

UNITED REPUBLIC OF TANZANIA  
TANZANIA COMMUNICATIONS REGULATORY AUTHORITY  
ISO 9001: 2015 CERTIFIED



**MINIMUM TECHNICAL SPECIFICATIONS**

**FOR**

**CELLULAR INTERNET OF THINGS (IoT) DEVICES**

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| <b>Approved by:</b>       | <b>Title:</b>    | <b>Signature:</b> | <b>Date:</b>                |
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## **PART 1: Introduction**

Tanzania Communications Regulatory Authority (TCRA), established under the Tanzania Communications Regulatory Authority Act [Cap 172, R.E. 2023], is mandated among other duties, to type approve electronic communication equipment for use in the United Republic of Tanzania.

Further, Regulation 4(1) of The Electronic and Postal Communications (Electronic Communications Equipment Standards and E-Waste Management) Regulations, GN. No. 919 of 2020 mandates the Authority with responsibility for formulating technical standards relating to all regulated services in the United Republic of Tanzania and the Standards may be reviewed from time to time. This document sets out the Minimum Technical Specifications for Cellular Internet of Things devices.

The Authority hereby notifies all manufacturers, suppliers and importers of electronic communication equipment of the minimum technical requirements and specifications for Cellular Internet of Things devices.

## **PART 2: Scope and Purpose**

This Specification defines the minimum technical requirements for Internet of Things (IoT) devices that use Low Power Wide Area Network (LPWAN) technologies to operate in the authorised frequency bands or frequencies stated in this specification.

The IoT devices covered in this Specification are User Equipment (UE) and Base Station (BS) which employ the Narrowband-IoT (NB-IoT), LTE-M, and the 5G NR Reduced Capability (NR RedCap) technologies defined in 3GPP Release 13 and 3GPP Release 17 onwards. Technical requirements related to IoT devices that use other technologies are not included in the present document.

### **PART 3: Abbreviations**

|           |  |
|-----------|--|
| 3GPP      | 3rd Generation Partnership Project                             |
| AC        | Alternating Current  |
| BS        | Base Station   |
| CDMA      | Code Division Multiple Access                                  |
| DC        | Direct Current   |
| EDGE      | Enhanced Data rates for GSM Evolution                          |
| eDRX      | Extended Discontinuous Reception                               |
| EMC       | Electromagnetic Compatibility                                  |
| EN        | European Standard  |
| eSIM      | Embedded Subscriber Identity Module (embedded SIM)             |
| ETSI      | European Telecommunications Standards Institute                |
| E-UTRA    | Evolved Universal Terrestrial Radio Access (also known as LTE) |
| FOTA      | Firmware Over-The-Air  |
| GSM       | Global System for Mobile Communications                        |
| GSMA      | GSM Association  |
| ICNIRP    | International Commission on Non-Ionizing Radiation Protection  |
| IEC       | International Electrotechnical Commission                      |
| IEEE      | Institute of Electrical and Electronics Engineers              |
| IETF      | Internet Engineering Task Force                                |
| IMT-2000  | International Mobile Telecommunications - 2000                 |
| IPv4      | Internet Protocol version 4                                    |
| IPv6      | Internet Protocol version 6                                    |
| iSIM      | Integrated Subscriber Identity Module (integrated SIM)         |
| ITU-R     | ITU Radiocommunication Sector                                  |
| LPWAN     | Low Power Wide Area Network                                    |
| LTE-M     | Long Term Evolution for Machines                               |
| MSR       | Multi-Standard Radio   |
| NB-IoT    | Narrowband – Internet of Things                                |
| NR RedCap | New Radio Reduced Capability                                   |
| PSM       | Power Saving Mode  |

|      |                            |
|------|----------------------------|
| RF   | Radio Frequency            |
| SAR  | Specific Absorption Rate   |
| SIM  | Subscriber Identity Module |
| SOTA | Software Over-The-Air      |
| UE   | User Equipment             |

#### **PART 4: References**

The following referenced documents are necessary for the application of this Specification. 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.

|                          |  |
|--------------------------|--|
| ETSI TS 136 521-1        | LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing                                     |
| ETSI TS 136 101          | LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception   |
| ITU-T Rec K.52           | ITU Recommendation on Guidance on complying with limits for human exposure to electromagnetic fields   |
| ETSI EN 301 489-1        | Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for Electromagnetic Compatibility                                |
| ETSI EN 301 489-24       | EMC standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA and E-UTRA) for Mobile and portable (UE) radio and ancillary equipment                   |
| IEC 62368-1              | Audio/video, information and communication technology equipment – Part 1: Safety requirements.   |
| IEC/IEEE 62209-1528:2020 | Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1528: Human models, |

|                       |  |
|-----------------------|--|
|                       | instrumentation and procedures (Frequency range of 4 MHz to 10 GHz).   |
| EN 50360:2017/A1:2023 | Product standard to demonstrate the compliance of wireless communication devices, with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 300 MHz to 6 GHz: devices used next to the ear |
| IEC 60215:2016        | Safety requirements for radio transmitting equipment – General requirements and terminology  |
| ETSI TS 136 141       | LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing  |
| 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   |
| ETSI TS 136 104       | LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception   |
| ETSI TS 137 104       | 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) radio transmission and reception                                  |
| 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 for Electromagnetic Compatibility                      |
| IETF RFC 8200         | Internet Protocol, Version 6 (IPv6) Specification.   |
| ITU Rec. ITU-T X.1364 | Security requirements and framework for narrowband Internet of things.   |
| SGP.02                | Remote Provisioning Architecture for Embedded UICC Technical Specification.  |
| SGP.32                | eSIM IoT Technical Specification.  |
| 3GPP TS 33.401        | 3GPP System Architecture Evolution (SAE); Security architecture  |
| 3GPP TS 33.216        | Security Assurance Specification (SCAS) for the evolved Node B (eNB) network product class   |

|                    |   |
|--------------------|---|
| ETSI TS 138 101-1  | 5G; NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone  |
| ETSI TS 138 521-1  | 5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone   |
| ETSI TS 138 104    | 5G; NR; Base Station (BS) radio transmission and reception  |
| ETSI TS 138 141-1  | 5G; NR; Base Station (BS) conformance testing; Part 1: Conducted conformance testing  |
| ETSI TS 138 141-2  | 5G; NR; Base Station (BS) conformance testing; Part 2: Radiated conformance testing   |
| ETSI EN 301 489-52 | ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication User Equipment (UE) radio and ancillary equipment; Harmonised Standard for ElectroMagnetic Compatibility |
| 3GPP TS 33.501     | Security architecture and procedures for 5G System  |
| 3GPP TS 33.511     | Security Assurance Specification (SCAS) for the next generation Node B (gNodeB) network product class   |

## **PART 5: General Requirements**

### **5.1 Power Supply**

- a. IoT device (UE) may be AC powered or DC (Battery) powered. For AC powered IoT device (UE), the device shall operate using an AC mains supply of voltage, 220V – 240V, and frequency, 50 Hz  $\pm$  2%.
- b. The battery of an IoT device (UE) shall have sufficient capacity to support device operation for its declared operational life under normal use.
- c. For IoT device (BS), the use of any supported power source shall not affect the capability of the equipment to meet the requirements of this Specification.

### **5.2 Power Saving Functionality**

IoT device (UE) shall support extended Discontinuous Reception (eDRX) and Power Saving Mode (PSM) functionalities to reduce device power consumption.

### **5.3 Radiation Safety Requirements**

- a. The use of the IoT device (UE or BS) shall comply with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), and the recommendation ITU-T Rec K.52.
- b. Where applicable, IoT (UE or BS) devices shall be tested and certified for conformity with the IEEE and ICNIRP SAR standards limits. The testing should be according to IEC/IEEE 62209-1528:2020 and EN 50360:2017/A1:2023.

### **5.4 EMC Requirements**

IoT device (UE) shall conform to common technical requirements specified in the standard ETSI EN 301 489-1. For NB-IoT and LTE-M UE, the standard ETSI EN 301 489-1 shall be used in conjunction with the standard ETSI EN 301 489-24. For NR RedCap UE, ETSI EN 301 489-1 shall be used in conjunction with ETSI EN 301 489-52 . The standard ETSI EN 301 489-50 shall be used for NR, E-UTRA, E-UTRA with NB-IoT, or standalone NB-IoT base stations.

### **5.5 Equipment safety testing**

Equipment safety testing or assessment shall be performed in accordance with the requirements defined in the standard IEC 62368-1. E-UTRA, E-UTRA with NB-IoT or standalone NB-IoT BS shall also be assessed for meeting the safety requirements defined in IEC 60215 for radio transmitting equipment, operating under the responsibility of skilled persons.

### **5.6 Security Requirements**

IoT device (UE) shall, at a minimum, meet the security requirements and capabilities of terminal device as specified in Recommendation ITU-T X.1364. For IoT BS, an E-UTRA/NB-IoT BS shall comply with the security requirements specified in 3GPP TS 33.401, together with the corresponding security assurance requirements in 3GPP TS 33.216. An NR BS supporting NR RedCap shall comply with the security requirements specified in 3GPP TS 33.501, together with the corresponding security assurance requirements in 3GPP TS 33.511.

## PART 6: Technical Requirements

### 6.1 SIM Card Requirements

IoT device (UE) shall support any form of subscriber identity module, whether a physical SIM or an electronic SIM (eSIM/iSIM); and where an IoT device (UE) implements an embedded SIM (eSIM) or integrated SIM (iSIM), the device shall support secure remote SIM provisioning and profile management in accordance with the applicable GSMA remote SIM provisioning architecture GSMA SGP.02 and/or GSMA SGP.32.

### 6.2 Operating frequency

The IoT device (UE or BS) shall operate within the applicable frequency bands given in Table 1.

**Table 1: Operating frequency for IoT device**

| <b>Downlink(DL) - BS Transmit /UE Receive</b> | <b>Uplink (UL) - BS receive / UE Transmit</b> |
|---|---|
| 758 MHz - 788 MHz                             | 703 MHz - 733 MHz                             |
| 791 MHz – 821 MHz                             | 832 MHz – 862 MHz                             |
| 925 MHz - 960 MHz                             | 880 MHz - 915 MHz                             |
| 1805 MHz - 1880 MHz                           | 1710 MHz - 1785 MHz                           |
| 2110 MHz - 2170 MHz                           | 1920 MHz - 1980 MHz                           |
| 2300 MHz – 2400 MHz                           | 2300 MHz – 2400 MHz                           |
| 2620 MHz – 2690 MHz                           | 2500 MHz – 2570 MHz                           |
| 3400 MHz – 3600 MHz                           | 3400 MHz – 3600 MHz                           |
| 3600 MHz – 3800 MHz                           | 3600 MHz – 3800 MHz                           |

### 6.3 RF requirements for UE

IoT devices that support NB-IoT and LTE-M technologies shall be tested as per the measurement procedures of conformance testing specified in ETSI TS 136 521-1, and shall comply with the minimum RF characteristics and minimum performance requirements specified in ETSI TS 136 101. IoT devices that support NR RedCap shall be tested as per the measurement procedures of conformance testing specified in ETSI TS 138 521-1, and shall comply with the minimum RF characteristics and minimum performance requirements specified in ETSI TS 138 101-1.

## **6.4 RF requirements for BS**

BS which supports E-UTRA, EUTRA with NB-IoT (in band and/or guard band) or standalone NB-IoT shall be tested as per measurement procedures of conformance testing specified in the Specification ETSI TS 136 141 or ETSI TS 137 141. The BS shall also comply with the minimum RF characteristics and minimum performance requirements as specified in the Specification ETSI TS 136 104.

A BS which supports NR RedCap, shall be tested as per the measurement procedures of conformance testing specified in ETSI TS 138 141-1 and ETSI TS 138 141-2, and shall comply with the minimum RF characteristics and performance requirements specified in ETSI TS 138 104.

## **6.5 Remote Device Management**

IoT device (UE) shall support at least one standardized lightweight device management protocol. At a minimum, the device management capability shall support remote configuration and monitoring of the device; secure remote firmware and software updates over-the-air (FOTA/SOTA), with integrity and authenticity verification of update packages.

## **6.6 IP Addressing Requirement**

IoT device with IP network interfaces shall support Internet Protocol version 6 (IPv6) as specified in IETF RFC 8200. IoT device may additionally support dual-stack IPv4/IPv6 operation to ensure interoperability with legacy IPv4 networks during the transition period.

## **PART 7: Testing and Certification Requirements**

IoT device shall comply with these Minimum Technical Specifications and shall be certified for use in accordance with this specification.

## **PART 8: Document Administration**

### **8.1 Amendment**

TCRA may, from time to time, review, update or modify this document to ensure its continued relevance and to meet the international and/or national requirements as necessary.

## **8.2 Compliance**

These specifications are enforceable under The TCRA Act, The Electronic and Postal Communications Act (Principal Legislation) Revised Edition 2022, and the related regulations effective from the date of publication.

## **8.3 Publication**

This document shall be published on the TCRA website <https://www.tcra.go.tz> for public information, compliance and reference purposes.