

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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Approved by:	Title:	Signature:	Date:
Eng. Peter P. Mwasalyanda	Director General		30 th June, 2026

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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 ± 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

Downlink(DL) - BS Transmit /UE Receive	Uplink (UL) - BS receive / UE Transmit
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.