**3GPP TSG-RAN2 Meeting # 110-e *draftR2-2005893***

**Electronic meeting, June 1st –12th, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.355** | **CR** | **0259** | **rev** | **1** | **Current version:** | **16.0.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Update B1I signal ICD file to v3.0 in BDS system in A-GNSS | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT, CAICT, Huawei, ZTE Corporation | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2020-6-2 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The BDS B1I signal ICD file has been updated from v2.0 to v3.0. The Stage 2 (and Stage 3) specifications for A-GNSS positioning methods in LTE and NR need to be updated accordingly. The modification of B1I ICD, BDS-SIS-ICD-B1I-3.0 mainly includes:  - an increase in the number of satellite vehicles supported,  - the No. of some tables and sections are changed which are the editor modification. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. ICD specification of B1I signal in BDS is updated to v3.0 in section 2 as reference. 2. The impacted description of reference (i.e. table number and section number) has been updated following the latest ICD file in section 6.5.2. 3. The value of satellite id of SV-ID is updated following the latest ICD file in section 6.5.2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The ICD version for B1I will not be up to date and assistance data of B1I signal in A-BDS won’t support the SV-ID larger than 37, but the real satellite system already supports SV-ID more than 37 in B1I signal. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 6.5.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS38.305 CR0024  TS36.305 CR0088 | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| **Start of change** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 36.305: "Stage 2 functional specification of User Equipment (UE) positioning in E-UTRAN".

[3] 3GPP TS 23.271: "Functional stage 2 description of Location Services (LCS)".

[4] IS-GPS-200, Revision D, Navstar GPS Space Segment/Navigation User Interfaces, March 7th, 2006.

[5] IS-GPS-705, Navstar GPS Space Segment/User Segment L5 Interfaces, September 22, 2005.

[6] IS-GPS-800, Navstar GPS Space Segment/User Segment L1C Interfaces, September 4, 2008.

[7] IS-QZSS, Quasi Zenith Satellite System Navigation Service Interface Specifications for QZSS, Ver.1.1, July 31, 2009.

[8] Galileo OS Signal in Space ICD (OS SIS ICD), Issue 1.2, February 2014, European Union.

[9] Global Navigation Satellite System GLONASS Interface Control Document, Version 5.1, 2008.

[10] Specification for the Wide Area Augmentation System (WAAS), US Department of Transportation, Federal Aviation Administration, DTFA01-96-C-00025, 2001.

[11] RTCM-SC104, RTCM Recommended Standards for Differential GNSS Service (v.2.3), August 20, 2001.

[12] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); "Radio Resource Control (RRC); Protocol specification".

[13] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification".

[14] 3GPP TS 44.031: "Location Services (LCS); Mobile Station (MS) - Serving Mobile Location Centre (SMLC) Radio Resource LCS Protocol (RRLP)".

[15] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[16] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

[17] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer – Measurements".

[18] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

[19] 3GPP TS 23.003: "Numbering, addressing and identification".

[20] OMA-TS-LPPe-V1\_0, LPP Extensions Specification, Open Mobile Alliance.

[21] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[22] ITU-T Recommendation X.691 (07/2002) "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)" (Same as the ISO/IEC International Standard 8825-2).

[23] BDS-SIS-ICD-B1I-3.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1I (Version 3.0)", February, 2019.

[24] ATIS-0500027: "Recommendations for Establishing Wide Scale Indoor Location Performance", May 2015.

[25] Bluetooth Special Interest Group: "Bluetooth Core Specification v4.2", December 2014.

[26] IEEE 802.11, Part 11: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[27] IETF RFC 6225, "Dynamic Host Configuration Protocol Options for Coordinate-Based Location Configuration Information", July 2011.

[28] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".

[29] "Earth Gravitational Model 96 (EGM96)", National Geospatial-Intelligence Agency, NASA.

[30] RTCM Standard 10403.3: "Differential GNSS (Global Navigation Satellite Systems) Services" – Version 3, October 7, 2016.

[31] IGS ANTEX: "The Antenna Exchanged Format" – version 1.4, September 15, 2010.

[32] Federal Information Processing Standards Publication 197, "Specification for the ADVANCED ENCRYPTION STANDARD (AES)", November 26, 2001.

[33] NIST Special Publication 800-38A, "Recommendation for Block Cipher Modes of Operation Methods and Techniques", 2001.

[34] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[35] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[36] 3GPP TS 38.215: "NR; Physical layer measurements".

[37] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[38] IRNSS Signal-In-Space (SPS) Interface Control Document (ICD) for standard positioning service version 1.1, Aug 2017.

[39] BDS-SIS-ICD-B1C-1.0: "BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal B1C (Version 1.0)", December, 2017.

[40] 3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".

[41] 3GPP TS 38.211: "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Physical channels and modulation".

[42] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[43] IS-QZSS-L6-001, Quasi-Zenith Satellite System Interface Specification – Centimetre Level Augmentation Service, Cabinet Office, November 5, 2018.

[44] 3GPP TR 38.901: "Technical Specification Group Radio Access Network; Study on channel model for frequencies from 0.5 to 100 GHz".

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| **The next change** |

#### 6.5.2.2 GNSS Assistance Data Elements

#### – *AlmanacBDS-AlmanacSet*

-- ASN1START

AlmanacBDS-AlmanacSet-r12 ::= SEQUENCE {

svID SV-ID,

bdsAlmToa-r12 INTEGER (0..255) OPTIONAL, -- Cond NotSameForAllSV

bdsAlmSqrtA-r12 INTEGER (0..16777215),

bdsAlmE-r12 INTEGER (0..131071),

bdsAlmW-r12 INTEGER (-8388608..8388607),

bdsAlmM0-r12 INTEGER (-8388608..8388607),

bdsAlmOmega0-r12 INTEGER (-8388608..8388607),

bdsAlmOmegaDot-r12 INTEGER (-65536..65535),

bdsAlmDeltaI-r12 INTEGER (-32768..32767),

bdsAlmA0-r12 INTEGER (-1024..1023),

bdsAlmA1-r12 INTEGER (-1024..1023),

bdsSvHealth-r12 BIT STRING (SIZE(9)) OPTIONAL, -- Cond SV-ID

...

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *NotSameForAllSV* | This field may be present if the toa is not the same for all SVs; otherwise it is not present and the toa is provided in *GNSS-Almanac*. |
| *SV-ID* | This field is mandatory present if *SV-ID* is between 0 and 63; otherwise it is not present. |

| *AlmanacBDS-AlmanacSet* field descriptions |
| --- |
| ***svID***  This field identifies the satellite for which the GNSS Almanac Model is given. |
| ***bdsAlmToa***  Parameter toa, Almanac reference time(seconds) [23]  Scale factor 212 seconds. |
| ***bdsAlmSqrtA***  Parameter A1/2, Square root of semi-major axis (meters1/2) [23]  Scale factor 2-11 meters1/2. |
| ***bdsAlmE***  Parameter e, Eccentricity, dimensionless [23]  Scale factor 2-21. |
| ***bdsAlmW***  Parameter , Argument of Perigee (semi-circles) [23]  Scale factor 2-23 semi-circles. |
| ***bdsAlmM0***  Parameter M0, Mean anomaly at reference time (semi-circles) [23]  Scale factor 2-23 semi-circles. |
| ***bdsAlmOmega0***  Parameter 0, Longitude of ascending node of orbital plane computed according to reference time (semi-circles) [23]  Scale factor 2-23 semi-circles. |
| ***bdsAlmOmegaDot***  Parameter  Rate of right ascension (semi-circles/sec) [23]  Scale factor 2-38 semi-circles/sec. |
| ***bdsAlmDeltaI***  Parameter i, Correction of orbit reference inclination at reference time (semi-circles) [23]  Scale factor 2-19 semi-circles. |
| ***bdsAlmA0***  Parameter a0, Satellite clock bias (seconds) [23]  Scale factor 2-20 seconds. |
| ***bdsAlmA1***  Parameter a1, Satellite clock rate (sec/sec) [23]  Scale factor 2-38 sec/sec. |
| ***bdsSvHealth***  This field indicates satellites health information as defined in [23] Table 5-16. The left most bit is the MSB. |

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| **The next change** |

#### 6.5.2.2 GNSS Assistance Data Elements

#### – *BDS-DifferentialCorrections*

The IE *BDS-DifferentialCorrections* is used by the location server to provide differential corrections to the target device for BDS B1I.

-- ASN1START

BDS-DifferentialCorrections-r12 ::= SEQUENCE {

dbds-RefTime-r12 INTEGER (0..3599),

bds-SgnTypeList-r12 BDS-SgnTypeList-r12,

...

}

BDS-SgnTypeList-r12 ::= SEQUENCE (SIZE (1..3)) OF BDS-SgnTypeElement-r12

BDS-SgnTypeElement-r12 ::= SEQUENCE {

gnss-SignalID GNSS-SignalID OPTIONAL, -- Need ON

dbds-CorrectionList-r12 DBDS-CorrectionList-r12,

...

}

DBDS-CorrectionList-r12 ::= SEQUENCE (SIZE (1..64)) OF DBDS-CorrectionElement-r12

DBDS-CorrectionElement-r12 ::= SEQUENCE {

svID SV-ID,

bds-UDREI-r12 INTEGER (0..15),

bds-RURAI-r12 INTEGER (0..15),

bds-ECC-DeltaT-r12 INTEGER (-4096..4095),

...

}

-- ASN1STOP

| *BDS-DifferentialCorrections* field descriptions |
| --- |
| ***dbds-RefTime***  This field *specifies* the time for which the differential corrections are valid, modulo 1 hour. d*bds-RefTime* is given in BDS system time.  Scale factor 1‑second. |
| ***bds-UDREI***  This field indicates user differential range error information by user differential range error index (UDREI) as defined in [23], clause 5.3.3.8.2. |
| ***bds-RURAI***  This field indicates Regional User Range Accuracy (RURA) information by Regional User Range Accuracy Index (UDREI) as defined in [23], clause 5.3.3.7. |
| ***bds-ECC***-***DeltaT***  This field indicates the BDS differential correction information which is expressed in equivalent clock correction (t). Add the value of t to the observed pseudo-range to correct the effect caused by the satellite clock offset and ephemeris error. Value -4096 means the t is not available.  The scale factor is 0.1 meter. |

#### – *BDS-GridModelParameter*

The IE *BDS-GridModelParameter* is used by the location server to provide Ionospheric Grid Information to the target device for BDS B1I.

-- ASN1START

BDS-GridModelParameter-r12 ::= SEQUENCE {

bds-RefTime-r12 INTEGER (0..3599),

gridIonList-r12 GridIonList-r12,

...

}

GridIonList-r12 ::= SEQUENCE (SIZE (1..320)) OF GridIonElement-r12

GridIonElement-r12 ::= SEQUENCE {

igp-ID-r12 INTEGER (1..320),

dt-r12 INTEGER (0..511),

givei-r12 INTEGER (0..15) ,

...

}

-- ASN1STOP

| *BDS-GridModelParamater* field descriptions |
| --- |
| ***bds-RefTime***  This field specifies the time for which the grid model parameters are valid, modulo 1 hour. *bds-RefTime* is given in BDS system time.  Scale factor 1‑second. |
| ***gridIonList***  This list provides ionospheric grid point information for each grid point. Up to 16 instances are used in this version of the specification. The values 17 to 320 are reserved for future use. |
| ***igp-ID***  This field indicates the ionospheric grid point (IGP) number as defined in [23], clause 5.3.3.9. |
| ***dt***  This field indicates dT as defined in [23], clause 5.3.3.9.1, i.e. the vertical delay at the corresponding IGP indicated by *igp-ID*.  The scale factor is 0.125 meter. |
| ***givei***  This field indicates the Grid Ionospheric Vertical Error Index (GIVEI) which is used to describe the delay correction accuracy at ionospheric grid point indicated by *igp-ID*, the mapping between GIVEI and GIVE is defined in [23], clause 5.3.3.9.2. |

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| **The next change** |

#### – *SV-ID*

The IE *SV‑ID* is used to indicate a specific GNSS satellite. The interpretation of *SV‑ID* depends on the *GNSS‑ID.*

-- ASN1START

SV-ID ::= SEQUENCE {

satellite-id INTEGER(0..63),

...

}

-- ASN1STOP

| *SV‑ID* field descriptions |
| --- |
| ***satellite‑id***  This field specifies a particular satellite within a specific GNSS. The interpretation of *satellite‑id* depends on the *GNSS‑ID* see the table below. |

interpretation of *satellite‑id*

|  |  |  |
| --- | --- | --- |
| System | Value of *satellite‑id* | Interpretation of *satellite‑id* |
| GPS | '0' – '62'  '63' | Satellite PRN Signal No. 1 to 63  Reserved |
| SBAS | '0' – '38'  '39' – '63' | Satellite PRN Signal No. 120 to 158  Reserved |
| QZSS | '0' – '9'  '10' – '63' | Satellite PRN Signal No. 193 to 202  Reserved |
| GLONASS | '0' – '23'  '24 – '63' | Slot Number 1 to 24  Reserved |
| Galileo | '0' – '35' '36' – '63' | Code No. 1 to 36 Reserved |
| BDS | '0' – '62'  '63' | Satellite ranging code number No.1 to 63  Reserved |
| NavIC | '0' – '13'  '14'–'63' | Satellite PRN Signal No. 1 to 14 Reserved |

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| **The end** |