the installation complies with the requirements EU Directive on EMC (2014/30/EC) and a technical document detailing the "good engineering practices" used as referred to in point 2 of Annex I of the relevant directive shall be made available to BT.
2.6	Maintenance or repairs	Maintenance or repairs to existing equipment or installations shall not have any significant detrimental impact on the EMC performance of the original equipment. Only spare parts approved by the original equipment manufacturer should be used. Spare parts from other sources should not be used unless either: a) they are subsequently approved by the original equipment manufacturer or installer; or b) the supplier or installer ensures that the original Equipment when fitted with the part(s) comply with the requirements given in 2.1 to

		2.5 above.

3 *Further information and documentation requirements*

3.1	The supplier shall inform BT if: a) the equipment requires a dedicated earth connection separate from that in a normal power supply connection in order to ensure EMC compliance; b) the equipment requires any additional external filters to ensure EMC (for example, power filter / conditioner or clip-on ferrite filters) that are not already permanently part of the equipment to ensure EMC compliance; and c) the EMC compliance of the equipment requires the use of any screened/shielded cabling (additional to any intra-equipment cabling that is supplied). Note: Typically the access network and cabling within customer's properties is installed using unscreened twisted pair cables only.
3.2	EU Directives define certain economic operator roles: a) the manufacturer, b) the authorised representative, c) the importer, and d) the distributor. The supplier shall identify if BT is expected to assume one of these roles for the equipment supplied.
3.3	The supplier will make the following documents available to BT upon request: a) EU Declaration of Conformity; b) Positive statement from Notified Body (if applicable, see 2.3); c) EMC technical documentation and test reports; and d) technical documentation detailing the compliance of a 'fixed installation' (if applicable, see 2.5)

4 *Enhanced EMC immunity requirements for equipment with respect to interference from Mobile devices*

4.1 Overview

BT requires that all equipment is immune to the threats posed by mobile devices when used in close proximity to it. The equipment shall be immune when cabinet doors or shelf covers are removed, as would be the case during maintenance procedures.

Therefore in addition to the minimum requirements specified by Harmonised EMC Standards, BT also requires that all telecommunication network equipment meets the minimum requirements set out in the following sections.

4.2 Methodology

Radiated immunity testing will be carried out using the methodology given in EN61000-4-3 (latest version) at the frequencies and test levels given in Table 1 below. The signal source will be a generator capable of simulating the radio technology and modulation type defined in the table below. If a suitable test simulator is not available, then a signal generator may be used if it is capable of emulating the radio technology. For example, the carrier of GSM should be pulsed at a rate of 217 Hz with a 12.5% duty cycle (on for 576us repeated every 4.6ms). The methodology used must be included in the technical report sent to BT.

The test levels given in the table below are the CW levels prior to the addition of the access method and modulation. The field uniformity of the calibrated volume will be within the range 0 to +6 dB with respect to these values.

All testing will be carried out with the cabinet/rack doors open and all shelf covers removed.

Technology	**Frequency Range of Test [MHz]**	**Test Level [V/m]**	**Max. Step Size [kHz]**	**Access Method/ Modulation**	**Comments**

4G	832 – 862	20	500	OFDM	
2G	880 – 915	50	200	TDMA/GMSK	If necessary, this can be simulated with pulse modulation of 217Hz and 12.5% duty cycle
2G / 4G	1710 – 1785	35	200	TDMA/GMSK	If necessary, this can be simulated with pulse modulation of 217Hz and 12.5% duty cycle
DECT	1880 – 1900	20	1000	TDMA/GFSK	If necessary, this can be simulated with pulse modulation of 100Hz and 4% duty cycle
3G TDD	1900 – 1920	50	2000	OFDM	
3G	1920 – 1980	50	2000	WCDMA/QPSK	
2.4 GHz LAN	2400 – 2480	12	2000	DSSS/PBCC	This is considered sufficient to also cover the threat from Bluetooth devices
4G	2500 – 2570	20	1000	OFDM	
4G TDD	2570 – 2620	20	1000	OFDM	
4G / 5G TDD	3410 – 4009	20	1000	OFDM	
5 GHz LAN	5150 - 5350	12	2000	OFDM	

NOTES

During testing, the minimum test distance may be reduced to 0.5m between the antenna and the equipment, provided the uniformity requirements of the test area can be satisfied. Care should be taken to ensure that the entirety of the equipment surface is exposed to the field, which may require several positions of the test antenna / test area.

Later versions of the test method can be used when published. If agreed with BT, an alternative test method may also be used if the results can be correlated to the above requirements.

4.3 Performance requirements

During the application of the test signals, the equipment shall be fully monitored for any disruption including: functional failures, equipment errors, data errors, loss of synchronisation and lock-up.

The Equipment shall continue to function as intended during the application of the tests without any form of malfunction, self-recovery or manual intervention. Acoustic noise within analogue circuits is permitted.

5 *Abbreviations*

CW - Carrier Wave

DSS - Direct Sequence Spread Spectrum

EN - European Norm

EU - European Union

EMC - Electromagnetic Compatibility

GSM - Global System for Mobile Communications

OFDM - Orthogonal Frequency Division Multiplex

PBCC - Packet Binary Convolution Coding

QPSK - Quadrature Phase Shift Keying

TDMA - Time Division Multiple Access

UMTS - Universal Mobile Telecommunications System

WCDMA - Wideband Code Division Multiple Access

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