

MCMC MTSFB TC T017:2021

TECHNICAL CODE

IMT-2020 (FIFTH GENERATION) - BASE STATION

Developed by



Registered by



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Development of technical codes

The Communications and Multimedia Act 1998 ('the Act') provides for Technical Standards Forum designated under section 184 of the Act or the Malaysian Communications and Multimedia Commission ('the Commission') to prepare a technical code. The technical code prepared pursuant to section 185 of the Act shall consist of, at least, the requirement for network interoperability and the promotion of safety of network facilities.

Section 96 of the Act also provides for the Commission to determine a technical code in accordance with section 55 of the Act if the technical code is not developed under an applicable provision of the Act and it is unlikely to be developed by the Technical Standards Forum within a reasonable time.

In exercise of the power conferred by section 184 of the Act, the Commission has designated the Malaysian Technical Standards Forum Bhd ('MTSFB') as a Technical Standards Forum which is obligated, among others, to prepare the technical code under section 185 of the Act.

A technical code prepared in accordance with section 185 shall not be effective until it is registered by the Commission pursuant to section 95 of the Act.

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Committee representation

This technical code was developed by the 5G Equipment Sub Working Group under the Fixed and Wireless Terminal Working Group of the Malaysian Technical Standards Forum Bhd (MTSFB), which consists of representatives from the following organisations:

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Huawei Technologies (Malaysia) Sdn Bhd
Maxis Broadband Sdn Bhd
Redsun Engineering Sdn Bhd
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Sony EMCS Malaysia Sdn Bhd
Telekom Malaysia Bhd
U Mobile Sdn Bhd
Webe Digital Sdn Bhd
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YTL Communications Sdn Bhd

Foreword

This technical code for the IMT-2020 (Fifth Generation) - Base Station ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd ('MTSFB') via its Wireless Terminal Working Group.

This Technical Code was developed for the purpose of certifying communications equipment under the Communications and Multimedia (Technical Standards) Regulations 2000.

This Technical Code shall continue to be valid and effective from the date of its registration until it is replaced or revoked.

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IMT-2020 (FIFTH GENERATION) - BASE STATION

1. Scope

This technical code specifies the minimum requirements for Base Station (BS) that are intended for use in IMT-2020 mobile telecommunications systems in Malaysia.

This Technical Code applies to IMT-2020 (Fifth Generation) Base Station (5G BS) based on the technologies as specified in applicable Malaysian Standards, technical codes, international standards, ITU Recommendations and its radio regulations as agreed and adopted by Malaysia.

2. Normative references

The following normative references are indispensable for the application of this Technical Code. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

See Annex A.

3. Abbreviations

5G BS	IMT-2020 (Fifth Generation) Base Station
AAS	Active Antenna System
AC	Alternating Current
ACLR	Adjacent Channel Selectivity Ratio
BS	Base Station
EDGE	Enhanced Data Rate for Global Evolution
EMC	Electromagnetic Compatibility
FDD	Frequency Division Duplexing
GSM	Global System for Mobile Communications
IMT	International Mobile Telecommunications
LTE	Long Term Evolution
MSR	Multi-Standard Radio
NB-IoT	Narrowband-Internet of Things
NR	New Radio
PVC	Polyvinyl Chloride
RF	Radio Frequency
SRSP	Standard Radio System Plan
TDD	Time Division Duplexing
UMTS	Universal Mobile Telecommunications Service

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4. Requirements

4.1 General requirements

4.1.1 Power supply

If the 5G BS is equipped with power supply, the Alternating Current (AC) adaptor or rectifier for 5G BS shall not affect the capability of the equipment to meet this specification. The operating voltage shall be 240 V + 5 % - 10 % and the frequency of 50 Hz \pm 1 % for single phase equipment and 415 V + 5 % - 10 % and the frequency of 50 Hz \pm 1 % for 3-phase equipment as according to MS 406 or MS IEC 60038 whichever is current.

Adaptor shall be pre-approved by the relevant regulatory body before being used with the equipment.

4.1.2 Power supply cord and mains plug

If the 5G BS is equipped with power supply cord and mains plug, the equipment shall be fitted with a suitable and appropriately approved power supply cord and mains plug. The power supply cord and mains plug are regulated products and shall be pre-approved by the relevant regulatory body with the following requirements before being used with the equipment:

- a) The power supply cord shall be certified according to:
 - i) MS 2112-5 or BS EN 50525-2-11 or IEC 60227-5 (for Polyvinyl Chloride (PVC) insulated - flexible cables/cords); or
 - ii) MS 2127-4 or IEC 60245-1 (for rubber insulated - flexible cables/cords).
- b) The mains plug shall be certified according to:
 - i) MS 589-1 or BS 1363 (for 13 A, fused plug); or
 - ii) MS 1577 (for 15 A, fused plugs); or
 - iii) MS 1578 or BS EN 50075 (for 2.5 A, 250 V, flat non-rewireable two-pole plugs with cord for the connection of class II equipment).

4.1.3 Marking

The 5G BS shall be marked with the following information:

- a) supplier/manufacturer's name or identification mark;
- b) supplier/manufacturer's model or type reference; and
- c) other markings as required by the relevant standards.

The markings shall be legible, inedible and readily visible. All information on the marking shall be either in Bahasa Melayu or English Language.

4.2 Technical requirements

The 5G BS shall comply with the following requirements:

- a) Radio Frequency (RF);
- b) Electromagnetic Compatibility (EMC); and
- c) Safety and health requirements.

4.2.1 Radio Frequency (RF)

The 5G BS shall operate in any of the following frequency bands as defined in Table 1.

Table 1. Operating band plans

No	Frequency (MHz)	Duplex mode	Operating band		Band Plan Reference
			Uplink (MHz)	Downlink (MHz)	
1	700	FDD	703 - 743	758 - 798	MCMC SRSP MS 700
2	3 500	TDD	3 400 – 3 600		MCMC SRSP MS 3500
3	28 000	TDD	26 500 - 28 100		MCMC SRSP MS 28000

Notwithstanding the mentioned bands above in Table 1, 5G BS may operate in other existing frequency bands identified for the International Mobile Telecommunications (IMT) Systems as specified in the Spectrum Plan and relevant Standard Radio System Plan (SRSP)s. The frequency bands are listed in Annex B.

4.2.1.1 Conformity

Depending on the technology supported by the base station, the 5G BS shall comply with the frequency bands stated in Table 1 and the requirements of one or more of the standards as defined in item (a), (b) or (c) of Table 2.

Table 2. Standards for conformity

Item	Base Station Technology	Reference
a)	<ul style="list-style-type: none"> i) NR BS ii) Narrowband-Internet of Things (NB-IoT) operation in NR in-band BS 	<ul style="list-style-type: none"> i) 3GPP TS 38.141-1 (at least Release 15); ii) 3GPP TS 38.141-2 (at least Release 15); iii) ETSI TS 138.141-1 (at least Version 15); and/or iv) ETSI TS 138 141-2 (at least Version 15).

Table 2. Standards for conformity (continued)

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Item	Base Station Technology	Reference
b)	i) NR Multi-Standard Radio (MSR) BS ii) NB-IoT MSR BS	i) 3GPP TS 37.141 (at least Release 15); or ii) ETSI TS 137 141 (at least Version 15).
c)	i) NR Active Antenna System (AAS) BS ii) NR MSR AAS BS	i) 3GPP TS 37.145-1 (at least Release 15); ii) 3GPP TS 37.145-2 (at least Release 15); iii) ETSI TS 137 145-1 (at least Version 15); and/or iv) ETSI TS 137 145-2 (at least Version 15).

The 5G BS shall comply with the minimum parameters of the above standards as specified in Annex C.

If the 5G BS supports technologies other than 5G, for example Long Term Evolution (LTE), Universal Mobile Telecommunications Service (UMTS) and Global System for Mobile Communications (GSM)/ Enhanced Data GSM Environment (EDGE) suppliers shall demonstrate that the 5G BS has been tested and certified for conformance to related Technical Codes or Class Assignments.

In the case of 5G BS support multiple network modes, the priority shall be configured to 5G followed by LTE, UMTS, and/or GSM/EDGE.

4.2.2 Electromagnetic Compatibility (EMC)

The 5G BS shall comply with the EMC emission requirements as defined in ETSI TS 138 113 or any equivalent standards.

4.2.3 Safety and health

4.2.3.1 Electrical safety and health

The 5G BS shall comply with the electrical safety requirements defined in MS IEC 60950-1, IEC 60950-22, IEC 62368-1 or any equivalent standards.

Annex A
(normative)

Normative references

MS 406, *Specification for voltages and frequency for alternating current transmission and distribution systems (Second revision)*

MS 589-1, *13 A Plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs (Fourth revision)*

MS 1577, *Specification for 15 a plugs and socket-outlets for domestic and similar purposes*

MS 1578, *Specification for flat non-rewirable two-pole plugs, 2.5 A, 250 V with cord, for the connection of Class II - Equipment for household and similar purposes*

MS 2112-5, *Electric cable and wire - Polyvinyl Chloride (pvc) insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables*

MS 2127-4, *Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables*

MS IEC 60038, *IEC standard voltages*

MS IEC 60950-1, *Information technology equipment - Safety - Part 1: General requirements (First revision) (IEC 60950-1:2005, IDT)*

IEC 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements*

IEC 60227-5, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)*

IEC 60245-1, *Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 1: General requirements*

IEC 60950-22, *Information technology equipment - Safety - Part 22: Equipment to be installed outdoors*

IEC 62368-1, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

ETSI TS 137 141, *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; NR, E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing (3GPP TS 37.141)*

ETSI TS 137 145-1, *Universal Mobile Telecommunications System (UMTS); LTE; Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing (3GPP TS 37.145-1)*

ETSI TS 137 145-2, *Universal Mobile Telecommunications System (UMTS); LTE; Active Antenna System (AAS) Base Station (BS) conformance testing; Part 2: radiated conformance testing (3GPP TS 37.145-2)*

ETSI TS 138 104, *5G; NR; Base Station (BS) radio transmission and reception (3GPP TS 38.104)*

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ETSI TS 138 113, 5G; NR; Base Station (BS) ElectroMagnetic Compatibility (EMC) (3GPP TS 38.113)

ETSI TS 138 141-1, 5G; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing (3GPP TS 38.141-1)

ETSI TS 138 141-2, 5G; NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing (3GPP TS 38.141-2)

3GPP TS 37.141, NR, E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing

3GPP TS 37.145-1, Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing

3GPP TS 37.145-2, Active Antenna System (AAS) Base Station (BS) conformance testing; Part 2: radiated conformance testing

3GPP TS 38.104, NR; Base Station (BS) radio transmission and reception

3GPP TS 38.141-1, NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing

3GPP TS 38.141-2, NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing

BS EN 50525-2-11, Electric cables. Low voltage energy cables of rated voltages up to and including 450/750V (U0/U). Cables for general applications. Flexible cables with thermoplastic PVC insulation

BS EN 50075, Specification for flat non-wirable two-pole plugs 2.5 A 250 V, with cord, for the connection of class II-equipment for household and similar purposes

BS 1363-1, Fire resistance tests. General requirements

Annex B
(normative)

Existing frequency bands identified for IMT systems in Malaysia

No	Frequency (MHz)	Band	Duplex mode	Operating band		Reference
				Uplink (MHz)	Downlink (MHz)	
1	800	20	FDD	839 - 844	798 - 803	MCMC SRSP MS 800
2	850	5	FDD	824 - 834	869 - 879	MCMC SRSP 504
3	900	8	FDD	880 - 915	925 - 960	MCMC SRSP 504
4	1 800	3	FDD	1 710 - 1 785	1 805 - 1 880	MCMC SRSP 508
5	2 100	1	FDD	1 920 - 1 980	2 110 - 2 170	MCMC SRSP MS 2100
6	2 100	33	TDD	1 915 - 1 920	1 915 - 1 920	MCMC SRSP MS 2100
		34		2 010 - 2 025	2 010 - 2 025	MCMC SRSP MS 2100
7	2 300	40	TDD	2 300 - 2 400	2 300 - 2 400	SKMM SRSP-532
8	2 600	7	FDD	2 500 - 2 570	2 620 - 2 690	SKMM SRSP-523
9	2 600	38	TDD	2 570 - 2 620	2 570 - 2 620	SKMM SRSP-523

Annex C
(normative)

Minimum parameters for Radio Frequency (RF) conformity

The detailed parameters for RF conformity are as follows:

- a) base station output power;
- b) Adjacent Channel Leakage Ratio (ACLR);
- c) operating band unwanted emission;
- d) transmitter spurious emission; and
- e) receiver spurious emission.

Acknowledgements

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