

MCMC MTSFB TC T018:2021

# TECHNICAL CODE

**GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS AND  
LONG TERM EVOLUTION - CELLULAR BOOSTER EQUIPMENT**

Developed by



Registered by



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## **MCMC MTSFB TC T018:2021**

### **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.

For further information on the technical code, please contact:

#### **Malaysian Communications and Multimedia Commission (MCMC)**

MCMC Tower 1  
Jalan Impact  
Cyber 6  
63000 Cyberjaya  
Selangor Darul Ehsan  
MALAYSIA

Tel: +60 3 8688 8000  
Fax: +60 3 8688 1000  
<http://www.mcmc.gov.my>

OR

#### **Malaysian Technical Standards Forum Bhd (MTSFB)**

MCMC Centre of Excellence (CoE),  
Off Persiaran Multimedia,  
Jalan Impact  
Cyber 6  
63000 Cyberjaya  
Selangor Darul Ehsan  
MALAYSIA

Tel: +60 3 8320 0300  
Fax: +60 3 8322 0115  
<http://www.mtsfb.org.my>

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### **Committee representation**

This technical code was developed by Cellular Booster 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:

Celcom Axiata Berhad

Digi Telecommunications Sdn Bhd

Maxis Broadband Sdn Bhd

Redsun Engineering Sdn Bhd

SIRIM Berhad

Telekom Malaysia Bhd

U Mobile Sdn Bhd

Webe Digital Sdn Bhd

Wideminds Pte Ltd

Wilson Electronics Malaysia Sdn Bhd

YTL Communications Sdn Bhd

**Foreword**

This technical code for the Global System for Mobile Communications and Long Term Evolution - Cellular Booster Equipment ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd (MTSFB) via its Fixed and 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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## GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS AND LONG TERM EVOLUTION - CELLULAR BOOSTER EQUIPMENT

### 1. Scope

This Technical Code defines the technical requirements for low power Cellular Booster Equipment (CBE) designed or intended for use with Global System for Mobile Communications (GSM) and Long Term Evolution (LTE) networks in Malaysia. A CBE boosts or amplifies the cellular signal from the nearest network operator's base station in order to enhance or extend the signal coverage.

This Technical Code sets forth the rules and specifications to ensure that any CBE does not cause interference to radiocommunications services. The actual utilisation of CBE is subjected to the successful coordination with the network operator.

### 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

AC	Alternating Current
CBE	Cellular Booster Equipment
EDGE	Enhanced Data GSM Environment
EIRP	Equivalent Isotropic Radiated Power
EMC	Electromagnetic Compatibility
FDD	Frequency Division Duplexing
GSM	Global System for Mobile Communications
IMT	International Mobile Telecommunications
LTE	Long Term Evolution
NFC	Near Field Communication
PVC	Polyvinyl Chloride
RF	Radio Frequency
SRSP	Standard Radio System Plan
TDD	Time Division Duplexing
WLAN	Wireless Local Area Network

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## 4. Requirements

### 4.1 General requirements

The CBE shall be designed to meet the following basic requirements:

- a) the CBE shall not cause interference with other authorised radiocommunications services and be able to tolerate any interference caused by other radiocommunication services, electrical or electronic equipment;
- b) the CBE shall not be constructed with any external or readily accessible control which permits the adjustments of its operation in a manner that is inconsistent with this Technical Code;
- c) the CBE default setting shall be such that they only operate within the frequency range stipulated in Standard Radio System Plan (SRSP)s; and
- d) the CBE shall fulfill any additional requirements made by Malaysian Communications and Multimedia Commission (MCMC).

#### 4.1.1 Power supply

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

The 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 CBE is equipped with power supply cord and mains plug, the CBE shall be fitted with a suitable and appropriate approved power supply cord and mains plug. Both are regulated products and shall be pre-approved by the relevant regulatory body 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 and IEC 60245-4 (for rubber insulated - flexible cables/cords).
- b) The mains plug shall be certified according to:
  - i) MS 589-1 or BS 1363-1 (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 CBE shall be marked with the following information:

- a) supplier/manufacturer's name or identification mark;



- b) equipment’s brand name/trademark and model; and
- c) other markings as required by the relevant standards.

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

**4.2 Technical requirements**

The CBE shall comply with the following requirements:

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

**4.2.1 Radio Frequency (RF)**

The CBE shall operate in any of the frequency bands as defined in Table 1, Table 2 and/or any other frequency bands as specified in SRSP document issued by MCMC.

The CBE shall comply with the test parameters of RF output power (EIRP), spurious emissions and out of band gain inclusive of the technical features as specified in 4.2.1.2 i.e. automatic gain control and anti-oscillation.

The RF output power limit shall comply with ETSI TS 136 104 whereby it shall not exceed 22 dBm (EIRP) per carrier. The spurious emissions and out of band gain limit shall comply with the standards given in 4.2.1.1.

**Table 1. Global System for Mobile Communications (GSM)/ Enhanced Data GSM Environment (EDGE) operating band plans**

Operating band	Duplex mode	Operating band		Band plan reference
		Uplink (MHz)	Downlink (MHz)	
900	FDD	880 - 915	925 - 960	MCMC SRSP-504
1800	FDD	1 710 - 1 785	1 805 - 1 880	MCMC SRSP 508

**Table 2. Long Term Evolution (LTE) operating band plans**

Operating band	Duplex mode	Operating band		Band plan reference
		Uplink (MHz)	Downlink (MHz)	
800	FDD	839 - 844	798 - 803	MCMC SRSP MS 800
850	FDD	824 - 834	869 - 879	MCMC SRSP-504
900	FDD	880 - 915	925 - 960	MCMC SRSP-504

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Table 2. Long Term Evolution (LTE) operating band plans (continued)

Operating band	Duplex mode	Operating band		Band plan reference
		Uplink (MHz)	Downlink (MHz)	
1800	FDD	1 710 - 1 785	1 805 - 1 880	MCMC SRSP 508
2100	FDD	1 920 - 1 980	2 110 - 2 170	MCMC SRSP MS 2100
2100	TDD	1 915 - 1 920		MCMC SRSP MS 2100
		2 010 - 2 025		
2300	TDD	2 300 - 2 400		SKMM SRSP-532
2600	FDD	2 500 - 2 570	2 620 - 2 690	SKMM SRSP-523
2600	TDD	2 570 - 2 620		SKMM SRSP-523

The specific operating frequency range of a CBE shall follow the frequency range allocated/assigned by MCMC to the network operator.

### 4.2.1.1 Conformity

The CBE shall comply with the frequency bands stated in 4.2.1 and the requirements of one or more of the following standards:

- a) ETSI EN 303 609.
- b) ETSI EN 301 908-15.
- c) ETSI TS 136 143.

In the case of CBE supports LTE TDD, the test measurement method shall refer to 3GPP TS 25 153 and the limit shall follow ETSI TS 136 143.

If the CBE supports technologies other than listed above, for example, Wireless Local Area Network (WLAN), Bluetooth and Near Field Communication (NFC), suppliers shall demonstrate that the CBE has been tested and certified for conformance to related Technical Codes and Class Assignments.

### 4.2.1.2 Automatic gain control and anti-oscillation

#### 4.2.1.2.1 Automatic gain control

The CBE shall be capable of monitoring its operations to ensure compliance with the limits of transmit frequency, applicable noise and gain.

The gain of the system shall be controlled automatically so that it does not exceed maximum RF output EIRP as given in 4.2.1.

#### 4.2.1.2.2 Anti-oscillation

The CBE shall be able to detect and mitigate (i.e. by automatic gain reduction or shut down) any unintended oscillations in uplink and downlink bands that could occur due to insufficient isolation between donor and serving antennas.

Oscillation detection and mitigation must occur automatically within:

- a) 0.3 s in the uplink band; and
- b) 1 s in the downlink band.

When the CBE no longer serves an active device connection, it shall, after no more than 5 minutes, reduce any uplink noise power to no more than - 70 dBm/MHz EIRP.

In cases where oscillation is detected, the CBE shall continue mitigation for at least 1 minute before restarting. After five such restarts, the CBE shall not resume operation until manually reset.

#### **4.2.2 Electromagnetic Compatibility (EMC)**

The CBE shall comply with the EMC emission requirements as defined in any of the following or equivalent standards:

- a) ETSI EN 301 489-1;
- b) ETSI EN 301 489-23; or
- c) ETSI EN 301 489-50.

#### **4.2.3 Safety**

The CBE shall comply with the safety requirements defined in any of the following or equivalent standards:

- a) MS IEC 60950-1; or
- b) IEC 62368-1.

**Annex A**  
(normative)

**Normative references**

MCMC SRSP-504, *Requirements for mobile cellular systems and International Mobile Telecommunications (IMT) systems operating in the frequency bands 824 MHz to 834 MHz paired with 869 MHz to 879 MHz and 880 MHz to 915 MHz paired with 925 MHz to 960 MHz*

MCMC SRSP 508, *Requirements for mobile cellular systems and International Mobile Telecommunications (IMT) systems operating in the frequency band 1710 MHz to 1785 MHz paired with 1805 MHz to 1880 MHz*

SKMM SRSP-523, *Requirements for International Mobile Telecommunications (IMT) systems operating in the frequency band 2500 MHz to 2690 MHz*

SKMM SRSP-532, *Requirements for Broadband Wireless Access (BWA) systems operating in the frequency band 2300 MHz to 2400 MHz*

MCMC SRSP MS 800, *Requirements for International Mobile Telecommunications Systems Operating in the Frequency Bands of 839 MHz to 844 MHz and 798 MHz to 803 MHz*

MCMC SRSP MS 2100, *Requirements for International Mobile Telecommunications systems operating in the frequency bands of 1915 MHz to 1980 MHz, 2010 MHz to 2025 MHz, and 2110 MHz to 2170 MHz*

MS 406, *Specification for voltages and frequency for alternating current transmission and distribution systems*

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

MS 1577, *Specification for 15A 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*

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 60245-4, *Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables*

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

ETSI EN 301 489-1, *Electromagnetic compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements*

ETSI EN 301 489-23, *Electromagnetic compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 23: Specific conditions for IMT-2000 CDMA, Direct Spread (UTRA and E-UTRA) Base Station (BS) radio, repeater and ancillary equipment*

ETSI EN 301 489-50, *Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU*

ETSI EN 301 908-15, *IMT cellular networks; Harmonised EN covering essential requirements of Directive 2014/53/EU; Part 15: Evolved Universal Terrestrial Radio Access (E-UTRA) FDD Repeaters*

ETSI EN 303 609, *Global System for Mobile communications (GSM); GSM Repeaters; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU*

ETSI TS 136 104, *LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 15.3.0 Release 15)*

ETSI TS 136 143, *LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); FDD repeater conformance testing (3GPP TS 36.143 version 12.1.0 Release 12)*

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 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 1363-1, *13 A plugs, socket-outlets, adaptors and connection units- Specification for rewirable and non-rewirable 13 A fused plugs*

3GPP TS 25 153, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRA repeater conformance testing (LCR TDD) (Release 15)*

## **Acknowledgements**

### **Members of the Cellular Booster Sub Working Group**

Ms Nurul Ain Ab Karim (Chairman/Draft lead)	SIRIM Berhad
Mr Keith Liu Min Tzau (Vice Chairman)	Wilson Electronics Malaysia Sdn Bhd
Mr Muhaimin Mat Salleh/ Ts Mohammad Hafiz Halal (Secretariat)	Malaysian Technical Standards Forum Bhd
Mr Low Kien Yap	Celcom Axiata Berhad
Mr Muhammad Rezza Alui	Digi Telecommunications Sdn Bhd
Mr Pang Chee Wai/ Mr Rakuram M Gandhi	Maxis Broadband Sdn Bhd
Mr Leong Woon Min	Redsun Engineering Sdn Bhd
Mr Ahmad Faizan Pardi/ Ms Khairunnisa Ab Halim/ Mr Mohd Rizal Ali/ Ms Rabi'ah Ruhan @ Idris/ Ms Wan Zarina Wan Abdullah/ Mr Zul Jaafar	SIRIM Berhad
Mr Najib Fadil Mohd Bisri @ Bisri	Telekom Malaysia Bhd
Mr Kuan Kok Wai/ Mr Md Hafnee Sepon/ Ms Ng Hsiao Ying	U Mobile Sdn Bhd
Ms Siti Najwa Muhammad	Webe Digital Sdn Bhd
Mr Low Wei Yap	Wideminds Pte Ltd
Ms Nabilla Zainodin	Wilson Electronics Malaysia Sdn Bhd
Mr Azmarhisyam Omar/ Mr Yew Kuan Min	YTL Communications Sdn Bhd

### **By invitation**

Mr Azmi Abdullah/ Mr Abd Rahman M Yusoff	Nextcell Sdn Bhd
Mr Cheong Wai Leng/ Mr Tham Weng Keat	Nextivity Inc