

ER for IoT Gateway

Scope

This document lays down the Essential Requirements under the mandatory testing Framework in accordance with Government of India Gazette Notification No. G.S.R. 1131(E), dated 05th September 2017, for IoT Gateway to be used in Indian Telecom Network using various communication technologies in Wide Area Network (WAN) and Local Area Network (LAN)/ Home Area Network (HAN)/ Field Area Network (FAN). IoT Gateway may be used to connect the IP and non IP devices working on short range communication technologies in the LAN / HAN/ FAN to the Head end server / cloud, using cellular / broadband technologies in the wide area network. The communication technologies in LAN/ HAN/ FAN may be 6LoWPAN, ZigBee, Z Wave, BLE, Wi-Fi, NB-PLC etc, and ADSL, ONT, Cellular, NB-LTE in WAN.

The product family may have various types of Gateways and products such as Point of Sale (PoS) machine etc.

Product Matrix: -

Product/ Variant	BLE	6LoW PAN	RFID	NFC	Wi-Fi	GSM 2G	CDMA 2000	WCDMA 3G	LTE/ LTE-A	Ether net	USB	ZigB ee	PSTN	LPWA N	Fixed line BB
IoT Gateway			NA										NA		
PoS Machine		NA										NA		NA	

1 EMI/ EMC Requirements

Clause	Parameter	Standard	Limits/ Results expected	Remarks
1.0	EMI/ EMC			
1.1	<p>Conducted and Radiated Emission (Class A or B)?</p> <p>The values of limits shall be as per TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p> <p>For Radiated Emission tests, limits below 1 GHz shall be as per Table 4 (a1) (for Class B) or 5 (a1) (for Class A) for measuring distance of 3m</p>	CISPR 22 (2008)/CISPR 32 (2015) Class A or B as per the requirement in Commercial or Domestic	Compliance	<i>As CISPR 32: 2015 has replaced CISPR 22: 2008 and the overlap period of 3 years between the two standards as provided by IEC is over in 2018</i>
1.2	<p>Immunity to Electrostatic discharge: Contact discharge level 2 {± 4 kV} or higher voltage;</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	IEC-61000-4-2	Compliance	

1.3	<p>Immunity to Electrostatic discharge: Air discharge level 3 {± 8 kV} or higher voltage.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	IEC-61000-4-2	Compliance	
1.4	<p>Immunity to radiated RF: Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	IEC 61000-4-3 (2010)	Compliance	
1.5	<p>Immunity to fast transients (burst): Test Level 2: 0.5 kV for signal / control / data / telecom lines.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p>	IEC 61000- 4- 4 {2012}	Compliance	

	Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16			
1.6	<p>Immunity to surges: (a) 2 kV peak open circuit voltage for line to ground</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	<p>IEC 61000-4-5 (2014)</p> <p>Note: For non-rechargeable fixed battery operated device without any telecom or power port, this test is not applicable</p>	Compliance	
1.7	<p>Immunity to surges: (b) 2 kV peak open circuit voltage for line to line coupling.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	<p>IEC 61000-4-5 (2014)</p> <p>Note: For non-rechargeable fixed battery operated device without any telecom or power port, this test is not applicable</p>	Compliance	
1.8	<p>Immunity to conducted disturbance induced by Radio frequency fields: Under the test level 2 {3 V r.m.s.} in the frequency range 150 kHz-80 MHz</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-</p>	IEC 61000-4-6 (2013)	Compliance	

	<p>221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>			
1.9	<p>Immunity to voltage dips & short interruptions (applicable to only ac mains power input ports, if any):</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	<p>IEC 61000-4-11 (2004)</p> <p>IEC 61000-4-29 for DC operated devices below 16A</p> <p>IEC 61000-4-34 will applicable for above 16 Ampere DC operated equipments</p>	Compliance	

2 Safety Requirements

Clause	Parameter	Standard	Limits/ Results expected	Remarks
2.1	General Safety Requirement	IEC 60950 (Part-1)/ IS 13252 (Part-1)	Compliance	

3 Security Requirements

As and when prescribed by DoT

Clause	Parameter	Standard	Limits/ Results expected	Remarks
3.0				

4 Technical Requirements

Gateway may have one or more communication technologies interfaces in the WAN as well as LAN/ HAN. In WAN, there may be any one of the cellular technologies such as GSM/ WCDMA/ LTE/ CDMA 2000 and/ or Ethernet. In LAN/ HAN, there may be any one or more communication technologies such as Wi-Fi, BLE, USB, ZigBee, Z-wave

4.1 Technical Requirements for GSM

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.1.1.	<p>Operating Frequency</p> <p>EUT shall be capable of at least operating in the following frequency bands.</p> <p>GSM: 1710-1785 MHz (U/L) and 1805-1880 MHz (D/L)</p> <p>GSM: 890-915 MHz (U/L) and 935-960 MHz (D/L)</p>	Current National Frequency Allocation Plan	Compliance	
4.1.2.	Transmitter Maximum output power	3GPP TS 51 010-1 13.16.2 (GPRS) and 3GPP TS 51 010-1 13.3 (GSM) or EN 301 511 (GSM) 4.2.10	Compliance	
4.1.3.	Output RF Spectrum	3GPP TS 51 010-1 13.4 or EN 301 511 (GSM) 4.2.6	Compliance	
4.1.4.	Transmitter spurious emissions in active mode	3GPP TS 51 010-1 12.1.1 or EN 301 511 (GSM) 4.2.12	Compliance	

	(Conducted)			
4.1.5.	Receiver spurious emission in idle mode (Conducted)	3GPP TS 51 010-1 12.1.2 or EN 301 511 (GSM) 4.2.13	Compliance	
4.1.6.	Frequency Stability	3GPP TS 51 010-1 13.1 or EN 301 511 (GSM) 4.2.1	Compliance	
4.1.7.	Receiver Reference sensitivity level	3GPP TS 51 010-1 14.2.1 or EN 301 511 (GSM)	Compliance	
4.1.8.	Adjacent Channel Rejection	3GPP TS 51 010-1 14.5.1 or EN 301 511 (GSM)	Compliance	
4.1.9.	Receiver blocking	3GPP TS 51 010-1 14.7.1 or EN 301 511 (GSM) 4.2.20	Compliance	

4.2 Technical Requirements for WCDMA/HSPA

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.2.1.	<p>Operating Frequency</p> <p>EUT shall be capable of at least operating in the following frequency bands. WCDMA: 1920-1980 MHz (U/L) and 2110-2170 MHz (D/L) WCDMA: 890-915 MHz (U/L) and 935-960 MHz (D/L)</p>	Current National Frequency Allocation Plan	Compliance	
4.2.2.	Transmitter Maximum output power	3GPP TS 34.121-1 5.2 or EN 301 908-2 (UMTS) 4.2.2	Compliance	
4.2.3.	Transmitter Spectrum emissions mask	3GPP TS 34.121-1 5.9 or EN 301 908-2 (UMTS) 4.2.3	Compliance	
4.2.4.	Transmitter spurious emissions in active mode (Conducted)	3GPP TS 34.121-1 5.11 or EN 301 908-2 (UMTS) 4.2.4	Compliance	
4.2.5.	Receiver spurious emission in idle mode (Conducted)	3GPP TS 34.121-1 6.8 or EN 301 908-2 (UMTS) 4.2.10	Compliance	
4.2.6.	Frequency Stability	3GPP TS 34.121-1 5.3 or EN 301 908-2 (UMTS)	Compliance	

4.2.7.	Transmitter Minimum Output Power	3GPP TS 34.121-1 5.4.3 or EN 301 908-2 (UMTS) 4.2.5	Compliance	
4.2.8.	Receiver Reference sensitivity level	3GPP TS 34.121-1 6.2 or EN 301 908-2 (UMTS) 4.2.13	Compliance	
4.2.9.	Receiver Adjacent Channel Selectivity (ACS)	3GPP TS 34.121-1 6.4 or EN 301 908-2 (UMTS) 4.2.6	Compliance	
4.2.10.	Receiver In-band blocking	3GPP TS 34.121-1 6.5.2.1 or EN 301 908-2 (UMTS) 4.2.7	Compliance	

4.3 Technical Requirements for LTE/LTE-A

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.3.1.	<p>Operating Frequency</p> <p>EUT shall be capable of operating in FDD bands or TDD bands or both FDD and TDD bands as mentioned below as per the band allocation to different operators.</p> <p>LTE(FDD):824 - 849 MHz (U/L) and 869 - 894 MHz (D/L)</p> <p>LTE(FDD):1710-1785 MHz (U/L) and 1805-1880 MHz (D/L)</p> <p>LTE(FDD): 1920-1980 MHz (U/L) and 2110-2170 MHz (D/L)</p> <p>LTE (TDD): 2300 - 2400 MHz</p> <p>LTE (TDD): 2496 - 2690 MHz</p>	Current National Frequency Allocation Plan	Compliance	
4.3.2.	Transmitter Maximum	3GPP TS 36.521-1 6.2.2 or	Compliance	

	output power	EN 301 908-13 (LTE) 4.2.2		
4.3.3.	Transmitter Spectrum emissions mask	3GPP TS 36.521-1 6.6.2.1 or EN 301 908-13 (LTE) 4.2.3	Compliance	
4.3.4.	Transmitter spurious emissions in active mode (Conducted)	3GPP TS 36.521-1 6.6.3.1, 6.6.3.2, 6.6.3.3 or EN 301 908-13 (LTE) 4.2.4	Compliance	
4.3.5.	Receiver spurious emission in idle mode (Conducted)	3GPP TS 36.521-1 7.9 or EN 301 908-13 (LTE) 4.2.10	Compliance	
4.3.6.	Frequency Stability	3GPP TS 36.521-1 6.5 or EN 301 908-13 (LTE)	Compliance	
4.3.7.	Power Control Absolute power tolerance	3GPP TS 36.521-1 6.3.5.1 or EN 301 908-13 (LTE)	Compliance	
4.3.8.	Receiver Reference sensitivity level	3GPP TS 36.521-1 7.3 or EN 301 908-13 (LTE) 4.2.12	Compliance	
4.3.9.	Receiver Adjacent Channel Selectivity (ACS)	3GPP TS 36.521-1 7.5 or EN 301 908-13 (LTE) 4.2.6	Compliance	
4.3.10.	Receiver In-band blocking	3GPP TS 36.521-1 7.6.1 or EN 301 908-13 (LTE) 4.2.7	Compliance	

4.4 Technical Requirements for CDMA 2000

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.4.1.	Operating Frequency EUT shall be capable of at least operating in the following frequency bands. CDMA: 824-844 MHz (U/L) and 869-889 MHz (D/L)	Current National Frequency Allocation Plan	Compliance	
4.4.2.	Transmitter Maximum output power	1x: S0011 4.4.5 or EN 301 908-04 (CDMA) 4.2.3	Compliance	
4.4.3.	Transmitter Spectrum emissions mask	1x: S0011 4.5.1 or EN 301 908-04 (CDMA) 4.2.2	Compliance	
4.4.4.	Transmitter spurious emissions in active mode (Conducted)	1x: S0011 4.5.1 or EN 301 908-04 (CDMA) 4.2.2	Compliance	
4.4.5.	Receiver spurious emission in idle mode (Conducted)	1x: S0011 3.6 or EN 301 908-04 (CDMA) 4.2.5	Compliance	
4.4.6.	Frequency Stability	1x: S0011 4.1 or EN 301 908-04 (CDMA)	Compliance	
4.4.7.	Receiver Reference sensitivity level	EN 301 908-04 (CDMA)	Compliance	
4.4.8.	Receiver Adjacent	EN 301 908-04 (CDMA) 4.2.8	Compliance	

	Channel Selectivity (ACS)			
4.4.9.	Receiver In-band blocking	EN 301 908-04 (CDMA) 4.2.6	Compliance	

4.5 Technical Requirements for NFC

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.5.1	Basic RF requirements	NFC Forum Certification for applicable ISO/IEC Standards ETSI EN 300.330 is applicable	Compliance	
4.5.2	Frequency of operation 13.56 MHz band <i>Note: Frequency of operation requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i>	Applicant to declare and submit test results pertaining to all the frequency bands of operation for the equipment stating that they are as per the provisions of latest NFAP.	Compliance	
4.5.3	EIRP	As per the provisions of latest NFAP and GSRs issued by WPC	Compliance	Note: No information is available for power levels in 13.56 MHz band

4.6 Technical Requirements for RFID

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.6.1	Basic RF requirements	RFID Certification Forum for applicable ISO/ IEC Standards ETSI EN 300.330 is applicable	Compliance	
4.6.2	Frequency of operation LF 50KHz to 200KHz , HF-13.56 MHz band, UHF- 865-867 MHz <i>Note: Frequency of operation requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i>	Applicant to declare and submit test results pertaining to all the frequency bands of operation for the equipment stating that they are as per the provisions of latest NFAP.	Compliance	
4.6.3	EIRP A. Maximum Transmitted Power: 1W (in a spread of 10 MHz or higher) B. Maximum effective radiated power: 4W. C. Carrier Bandwidth: 200KHz.	As per the provisions of latest NFAP and GSRs issued by WPC	Compliance	Applicable only for UHF band As per G.S.R. 168 (E) of WPC Note: No information is available for power levels in 13.56 MHz band

	<i>Note: EIRP requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i>			and LF band.
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4.7 Technical Requirements for WAN interface- Ethernet

As per the technical requirement of ER of Ethernet interface

4.8 Technical Requirements for LAN/ HAN interface- Wi-Fi

As per the technical requirement of ER of Wi-Fi

4.9 Technical Requirements for LAN/ HAN interface- Bluetooth Low Energy (BLE)

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.9.1	Basic RF requirements	Conformance to IEEE 15.1, Bluetooth Special Interest Group (SIG) Product compliance accordance with TEC specification- SD/RAD-01/01.SEP 2005 ETSI EN 300.328.V2.1.1	Compliance	
4.9.2	Frequency of operation A. 2.4 GHz band as per latest NFAP provisions. <i>Note: Frequency of operation requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i>	Current National Frequency Allocation Plan	Compliance	
4.9.3	EIRP D. Maximum Transmitted Power: 1W (in a spread of 10 MHz or higher) E. Maximum effective radiated power: 4W.	As per the provisions of latest NFAP and GSRs issued by WPC	Compliance	

	<p>F. Maximum antenna height: 5 metres above the roof-top of an existing authorised building</p> <p><i>Note: EIRP requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i></p>			
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4.10 Technical Requirements for RF Mesh

Clause	Parameter	Standard	Limits/ Results expected	Results
4.10.1	Operating frequency 865-867MHz	EN 300 220	Compliance	
4.10.2	Unwanted emissions in the spurious domain	EN 300 220 or FCC part 15.247	Compliance	
4.10.3	TX effective radiated power <ul style="list-style-type: none"> A. Maximum Transmitted Power: 1W (in a spread of 200KHz or higher) B. Maximum effective radiated power: 4W. <p><i>Note: EIRP requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i></p>	EN 300 220-1 or FCC part 15.247 or As per the provisions of latest NFAP and GSRs issued by WPC	Compliance	

4.11 Technical Requirements for LAN/ HAN interface- USB

As per the technical requirement of ER of USB

4.12 Technical Requirements for Broadband

As per the technical requirements of ER of broadband

4.13 Technical Requirement for ZigBee

Clause	Parameter	Standard	Limits/ Results expected	Results
4.13.1	For Metropolitan area network- using ZigBee protocol	Compliance as per IEEE 802.15.4	Compliance	

Note: If Gateway has some other communication technologies in the LAN/ WAN in addition to the technologies mentioned in this ER (e.g. ADSL, High Speed Line Driver, ONT etc. in WAN and ZigBee, Z Wave, narrow band PLC etc. in LAN/ HAN/ FAN), then the corresponding technical requirements of that ERs will be applicable.

4.14 Technical Requirements for Low Power Wide Area Network (LPWAN) – LoRa/ Sigfox

Clause	Parameter	Standard	Limits/ Results expected	Results
4.13.1	<p>Operating frequency</p> <p>865-867MHz</p>	<p>EN 300 220-1</p> <p>or</p> <p>Conformance to LoRaWAN specification for India region</p> <p>Link: https://www.lora-alliance.org/Or</p> <p>Conformance to Sigfox specification for India Region</p> <p>Link: https://www.sigfox.com/en</p>	Compliance	
4.13.2	Unwanted emissions in the spurious domain	EN 300 220-1 or FCC part 15.247	Compliance	
4.13.3	<p>TX effective radiated power</p> <p>A. Maximum Transmitted Power: 1W (in a spread of 200KHz or higher)</p> <p>B. Maximum effective radiated power: 4W.</p> <p><i>Note: EIRP requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i></p>	<p>EN 300 220-1 or FCC part 15.247</p> <p>or</p> <p>As per the provisions of latest NFAP and GSRs issued by WPC</p>	Compliance	

5 Other Requirements

Clause	Parameter	Standard	Limits/ Results expected	Remarks
5.1.	Identification of Equipment for GSM/UMTS/LTE			
a)	Each device shall have a unique 'International Mobile Station Equipment Identity' (IMEI) which shall not be with all zeros/ null/ invalid IMEI.	GSMA Official Document TS.06, 2017 - IMEI Allocation and Approval Process Test Procedure: Manufacturer shall mention the suitable procedure for testing IMEI by connecting device to smart phone/ tablet/ PC and without using any specialised test equipment	Compliance	
5.2.	Identification of Equipment for CDMA 2000			
a)	Each device shall be allocated a unique 'Mobile Equipment Identifier (MEID/ESN)' which shall not be with all zeroes/ null/ invalid MEID/ESN.	Similar Procedure as in Clause 5.1. above	Compliance	

<p>5.3.</p>	<p>Identification of Equipment for technologies other than cellular (BLE, NFC, LPWAN (LoRa, Sigfox) etc.)</p> <p>Each individual gateway shall have a unique “Media Access Control address” (MAC address) mentioned in the label attached to it, by which it shall be uniquely identified within the network.</p>	<p>Test Procedure:</p> <p>Manufacturer shall mention the suitable procedure for testing MAC address/ any other unique ID by connecting device to smart phone/ tablet/ PC and without using any specialised test equipment</p>	<p>Compliance</p>	
<p>5.4.</p>	<p>IPv6 Compliance</p> <p>All data (Packet) enabled devices shall be capable of carrying IPv6 traffic either on dual stack (IPv4v6) or on native IPv6 compliant</p>	<p>For IPv6: RFC 2460: Clause no. 3, 4.1, 4.2, 4.3, 4.4</p> <p>For Dual stack: RFC 4213: Clause 2.1 & Clause 2.2</p> <p>(Note: Date of implementation will be as per DoT policy)</p>	<p>Compliance</p>	