

Government of India
Department of Telecommunications
Telecommunication Engineering Centre
Gate No. 5, Khurshid Lal Bhawan, Janpath, New Delhi-110001.
(IoT Division)

File No: 2-20/2023-IoT/TEC

Date: 17 October 2025

Subject: Revision of Standard for Essential Requirements (ER) of "Tracking Device" - Inviting comments.

In exercise of the powers conferred by rule 5(2) of the Telecommunications (Framework to Notify Standards, Conformity Assessment and Certification) Rules 2025, a draft revision of Standard of Essential Requirements (ER) on "Tracking Device" is enclosed herewith (Annexure-I) for stakeholder consultation. It is requested to go through the enclosed draft Standard for revision and offer your inputs/comments. The comments may please be furnished in the template sheet enclosed herewith as Annexure-II.

The comments/inputs may be furnished through email to adet.iottec-dot@gov.in with copy to adg.iot-tec-dot@gov.in and ddgsd.tec@gov.in at the earliest and latest within **sixty days of the date of this reference** please.

Enclosures:

- (i) Draft Revision of Standard for Essential Requirements of "Tracking Device" (Annexure-I)
- (ii) Template sheet for providing comments/inputs (Annexure-II)

Digitally signed by
Raghav Purwar
Date: 17-10-2025
15:04:55
(Raghav Purwar)

ADG (IoT), TEC

Email: adet.iottec-dot@gov.in

To,

All Stakeholders (through portal)

Copy to:

1. Sr. DDG & Head, TEC
2. AD (IT), TEC – for uploading on TEC Portal

अनिवार्य आवश्यकताएं

संख्या : TEC28732401

संख्या :

Essential Requirements

ER No. : TEC28732401

Tracking Device

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MTCTE के तहत जारी:

Issued under MTCTE by:

दूरसंचार अभियांत्रिकी केंद्र

भारत सरकार

खुशीद लाल भवन, जनपथ, नई दिल्ली - 110001, भारत

**Telecommunication Engineering Centre
Government of India
Khurshid Lal Bhawan, Janpath, New Delhi-110001, INDIA**

DRAFT

Essential Requirements for:

Tracking Device

Certification Scheme: **SCS**

Product Fee Group: **B**

This ER covers all types of Tracking Devices with working on wired or wireless (cellular/ non cellular) communication technologies

Note: Annexures referred to in this ER are Annexures as mentioned in "Annexures to ERs" No. TEC/SD/DD/TCP-222/02/June19 as updated from time to time and available on MTCTE portal.

This product has the following variants:

1. Asset Tracking Device
2. Human Tracking Device
3. Pet Tracking Device
4. Standalone tracking device for Vehicle

1. Variant 1 : Asset Tracking Device

1.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
1.1.1	Conducted and Radiated Emission-Class A-IoT	TEC EMI EMC Standard CISPR 32 EN55032. Annex-B. Refer Note for IoT
1.1.2	Conducted And Radiated Emission-Class B-IoT	TEC EMI EMC Standard CISPR 32 EN55032. Annex-B. Refer Note for IoT
1.1.3	Dual IP Parameters	RFC 4213, RFC 791 Annex-P6, RFC 8200. Annex- P7 RFC 4213. Annex-P6
1.1.4	Immunity to Electrostatic Discharge (Level 2 or Level 3)	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B

1.1.5	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
1.1.6	IoT Dev - Non-0 IMEI or MEID or Unique MAC	Annex-M
1.1.7	IPV4 Parameters	RFC 791. Annex-P6
1.1. 7 8	IPV6 Parameters -IoT	RFC 2460/ 8200. Annex-P7
1.1. 8 9	IT Equipment Safety	IEC 62368-1. Annex-A1

1.2 Interface 1 : BLE for IoT

S.No.	Parameter Name	Standard Name
1.2.1	Basic RF Requirements for BLE Interface	Annex G4 (4.4 to 4.15). ETSI EN 300 328 V2.2.2.
1.2.2	EIRP for BLE Interface	WPC GSR 45(E). Annex-G4 (4.2)
1.2.3	Frequency of Operation for BLE Interface	Latest NFAP. Annex-G4(4.1)
1.2.4	Maximum Transmitted Power for BLE Int	WPC GSR 45(E). Annex-G4 (4.3)

1.3 Interface 2 : GSM or GPRS or EDGE

S.No.	Parameter Name	Standard Name
1.3.1	Int Parameters for GSM or GPRS or EDGE	3GPP TS 51 010-1 or EN 301 511. Annex-F10
1.3.2	Operating Frequency for GSM or GPRS or EDGE Int	NFAP. Annex-F

1.4 Interface 3 : LPWAN - LoRa

S.No.	Parameter Name	Standard Name
1.4.1	Basic RF Requirements for LPWAN-LoRA	Annex- G5(5.4 to 5. 2018). ETSI EN 300 220-2V3.2.1
1.4.2	EIRP LoRa	WPC GSR 853 (E)WPC GSR 564(E). Annex-G5(5.2).
1.4.3	Frequency of Operation for LoRa Int	Latest NFAP. Annex- G5(5.1)
1.4.4	Maximum Transmit Power LoRa	WPC GSR 853 (E)WPC GSR 564(E). Annex-G5(5.3).

1.5 Interface 4 : LTE or LTE-A

S.No.	Parameter Name	Standard Name
1.5.1	Int Parameters for LTE or LTE-A	3GPP TS 36.521-1 or EN 301 908-13. Annex-F12
1.5.2	Operating Frequency for LTE or LTE-A Int	NFAP. Annex-F

1.6 Interface 5 : WCDMA or HSPA

S.No.	Parameter Name	Standard Name
1.6.1	Operating Frequency for WCDMA or HSPA Int	NFAP. Annex-F
1.6.2	WCDMA or HSPA Int Parameters	3GPP TS 34.121-1 or EN 301 908-2. Annex-F11

1.7 Interface 6 : WiFi

S.No.	Parameter Name	Standard Name
1.7.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
1.7.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 and or ETSI EN 302 502 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3
1.7.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
1.7.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E) 1048(E). Annex-G1

1.8 Interface 7 : 5G NR- FR1 and FR2 interworking with other Radios

S.No.	Parameter Name	Standard Name
1.8.1	Additional Spectrum emissions mask for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.2
1.8.2	Additional Spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.4.3
1.8.3	Adjacent channel leakage ratio for Inter- band EN-DC including FR2 2CCs	3GPP TS 38.521-3 Clause 6.5B.2.4.3
1.8.4	Adjacent channel leakage ratio for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.3

1.8.5	Adjacent channel selectivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 3GPP TS 38.521-3 Clause 7.5B.3
1.8.6	Adjacent channel selectivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.5B.1
1.8.7	General spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.1
1.8.8	General spurious emissions for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.1
1.8.9	Inband blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.3
1.8.10	Inband blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.1
1.8.11	Minimum output power for EN-DC Inter- band including FR2	3GPP TS 38.521-3 Clause 6.3B.1.4
1.8.12	Minimum Output Power for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.3B.1.1
1.8.13	Minimum output power for intra-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.3B.1.3
1.8.14	Narrow band blocking for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.3
1.8.15	Narrow band blocking for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.1
1.8.16	Out-of-band blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.3
1.8.17	Out-of-band blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.1
1.8.18	Reference sensitivity for EN-DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.3B.2.3_1.1
1.8.19	Reference sensitivity for inter-band EN-DC including FR2	3GPP TS 38.521-3 Clause 7.3B.2.4
1.8.20	Reference sensitivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.3
1.8.21	Reference sensitivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.1
1.8.22	Spectrum emissions mask for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.1

1.8.23	Spectrum emissions mask for inter-band EN-DC including FR2 (2 CCs)	3GPP TS 38.521-3 Clause 6.5B.2.4.1
1.8.24	Spurious emission band UE co-existence for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.2
1.8.25	Spurious emissions band UE co-existence for inter-band within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.2
1.8.26	Spurious Emissions for EN DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.9B.3 1.1
1.8.27	Spurious Emissions for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.3
1.8.28	Spurious emissions for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.1
1.8.29	Spurious Response for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.3
1.8.30	Spurious Response for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.1
1.8.31	UE Maximum Output Power for Inter-Band EN-DC including FR2 - EIRP and TR	3GPP TS 38.521-3 Clause 6.2B.1.4.1
1.8.32	UE Maximum Output Power for Inter-Band EN-DC including FR2 - Spherical Coverage	3GPP TS 38.521-3 Clause 6.2B.1.4.2
1.8.33	UE Maximum Output Power for Inter-Band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.2B.1.3
1.8.34	UE Maximum Output Power for Intra-Band Contiguous EN-DC	3GPP TS 38.521-3 Clause 6.2B.1.1
1.8.35	Wideband Intermodulation for inter band EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.8B.2.3
1.8.36	Wideband Intermodulation for intra band contiguous EN DC in FR1	3GPP TS 38.521-3 Clause 7.8B.2.1

1.9 Interface 8 : 5G NR (FR1)

S.No.	Parameter Name	Standard Name
1.9.1	Additional spectrum emission mask- Transmitter	3GPP TS 38.521-1 Clause 6.5.2.3
1.9.2	Additional spectrum emission mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.3
1.9.3	Additional spurious emissions	3GPP TS 38.521-1 Clause 6.5.3.3
1.9.4	Additional spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.3

1.9.5	Adjacent channel selectivity	3GPP TS 38.521-1 Clause 7.5
1.9.6	Adjacent channel selectivity for 2DL CA	3GPP TS 38.521-1 Clause 7.5A.1
1.9.7	Adjacent channel selectivity for UL-MIMO	3GPP TS 38.521-1 Clause 7.5D
1.9.8	General spurious emissions-Transmitter	3GPP TS 38.521-1 Clause 6.5.3.1
1.9.9	General spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.1
1.9.10	In-band Blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.2.1
1.9.11	Inband Blocking	3GPP TS 38.521-1 Clause 7.6.2
1.9.12	Inband blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.2
1.9.13	Minimum output power	3GPP TS 38.521-2 Clause 6.3.1
1.9.14	Narrow band blocking	3GPP TS 38.521-1 Clause 7.6.4
1.9.15	Narrow band blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.4.1
1.9.16	Narrow band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.4
1.9.17	NR ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.1
1.9.18	NR ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.1
1.9.19	Out-of-band blocking	3GPP TS 38.521-1 Clause 7.6.3
1.9.20	Out-of-band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.3
1.9.21	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
1.9.22	Reference sensitivity power level for 2DL CA without exception	3GPP TS 38.521-1 Clause 7.3A.1
1.9.23	Reference sensitivity power level for UL- MIMO	3GPP TS 38.521-1 Clause 7.3D.2
1.9.24	Spectrum Emission Mask-5G NR FR1	3GPP TS 38.521-1 Clause 6.5.2.2
1.9.25	Spectrum emission Mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.2
1.9.26	Spurious emission for 2DL CA	3GPP TS 38.521-1 Clause 7.9A.1
1.9.27	Spurious emission for UE co-existence	3GPP TS 38.521-1 Clause 6.5.3.2
1.9.28	Spurious emission for UE co-existence for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.2
1.9.29	Spurious emissions-5G NR FR1	3GPP TS 38.521-1 Clause 7.9
1.9.30	Spurious response	3GPP TS 38.521-1 Clause 7.7
1.9.31	Spurious response for 2DL CA	3GPP TS 38.521-1 Clause 7.7A.1
1.9.32	Spurious response for UL-MIMO	3GPP TS 38.521-1 Clause 7.7D
1.9.33	UE Maximum Output Power	3GPP TS 38.521-1 Clause 6.2.1
1.9.34	UE maximum output power for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.1

1.9.35	UE maximum output power reduction for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.2
1.9.36	UTRA ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.2
1.9.37	UTRA ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.2
1.9.38	Wide band Intermodulation	3GPP TS 38.521-1 Clause 7.8.2
1.9.39	Wide band Intermodulation for CA-2DL CA	3GPP TS 38.521-1 Clause 7.8A.2.1
1.9.40	Wide band Intermodulation for UL-MIMO	3GPP TS 38.521-1 Clause 7.8D.2

1.10 Interface 9 : 5G NR (FR2)

S.No.	Parameter Name	Standard Name
1.10.1	Adjacent channel leakage ratio	3GPP TS 38.521-2 Clause 6.5.2.3
1.10.2	Minimum Output power-Transmitter	3GPP TS 38.521-1 Clause 6.3.1
1.10.3	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
1.10.4	Spectrum Emission Mask-5G NR FR2	3GPP TS 38.521-2 Clause 6.5.2.1
1.10.5	UE maximum output power-EIRP and TRP	3GPP TS 38.521-2 Clause 6.2.1.1
1.10.6	UE maximum output power-Spherical coverage	3GPP TS 38.521-2 Clause 6.2.1.2
1.10.7	UE maximum output power reduction	3GPP TS 38.521-2 Clause 6.2.2
1.10.8	UE maximum output power with additional requirements	3GPP TS 38.521-2 Clause 6.2.3

1.11 Interface 10 : NB-IoT

S.No.	Parameter Name	Standard Name
1.11.1	Frequency Stability-NB-IOT	3GPP TS 36.521-1 Clause 6.5.1F
1.11.2	Maximum output power-NB-IOT	3GPP TS 36.521-1 Clause 6.2.2F
1.11.3	Operating Frequency-NB-IOT-Device Equip. shall be capable of operating in at least one of the frequency bands as per the National Freq. Allocation plan	National Frequency Allocation Plan- 2018 Frequency Allocation Table (IND 16)
1.11.4	Power Control Absolute Power Tolerance-NB-IOT	3GPP TS 36.521-1 Clause 6.3.5F.1
1.11.5	Receiver Adjacent Channel Selectivity (ACS) - NB-IOT	3GPP TS 36.521-1 Clause 7.5F
1.11.6	Receiver In-band blocking-NB-IOT	3GPP TS 36.521-1 Clause 7.6.1F
1.11.7	Receiver Reference Sensitivity level-NB-IOT	3GPP TS 36.521-1 Clause 7.3F

1.11.8	Receiver spurious emission-NB-IOT	3GPP TS 36.521-1 Clause 7.9F
1.11.9	Spectrum emissions mask-NB-IOT	3GPP TS 36.521-1 Clause 6.6.2.1F
1.11.10	Spurious emissions-NB-IOT	3GPP TS 36.521-1 Clause 6.6.3F.1-6.6.3F.2

1.12 Interface 11 : Geolocation Navigation Interface

S.No.	Parameter Name	Standard Name
1.12.1	GPS	Annexure to ER for Tracking Device
1.12.2	NavIC	Annexure to ER for Tracking Device

Interface: oneM2M

Note: Testing applicable as per available profile(s) in the device

S.No.	Profile Details	Standard Name
<u>1</u>	<u>Constrained sensor as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.10</u>
<u>2</u>	<u>Constrained actuator as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.11</u>

2. Variant 2 : Human Tracking Device

2.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
2.1.1	Conducted And Radiated Emission - Class B	TEC EMI EMC Standard CISPR 32 EN55032. Annex-B
2.1.2	Dual IP Parameters	<u>RFC 4213, RFC 791 Annex-P6 RFC 8200, Annex- P7 RFC 4213. Annex-P6</u>
2.1.3	Immunity to Electrostatic Discharge (Level 2 or Level 3)	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
2.1.4	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
2.1.5	IoT Dev - Non-0 IMEI or MEID or Unique MAC	Annex-M

2.1.67	IPV6 Parameters-IOT	RFC 2460 8200. Annex-P7
2.1.78	IT Equipment Safety	IEC 62368-1. Annex-A1
2.1.89	SAR Value for IoT Devices	TEC 13016:2023, Annex-M

2.2 Interface 1 : BLE for IoT

S.No.	Parameter Name	Standard Name
2.2.1	Basic RF Requirements for BLE Interface	Annex G4 (4.4 to 4.15). ETSI EN 300 328 V2.2.2.
2.2.2	EIRP for BLE Interface	WPC GSR 45(E). Annex-G4 (4.2)
2.2.3	Frequency of Operation for BLE Interface	Latest NFAP. Annex-G4(4.1)
2.2.4	Maximum Transmitted Power for BLE Int	WPC GSR 45(E). Annex-G4 (4.3)

2.3 Interface 2 : GSM or GPRS or EDGE

S.No.	Parameter Name	Standard Name
2.3.1	Int Parameters for GSM or GPRS or EDGE	3GPP TS 51 010-1 or EN 301 511. Annex-F10
2.3.2	Operating Frequency for GSM or GPRS or EDGE Int	NFAP. Annex-F

2.4 Interface 3 : LPWAN - LoRa

S.No.	Parameter Name	Standard Name
2.4.1	Basic RF Requirements for LPWAN-LoRa	Annex- G5(5.4 to 5.2018). ETSI EN 300 220-2V3.2.1
2.4.2	EIRP LoRa	WPC GSR 853 (E)WPC GSR 564(E) . Annex-G5(5.2).
2.4.3	Frequency of Operation for LoRa Int	Latest NFAP. Annex- G5(5.1)
2.4.4	Maximum Transmit Power LoRa	WPC GSR 853 (E)WPC GSR 564(E) . Annex-G5(5.3).

2.5 Interface 4 : LTE or LTE-A

S.No.	Parameter Name	Standard Name
2.5.1	Int Parameters for LTE or LTE-A	3GPP TS 36.521-1 or EN 301 908-13. Annex-F12
2.5.2	Operating Frequency for LTE or LTE-A Int	NFAP. Annex-F

2.6 Interface 5 : WCDMA or HSPA

S.No.	Parameter Name	Standard Name
2.6.1	Operating Frequency for WCDMA or HSPA Int	NFAP. Annex-F
2.6.2	WCDMA or HSPA Int Parameters	3GPP TS 34.121-1 or EN 301 908-2. Annex-F11

2.7 Interface 6 : WiFi

S.No.	Parameter Name	Standard Name
2.7.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
2.7.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 and or ETSI EN 302 502 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3
2.7.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
2.7.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E) 1048(E). Annex-G1

2.8 Interface 7 : 5G NR- FR1 and FR2 interworking with other Radios

S.No.	Parameter Name	Standard Name
2.8.1	Additional Spectrum emissions mask for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.2
2.8.2	Additional Spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.4.3

2.8.3	Adjacent channel leakage ratio for Inter- band EN-DC including FR2 2CCs	3GPP TS 38.521-3 Clause 6.5B.2.4.3
2.8.4	Adjacent channel leakage ratio for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.3
2.8.5	Adjacent channel selectivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 3GPP TS 38.521-3 Clause 7.5B.3
2.8.6	Adjacent channel selectivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.5B.1
2.8.7	General spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.1
2.8.8	General spurious emissions for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.1
2.8.9	Inband blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.3
2.8.10	Inband blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.1
2.8.11	Minimum output power for EN-DC Inter- band including FR2	3GPP TS 38.521-3 Clause 6.3B.1.4
2.8.12	Minimum Output Power for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.3B.1.1
2.8.13	Minimum output power for intra-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.3B.1.3
2.8.14	Narrow band blocking for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.3
2.8.15	Narrow band blocking for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.1
2.8.16	Out-of-band blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.3

2.8.17	Out-of-band blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.1
2.8.18	Reference sensitivity for EN-DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.3B.2.3_1.1
2.8.19	Reference sensitivity for inter-band EN-DC including FR2	3GPP TS 38.521-3 Clause 7.3B.2.4
2.8.20	Reference sensitivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.3
2.8.21	Reference sensitivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.1
2.8.22	Spectrum emissions mask for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.1
2.8.23	Spectrum emissions mask for inter-band EN-DC including FR2 (2 CCs)	3GPP TS 38.521-3 Clause 6.5B.2.4.1
2.8.24	Spurious emission band UE co-existence for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.2
2.8.25	Spurious emissions band UE co-existence for inter-band within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.2
2.8.26	Spurious Emissions for EN DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.9B.3 1.1
2.8.27	Spurious Emissions for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.3
2.8.28	Spurious emissions for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.1
2.8.29	Spurious Response for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.3
2.8.30	Spurious Response for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.1
2.8.31	UE Maximum Output Power for Inter-Band EN-DC including FR2 - EIRP and TR	3GPP TS 38.521-3 Clause 6.2B.1.4.1
2.8.32	UE Maximum Output Power for Inter-Band EN-DC including FR2 - Spherical Coverage	3GPP TS 38.521-3 Clause 6.2B.1.4.2
2.8.33	UE Maximum Output Power for Inter-Band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.2B.1.3
2.8.34	UE Maximum Output Power for Intra-Band Contiguous EN-DC	3GPP TS 38.521-3 Clause 6.2B.1.1

2.8.35	Wideband Intermodulation for inter band EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.8B.2.3
2.8.36	Wideband Intermodulation for intra band contiguous EN DC in FR1	3GPP TS 38.521-3 Clause 7.8B.2.1

2.9 Interface 8 : 5G NR (FR1)

S.No.	Parameter Name	Standard Name
2.9.1	Additional spectrum emission mask- Transmitter	3GPP TS 38.521-1 Clause 6.5.2.3
2.9.2	Additional spectrum emission mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.3
2.9.3	Additional spurious emissions	3GPP TS 38.521-1 Clause 6.5.3.3
2.9.4	Additional spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.3
2.9.5	Adjacent channel selectivity	3GPP TS 38.521-1 Clause 7.5
2.9.6	Adjacent channel selectivity for 2DL CA	3GPP TS 38.521-1 Clause 7.5A.1
2.9.7	Adjacent channel selectivity for UL-MIMO	3GPP TS 38.521-1 Clause 7.5D
2.9.8	General spurious emissions-Transmitter	3GPP TS 38.521-1 Clause 6.5.3.1
2.9.9	General spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.1
2.9.10	In-band Blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.2.1
2.9.11	Inband Blocking	3GPP TS 38.521-1 Clause 7.6.2
2.9.12	Inband blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.2
2.9.13	Minimum output power	3GPP TS 38.521-2 Clause 6.3.1
2.9.14	Narrow band blocking	3GPP TS 38.521-1 Clause 7.6.4
2.9.15	Narrow band blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.4.1
2.9.16	Narrow band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.4
2.9.17	NR ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.1
2.9.18	NR ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.1
2.9.19	Out-of-band blocking	3GPP TS 38.521-1 Clause 7.6.3
2.9.20	Out-of-band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.3
2.9.21	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
2.9.22	Reference sensitivity power level for 2DL CA without exception	3GPP TS 38.521-1 Clause 7.3A.1

2.9.23	Reference sensitivity power level for UL- MIMO	3GPP TS 38.521-1 Clause 7.3D.2
2.9.24	Spectrum Emission Mask-5G NR FR1	3GPP TS 38.521-1 Clause 6.5.2.2
2.9.25	Spectrum emission Mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.2
2.9.26	Spurious emission for 2DL CA	3GPP TS 38.521-1 Clause 7.9A.1
2.9.27	Spurious emission for UE co-existence	3GPP TS 38.521-1 Clause 6.5.3.2
2.9.28	Spurious emission for UE co-existence for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.2
2.9.29	Spurious emissions-5G NR FR1	3GPP TS 38.521-1 Clause 7.9
2.9.30	Spurious response	3GPP TS 38.521-1 Clause 7.7
2.9.31	Spurious response for 2DL CA	3GPP TS 38.521-1 Clause 7.7A.1
2.9.32	Spurious response for UL-MIMO	3GPP TS 38.521-1 Clause 7.7D
2.9.33	UE Maximum Output Power	3GPP TS 38.521-1 Clause 6.2.1
2.9.34	UE maximum output power for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.1
2.9.35	UE maximum output power reduction for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.2
2.9.36	UTRA ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.2
2.9.37	UTRA ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.2
2.9.38	Wide band Intermodulation	3GPP TS 38.521-1 Clause 7.8.2
2.9.39	Wide band Intermodulation for CA-2DL CA	3GPP TS 38.521-1 Clause 7.8A.2.1
2.9.40	Wide band Intermodulation for UL-MIMO	3GPP TS 38.521-1 Clause 7.8D.2

2.10 Interface 9 : 5G NR (FR2)

S.No.	Parameter Name	Standard Name
2.10.1	Adjacent channel leakage ratio	3GPP TS 38.521-2 Clause 6.5.2.3
2.10.2	Minimum Output power-Transmitter	3GPP TS 38.521-1 Clause 6.3.1
2.10.3	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
2.10.4	Spectrum Emission Mask-5G NR FR2	3GPP TS 38.521-2 Clause 6.5.2.1
2.10.5	UE maximum output power-EIRP and TRP	3GPP TS 38.521-2 Clause 6.2.1.1
2.10.6	UE maximum output power-Spherical coverage	3GPP TS 38.521-2 Clause 6.2.1.2
2.10.7	UE maximum output power reduction	3GPP TS 38.521-2 Clause 6.2.2

2.10.8	UE maximum output power with additional requirements	3GPP TS 38.521-2 Clause 6.2.3
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2.11 Interface 10 : NB-IoT

S.No.	Parameter Name	Standard Name
2.11.1	Frequency Stability-NB-IOT	3GPP TS 36.521-1 Clause 6.5.1F
2.11.2	Maximum output power-NB-IOT	3GPP TS 36.521-1 Clause 6.2.2F
2.11.3	Operating Frequency-NB-IOT-Device Equip. shall be capable of operating in at least one of the frequency bands as per the National Freq. Allocation plan	National Frequency Allocation Plan- 2018 Frequency Allocation Table (IND 16)
2.11.4	Power Control Absolute Power Tolerance-NB-IOT	3GPP TS 36.521-1 Clause 6.3.5F.1
2.11.5	Receiver Adjacent Channel Selectivity (ACS) - NB-IOT	3GPP TS 36.521-1 Clause 7.5F
2.11.6	Receiver In-band blocking-NB-IOT	3GPP TS 36.521-1 Clause 7.6.1F
2.11.7	Receiver Reference Sensitivity level-NB-IOT	3GPP TS 36.521-1 Clause 7.3F
2.11.8	Receiver spurious emission-NB-IOT	3GPP TS 36.521-1 Clause 7.9F
2.11.9	Spectrum emissions mask-NB-IOT	3GPP TS 36.521-1 Clause 6.6.2.1F
2.11.10	Spurious emissions-NB-IOT	3GPP TS 36.521-1 Clause 6.6.3F.1-6.6.3F.2

2.12 Interface 11 : Geolocation Navigation Interface

S.No.	Parameter Name	Standard Name
2.12.1	GPS	Annexure to ER for Tracking Device
2.12.2	NavIC	Annexure to ER for Tracking Device

Interface: oneM2M

Note: Testing applicable as per available profile(s) in the device

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S.No.	Profile Details	Standard Name
<u>1</u>	<u>Constrained sensor as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.10</u>

<u>2</u>	<u>Constrained actuator as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.11</u>
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3. Variant 3 : Pet Tracking Device

3.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
3.1.1	Conducted And Radiated Emission - Class B	TEC EMI EMC Standard CISPR 32 EN55032. Annex-B
3.1.2	Dual IP Parameters	<u>RFC 4213, RFC 791 Annex-P6 RFC 8200. Annex- P7 RFC 4213, Annex P6</u>
3.1.3	Immunity to Electrostatic Discharge (Level 2 or Level 3)	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
3.1.4	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
3.1.5	IoT Dev - Non-0 IMEI or MEID or Unique MAC	Annex-M
3.1.6	IPV4 Parameters	RFC 791, Annex-P6
3.1. 6 7	IPV6 Parameters	RFC 2460 / 8200. Annex-P7
3.1. 7 8	IT Equipment Safety	IEC 62368-1. Annex-A1
3.1. 8 9	SAR Value for IoT Devices	TEC 13016:2023 ,Annex-M

3.2 Interface 1 : GSM or GPRS or EDGE

S.No.	Parameter Name	Standard Name
3.2.1	Int Parameters for GSM or GPRS or EDGE	3GPP TS 51 010-1 or EN 301 511. Annex-F10
3.2.2	Operating Frequency for GSM or GPRS or EDGE Int	NFAP. Annex-F

3.3 Interface 2 : LPWAN - LoRa

S.No.	Parameter Name	Standard Name
3.3.1	Basic RF Requirements for LPWAN-LoRa	Annex- G5(5.4 to 5. 2018). ETSI EN 300 220-2V3.2.1
3.3.2	EIRP LoRa	<u>WPC GSR 853 (E)WPG-GSR-564(E)</u> . Annex-G5(5.2).
3.3.3	Frequency of Operation for LoRa Int	Latest NFAP. Annex- G5(5.1)

3.3.4	Maximum Transmit Power LoRa	WPC GSR 853 (E) WPC GSR 564(E) -Annex-G5(5.3).
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3.4 Interface 3 : LTE or LTE-A

S.No.	Parameter Name	Standard Name
3.4.1	Int Parameters for LTE or LTE-A	3GPP TS 36.521-1 or EN 301 908-13. Annex-F12
3.4.2	Operating Frequency for LTE or LTE-A Int	NFAP. Annex-F

3.5 Interface 4 : WCDMA or HSPA

S.No.	Parameter Name	Standard Name
3.5.1	Operating Frequency for WCDMA or HSPA Int	NFAP. Annex-F
3.5.2	WCDMA or HSPA Int Parameters	3GPP TS 34.121-1 or EN 301 908-2. Annex-F11

3.6 Interface 5 : 5G NR- FR1 and FR2 interworking with other Radios

S.No.	Parameter Name	Standard Name
3.6.1	Additional Spectrum emissions mask for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.2
3.6.2	Additional Spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.4.3
3.6.3	Adjacent channel leakage ratio for Inter- band EN-DC including FR2 2CCs	3GPP TS 38.521-3 Clause 6.5B.2.4.3
3.6.4	Adjacent channel leakage ratio for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.3
3.6.5	Adjacent channel selectivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 3GPP TS 38.521-3 Clause 7.5B.3
3.6.6	Adjacent channel selectivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.5B.1
3.6.7	General spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.1
3.6.8	General spurious emissions for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.1
3.6.9	Inband blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.3

3.6.10	Inband blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.1
3.6.11	Minimum output power for EN-DC Inter- band including FR2	3GPP TS 38.521-3 Clause 6.3B.1.4
3.6.12	Minimum Output Power for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.3B.1.1
3.6.13	Minimum output power for intra-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.3B.1.3
3.6.14	Narrow band blocking for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.3
3.6.15	Narrow band blocking for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.1
3.6.16	Out-of-band blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.3
3.6.17	Out-of-band blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.1
3.6.18	Reference sensitivity for EN-DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.3B.2.3_1.1
3.6.19	Reference sensitivity for inter-band EN-DC including FR2	3GPP TS 38.521-3 Clause 7.3B.2.4
3.6.20	Reference sensitivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.3
3.6.21	Reference sensitivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.1
3.6.22	Spectrum emissions mask for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.1
3.6.23	Spectrum emissions mask for inter-band EN-DC including FR2 (2 CCs)	3GPP TS 38.521-3 Clause 6.5B.2.4.1
3.6.24	Spurious emission band UE co-existence for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.2
3.6.25	Spurious emissions band UE co-existence for inter-band within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.2
3.6.26	Spurious Emissions for EN DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.9B.3 1.1
3.6.27	Spurious Emissions for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.3

3.6.28	Spurious emissions for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.1
3.6.29	Spurious Response for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.3
3.6.30	Spurious Response for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.1
3.6.31	UE Maximum Output Power for Inter-Band EN-DC including FR2 - EIRP and TR	3GPP TS 38.521-3 Clause 6.2B.1.4.1
3.6.32	UE Maximum Output Power for Inter-Band EN-DC including FR2 - Spherical Coverage	3GPP TS 38.521-3 Clause 6.2B.1.4.2
3.6.33	UE Maximum Output Power for Inter-Band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.2B.1.3
3.6.34	UE Maximum Output Power for Intra-Band Contiguous EN-DC	3GPP TS 38.521-3 Clause 6.2B.1.1
3.6.35	Wideband Intermodulation for inter band EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.8B.2.3
3.6.36	Wideband Intermodulation for intra band contiguous EN DC in FR1	3GPP TS 38.521-3 Clause 7.8B.2.1

3.7 Interface 6 : 5G NR (FR1)

S.No.	Parameter Name	Standard Name
3.7.1	Additional spectrum emission mask- Transmitter	3GPP TS 38.521-1 Clause 6.5.2.3
3.7.2	Additional spectrum emission mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.3
3.7.3	Additional spurious emissions	3GPP TS 38.521-1 Clause 6.5.3.3
3.7.4	Additional spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.3
3.7.5	Adjacent channel selectivity	3GPP TS 38.521-1 Clause 7.5
3.7.6	Adjacent channel selectivity for 2DL CA	3GPP TS 38.521-1 Clause 7.5A.1
3.7.7	Adjacent channel selectivity for UL-MIMO	3GPP TS 38.521-1 Clause 7.5D
3.7.8	General spurious emissions-Transmitter	3GPP TS 38.521-1 Clause 6.5.3.1
3.7.9	General spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.1
3.7.10	In-band Blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.2.1
3.7.11	Inband Blocking	3GPP TS 38.521-1 Clause 7.6.2
3.7.12	Inband blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.2
3.7.13	Minimum output power	3GPP TS 38.521-2 Clause 6.3.1

3.7.14	Narrow band blocking	3GPP TS 38.521-1 Clause 7.6.4
3.7.15	Narrow band blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.4.1
3.7.16	Narrow band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.4
3.7.17	NR ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.1
3.7.18	NR ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.1
3.7.19	Out-of-band blocking	3GPP TS 38.521-1 Clause 7.6.3
3.7.20	Out-of-band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.3
3.7.21	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
3.7.22	Reference sensitivity power level for 2DL CA without exception	3GPP TS 38.521-1 Clause 7.3A.1
3.7.23	Reference sensitivity power level for UL- MIMO	3GPP TS 38.521-1 Clause 7.3D.2
3.7.24	Spectrum Emission Mask-5G NR FR1	3GPP TS 38.521-1 Clause 6.5.2.2
3.7.25	Spectrum emission Mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.2
3.7.26	Spurious emission for 2DL CA	3GPP TS 38.521-1 Clause 7.9A.1
3.7.27	Spurious emission for UE co-existence	3GPP TS 38.521-1 Clause 6.5.3.2
3.7.28	Spurious emission for UE co-existence for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.2
3.7.29	Spurious emissions-5G NR FR1	3GPP TS 38.521-1 Clause 7.9
3.7.30	Spurious response	3GPP TS 38.521-1 Clause 7.7
3.7.31	Spurious response for 2DL CA	3GPP TS 38.521-1 Clause 7.7A.1
3.7.32	Spurious response for UL-MIMO	3GPP TS 38.521-1 Clause 7.7D
3.7.33	UE Maximum Output Power	3GPP TS 38.521-1 Clause 6.2.1
3.7.34	UE maximum output power for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.1
3.7.35	UE maximum output power reduction for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.2
3.7.36	UTRA ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.2
3.7.37	UTRA ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.2
3.7.38	Wide band Intermodulation	3GPP TS 38.521-1 Clause 7.8.2
3.7.39	Wide band Intermodulation for CA-2DL CA	3GPP TS 38.521-1 Clause 7.8A.2.1
3.7.40	Wide band Intermodulation for UL-MIMO	3GPP TS 38.521-1 Clause 7.8D.2

3.8 Interface 7 : 5G NR (FR2)

S.No.	Parameter Name	Standard Name
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3.8.1	Adjacent channel leakage ratio	3GPP TS 38.521-2 Clause 6.5.2.3
3.8.2	Minimum Output power-Transmitter	3GPP TS 38.521-1 Clause 6.3.1
3.8.3	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
3.8.4	Spectrum Emission Mask-5G NR FR2	3GPP TS 38.521-2 Clause 6.5.2.1
3.8.5	UE maximum output power-EIRP and TRP	3GPP TS 38.521-2 Clause 6.2.1.1
3.8.6	UE maximum output power-Spherical coverage	3GPP TS 38.521-2 Clause 6.2.1.2
3.8.7	UE maximum output power reduction	3GPP TS 38.521-2 Clause 6.2.2
3.8.8	UE maximum output power with additional requirements	3GPP TS 38.521-2 Clause 6.2.3

3.9 Interface 8 : NB-IoT

S.No.	Parameter Name	Standard Name
3.9.1	Frequency Stability-NB-IOT	3GPP TS 36.521-1 Clause 6.5.1F
3.9.2	Maximum output power-NB-IOT	3GPP TS 36.521-1 Clause 6.2.2F
3.9.3	Operating Frequency-NB-IOT-Device Equip. shall be capable of operating in at least one of the frequency bands as per the National Freq. Allocation plan	National Frequency Allocation Plan- 2018 Frequency Allocation Table (IND 16)
3.9.4	Power Control Absolute Power Tolerance-NB-IOT	3GPP TS 36.521-1 Clause 6.3.5F.1
3.9.5	Receiver Adjacent Channel Selectivity (ACS) - NB-IOT	3GPP TS 36.521-1 Clause 7.5F
3.9.6	Receiver In-band blocking-NB-IOT	3GPP TS 36.521-1 Clause 7.6.1F
3.9.7	Receiver Reference Sensitivity level-NB-IOT	3GPP TS 36.521-1 Clause 7.3F
3.9.8	Receiver spurious emission-NB-IOT	3GPP TS 36.521-1 Clause 7.9F
3.9.9	Spectrum emissions mask-NB-IOT	3GPP TS 36.521-1 Clause 6.6.2.1F
3.9.10	Spurious emissions-NB-IOT	3GPP TS 36.521-1 Clause 6.6.3F.1-6.6.3F.2

3.10 Interface 9 : Geolocation Navigation Interface

S.No.	Parameter Name	Standard Name
3.10.1	GPS	Annexure to ER for Tracking Device
3.10.2	NavIC	Annexure to ER for Tracking Device

Interface: oneM2M

Note: Testing applicable as per available profile(s) in the device

<u>S.No.</u>	<u>Profile Details</u>	<u>Standard Name</u>
<u>1</u>	<u>Constrained sensor as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.10</u>
<u>2</u>	<u>Constrained actuator as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.11</u>

4. Variant 4 : Standalone tracking device for Vehicle

4.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
4.1.1	Dual IP Parameters	IS 16833
4.1.2	EMI EMC compliance	IS 16833
4.1.3	GNSS Compliance	IS 16833
4.1.4	IoT Dev - Non-0 IMEI or MEID or Unique MAC	Annex-M
4.1.5	IPV4 Parameters	IS 16833
4.1.6	IPV6 Parameters	IS 16833
4.1.7	Safety compliance	IS 16833

4.2 Interface 1 : BLE for IoT

S.No.	Parameter Name	Standard Name
4.2.1	Basic RF Requirements for BLE Interface	Annex G4 (4.4 to 4.15). ETSI EN 300 328 V2.2.2.
4.2.2	EIRP for BLE Interface	WPC GSR 45(E). Annex-G4 (4.2)
4.2.3	Frequency of Operation for BLE Interface	Latest NFAP. Annex-G4(4.1)
4.2.4	Maximum Transmitted Power for BLE Int	WPC GSR 45(E). Annex-G4 (4.3)

4.3 Interface 2 : GSM or GPRS or EDGE

S.No.	Parameter Name	Standard Name
4.3.1	Int Parameters for GSM or GPRS or EDGE	3GPP TS 51 010-1 or EN 301 511. Annex-F10

4.3.2	Operating Frequency for GSM or GPRS or EDGE Int	NFAP. Annex-F
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4.4 Interface 3 : LPWAN - LoRa

S.No.	Parameter Name	Standard Name
4.4.1	Basic RF Requirements for LPWAN-LoRA	Annex- G5(5.4 to 5. 2018). ETSI EN 300 220-2V3.2.1
4.4.2	EIRP LoRa	WPC GSR 853 (E)WPC GSR 564(E) . Annex- G5(5.2).
4.4.3	Frequency of Operation for LoRa Int	Latest NFAP. Annex- G5(5.1)
4.4.4	Maximum Transmit Power LoRa	WPC GSR 853 (E)WPC GSR 564(E) . Annex- G5(5.3).

4.5 Interface 4 : LTE or LTE-A

S.No.	Parameter Name	Standard Name
4.5.1	Int Parameters for LTE or LTE-A	3GPP TS 36.521-1 or EN 301 908-13. Annex-F12
4.5.2	Operating Frequency for LTE or LTE-A Int	NFAP. Annex-F

4.6 Interface 5 : WCDMA or HSPA

S.No.	Parameter Name	Standard Name
4.6.1	Operating Frequency for WCDMA or HSPA Int	NFAP. Annex-F
4.6.2	WCDMA or HSPA Int Parameters	3GPP TS 34.121-1 or EN 301 908-2. Annex-F11

4.7 Interface 6 : WiFi

S.No.	Parameter Name	Standard Name
4.7.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
4.7.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 and or ETSI EN 302 502 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3
4.7.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
4.7.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E) 1048(E). Annex-

		G1
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4.8 Interface 7 : 5G NR- FR1 and FR2 interworking with other Radios

S.No.	Parameter Name	Standard Name
4.8.1	Additional Spectrum emissions mask for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.2
4.8.2	Additional Spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.4.3
4.8.3	Adjacent channel leakage ratio for Inter- band EN-DC including FR2 2CCs	3GPP TS 38.521-3 Clause 6.5B.2.4.3
4.8.4	Adjacent channel leakage ratio for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.3
4.8.5	Adjacent channel selectivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 3GPP TS 38.521-3 Clause 7.5B.3
4.8.6	Adjacent channel selectivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.5B.1
4.8.7	General spurious emissions for inter-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.1
4.8.8	General spurious emissions for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.1
4.8.9	Inband blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.3
4.8.10	Inband blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.2.1
4.8.11	Minimum output power for EN-DC Inter- band including FR2	3GPP TS 38.521-3 Clause 6.3B.1.4
4.8.12	Minimum Output Power for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.3B.1.1
4.8.13	Minimum output power for intra-band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.3B.1.3
4.8.14	Narrow band blocking for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.3
4.8.15	Narrow band blocking for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.6B.4.1

4.8.16	Out-of-band blocking for inter-band EN-DC within FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.3
4.8.17	Out-of-band blocking for intra-band contiguous EN-DC in FR1-2CCs	3GPP TS 38.521-3 Clause 7.6B.3.1
4.8.18	Reference sensitivity for EN-DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.3B.2.3_1.1
4.8.19	Reference sensitivity for inter-band EN-DC including FR2	3GPP TS 38.521-3 Clause 7.3B.2.4
4.8.20	Reference sensitivity for inter-band EN-DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.3
4.8.21	Reference sensitivity for intra-band contiguous EN-DC 2CCs	3GPP TS 38.521-3 Clause 7.3B.2.1
4.8.22	Spectrum emissions mask for inter- band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.5B.2.3.1
4.8.23	Spectrum emissions mask for inter-band EN-DC including FR2 (2 CCs)	3GPP TS 38.521-3 Clause 6.5B.2.4.1
4.8.24	Spurious emission band UE co-existence for intra-band contiguous EN-DC	3GPP TS 38.521-3 Clause 6.5B.3.1.2
4.8.25	Spurious emissions band UE co-existence for inter-band within FR1	3GPP TS 38.521-3 Clause 6.5B.3.3.2
4.8.26	Spurious Emissions for EN DC within FR1 3CCs	3GPP TS 38.521-3 Clause 7.9B.3 1.1
4.8.27	Spurious Emissions for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.3
4.8.28	Spurious emissions for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.9B.1
4.8.29	Spurious Response for inter band EN DC within FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.3
4.8.30	Spurious Response for intra band contiguous EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.7B.1
4.8.31	UE Maximum Output Power for Inter-Band EN-DC including FR2 - EIRP and TR	3GPP TS 38.521-3 Clause 6.2B.1.4.1
4.8.32	UE Maximum Output Power for Inter-Band EN-DC including FR2 - Spherical Coverage	3GPP TS 38.521-3 Clause 6.2B.1.4.2
4.8.33	UE Maximum Output Power for Inter-Band EN-DC within FR1	3GPP TS 38.521-3 Clause 6.2B.1.3

4.8.34	UE Maximum Output Power for Intra-Band Contiguous EN-DC	3GPP TS 38.521-3 Clause 6.2B.1.1
4.8.35	Wideband Intermodulation for inter band EN DC in FR1 2CCs	3GPP TS 38.521-3 Clause 7.8B.2.3
4.8.36	Wideband Intermodulation for intra band contiguous EN DC in FR1	3GPP TS 38.521-3 Clause 7.8B.2.1

4.9 Interface 8 : 5G NR (FR1)

S.No.	Parameter Name	Standard Name
4.9.1	Additional spectrum emission mask- Transmitter	3GPP TS 38.521-1 Clause 6.5.2.3
4.9.2	Additional spectrum emission mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.3
4.9.3	Additional spurious emissions	3GPP TS 38.521-1 Clause 6.5.3.3
4.9.4	Additional spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.3
4.9.5	Adjacent channel selectivity	3GPP TS 38.521-1 Clause 7.5
4.9.6	Adjacent channel selectivity for 2DL CA	3GPP TS 38.521-1 Clause 7.5A.1
4.9.7	Adjacent channel selectivity for UL-MIMO	3GPP TS 38.521-1 Clause 7.5D
4.9.8	General spurious emissions-Transmitter	3GPP TS 38.521-1 Clause 6.5.3.1
4.9.9	General spurious emissions for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.1
4.9.10	In-band Blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.2.1
4.9.11	Inband Blocking	3GPP TS 38.521-1 Clause 7.6.2
4.9.12	Inband blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.2
4.9.13	Minimum output power	3GPP TS 38.521-2 Clause 6.3.1
4.9.14	Narrow band blocking	3GPP TS 38.521-1 Clause 7.6.4
4.9.15	Narrow band blocking for CA-2DL CA	3GPP TS 38.521-1 Clause 7.6A.4.1
4.9.16	Narrow band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.4
4.9.17	NR ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.1
4.9.18	NR ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.1
4.9.19	Out-of-band blocking	3GPP TS 38.521-1 Clause 7.6.3
4.9.20	Out-of-band blocking for UL-MIMO	3GPP TS 38.521-1 Clause 7.6D.3
4.9.21	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
4.9.22	Reference sensitivity power level for 2DL CA without exception	3GPP TS 38.521-1 Clause 7.3A.1

4.9.23	Reference sensitivity power level for UL- MIMO	3GPP TS 38.521-1 Clause 7.3D.2
4.9.24	Spectrum Emission Mask-5G NR FR1	3GPP TS 38.521-1 Clause 6.5.2.2
4.9.25	Spectrum emission Mask for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.2
4.9.26	Spurious emission for 2DL CA	3GPP TS 38.521-1 Clause 7.9A.1
4.9.27	Spurious emission for UE co-existence	3GPP TS 38.521-1 Clause 6.5.3.2
4.9.28	Spurious emission for UE co-existence for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.3.2
4.9.29	Spurious emissions-5G NR FR1	3GPP TS 38.521-1 Clause 7.9
4.9.30	Spurious response	3GPP TS 38.521-1 Clause 7.7
4.9.31	Spurious response for 2DL CA	3GPP TS 38.521-1 Clause 7.7A.1
4.9.32	Spurious response for UL-MIMO	3GPP TS 38.521-1 Clause 7.7D
4.9.33	UE Maximum Output Power	3GPP TS 38.521-1 Clause 6.2.1
4.9.34	UE maximum output power for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.1
4.9.35	UE maximum output power reduction for UL-MIMO	3GPP TS 38.521-1 Clause 6.2D.2
4.9.36	UTRA ACLR	3GPP TS 38.521-1 Clause 6.5.2.4.2
4.9.37	UTRA ACLR for UL MIMO	3GPP TS 38.521-1 Clause 6.5D.2.4.2
4.9.38	Wide band Intermodulation	3GPP TS 38.521-1 Clause 7.8.2
4.9.39	Wide band Intermodulation for CA-2DL CA	3GPP TS 38.521-1 Clause 7.8A.2.1
4.9.40	Wide band Intermodulation for UL-MIMO	3GPP TS 38.521-1 Clause 7.8D.2

4.10 Interface 9 : 5G NR (FR2)

S.No.	Parameter Name	Standard Name
4.10.1	Adjacent channel leakage ratio	3GPP TS 38.521-2 Clause 6.5.2.3
4.10.2	Minimum Output power-Transmitter	3GPP TS 38.521-1 Clause 6.3.1
4.10.3	Reference sensitivity power level	3GPP TS 38.521-1 Clause 7.3.2
4.10.4	Spectrum Emission Mask-5G NR FR2	3GPP TS 38.521-2 Clause 6.5.2.1
4.10.5	UE maximum output power-EIRP and TRP	3GPP TS 38.521-2 Clause 6.2.1.1
4.10.6	UE maximum output power-Spherical coverage	3GPP TS 38.521-2 Clause 6.2.1.2
4.10.7	UE maximum output power reduction	3GPP TS 38.521-2 Clause 6.2.2
4.10.8	UE maximum output power with additional requirements	3GPP TS 38.521-2 Clause 6.2.3

4.11 Interface 10 : NB-IoT

S.No.	Parameter Name	Standard Name
4.11.1	Frequency Stability-NB-IOT	3GPP TS 36.521-1 Clause 6.5.1F
4.11.2	Maximum output power-NB-IOT	3GPP TS 36.521-1 Clause 6.2.2F
4.11.3	Operating Frequency-NB-IOT-Device Equip. shall be capable of operating in at least one of the frequency bands as per the National Freq. Allocation plan	National Frequency Allocation Plan- 2018 Frequency Allocation Table (IND 16)
4.11.4	Power Control Absolute Power Tolerance-NB-IOT	3GPP TS 36.521-1 Clause 6.3.5F.1
4.11.5	Receiver Adjacent Channel Selectivity (ACS) - NB-IOT	3GPP TS 36.521-1 Clause 7.5F
4.11.6	Receiver In-band blocking-NB-IOT	3GPP TS 36.521-1 Clause 7.6.1F
4.11.7	Receiver Reference Sensitivity level-NB-IOT	3GPP TS 36.521-1 Clause 7.3F
4.11.8	Receiver spurious emission-NB-IOT	3GPP TS 36.521-1 Clause 7.9F
4.11.9	Spectrum emissions mask-NB-IOT	3GPP TS 36.521-1 Clause 6.6.2.1F
4.11.10	Spurious emissions-NB-IOT	3GPP TS 36.521-1 Clause 6.6.3F.1-6.6.3F.2

4.12 Interface 9 : Geolocation Navigation Interface

S.No.	Parameter Name	Standard Name
3.10.1	GPS	Annexure to ER for Tracking Device
3.10.2	NavIC	Annexure to ER for Tracking Device

Interface: oneM2M

Note: Testing applicable as per available profile(s) in the device

S.No.	Profile Details	Standard Name
<u>1</u>	<u>Constrained sensor as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.10</u>
<u>2</u>	<u>Constrained actuator as ADN with security</u>	<u>oneM2M TS-0025, v3.3.0, clause 5.11</u>

Annexure – II

Name (of Member/Manufacturer)

Inputs/Comments/Suggestions on Draft Revision of Essential Requirements of Tracking Device:

Clause Number	Clause Description	Modified/New Clause	Justification