3GPP TS 37.571-5 V1.0.0 (2010-11)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
Universal Terrestrial Radio Access (UTRA) and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC);
User Equipment (UE) conformance specification for UE positioning;
Part 5: Test scenarios and assistance data;
(Release 9)

Keywords
UMTS, radio

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword 6
Introduction 6
1 Scope 7
2 References 7
3 Definitions, symbols and abbreviations 8
3.1 Definitions 8
3.2 Symbols 8
3.3 Abbreviations 8
4 General 9
4.1 GPS and GNSS orbital model information, assistance data and assistance data files 9
4.2 OTDOA scenario information and assistance data 9
4.3 ECID scenario information 9
5 GPS information 10
5.1 GPS Scenario and Assistance data for Assisted GPS signalling tests 10
5.1.1 General 10
5.1.2 GPS Scenario 10
5.1.3 Assistance Data 10
5.1.3.1 Assistance Data Reference Time 10
5.1.3.2 Assistance Data Reference UE Position 11
5.1.3.3 Assistance Data Navigation Model 11
5.1.3.4 Assistance Data Ionospheric Model 12
5.1.3.5 Assistance Data Almanac 12
5.1.3.6 Assistance Data Acquisition Assistance 13
5.2 GPS Scenarios and Assistance Data for Assisted GPS Minimum Performance tests 14
5.2.1 General 14
5.2.1.1 Satellite constellations and assistance data for minimum performance testing 14
5.2.1.2 GPS Scenarios for minimum performance testing 14
5.2.1.2.1 GPS Scenario #1 14
5.2.1.2.2 GPS Scenario #2 15
5.2.1.2.3 GPS Scenario #3 15
5.2.1.2.4 UE Location for TTFF test cases 15
5.2.1.2.4.1 UE Location Offset 16
5.2.1.2.4.2 UE Altitude 16
5.2.1.2.5 Satellites to be simulated in each test case 16
5.2.2 Information elements required for normal UE based testing 16
5.2.3 Information elements required for UE based Sensitivity Fine Time Assistance test case 17
5.2.4 Information elements available for normal UE assisted testing 17
5.2.5 Information elements available for UE assisted Sensitivity Fine Time Assistance test case 18
5.2.6 Contents of Information elements for Minimum performance testing 19
5.2.6.1 General 19
5.2.6.2 IE Random Offset Values 19
5.2.6.2.1 GPS TOW msec 20
5.2.6.2.1 UTRAN GPS timing of cell frames 20
5.2.6.3 Assistance Data Reference Time 20
5.2.6.4 Assistance Data Reference UE Position 22
5.2.6.5 Assistance Data Navigation Model 22
5.2.6.6 Assistance Data Ionospheric Model 23
5.2.6.7 Assistance Data Almanac 23
5.2.6.8 Assistance Data Acquisition Assistance 24
6 GNSS information 26
6.1 GNSS Scenarios and Assistance Data for Assisted GNSS signalling tests 26
6.1.1 General 26
6.1.2 GNSS Scenario 27

6.1.3 Assistance Data 28
6.1.3.1 Default Assistance Data for TS 34.123-1 subclauses 17.2.5 to 17.2.7 28
6.1.3.3 Assistance Data values for TS 34.123-1 subclauses 17.2.5 to 17.2.7 29
6.1.3.3 Default Assistance Data for TS 36.571-2 40
6.1.3.4 Assistance Data values for TS 36.571-2 40
6.2 GNSS Scenarios and Assistance Data for Assisted GNSS Minimum Performance tests 49
6.2.1 General 49
6.2.1.1 Satellite constellations and assistance data for minimum performance testing 50
6.2.1.2 GNSS Scenarios for minimum performance testing 50
6.2.1.2.1 GNSS Scenario #1 51
6.2.1.2.2 GNSS Scenario #2 52
6.2.1.2.3 GNSS Scenario #3 54
6.2.1.2.3.1 GNSS Scenario #3A 54
6.2.1.2.3.2 GNSS Scenario #3B 54
6.2.1.2.3.3 QZSS Scenario #1 54
6.2.1.2.3.4 WAAS Scenario 54
6.2.1.2.3.5 EGNOS Scenario 54
6.2.1.2.3.6 MSAS Scenario 55
6.2.1.2.3.7 GAGAN Scenario 55
6.2.1.2.4 GNSS Scenario #4 55
6.2.1.2.4.1 GNSS Scenario #4A 55
6.2.1.2.4.2 GNSS Scenario #4B 55
6.2.1.2.4.3 GNSS Scenario #4C 55
6.2.1.2.4.4 GNSS Scenario #4D 57
6.2.1.2.4.5 QZSS Scenario #2 57
6.2.1.2.3.6 WAAS Scenario 57
6.2.1.2.3.7 EGNOS Scenario 57
6.2.1.2.3.8 MSAS Scenario 57
6.2.1.2.3.9 GAGAN Scenario 58
6.2.1.2.5 UE Location for TTFF test cases 58
6.2.1.2.5.1 UE Location Offset 58
6.2.1.2.5.2 UE Altitude 58
6.2.2 Information elements required for normal UE based testing for TS 34.172 58
6.2.3 Information elements required for UE based Sensitivity Fine Time Assistance test case for TS 34.172 60
6.2.4 Information elements available for normal UE assisted testing for TS 34.172 61
6.2.5 Information elements available for UE assisted Sensitivity Fine Time Assistance test case for TS 34.172 63
6.2.6 Information elements available for A-GNSS test cases in TS 36.571-1 64
6.2.7 Contents of Information elements for A-GNSS Minimum performance testing 67
6.2.7.1 General 67
6.2.7.2 IE Random Offset Values 67
6.2.7.2.1 GNSS TOW 67
6.2.7.2.1 GNSS/cellular time offset 68
6.2.7.3 Contents of Information elements for A-GNSS Minimum performance testing in TS 34.172 68
6.2.7.4 Contents of Information elements for A-GNSS Minimum performance testing in TS 36.571-1 68
7 OTDOA 69
7.1 OTDOA Scenario and Assistance data for OTDOA signalling tests 69
7.1.1 General 69
7.1.2 OTDOA Scenario 69
7.1.3 OTDOA Assistance Data 69
7.2 OTDOA Scenario and Assistance data for OTDOA minimum performance tests 70
7.2.1 General 70
7.2.2 OTDOA Scenario 70
7.2.3 OTDOA Assistance Data 70
8 ECID 71
Annex A (normative): GPS data files 72
A.1 GPS data files for signalling tests 72
A.2 GPS data files for Minimum Performance tests 72

Annex B (normative): GNSS data files 73
B.1 GNSS data files for signalling tests 73
B.2 GNSS data files for Minimum Performance tests 73

Annex C (normative): OTDOA data files 74
C.1 OTDOA data files for signalling tests 74
C.2 OTDOA data files for Minimum Performance tests 74

Annex D (informative): Change history 75

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part 5 of a multi-part TS:

3GPP TS 37. 571-1: Void

3GPP TS 37. 571-2: Void

3GPP TS 37. 571-3: Void

3GPP TS 37. 571-4: Void

3GPP TS 37. 571-5: Universal Terrestrial Radio Access (UTRA) and Evolved UTRA) (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 5: Test scenarios and assistance data.

Note: the structure of this document as part of a multi-part TS is aligned for simplicity with the structure of TS 36.571. It is expected that parts 1 to 4 will remain void and will never be used.

1 Scope

The present document specifies the test scenarios and assistance data required for the conformance test for FDD or TDD mode of UTRA and E-UTRA for the User Equipment (UE) that supports one or more of the defined positioning methods. For UTRA these are Assisted Global Positioning System (A-GPS) and Assisted Global Navigation Satellite System (A-GNSS). For E-UTRA these are A-GNSS, Observed Time Difference of Arrival (OTDOA) and Enhanced Cell ID (ECID).

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 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[3] 3GPP TS 34.123-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".

[4] 3GPP TS 34.171: "Terminal conformance specification; Assisted Global Positioning System (A-GPS); Frequency Division Duplex (FDD)".

[5] 3GPP TS 34.172: "Terminal conformance specification; Assisted Global Navigation Satellite System (A-GNSS); Frequency Division Duplex (FDD)".

[6] 3GPP TS 36. 571-1: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 1: Terminal conformance".

[7] 3GPP TS 36. 571-2: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 2: Protocol conformance".

[8] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

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

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

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

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

[13] Galileo OS Signal in Space ICD (OS SIS ICD), Draft 0, Galileo Joint Undertaking, May 23rd, 2006.

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

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

[16] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol specification"

[17] STANAG 4294: NATO STANAG 4294. Navstar Global Positioning System (GPS) System Characteristics.

[18] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".

[19] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], TS 36.101 [2], 3GPP TS 36.104 [18] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Horizontal Dilution Of Precision (HDOP): measure of position determination accuracy that is a function of the geometrical layout of the satellites used for the fix, relative to the receiver antenna

3.2 Symbols

For the purposes of the present document, the following symbols apply:

E1	Galileo E1 navigation signal with carrier frequency of 1575.420 MHz.
E5	Galileo E5 navigation signal with carrier frequency of 1191.795 MHz.
E6	Galileo E6 navigation signal with carrier frequency of 1278.750 MHz.
G1	GLONASS navigation signal in the L1 sub-bands with carrier frequencies 1602 MHz ± k × 562.5 kHz.
G2	GLONASS navigation signal in the L2 sub-bands with carrier frequencies 1246 MHz ± k × 437.5 kHz.
k	GLONASS channel number, k = -7…13.
L1 C/A	GPS or QZSS L1 navigation signal carrying the Coarse/Acquisition code with carrier frequency of 1575.420 MHz.
L1C	GPS or QZSS L1 Civil navigation signal with carrier frequency of 1575.420 MHz.
L2C	GPS or QZSS L2 Civil navigation signal with carrier frequency of 1227.600 MHz.
L5	GPS or QZSS L5 navigation signal with carrier frequency of 1176.450 MHz.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

A-GNSS	Assisted Global Navigation Satellite System
A-GPS	Assisted - Global Positioning System
AWGN	Additive White Gaussian Noise
C/A	Coarse/Acquisition
DUT	Device Under Test
ECEF	Earth Centred, Earth Fixed
E-UTRA	Evolved UMTS Terrestrial Radio Access
E-UTRAN	Evolved UMTS Terrestrial Radio Access Network
FDD	Frequency Division Duplex
GLONASS	GLObal'naya NAvigatsionnaya Sputnikovaya Sistema (English: Global Navigation Satellite System)

GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSS	GNSS System Simulator
HDOP	Horizontal Dilution Of Precision
ICD	Interface Control Document
IS	Interface Specification
LOS	Line Of Sight
LPP	LTE Positioning Protocol
PPM	Parts per million
QZSS	Quasi-Zenith Satellite System
RRC	Radio Resource Control
SBAS	Space Based Augmentation System
SS	System simulator
SV	Space Vehicle
TDD	Time Division Duplex
TTFF	Time To First Fix
UE	User Equipment
WGS-84	World Geodetic System 1984

4 General

4.1 GPS and GNSS orbital model information, assistance data and assistance data files

The following subclauses 5 and 6 define the GPS and GNSS orbital model information, the assistance data and the assistance data files for the test cases as follows:

Subclause 5.1: data for A-GPS Signalling test cases defined in TS 34.123-1 [3] subclauses 17.2.1 to 17.2.4

Subclause 5.2: data for A-GPS Minimum Performance test cases defined in TS 34.171 [4]

Subclause 6.1: data for A-GNSS Signalling test cases defined in TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7 and in TS 36.571-2 [7].

Subclause 6.2: data for A-GNSS Minimum Performance test cases defined in TS 34.172 [5] and in TS 36.571-1 [6].

The orbital model information is defined and where appropriate is given in Yuma format in .txt files for each scenario in the appropriate data file specified in Annex A or Annex B.

Where the assistance data is fixed or is not required on a per-satellite basis, then it is defined in the following subclauses. Where assistance data is required on a per-satellite basis, or where the values of the data also vary with time then it is specified in comma-separated-variable files in the appropriate data file specified in Annex A or Annex B. These files specify the values to be used for each satellite, indexed by satellite PRN, and, where applicable, the values to be used indexed by both time and satellite PRN.

4.2 OTDOA scenario information and assistance data

The following subclause 7 defines the OTDOA scenario information and the assistance data for the test cases as follows:

Subclause 7.1: data for OTDOA Signalling test cases defined in TS 36.571-2 [7].

Subclause 7.2: data for OTDOA Minimum Performance test cases defined in TS 36.571-1 [6].

4.3 ECID scenario information

The following subclause 8 defines the ECID scenario information for the test cases as follows:

Subclause 8.1: data for ECID Signalling test cases defined in TS 36.571-2 [7].

Subclause 8.2: data for ECID Minimum Performance test cases defined in TS 36.571-1 [6].

5 GPS information

5.1 GPS Scenario and Assistance data for Assisted GPS signalling tests

5.1.1 General

This subclause defines the GPS scenario and the associated assistance data that shall be used for all Assisted GPS signalling tests defined in TS 34.123-1 [3] subclauses 17.2.1 to 17.2.4.

The satellite simulator (SS) shall generate the six satellite signals defined in subclause 5.1.2 and shall provide assistance data as defined in subclause 5.1.3.

5.1.2 GPS Scenario

The following GPS scenario shall be used. The assistance data specified in the following subclauses is consistent with this GPS scenario:

- Yuma Almanac data: see file Tokyo Yuma.txt in the GPS data sig zip file specified in Annex A
- UE location and Reference location: static at latitude: 35 degrees 40 minutes north, longitude: 139 degrees 45 minutes east, (Tokyo) height: = 50m
- Start time: 12th September 2003 21:30:00
- Visible satellites simulated: PRNs: 4, 6, 9, 10, 13, 22.
- Ionospheric model: see values in subclause 5.1.6
- The levels of the simulated satellites shall all be at -125dBm +/- 6dB

5.1.3 Assistance Data

Where assistance data is required on a per-satellite basis, or where the values of the data also varies with time it is specified in comma-separated-variable files in the GPS data sig zip file specified in Annex A. These files specify the values to be used for each satellite, indexed by satellite PRN, and, where applicable, the values to be used indexed by both time and satellite PRN.

Assistance data that is marked as “time varying” and the GPS TOW msec field are only specified and used in 1 second increments. Interpolation between these values shall not be used.

The accuracy of the GPS TOW msec and assistance data that is marked as “time varying” in the provided assistance data shall be within +/- 2 s relative to the GPS time in the system simulator.

Assistance data Information Elements and fields that are not specified shall not be used.

The information elements detailed below are fully defined in 3GPP TS 25.331 [16]

5.1.3.1 Assistance Data Reference Time

Reference Time

Reference Time (Fields occurring once per message)

Information Element	Units	Value/remark
GPS Week	weeks	211
GPS TOW msec	msec	509400 s. Start time. Add integer number of 1 seconds as required. (Note)

Note: GPS TOW msec

This is the value of GPS TOW msec when the GPS scenario is started in the GPS simulator. The value of GPS TOW msec to be used in the Reference Time IE shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GPS simulator to this value, rounded up to the next 1 second interval. This "current GPS TOW msec" is then also used to determine the value of any other Information Elements marked as "Time varying" in subclause 5.1.3

5.1.3.2 Assistance Data Reference UE Position

Reference UE Position

Information Element	Units	Value/remark
Latitude sign		0
Degrees Of Latitude	degrees	3.56666666666667 10E1
Degrees Of Longitude	degrees	1.39750000000000 10E2
Altitude Direction		0
Altitude	m	50
Uncertainty semi-major	m	3000
Uncertainty semi-minor	m	3000
Orientation of major axis	degrees	0
Uncertainty Altitude	m	500
Confidence	%	68

5.1.3.3 Assistance Data Navigation Model

Satellite Information

Information Element	Units	Value/remark
Num_Sats_Total	---	6

Navigation Model (Fields occurring once per satellite)

Information Element	Units	Value/remark
SatID	---	PRNs: 4, 6, 9, 10, 13, 22.
Satellite Status		0 (see note)
NOTE: For consistency Satellite Status is also given in file: Navigation model.csv		

Ephemeris and Clock correction Information Elements (Fields occurring once per satellite)

Information Element	Units	Value/remark
C/A or P on L2		See file: Navigation model.csv
URA Index		See file: Navigation model.csv
SV Health		See file: Navigation model.csv
IODC	---	See file: Navigation model.csv
L2 P Data Flag		See file: Navigation model.csv
SF 1 Reserved	---	See file: Navigation model.csv
T_{GD}	sec	See file: Navigation model.csv
t_{oc}	sec	See file: Navigation model.csv
af_2	sec/sec^2	See file: Navigation model.csv
af_1	sec/sec	See file: Navigation model.csv
af_0	sec	See file: Navigation model.csv
C_{rs}	meters	See file: Navigation model.csv
Δn	semi-circles/sec	See file: Navigation model.csv
M_0	semi-circles	See file: Navigation model.csv
C_{uc}	radians	See file: Navigation model.csv
e	---	See file: Navigation model.csv
C_{us}	radians	See file: Navigation model.csv
$(A)^{1/2}$	meters$^{1/2}$	See file: Navigation model.csv
t_{oe}	sec	See file: Navigation model.csv
Fit Interval Flag		See file: Navigation model.csv
AODO	sec	See file: Navigation model.csv
C_{ic}	radians	See file: Navigation model.csv
$OMEGA_0$	semi-circles	See file: Navigation model.csv
C_{is}	radians	See file: Navigation model.csv
i_0	semi-circles	See file: Navigation model.csv
C_{rc}	meters	See file: Navigation model.csv
ω	semi-circles	See file: Navigation model.csv
OMEGAdot	semi-circles/sec	See file: Navigation model.csv
Idot	semi-circles/sec	See file: Navigation model.csv

5.1.3.4 Assistance Data Ionospheric Model

Ionospheric Model

Information Element	Units	Value/remark
α_0	seconds	4.6566129 10E-9
α_1	sec/semi-circle	1.4901161 10E-8
α_2	sec/(semi-circle)^2	-5.96046 10E-8
α_3	sec/(semi-circle)^3	-5.96046 10E-8
β_0	seconds	79872
β_1	sec/semi-circle	65536
β_2	sec/(semi-circle)^2	-65536
β_3	sec/(semi-circle)^3	-393216

5.1.3.5 Assistance Data Almanac

Almanac (Fields occurring once per message)

Information Element	Units	Value/remark
WN_a	weeks	212

Satellite Information

Information Element	Units	Value/remark
Num_Sats_Total	---	24

Almanac (Fields occurring once per satellite)

Information Element	Units	Value/remark
DataID	---	See file: Almanac.csv
SatID	---	PRNs: 1 to 24
e	dimensionless	See file: Almanac.csv
t_{oa}	sec	See file: Almanac.csv
δi	semi-circles	See file: Almanac.csv
OMEGADOT	semi-circles/sec	See file: Almanac.csv
SV Health		See file: Almanac.csv
$A^{1/2}$	meters$^{1/2}$	See file: Almanac.csv
$OMEGA_0$	semi-circles	See file: Almanac.csv
M_0	semi-circles	See file: Almanac.csv
ω	semi-circles	See file: Almanac.csv
af_0	seconds	See file: Almanac.csv
af_1	sec/sec	See file: Almanac.csv

5.1.3.6 Assistance Data Acquisition Assistance

GPS Acquisition Assist - Information Elements appearing once per message

Information Element	Units	Value/remark
GPS TOW msec	msec	509400 s. Start time. Add integer number of 1 seconds as required. (Note)

Note: GPS TOW msec

This is the value of GPS TOW msec when the GPS scenario is started in the GPS simulator. The value of GPS TOW msec to be used in the Acquisition Assistance IE shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GPS simulator to this value, rounded up to the next 1 second interval.

Satellite Information

Information Element	Units	Value/remark
Num_Sats_Total	---	6

GPS Acquisition Assist - Information Elements appearing once per satellite

Information Element	Units	Value/remark
SatID	---	PRNs: 4, 6, 9, 10, 13, 22.
Doppler (0th order term)	Hz	Time varying. See file: Acquisition assist .csv (Note)
Doppler (1storder term)	Hz/s	Time varying. See file: Acquisition assist .csv (Note)
Doppler Uncertainty	Hz	Time varying. See file: Acquisition assist .csv (Note)
Code Phase	chips	Time varying. See file: Acquisition assist .csv (Note)
Integer Code Phase	---	Time varying. See file: Acquisition assist .csv (Note)
GPS Bit number	---	Time varying. See file: Acquisition assist .csv (Note)
Code Phase Search Window	chips	Time varying. See file: Acquisition assist .csv (Note)
Azimuth	Degrees	Time varying. See file: Acquisition assist .csv (Note)
Elevation	Degrees	Time varying. See file: Acquisition assist .csv (Note)

Note: Acquisition Assist Information Elements

This field is "Time varying" and its value depends on the "current GPS TOW msec". The value of this field to be used shall be determined by taking the "current GPS TOW msec" value and selecting the field value in the Acquisition assist.csv file corresponding to the value of "current GPS TOW msec".

5.2 GPS Scenarios and Assistance Data for Assisted GPS Minimum Performance tests

5.2.1 General

This subclause defines the GPS scenarios and assistance data IEs which shall be available for use as specified in all A-GPS Minimum Performance test cases defined in TS 34.171 [4].

Subclauses 5.2.2 and 5.2.3 list the assistance data IEs required for minimum performance testing of UE-based mode, and subclauses 5.2.4 and 5.2.5 list the assistance data available for minimum performance testing of UE-assisted mode. Subclause 5.2.6 lists the values of the assistance data IE fields for all minimum performance testing.

The A-GPS minimum performance requirements are defined by assuming that all relevant and valid assistance data is received by the UE in order to perform GPS measurements and/or position calculation. This subclause does not include nor consider delays occurring in the various signalling interfaces of the network.

5.2.1.1 Satellite constellations and assistance data for minimum performance testing

The satellite constellations for minimum performance testing shall consist of 24 satellites. Almanac assistance data shall be available for all these 24 satellites. At least 9 of the satellites shall be visible to the UE (that is above 5 degrees elevation with respect to the UE). Other assistance data shall be available for 9 of these visible satellites. In each test, signals are generated for only a sub-set of these satellites for which other assistance data is available. The number of satellites in this sub-set is specified in the test. The satellites in this sub-set shall all be above 15 degrees elevation with respect to the UE. The HDOP for the test shall be calculated using this sub-set of satellites. The selection of satellites for this sub-set shall be random and consistent with achieving the required HDOP for the test.

5.2.1.2 GPS Scenarios for minimum performance testing

This subclause defines the GPS scenarios that shall be used for all Assisted GPS minimum performance tests defined in TS 34.171 [4]

The GPS scenarios achieve the required HDOP for the Test Cases and they also satisfy the requirement that for each test instance that the reference location shall change sufficiently such that the UE shall have to use the new assistance data.

The satellites to be simulated in each test case are specified in subclause 5.2.1.2.5.

The viable running time during which the scenario maintains the required HDOP or HDOPs is given. Once this time has been reached the scenario shall be restarted from its nominal start time.

5.2.1.2.1 GPS Scenario #1

The following GPS scenario #1 shall be used during the TTFF tests defined in TS 34.171 [4]. The assistance data specified in the following subclauses for GPS scenario #1 is consistent with this GPS scenario.

Yuma Almanac data: see file GPS 1 Yuma.txt in the GPS data perf zip file specified in Annex A.

UE location: the UE location is calculated as a random offset from the reference location using the method described in subclause 5.2.1.2.4. The reference location is: latitude: 33 degrees 45 minutes 0.019 seconds north, longitude: 84 degrees 23 minutes 0.011 seconds west, (Atlanta USA), height: = 300m.

Nominal start time: 22nd January 2005 (Saturday) 00:08:00.

Viable running time to maintain specified HDOP values: 19 minutes.

Visible satellites available for simulation and for which Assistance Data (other than Almanac) shall be generated: PRNs: 2, 6, 10, 17, 18, 21, 26, 29, 30.

Ionospheric model: see values in subclause 5.2.6.6.

Tropospheric model: STANAG with SRI equal to 324.8, as defined in STANAG 4294 [17].

5.2.1.2.2 GPS Scenario #2

The following GPS scenario #2 shall be used during the TTFF tests defined in TS 34.171 [4]. The assistance data specified in the following subclauses for GPS scenario #2 is consistent with this GPS scenario.

Yuma Almanac data: see file GPS 2 Yuma.txt in the GPS data perf zip file specified in Annex A.

UE location: the UE location is calculated as a random offset from the reference location using the method described in subclause 5.2.1.2.4. The reference location is: latitude: 37 degrees 48 minutes 59.988 seconds south, longitude: 144 degrees 58 minutes 0.013 seconds east, (Melbourne Australia), height: = 100m.

Nominal start time: 22nd January 2004 (Thursday) 00:08:00.

Viable running time to maintain specified HDOP values: 19 minutes.

Visible satellites available for simulation and for which Assistance Data (other than Almanac) shall be generated: PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31.

Ionospheric model: see values in subclause 5.2.6.6.

Tropospheric model: STANAG with SRI equal to 324.8, as defined in STANAG 4294 [17].

5.2.1.2.3 GPS Scenario #3

The following GPS scenario #3 shall be used during the Moving Scenario and Periodic Location test case defined in TS 34.171 [4]. The assistance data specified in the following subclauses for GPS scenario #3 is consistent with this GPS scenario.

Yuma Almanac data: see file GPS 3 Yuma.txt in the GPS data perf zip file specified in Annex A.

UE location: the UE location is given as a trajectory as shown in Figure 5.6.1 of TS 34.171 [4]. The reference location is at the centre of the trajectory and is at: latitude: 37 degrees 48 minutes 59.988 seconds south, longitude: 144 degrees 58 minutes 0.013 seconds east, (Melbourne Australia), height: = 100m.

Start time: 22nd January 2004 (Thursday) 00:08:00.

Start location: at the point between l_{11} and l_{12} in Figure 5.6.1 of TS 34.171 [4], going in a clock-wise direction.

Visible satellites available for simulation and for which Assistance Data (other than Almanac) shall be generated: PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31.

Viable running time to maintain specified HDOP values: 19 minutes.

Ionospheric model: see values in subclause 5.2.6.6.

Tropospheric model: STANAG with SRI equal to 324.8, as defined in STANAG 4294 [17].

5.2.1.2.4 UE Location for TTFF test cases

This subclause defines the method for generating the random UE locations that are required to be used for the TTFF tests defined in TS 34.171 [4].

For every Test Instance in each TTFF test case, the UE location shall be randomly selected to be within 3 km of the Reference Location. The Altitude of the UE shall be randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid. These values shall have uniform random distributions.

The UE location is calculated as an offset from the Reference Location.

5.2.1.2.4.1 UE Location Offset

The UE location offset shall be calculated by selecting the next pair of random numbers, representing a pair of latitude and longitude offsets in degrees, from a standard uniform random number generator, with the following properties:

The ranges of the latitude and longitude offsets values shall be such that when translated onto the surface of the earth they shall lie within a 3km radius circle, centred on the Reference location specified for the GPS scenario under consideration. For the purposes of this calculation make the following assumptions:

a) Over the 3km radius circle at the Reference location the earth is flat and the meridians and parallels form a rectangular grid

b) The earth is spherical with a radius of 6371141m (equal to the WGS 84 value at 35 degrees latitude)

The resolution used for the latitude and longitude offsets values shall be 90/2 E23 for the latitude offset values and 360/2E24 for the longitude offset values, representing the coding resolution in degrees specified in 3GPP TS 23.032 [19].

5.2.1.2.4.2 UE Altitude

The UE altitude value shall be calculated by selecting the next random number from a standard uniform random number generator, in the range 0 to 500, representing meters. The resolution used for the random number shall be 1, representing 1 meter.

5.2.1.2.5 Satellites to be simulated in each test case

The satellites to be simulated in each test case have been selected in order to achieve the required HDOP for that test case.

Satellites to be simulated

Test case	PRNs GPS #1	PRNs GPS #2	PRNs GPS #3
Sensitivity Coarse Time Assistance	2, 6, 10, 17, 18, 21, 26, 29	3, 11, 14, 15, 22, 23, 25, 31	-
Sensitivity Fine Time Assistance	2, 6, 10, 17, 18, 21, 26, 29	3, 11, 14, 15, 22, 23, 25, 31	-
Nominal Accuracy	2, 6, 10, 17, 18, 21, 26, 29	3, 11, 14, 15, 22, 23, 25, 31	-
Dynamic Range	2, 6, 10, 17, 26, 29	3, 14, 15, 22, 25, 31	-
Multi-Path scenario	2, 6, 17, 21, 26	3, 14, 15, 22, 25	-
Moving Scenario and Periodic location	-	-	3, 14, 15, 22, 25

5.2.2 Information elements required for normal UE based testing

The following A-GPS assistance data IEs and fields shall be present for each test. Fields not specified shall not be present. The values of the fields are specified in subclause 5.2.6.

a) UE positioning GPS reference time IE.

Name of the IE	Fields of the IE
Reference time	
	GPS Week
	GPS TOW msec
	GPS TOW Assist
	SatID
	TLM Message
	TLM Reserved
	Alert
	Anti-Spoof

b) UE positioning GPS reference UE position IE.

Name of the IE	Fields of the IE
Reference UE position	Ellipsoid point with Altitude and uncertainty ellipsoid

c) UE positioning GPS navigation model IE.

Name of the IE	Fields of the IE
Navigation Model	All satellite information

d) UE positioning GPS ionospheric model IE.

Name of the IE	Fields of the IE
Ionospheric Model	All

5.2.3 Information elements required for UE based Sensitivity Fine Time Assistance test case

The A-GPS assistance data IEs and fields that shall be present for the Sensitivity Fine Time Assistance test case shall be those specified in subclause 5.2.2 with the following exception. Fields not specified shall not be present. The values of the fields are specified in subclause 5.2.6.

UE positioning GPS reference time IE.

Name of the IE	Fields of the IE	Release
Reference time		
	GPS Week	
	GPS TOW msec	
	UTRAN GPS reference time	
	UTRAN GPS timing of cell frames	
	CHOICE mode	
	FDD	
	Primary CPICH Info	
	SFN	
	UE Positioning GPS ReferenceTime Uncertainty	Rel-7 onwards
	SFN-TOW Uncertainty	
	TUTRAN-GPS drift rate	
	GPS TOW Assist	
	SatID	
	TLM Message	
	TLM Reserved	
	Alert	
	Anti-Spoof	

5.2.4 Information elements available for normal UE assisted testing

The following A-GPS assistance data IEs and fields shall be available for use in each test. Fields not specified shall not be present. The values of the fields are specified in subclause 5.2.6.

a) UE positioning GPS reference time IE.

Name of the IE	Fields of the IE
Reference time	
	GPS Week
	GPS TOW msec
	GPS TOW Assist
	SatID
	TLM Message
	TLM Reserved
	Alert
	Anti-Spoof

b) UE positioning GPS reference UE position IE.

Name of the IE	Fields of the IE
Reference UE position	Ellipsoid point with Altitude and uncertainty ellipsoid

c) UE positioning GPS almanac IE.

Name of the IE	Fields of the IE
Almanac	
	Almanac Reference Week
	All Satellite information

d) UE positioning GPS navigation model IE.

Name of the IE	Fields of the IE
Navigation Model	All satellite information

e) UE positioning GPS acquisition assistance IE.

Name of the IE	Fields of the IE
Acquisition Assistance	
	GPS TOW msec
	Satellite information
	SatID
	Doppler (0^{th} order term)
	Extra Doppler
	Doppler (1^{st} order term)
	Doppler Uncertainty
	Code Phase
	Integer Code Phase
	GPS Bit number
	Code Phase Search Window
	Azimuth and Elevation
	Azimuth
	Elevation

5.2.5 Information elements available for UE assisted Sensitivity Fine Time Assistance test case

The A-GPS assistance data IEs and fields that shall be available for use for the Sensitivity Fine Time Assistance test case shall be those specified in subclause 5.2.4 with the following exceptions. Fields not specified shall not be present. The values of the fields are specified in subclause 5.2.6.

a) UE positioning GPS reference time IE.

Name of the IE	Fields of the IE	Release
Reference time		
	GPS Week	
	GPS TOW msec	
	UTRAN GPS reference time	
	UTRAN GPS timing of cell frames	
	CHOICE mode	
	FDD	
	Primary CPICH Info	
	SFN	
	UE Positioning GPS ReferenceTime Uncertainty	Rel-7 onwards
	SFN-TOW Uncertainty	
	TUTRAN-GPS drift rate	

	GPS TOW Assist	
	SatID	
	TLM Message	
	TLM Reserved	
	Alert	
	Anti-Spoof	

b) UE positioning GPS acquisition assistance IE.

Name of the IE	Fields of the IE	Release
Acquisition Assistance		
	GPS TOW msec	
	UTRAN GPS reference time	
	UTRAN GPS timing of cell frames	
	CHOICE mode	
	FDD	
	Primary CPICH Info	
	SFN	
	UE Positioning GPS ReferenceTime Uncertainty.	Rel-7 onwards
	Satellite information	
	SatID	
	Doppler (0^{th} order term)	
	Extra Doppler	
	Doppler (1^{st} order term)	
	Doppler Uncertainty	
	Code Phase	
	Integer Code Phase	
	GPS Bit number	
	Code Phase Search Window	
	Azimuth and Elevation	
	Azimuth	
	Elevation	

5.2.6 Contents of Information elements for Minimum performance testing

5.2.6.1 General

This subclause defines the assistance data values that shall be used for all Assisted GPS minimum performance tests. It is given for GPS scenarios #1, #2 and #3 where it is different for each scenario; otherwise it is marked "All" where the same value is used for all scenarios.

Where assistance data is required on a per-satellite basis, or where the values of the data also varies with time it is specified in comma-separated-variable files with suffixes XX in the GPS data perf zip file specified in Annex A, where XX is 01, 02 and 03 for GPS scenarios #1, #2 and #3 respectively. These files specify the values to be used for each satellite, indexed by satellite PRN, and, where applicable, the values to be used indexed by both time and satellite PRN.

Assistance data that is marked as "time varying" is specified and used in 80 ms increments. Interpolation between these values shall not be used.

Assistance data Information Elements and fields that are not specified shall not be used.

The information elements detailed below are fully defined in 3GPP TS 25.331 [16]

5.2.6.2 IE Random Offset Values

This subclause defines the methods for generating the random offsets that are required to be applied to some assistance data IEs for certain tests.

5.2.6.2.1 GPS TOW msec

For every Test Instance in each TTFF test case, the IE GPS TOW msec shall have a random offset, relative to GPS system time, within the allowed error range of Coarse Time Assistance defined in the test case. This offset value shall have a uniform random distribution.

Note: For the Moving Scenario and Periodic Update Test Case the value of the IE GPS TOW msec shall be set to the nominal value, i.e. no offset shall be used.

The offset value shall be calculated by selecting the next random number from a standard uniform random number generator, in the range specified for the GPS Coarse Time assistance error range in the Test Requirements, Test parameters table for the test under consideration. The resolution used for the random number shall be 0.01, representing 10ms.

5.2.6.2.1 UTRAN GPS timing of cell frames

In addition, for every Fine Time Assistance Test Instance the IE UTRAN GPS timing of cell frames shall have a random offset, relative to the true value of the relationship between the two time references, within the allowed error range of Fine Time Assistance defined in the test case. This offset value shall have a uniform random distribution.

The offset value shall be calculated by selecting the next random number from a standard uniform random number generator with the following properties:

The range shall be the number of UMTS chips whose duration is less than the range specified for the GPS Fine Time assistance error range in the Test Requirements, Test parameters table for the test under consideration.

The resolution used for the random number shall be 1, representing 1 UMTS chip.

5.2.6.3 Assistance Data Reference Time

Contents of UE positioning GPS reference time IE

Reference Time (Fields occurring once per message)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
GPS Week	weeks	282	230	230
GPS TOW msec	msec	518880000. Start time. Add number of ms as required. (Note 1)	346080000. Start time. Add number of ms as required. (Note 1)	346080000. Start time. Add number of ms as required. (Note 1)
UTRAN GPS reference time		Present for Sensitivity Fine Time Assistance test case. Absent otherwise	Present for Sensitivity Fine Time Assistance test case. Absent otherwise	Absent
UTRAN GPS timing of cell frames		Note 2	Note 2	-
CHOICE mode		Present for Sensitivity Fine Time Assistance test case. Absent otherwise	Present for Sensitivity Fine Time Assistance test case. Absent otherwise	-
FDD		-	-	-
Primary CPICH Info		100	100	-
SFN		Note 2	Note 2	-
UE Positioning GPS ReferenceTime Uncertainty. Note 3		TBD	TBD	-
SFN-TOW Uncertainty		lessThan10	lessThan10	-
TUTRAN-GPS drift rate		0	0	-

Note 1: GPS TOW msec

This is the value in ms of GPS TOW msec when the GPS scenario is initially started in the GPS simulator. For all TTFF test cases, each time a GPS scenario is used, the GPS start time shall be advanced by 120 seconds from the value last used so that, at the time the fix is made, it is at least 2 minutes later than the previous fix made with that scenario.

The actual value of GPS TOW msec to be used in the Reference Time IE (before the addition of the random offset, if applicable) shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GPS simulator to this value. The accuracy shall be such that the Maximum Test System Uncertainty for Coarse Time Assistance, specified in Table F.1.2 of TS 34.171 [4], shall be met.

For all TTFF test cases a random offset is then added to the value of GPS TOW msec as described in subclause 5.2.6.2

Note 2: UTRAN GPS timing of cell frames and SFN

The values of UTRAN GPS timing of cell frames (before the addition of the random offset) and SFN shall be calculated at the time the IE is required. The accuracy of the relationship between the two fields shall be such that the Maximum Test System Uncertainty for Fine Time Assistance, specified in Table F.1.2 of TS 34.171 [4], shall be met.

A random offset is then added to the value of UTRAN GPS timing of cell frames as described in subclause 5.2.6.2

Note 3: This IE only present for Rel-7 onwards.

Satellite Information

Information Element	Units	Value/remark GPS All
Number of satellites	---	9

Reference Time - GPS TOW Assist (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
SatID		PRNs: 2, 6, 10, 17, 18, 21, 26, 29, 30	PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31	PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31

Reference Time - GPS TOW Assist (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS All
TLM Message	Bit string	10922
TLM Reserved	Bit string	2
Alert		0
Anti-Spoof		1

5.2.6.4 Assistance Data Reference UE Position

Contents of UE positioning GPS reference UE position IE

The uncertainty of the semi-major axis is 3 km. The uncertainty of the semi-minor axis is 3 km. The orientation of the major axis is 0 degrees. The uncertainty of the altitude information is 500 m. The confidence factor is 68%.

Reference UE Position

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
Latitude sign		0	1	1
Degrees of latitude	degrees	33.750005	37.816663	37.816663
Degrees of longitude	degrees	-84.383517	144.966670	144.966670
Altitude Direction		0	0	0
Altitude	m	300	100	100
Uncertainty semi-major	m	3000	3000	3000
Uncertainty semi-minor	m	3000	3000	3000
Orientation of major axis	degrees	0	0	0
Uncertainty altitude	m	500	500	500
Confidence	%	68	68	68

5.2.6.5 Assistance Data Navigation Model

Contents of UE positioning GPS navigation model IE

Satellite Information

Information Element	Units	Value/remark GPS All
Number of satellites	---	9

Navigation Model (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
SatID	---	PRNs: 2, 6, 10, 17, 18, 21, 26, 29, 30	PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31	PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31
Satellite Status		0 (Note)	0 (Note)	0 (Note)
Note: For consistency Satellite Status is also given in file: Navigation model XX.csv				

Ephemeris and Clock Correction Information Elements (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS All
C/A or P on L2		See file: Navigation model XX.csv
URA Index		See file: Navigation model XX.csv
SV Health		See file: Navigation model XX.csv
IODC	---	See file: Navigation model XX.csv
L2 P Data Flag		See file: Navigation model XX.csv
SF 1 Reserved	---	See file: Navigation model XX.csv
T_{GD}	sec	See file: Navigation model XX.csv
t_{oc}	sec	See file: Navigation model XX.csv
af_2	sec/sec^2	See file: Navigation model XX.csv
af_1	sec/sec	See file: Navigation model XX.csv
af_0	sec	See file: Navigation model XX.csv
C_{rs}	meters	See file: Navigation model XX.csv
Δn	semi-circles/sec	See file: Navigation model XX.csv
M_0	semi-circles	See file: Navigation model XX.csv
C_{uc}	radians	See file: Navigation model XX.csv
e	---	See file: Navigation model XX.csv
C_{us}	radians	See file: Navigation model XX.csv
$(A)^{1/2}$	meters$^{1/2}$	See file: Navigation model XX.csv
t_{oe}	sec	See file: Navigation model XX.csv
Fit Interval Flag		See file: Navigation model XX.csv
AODO	sec	See file: Navigation model XX.csv
C_{ic}	radians	See file: Navigation model XX.csv
$OMEGA_0$	semi-circles	See file: Navigation model XX.csv
C_{is}	radians	See file: Navigation model XX.csv
i_0	semi-circles	See file: Navigation model XX.csv
C_{rc}	meters	See file: Navigation model XX.csv
ω	semi-circles	See file: Navigation model XX.csv
OMEGAdot	semi-circles/sec	See file: Navigation model XX.csv
Idot	semi-circles/sec	See file: Navigation model XX.csv

5.2.6.6 Assistance Data Ionospheric Model

Contents of UE positioning GPS ionospheric model IE

Ionospheric Model

Information Element	Units	Value/remark GPS All
α_0	seconds	4.6566129 10E-9
α_1	sec/semi-circle	1.4901161 10E-8
α_2	sec/(semi-circle)^2	-5.96046 10E-8
α_3	sec/(semi-circle)^3	-5.96046 10E-8
β_0	seconds	79872
β_1	sec/semi-circle	65536
β_2	sec/(semi-circle)^2	-65536
β_3	sec/(semi-circle)^3	-393216

5.2.6.7 Assistance Data Almanac

Contents of UE positioning GPS almanac

Almanac (Field occurring once per message)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
WN_a	weeks	27	230	230

Satellite Information

Information Element	Units	Value/remark GPS All
Number of satellites	---	24

Almanac (Fields occurring once per satellite)

Information Element	Units	Value/remark
DataID	---	See file: Almanac XX.csv

Almanac (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
SatID	---	PRNs: 1, 2, 4, 5, 6, 7, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 29, 30	PRNs: 1, 2, 3, 4, 5, 6, 7, 8, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25, 27, 28, 30, 31	PRNs: 1, 2, 3, 4, 5, 6, 7, 8, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25, 27, 28, 30, 31

Almanac (Fields occurring once per satellite)

Information Element	Units	Value/remark
e	dimensionless	See file: Almanac XX.csv
t_{oa}	sec	See file: Almanac XX.csv
δi	semi-circles	See file: Almanac XX.csv
OMEGADOT	semi-circles/sec	See file: Almanac XX.csv
SV Health		See file: Almanac XX.csv
$A^{1/2}$	$meters^{1/2}$	See file: Almanac XX.csv
$OMEGA_0$	semi-circles	See file: Almanac XX.csv
M_0	semi-circles	See file: Almanac XX.csv
ω	semi-circles	See file: Almanac XX.csv
af_0	seconds	See file: Almanac XX.csv
af_1	sec/sec	See file: Almanac XX.csv

5.2.6.8 Assistance Data Acquisition Assistance

Contents of UE positioning GPS acquisition assistance IE

GPS Acquisition Assistance (Fields occurring once per message)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
GPS TOW msec	msec	51888000 ms. Start time. Add number of ms as required. (Note 1)	346080000 ms. Start time. Add number of ms as required. (Note 1)	346080000 ms. Start time. Add number of ms as required. (Note 1)
UTRAN GPS reference time		Present for Sensitivity Fine Time Assistance test case. Absent otherwise	Present for Sensitivity Fine Time Assistance test case. Absent otherwise	Absent
UTRAN GPS timing of cell frames		Note 2	Note 2	-
CHOICE mode		Present for Sensitivity Fine Time Assistance test case. Absent otherwise	Present for Sensitivity Fine Time Assistance test case. Absent otherwise	-
FDD		-	-	-
Primary CPICH Info		100	100	-
SFN		Note 2	Note 2	-
UE Positioning GPS ReferenceTime Uncertainty. Note 3		TBD	TBD	-

Note 1: GPS TOW msec
This is the value in ms of GPS TOW msec when the GPS scenario is initially started in the GPS simulator. For all TTFF test cases, each time a GPS scenario is used, the GPS start time shall be advanced by 120 seconds from the value last used so that, at the time the fix is made, it is at least 2 minutes later than the previous fix made with that scenario.

The actual value of GPS TOW msec to be used in the Acquisition Assistance IE (before the addition of the random offset, if applicable) shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GPS simulator to this value. The accuracy shall be such that the Maximum Test System Uncertainty for Coarse Time Assistance, specified in Table F.1.2 of TS 34.171 [4], shall be met.

For all TTFF test cases a random offset is then added to the value of GPS TOW msec as described in subclause 5.2.6.2

This “final GPS TOW msec” value is then also used to determine the value of the Acquisition Assistance Information Elements marked as “Time varying”

Note 2: UTRAN GPS timing of cell frames and SFN
The values of UTRAN GPS timing of cell frames (before the addition of the random offset) and SFN shall be calculated at the time the IE is required. The accuracy of the relationship between the two fields shall be such that the Maximum Test System Uncertainty for Fine Time Assistance, specified in Table F.1.2 of TS 34.171 [4], shall be met.

A random offset is then added to the value of UTRAN GPS timing of cell frames as described in subclause 5.2.6.2

Note 3: This IE only present for Rel-7 onwards.

Satellite Information

Information Element	Units	Value/remark GPS All
Number of satellites	---	9

GPS Acquisition Assistance (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS #1	Value/remark GPS #2	Value/remark GPS #3
SatID	---	PRNs: 2, 6, 10, 17, 18, 21, 26, 29, 30	PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31	PRNs: 3, 11, 14, 15, 18, 22, 23, 25, 31

GPS Acquisition Assistance (Fields occurring once per satellite)

Information Element	Units	Value/remark GPS All
Doppler (0^{th} order term)	Hz	Time varying. See file: Acquisition assist XX.csv (Note)
Doppler (1^{st} order term)	Hz/sec	Time varying. See file: Acquisition assist XX.csv (Note)
Doppler Uncertainty	Hz	Time varying. See file: Acquisition assist XX.csv (Note)
Code Phase	chips	Time varying. See file: Acquisition assist XX.csv (Note)
Integer Code Phase	---	Time varying. See file: Acquisition assist XX.csv (Note)
GPS Bit number	---	Time varying. See file: Acquisition assist XX.csv (Note)
Code Phase Search Window	chips	Time varying. See file: Acquisition assist XX.csv (Note)
Azimuth	deg	Time varying. See file: Acquisition assist XX.csv (Note)
Elevation	deg	Time varying. See file: Acquisition assist XX.csv (Note)
Note: Acquisition Assistance Information Elements This field is "Time varying" and its value depends on the "final GPS TOW msec" as described above. The value of this field to be used shall be determined by taking the "final GPS TOW msec" value and selecting the nearest field value in the Acquisition assist.csv file corresponding to the value of "final current GPS TOW msec".		

6 GNSS information

6.1 GNSS Scenarios and Assistance Data for Assisted GNSS signalling tests

6.1.1 General

This subclause defines the GNSS scenario and the associated assistance data that shall be used for all Assisted GNSS signalling tests defined in TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7 and in TS 36.571-2 [7].

In all cases the Assistance Data is given in the two necessary formats, RRC format for TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7 and LPP format for TS 36.571-2 [7]. Other information is also given separately for TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7 and TS 36.571-2 [7] where it differs between the specifications.

The satellite simulator (SS) shall generate all the UE supported GNSS satellite signals defined in subclause 6.1.2 and shall provide assistance data dependent on the UE capabilities defined in subclause 6.1.3.

The A-GNSS signalling test cases may include several sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below. In some cases the detailed assistance data content defined in subclause 6.1.3 depends on the particular sub-test case.

Table 6.1.1-1: Sub-Test Case Number Definition for TS 34.123-1 subclauses 17.2.5 to 17.2.7

Sub-Test Case Number	Supported GNSS
1	UE supporting A-GLONASS only
2	UE supporting A-Galileo only
3	UE supporting A-GPS and Modernized GPS only
4	UE supporting A-GPS and A-GLONASS only

Table 6.1.1-2: Sub-Test Case Number Definition for TS 36.571-2

Sub-Test Case Number	Supported GNSS
1	UE supporting GNSS with A-GPS only
2	UE supporting GNSS with A-GLONASS only
3	UE supporting GNSS with A-Galileo only
4	UE supporting GNSS with A-GPS and A-GLONASS only
7	UE supporting GNSS[1] and OTDOA
NOTE 1: Any GNSS of GPS, GLONASS, Galileo (FFS)	

6.1.2 GNSS Scenario

Editor's note: in the following subclause values marked "TBD" need to be determined

Editor's note: in the following subclause in some cases the use of the term "PRN" is incorrect and needs to be reconsidered

The following GNSS scenarios shall be used. The assistance data specified in the following subclauses is consistent with this GNSS scenario:

- Yuma Almanac data: the required file(s) in the GNSS data sig zip file specified in Annex B are given below.

Table 6.1.2-1: Yuma Almanac data files for TS 34.123-1 subclauses 17.2.5 to 17.2.7

Sub-Test Case Number	Yuma file(s)
1	GNSS 1-1 Yuma.txt
2	GNSS 1-2 Yuma.txt
3	GNSS 1-3 Yuma.txt
4	GNSS 1-1 Yuma.txt and GNSS 1-3 Yuma.txt

Table 6.1.2-2: Yuma Almanac data files for TS 36.571-2

Sub-Test Case Number	Yuma file(s)
1	GNSS 1-3 Yuma.txt
2	GNSS 1-1 Yuma.txt
3	GNSS 1-2 Yuma.txt
4	GNSS 1-1 Yuma.txt and GNSS 1-3 Yuma.txt
7	[FFS]

- UE location and Reference location:

Static at latitude: 35 degrees 44 minutes 39.432 seconds north, longitude: 139 degrees 40 minutes 48.633 seconds east, (Tokyo Japan), height: = 300m.

- Nominal start time:

1st January 2012 00:30:00.

- Visible satellites simulated are given below

Table 6.1.2-3: Satellites to be simulated for TS 34.123-1 subclauses 17.2.5 to 17.2.7

Sub-Test Case Number	PRNs of Satellites to be simulated
1	3, 10, 20, [TBD], [TBD], [TBD]
2	[TBD]
3	8, 11, 17, 19, 27, 28 (Note)
4	GPS: 8, 19, 27. GLONASS: 3, 10, 20
NOTE: For this sub-test the satellite simulator shall generate all the GPS signals supported by the UE for all the simulated satellites.	

Table 6.1.2-4: Satellites to be simulated for TS 36.571-2

Sub-Test Case Number	PRNs of Satellites to be simulated
1	8, 11, 17, 19, 27, 28
2	3, 10, 20, [TBD], [TBD], [TBD]
3	[TBD]
4	GPS: 8, 19, 27. GLONASS: 3, 10, 20
7	[FFS]

- Ionospheric model: see values in subclause 6.1.3
- The levels of the simulated satellites shall all be at -125dBm +/- 6dB

6.1.3 Assistance Data

This subclause defines the GNSS scenarios and assistance data IEs which shall be available for use as specified in all A-GNSS signalling test cases defined in TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7 and for TS 36.571-2 [7].

6.1.3.1 Default Assistance Data for TS 34.123-1 subclauses 17.2.5 to 17.2.7

The assistance data listed in subclause 6.1.3.1 are the assistance data elements pushed by the SS in some tests defined in TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7. During the test the UE may request additional assistance data as specified in the tests and the SS shall then provide any other assistance data available as defined in subclause 6.1.3.

Table 6.1.3.1 -1: GNSS assistance data to be provided to the UE

GNSS Assistance Data IE to be provided to the UE	Mode used in test case	
	UE-based	**UE-assisted**
GPS reference time	Yes for sub-tests 3, 4	Yes for sub-tests 3, 4
GPS reference UE position	Yes for sub-tests 3, 4	No
GPS navigation model	Yes for sub-tests 3, 4	No
GPS ionospheric model	Yes for sub-tests 3, 4	No
GPS UTC model	Yes for sub-test 4	No
GPS acquisition assistance	No	Yes for sub-tests 3, 4
GANSS reference time	Yes for sub-tests 1, 2	Yes for sub-tests 1, 2
GANSS reference UE position	Yes for sub-tests 1, 2	No
GANSS ionospheric model	Yes for sub-test 2	No
GANSS Time Models	Yes for sub-test 4	No
GANSS navigation model	Yes for sub-test 2	No
GANSS additional navigation models	Yes for sub-tests 1, 4	No
GANSS reference measurement information	No	Yes for sub-tests 1, 2, 4
GANSS UTC model	Yes	No
GANSS auxiliary information	Yes for sub-tests 1, 3, 4. Note.	Yes for sub-tests 1, 3, 4. Note.
	NOTE: Also if UE supports multiple signals per GNSS	

6.1.3.3 Assistance Data values for TS 34.123-1 subclauses 17.2.5 to 17.2.7

Editor's note: in the following subclause values marked "TBD" need to be determined

Editor's note: in the following subclause in some cases the use of the term "PRN" is incorrect and needs to be reconsidered

Where assistance data is required on a per-satellite basis, or where the values of the data also varies with time it is specified in comma-separated-variable files in the GNSS data sig zip file specified in Annex B. These files specify the values to be used for each satellite, indexed by satellite PRN, and, where applicable, the values to be used indexed by both time and satellite PRN.

Assistance data that is marked as "time varying" and the GPS TOW msec or GANSS TOD field are only specified and used in 1 second increments. Interpolation between these values shall not be used.

The accuracy of the GPS TOW msec or GANSS TOD and assistance data that is marked as "time varying" in the provided assistance data shall be within +/- 2 s relative to the GNSS time in the system simulator.

Assistance data Information Elements and fields that are not specified shall not be used.

The information elements detailed below are fully defined in 3GPP TS 25.331 [16]

Editor's note: Here we need a table of PRNs for use in the IE SatID, to simplify the tables below (see for example TS 51.010-7)

Assistance Data GPS Reference Time

GPS Reference Time (Fields occurring once per message)

Information Element	Units	Value/remark
GPS Week	weeks	TBD
GPS TOW msec	msec	TBD s. Start time. Add integer number of 1 seconds as required. (Note)
UE Positioning GPS Reference Time Uncertainty		125 (2.127 seconds)

Note: GPS TOW msec

This is the value of GPS TOW msec when the GNSS scenario is started in the GNSS simulator. The value of GPS TOW msec to be used in the Reference Time IE shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GNSS simulator to this value, rounded up to the next 1 second interval. This "current GPS TOW msec" is then also used to determine the value of any other Information Elements marked as "Time varying" in subclause 6.1.3.3

Assistance Data GPS Reference UE Position

GPS Reference UE Position

Information Element	Units	Value/remark
Latitude sign		0
Degrees Of Latitude	degrees	TBD
Degrees Of Longitude	degrees	TBD
Altitude Direction		0
Altitude	m	300
Uncertainty semi-major	m	3000
Uncertainty semi-minor	m	3000
Orientation of major axis	degrees	0
Uncertainty Altitude	m	500
Confidence	%	68

Assistance Data GPS Navigation Model

Satellite Information

Information Element	Units	Value/remark
Num_Sats_Total	---	6

GPS Navigation Model (Fields occurring once per satellite)

Information Element	Units	Value/remark
SatID	---	PRNs: TBD
Satellite Status		0 (see note)
NOTE: For consistency Satellite Status is also given in file: GPS Navigation model.csv		

GPS Ephemeris and Clock correction Information Elements (Fields occurring once per satellite)

Information Element	Units	Value/remark
C/A or P on L2		See file: GPS Navigation model.csv
URA Index		See file: GPS Navigation model.csv
SV Health		See file: GPS Navigation model.csv
IODC	---	See file: GPS Navigation model.csv
L2 P Data Flag		See file: GPS Navigation model.csv
SF 1 Reserved	---	See file: GPS Navigation model.csv
T_{GD}	sec	See file: GPS Navigation model.csv
t_{oc}	sec	See file: GPS Navigation model.csv
af_2	sec/sec^2	See file: GPS Navigation model.csv
af_1	sec/sec	See file: GPS Navigation model.csv
af_0	sec	See file: GPS Navigation model.csv
C_{rs}	meters	See file: GPS Navigation model.csv
Δn	semi-circles/sec	See file: GPS Navigation model.csv
M_0	semi-circles	See file: GPS Navigation model.csv
C_{uc}	radians	See file: GPS Navigation model.csv
e	---	See file: GPS Navigation model.csv
C_{us}	radians	See file: GPS Navigation model.csv
$(A)^{1/2}$	$meters^{1/2}$	See file: GPS Navigation model.csv
t_{oe}	sec	See file: GPS Navigation model.csv
Fit Interval Flag		See file: GPS Navigation model.csv
AODO	sec	See file: GPS Navigation model.csv
C_{ic}	radians	See file: GPS Navigation model.csv
$OMEGA_0$	semi-circles	See file: GPS Navigation model.csv
C_{is}	radians	See file: GPS Navigation model.csv
i_0	semi-circles	See file: GPS Navigation model.csv
C_{rc}	meters	See file: GPS Navigation model.csv
ω	semi-circles	See file: GPS Navigation model.csv
OMEGAdot	semi-circles/sec	See file: GPS Navigation model.csv
Idot	semi-circles/sec	See file: GPS Navigation model.csv

Assistance Data GPS Ionospheric Model

GPS Ionospheric Model

Information Element	Units	Value/remark
α_0	seconds	4.6566129 10E-9
α_1	sec/semi-circle	1.4901161 10E-8
α_2	sec/(semi-circle)^2	-5.96046 10E-8
α_3	sec/(semi-circle)^3	-5.96046 10E-8
β_0	seconds	79872
β_1	sec/semi-circle	65536
β_2	sec/(semi-circle)^2	-65536
β_3	sec/(semi-circle)^3	-393216

Assistance Data GPS UTC model

GPS UTC Model

Information Element	Units	Value/remark
A_1	sec/sec	TBD
A_0	seconds	TBD
t_{ot}	seconds	TBD
WN_t	weeks	TBD
Δt_{LS}	seconds	TBD
WN_{LSF}	weeks	TBD
DN	days	TBD
Δt_{LSF}	seconds	TBD

Assistance Data GPS Almanac

GPS Almanac (Fields occurring once per message)

Information Element	Units	Value/remark
WN_a	weeks	TBD

Satellite Information

Information Element	Units	Value/remark
Num_Sats_Total	---	24

GPS Almanac (Fields occurring once per satellite)

Information Element	Units	Value/remark
DataID	---	See file: GPS Almanac.csv
SatID	---	PRNs: 1 to 24
e	dimensionless	See file: GPS Almanac.csv
t_{oa}	sec	See file: GPS Almanac.csv
δi	semi-circles	See file: GPS Almanac.csv
OMEGADOT	semi-circles/sec	See file: GPS Almanac.csv
SV Health		See file: GPS Almanac.csv
$A^{1/2}$	meters$^{1/2}$	See file: GPS Almanac.csv
$OMEGA_0$	semi-circles	See file: GPS Almanac.csv
M_0	semi-circles	See file: GPS Almanac.csv
ω	semi-circles	See file: GPS Almanac.csv
af_0	seconds	See file: GPS Almanac.csv
af_1	sec/sec	See file: GPS Almanac.csv

Assistance Data GPS Acquisition Assistance

GPS Acquisition Assist - Information Elements appearing once per message

Information Element	Units	Value/remark
GPS TOW msec	msec	TBD s. Start time. Add integer number of 1 seconds as required. (Note)

Note: GPS TOW msec

This is the value of GPS TOW msec when the GNSS scenario is started in the GNSS simulator. The value of GPS TOW msec to be used in the Acquisition Assistance IE shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GNSS simulator to this value, rounded up to the next 1 second interval.

Satellite Information

Information Element	Units	Value/remark
Num_Sats_Total	---	6

GPS Acquisition Assist - Information Elements appearing once per satellite

Information Element	Units	Value/remark
SatID	---	PRNs: TBD.
Doppler (0th order term)	Hz	Time varying. See file: GPS Acquisition assist .csv (Note)
Doppler (1storder term)	Hz/s	Time varying. See file: GPS Acquisition assist .csv (Note)
Doppler Uncertainty	Hz	Time varying. See file: GPS Acquisition assist .csv (Note)
Code Phase	chips	Time varying. See file: GPS Acquisition assist .csv (Note)
Integer Code Phase	---	Time varying. See file: GPS Acquisition assist .csv (Note)
GPS Bit number	---	Time varying. See file: GPS Acquisition assist .csv (Note)
Code Phase Search Window	chips	Time varying. See file: GPS Acquisition assist .csv (Note)
Azimuth	Degrees	Time varying. See file: GPS Acquisition assist .csv (Note)
Elevation	Degrees	Time varying. See file: GPS Acquisition assist .csv (Note)

Note: This field is "Time varying" and its value depends on the "current GPS TOW msec". The value of this field to be used shall be determined by taking the "current GPS TOW msec" value and selecting the field value in the GPS Acquisition assist.csv file corresponding to the value of "current GPS TOW msec".

Assistance Data GANSS reference time

Assistance Data GANSS reference time: sub-test 1

Information Element	Units	Value/remark
GANSS Day		TBD
GANSS TOD	seconds	TBD. Start time. Add integer number of 1 seconds as required. (Note)
GANSS TOD Uncertainty		125 (2.127 seconds)
GANSS Time ID		2 (GLONASS)

Assistance Data GANSS reference time: sub-test 2

Information Element	Units	Value/remark
GANSS Day		TBD
GANSS TOD	seconds	TBD. Start time. Add integer number of 1 seconds as required. (Note)
GANSS TOD Uncertainty		125 (2.127 seconds)
GANSS Time ID		Not present (Galileo)

Note: GANSS TOD

This is the value of GANSS TOD when the GNSS scenario is started in the GNSS simulator. The value of GANSS TOD to be used in the Reference Time IE shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GNSS simulator to this value, rounded up to the next 1 second interval. This "current GANSS TOD" is then also used to determine the value of any other Information Elements marked as "Time varying" in subclause 6.1.3.3

Assistance Data GANSS reference UE position

Assistance Data GANSS reference UE position

Information Element	Units	Value/remark
Latitude sign		0
Degrees Of Latitude	degrees	TBD
Degrees Of Longitude	degrees	TBD
Altitude Direction		0
Altitude	m	300
Uncertainty semi-major	m	3000
Uncertainty semi-minor	m	3000
Orientation of major axis	degrees	0
Uncertainty Altitude	m	500
Confidence	%	68

Assistance Data GANSS ionospheric model

GANSS ionospheric model.

Information Element	Units	Value/remark
a_{i0}		TBD
a_{i1}		TBD
a_{i2}		TBD
Storm Flag 1		0
Storm Flag 2		0
Storm Flag 3		0
Storm Flag 4		0
Storm Flag 5		0

Assistance Data GANSS time model

GANSS ID

Information Element	Units	Value/remark
GANSS ID		3 (GLONASS)

GANSS time model

Information Element	Units	Value/remark
GANSS Time Model Reference Time	16s	TBD
T_{A0}	Seconds	TBD
GNSS_TO_ID		0 (GPS)

Assistance Data GANSS navigation model

GANSS ID

Information Element	Units	Value/remark
GANSS ID		Not present

GANSS navigation model

Information Element	Units	Value/remark
Non-Broadcast Indication		Not present

Satellite Information (Fields occurring once per satellite)

Information Element	Units	Value/remark
SatID		PRNs: TBD
SV Health		0 (Note)
IOD		TBD

Note: For consistency Satellite Status is also given in file: GANSS Navigation model.csv

GANSS Clock Model (Fields occurring once per satellite)

Information Element	Units	Value/remark
Satellite clock model		
t_{oc}	seconds	See file: GANSS Navigation model.csv
a_{f2}	sec/sec^2	See file: GANSS Navigation model.csv
a_{f1}	sec/sec	See file: GANSS Navigation model.csv
a_{f0}	sec	See file: GANSS Navigation model.csv
T_{GD}	sec	See file: GANSS Navigation model.csv
Model ID		See file: GANSS Navigation model.csv

GANSS Orbit Model (Fields occurring once per satellite)

Information Element	Units	Value/remark
t_{oe}	seconds	See file: GANSS Navigation model.csv
ω	semi-circles	See file: GANSS Navigation model.csv
Δn	semi-circles/sec	See file: GANSS Navigation model.csv
M_0	semi-circles	See file: GANSS Navigation model.csv
OMEGAdot	semi-circles/sec	See file: GANSS Navigation model.csv
e		See file: GANSS Navigation model.csv
Idot	semi-circles/sec	See file: GANSS Navigation model.csv
sqrtA	$meters^{1/2}$	See file: GANSS Navigation model.csv
i_0	semi-circles	See file: GANSS Navigation model.csv
$OMEGA_0$	semi-circles	See file: GANSS Navigation model.csv
C_{rs}	meters	See file: GANSS Navigation model.csv
C_{is}	radians	See file: GANSS Navigation model.csv
C_{us}	radians	See file: GANSS Navigation model.csv
C_{rc}	meters	See file: GANSS Navigation model.csv
C_{ic}	radians	See file: GANSS Navigation model.csv
C_{uc}	radians	See file: GANSS Navigation model.csv

Assistance Data GANSS additional navigation models

GANSS ID

Information Element	Units	Value/remark
GANSS ID		3 (GLONASS)

GANSS additional navigation models

Information Element	Units	Value/remark
Non-Broadcast Indication		Not present

Satellite Information (Fields occurring once per satellite)

Information Element	Units	Value/remark
SatID		PRNs: TBD
SV Health		0 (Note)
IOD		TBD

Note: For consistency Satellite Status is also given in file: GANSS Additional Navigation model.csv

GANSS additional Clock Models (Fields occurring once per satellite)

Information Element	Units	Value/remark
GLONASS Satellite Clock Model		
$\tau_n(t_b)$	seconds	See file: GANSS Additional Navigation model.csv
$\gamma_n(t_b)$		See file: GANSS Additional Navigation model.csv
$\Delta\tau_n$	seconds	See file: GANSS Additional Navigation model.csv

GANSS additional orbit models (Fields occurring once per satellite)

Information Element	Units	Value/remark
GLONASS Earth-Centered, Earth-fixed Parameters		
E_n	days	See file: GANSS Additional Navigation model.csv
P1	minutes	See file: GANSS Additional Navigation model.csv
P2		See file: GANSS Additional Navigation model.csv
M		See file: GANSS Additional Navigation model.csv
$x_n(t_b)$	kilometers	See file: GANSS Additional Navigation model.csv
$\dot{x}_n(t_b)$	kilometers/sec	See file: GANSS Additional Navigation model.csv
$\ddot{x}_n(t_b)$	kilometers/sec^2	See file: GANSS Additional Navigation model.csv
$y_n(t_b)$	kilometers	See file: GANSS Additional Navigation model.csv
$\dot{y}_n(t_b)$	kilometers/sec	See file: GANSS Additional Navigation model.csv
$\ddot{y}_n(t_b)$	kilometers/sec^2	See file: GANSS Additional Navigation model.csv
$z_n(t_b)$	kilometers	See file: GANSS Additional Navigation model.csv
$\dot{z}_n(t_b)$	kilometers/sec	See file: GANSS Additional Navigation model.csv
$\ddot{z}_n(t_b)$	kilometers/sec^2	See file: GANSS Additional Navigation model.csv

Assistance Data GANSS reference measurement information

GANSS ID: sub-test 1, 4

Information Element	Units	Value/remark
GANSS ID		3 (GLONASS)

GANSS reference measurement information: sub-test 1, 4 (Fields occurring once per message)

Information Element	Units	Value/remark
GANSS Signal ID		Not present
Satellite information		TBD

GANSS reference measurement information: sub-test 1, 4 (Fields occurring once per satellite)

Information Element	Units	Value/remark
SatID		PRNs: TBD.
Doppler (0^{th} order term)	m/s	Time varying. See file: GANSS reference measurement information subtest1_4.csv (Note)
Doppler (1^{st}order term)	m/s^2	Time varying. See file: Acquisition assist .csv (Note)
Doppler Uncertainty	m/s	Time varying. See file: Acquisition assist .csv (Note)
Code Phase	ms	Time varying. See file: GANSS reference measurement information subtest1_4.csv (Note)
Integer Code Phase	ms	Time varying. See file: GANSS reference measurement information subtest1_4.csv (Note)
Code Phase Search Window		Time varying. See file: GANSS reference measurement information subtest1_4.csv (Note)
Azimuth	Degrees	Time varying. See file: GANSS reference measurement information subtest1_4.csv (Note)
Elevation	Degrees	Time varying. See file: GANSS reference measurement information subtest1_4.csv (Note)

Note:

For sub-test 1: this field is "Time varying" and its value depends on the "current GANSS TOD". The value of this field to be used shall be determined by taking the "current GANSS TOD" value and selecting the field value in the GANSS reference measurement information subtest1_4.csv file corresponding to the value of "current GANSS TOD".

For sub-test 4: this field is "Time varying" and its value depends on the "current GPS TOW msec". The value of this field to be used shall be determined by taking the "current GPS TOW msec" value and selecting the field value in the GANSS reference measurement information subtest1_4.csv file corresponding to the value of "current GPS TOW msec".

GANSS ID: sub-test 2

Information Element	Units	Value/remark
GANSS ID		Not present

GANSS reference measurement information: sub-test 2 (Fields occurring once per message)

Information Element	Units	Value/remark
GANSS Signal ID		Not present
Satellite information		TBD

GANSS reference measurement information: sub-test 2 (Fields occurring once per satellite)

Information Element	Units	Value/remark
SatID		PRNs: TBD.
Doppler (0^{th} order term)	m/s	Time varying. See file: GANSS reference measurement information subtest2.csv (Note)
Doppler (1^{st}order term)	m/s^2	Time varying. See file: GANSS reference measurement information

Information Element	Units	Value/remark
		subtest2.csv (Note)
Doppler Uncertainty	m/s	Time varying. See file: GANSS reference measurement information subtest2.csv (Note)
Code Phase	ms	Time varying. See file: GANSS reference measurement information subtest2.csv (Note)
Integer Code Phase	ms	Time varying. See file: GANSS reference measurement information subtest2.csv (Note)
Code Phase Search Window		Time varying. See file: GANSS reference measurement information subtest2.csv (Note)
Azimuth	Degrees	Time varying. See file: GANSS reference measurement information subtest2.csv (Note)
Elevation	Degrees	Time varying. See file: GANSS reference measurement information subtest2.csv (Note)

Note: This field is "Time varying" and its value depends on the "current GANSS TOD". The value of this field to be used shall be determined by taking the "current GANSS TOD" value and selecting the field value in the GANSS reference measurement information subtest2.csv file corresponding to the value of "current GANSS TOD".

Assistance Data GANSS almanac

GANSS ID: sub-test 1,4

Information Element	Units	Value/remark
GANSS ID		3 (GLONASS)

GANSS almanac: sub-test 1, 4 (Fields occurring once per message)

Information Element	Units	Value/remark
GLONASS Keplerian Parameters		
Week Number		TBD
Satellite information GLO-KP		TBD

GANSS almanac: sub-test 1, 4 (Fields occurring once per satellite)

Information Element	Units	Value/remark
N^A	days	See file: GANSS Almanac subtest1_4.csv
n^A		See file: GANSS Almanac subtest1_4.csv
H_n^A		See file: GANSS Almanac subtest1_4.csv
λ_n^A	semi-circles	See file: GANSS Almanac subtest1_4.csv
$t_{\lambda n}^A$	seconds	See file: GANSS Almanac subtest1_4.csv
Δi_n^A	semi-circles	See file: GANSS Almanac subtest1_4.csv
ΔT_n^A	sec/orbit period	See file: GANSS Almanac subtest1_4.csv
$\Delta T\_DOT_n^A$	sec/orbit period^2	See file: GANSS Almanac subtest1_4.csv
ε_n^A		See file: GANSS Almanac subtest1_4.csv
ω_n^A	semi-circles	See file: GANSS Almanac subtest1_4.csv
τ_n^A	seconds	See file: GANSS Almanac subtest1_4.csv
C_n^A		See file: GANSS Almanac subtest1_4.csv
M_n^A		See file: GANSS Almanac subtest1_4.csv

GANSS ID: sub-test 2

Information Element	Units	Value/remark
GANSS ID		Not present

GANSS almanac: sub-test 2 (Fields occurring once per message)

Information Element	Units	Value/remark
Keplerian parameters		

Week Number	MP	TBD
Satellite information KP		TBD

GANSS almanac: sub-test 2 (Fields occurring once per satellite)

Information Element	Units	Value/remark
SV ID		PRNs: TBD
e		See file: GANSS Almanac subtest2.csv
δi	semi-circles	See file: GANSS Almanac subtest2.csv
OMEGADOT	semi-circles/sec	See file: GANSS Almanac subtest2.csv
SV Health KP		See file: GANSS Almanac subtest2.csv
delta $A^{1/2}$	meters$^{1/2}$	See file: GANSS Almanac subtest2.csv
$OMEGA_0$	semi-circles	See file: GANSS Almanac subtest2.csv
M_0	semi-circles	See file: GANSS Almanac subtest2.csv
ω	semi-circles	See file: GANSS Almanac subtest2.csv
af_0	Seconds	See file: GANSS Almanac subtest2.csv
af_1	sec/sec	See file: GANSS Almanac subtest2.csv

Assistance Data GANSS auxiliary information

GANSS ID: sub-test 1, 4

Information Element	Units	Value/remark
GANSS ID		3 (GLONASS)

GANSS auxiliary information: sub-test 1, 4 (Fields occurring once per message)

Information Element	Units	Value/remark
GANSS-ID-3		Present (GLONASS)
Aux Info List		TBD

GANSS auxiliary information: sub-test 1, 4 (Fields occurring once per satellite)

Information Element	Units	Value/remark
Sat ID		Slot Number TBD
Signals Available		G1
Channel Number		TBD

GANSS ID: sub-test 3

Information Element	Units	Value/remark
GANSS ID		1 (Modernized GPS)

GANSS auxiliary information: sub-test 3 (Fields occurring once per message)

Information Element	Units	Value/remark
GANSS-ID-1		Present (Modernized GPS)
Aux Info List		TBD

GANSS auxiliary information: sub-test 3 (Fields occurring once per satellite)

Information Element	Units	Value/remark
Sat ID		PRNs: TBD
Signals Available		L1C and others as supported by the UE

6.1.3.3 Default Assistance Data for TS 36.571-2

This subclause defines the GNSS assistance data elements which shall be provided to the UE in certain tests in TS 36.571-2 [7] in the LPP Provide Assistance Data messages in the absence of a corresponding LPP Request Assistance Data message. The GNSS assistance data provided depends on the mode being used in the test case, the assistance data supported by the UE and the GNSS(s) supported by the UE. GNSS assistance data IEs not supported by the UE shall not be sent. GNSS assistance data IEs supported by the UE but not listed below shall not be sent.

Table 6.1.3.3 -1: Default GNSS assistance data to be provided to the UE

GNSS Assistance Data IE supported by UE	Mode used in test case		
	UE-based	UE-assisted. GNSS-Acquisition Assistance supported by UE	UE-assisted. GNSS-Acquisition Assistance not supported by UE
GNSS-Reference Time	Yes	Yes	Yes
GNSS-ReferenceLocation	Yes	No	Yes
GNSS-IonosphericModel	Yes	No	No
GNSS-TimeModelList	Yes for sub-test 4	No	Yes for sub-test 4
GNSS-NavigationModel	Yes	No	Yes
GNSS-AcquisitionAssistance	No	Yes	No
GNSS-Almanac	No	No	Yes
GNSS-UTC-Model	Yes	No	No
GNSS-AuxiliaryInformation	Yes for sub-tests 2, 4. Note.	Yes for sub-tests 2, 4. Note.	Yes for sub-tests 2, 4. Note.
NOTE: Also if UE supports multiple signals per GNSS			

6.1.3.4 Assistance Data values for TS 36.571-2

Editor's note: in the following subclause values marked "TBD" need to be determined

Editor's note: in the following subclause in some cases the use of the term "PRN" is incorrect and needs to be reconsidered

Where assistance data is required on a per-satellite basis, or where the values of the data also varies with time it is specified in comma-separated-variable files in the GNSS data zip file specified in Annex B. These files specify the values to be used for each satellite, indexed by satellite PRN, and, where applicable, the values to be used indexed by both time and satellite PRN.

Assistance data that is marked as "time varying" and the gnss-TimeOfDay field are only specified and used in 1 second increments. Interpolation between these values shall not be used.

The accuracy of the gnss-TimeOfDay and assistance data that is marked as "time varying" in the provided assistance data shall be within +/- 2 s relative to the GNSS time in the system simulator.

Assistance data Information Elements and fields that are not specified shall not be used.

The information elements detailed below are fully defined in 3GPP TS 36.355 [8]

Editor's note: Here we need a table of PRNs for use in the IE SatID, to simplify the tables below (see for example TS 51.010-7)

GNSS REFERENCE TIME:

***GNSS-ReferenceTime:* sub-tests 1, 4**

Information Element	Units	Value/remark
gnss-SystemTime		
gnss-TimeID		0 (gps)
gnss-DayNumber		TBD
gnss-TimeOfDay		TBD s. Start time. Add integer number of 1 seconds as required. (Note)
gnss-TimeOfDayFrac-msec		Not present
notificationOfLeapSecond		Not present
gps-TOW-Assist		
satelliteID		PRNs: TBD
tlmWord		TBD
antiSpoof		TBD
alert		TBD
tlmRsvdBits		TBD
referenceTimeUnc		117 (2.274 seconds)
gnss-ReferenceTimeForCells		Not present

***GNSS-ReferenceTime:* sub-test 2**

Information Element	Units	Value/remark
gnss-SystemTime		
gnss-TimeID		4 (glonass)
gnss-DayNumber		TBD
gnss-TimeOfDay		TBD s. Start time. Add integer number of 1 seconds as required. (Note)
gnss-TimeOfDayFrac-msec		Not present
notificationOfLeapSecond		TBD
gps-TOW-Assist		Not present
referenceTimeUnc		117 (2.274 seconds)
gnss-ReferenceTimeForCells		Not present

***GNSS-ReferenceTime:* sub-test 3**

Information Element	Units	Value/remark
gnss-SystemTime		
gnss-TimeID		3 (galileo)
gnss-DayNumber		TBD
gnss-TimeOfDay		TBD s. Start time. Add integer number of 1 seconds as required. (Note)
gnss-TimeOfDayFrac-msec		Not present
notificationOfLeapSecond		Not present
gps-TOW-Assist		Not present
referenceTimeUnc		117 (2.274 seconds)
gnss-ReferenceTimeForCells		Not present

Note: gnss-TimeOfDay

This is the value of gnss-TimeOfDay when the GNSS scenario is started in the GNSS simulator. The value of gnss-TimeOfDay to be used in the Reference Time IE shall be calculated at the time the IE is required by adding the elapsed time since the time the scenario was started in the GNSS simulator to this value, rounded up to the next 1 second interval. This "current gnss-TimeOfDay" is then also used to determine the value of any other Information Elements marked as "Time varying" in subclause 6.1.3.4

GNSS REFERENCE LOCATION:

GNSS-ReferenceLocation

Information Element	Units	Value/remark
threeDlocation		
latitudeSign		0
degreesLatitude	degrees	TBD
degreesLongitude	degrees	TBD
altitudeDirection		0
altitude	m	300
uncertaintySemiMajor	m	3000
uncertaintySemiMinor	m	3000
orientationMajorAxis	degrees	0
uncertaintyAltitude	m	500
confidence	%	68

GNSS IONOSPHERIC MODEL:

***GNSS-IonosphericModel:* sub-tests 1, 4**

Information Element	Units	Value/remark
klobucharModel		
dataID		TBD
alfa0	seconds	4.6566129 10E-9
alfa1	sec/semi-circle	1.4901161 10E-8
alfa2	sec/(semi-circle)^2	-5.96046 10E-8
alfa3	sec/(semi-circle)^3	-5.96046 10E-8
beta0	seconds	79872
beta1	sec/semi-circle	65536
beta2	sec/(semi-circle)^2	-65536
beta3	sec/(semi-circle)^3	-393216
neQuickModel		Not present

***GNSS-IonosphericModel:* sub-test 3**

Information Element	Units	Value/remark
GNSS-IonospericModel		
klobucharModel		Not present
neQuickModel		
ai0		TBD
ai1		TBD
ai2		TBD
ionoStormFlag1		0
ionoStormFlag2		0
ionoStormFlag3		0
ionoStormFlag4		0
ionoStormFlag5		0

GNSS TIME MODEL:

***GNSS-TimeModelList:* sub-test 4**

Information Element	Units	Value/remark
gnss-TimeModelRefTime		TBD
tA0		TBD
gnss-TO-ID		4 (GLONASS)
weekNumber		TBD
deltaT		TBD

GNSS NAVIGATION MODEL:

***GNSS-NavigationModel:* sub-test 1**

Information Element	Units	Value/remark
nonBroadcastFlag		0
gnss-SatelliteList		(SIZE) 6

***GNSS-NavModelSatelliteElement:* sub-test 1**

Information Element	Units	Value/remark
svID		PRNs: TBD
svHealth		0
iod		TBD
gnss-ClockModel		
nav-ClockModel		
navToc		See file: GNSS Navigation Model subtest1.csv
navaf2		See file: GNSS Navigation Model subtest1.csv
navaf1		See file: GNSS Navigation Model subtest1.csv
navaf0		See file: GNSS Navigation Model subtest1.csv
navTgd		See file: GNSS Navigation Model subtest1.csv
gnss-OrbitModel		
nav-KeplerianSet		
navURA		See file: GNSS Navigation Model subtest1.csv
navFitFlag		See file: GNSS Navigation Model subtest1.csv
navToe		See file: GNSS Navigation Model subtest1.csv
navOmega		See file: GNSS Navigation Model subtest1.csv
navDeltaN		See file: GNSS Navigation Model subtest1.csv
navM0		See file: GNSS Navigation Model subtest1.csv
navOmegaADot		See file: GNSS Navigation Model subtest1.csv
navE		See file: GNSS Navigation Model subtest1.csv
navIDot		See file: GNSS Navigation Model subtest1.csv
navAPowerHalf		See file: GNSS Navigation Model subtest1.csv
navI0		See file: GNSS Navigation Model subtest1.csv
navOmegaA0		See file: GNSS Navigation Model subtest1.csv
navCrs		See file: GNSS Navigation Model subtest1.csv
navCis		See file: GNSS Navigation Model subtest1.csv
navCus		See file: GNSS Navigation Model subtest1.csv
navCrc		See file: GNSS Navigation Model subtest1.csv
navCic		See file: GNSS Navigation Model subtest1.csv
navCuc		See file: GNSS Navigation Model subtest1.csv

***GNSS-NavigationModel:* sub-test 2**

Information Element	Units	Value/remark
nonBroadcastFlag		0
gnss-SatelliteList		(SIZE) 6

***GNSS-NavModelSatelliteElement:* sub-test 2**

Information Element	Units	Value/remark
svID		PRNs: TBD
svHealth		0
iod		TBD
gnss-ClockModel		
glonass-ClockModel		
gloTau		See file: GNSS Navigation Model subtest2.csv
gloGamma		See file: GNSS Navigation Model subtest2.csv
gloDeltaTau		See file: GNSS Navigation Model subtest2.csv
gnss-OrbitModel		
glonass-ECEF		
gloEn		See file: GNSS Navigation Model subtest2.csv
gloP1		See file: GNSS Navigation Model subtest2.csv
gloP2		See file: GNSS Navigation Model subtest2.csv
glom		See file: GNSS Navigation Model subtest2.csv
gloX		See file: GNSS Navigation Model subtest2.csv
gloXdot		See file: GNSS Navigation Model subtest2.csv
gloXdotdot		See file: GNSS Navigation Model subtest2.csv
gloY		See file: GNSS Navigation Model subtest2.csv
gloYdot		See file: GNSS Navigation Model subtest2.csv
gloYdotdot		See file: GNSS Navigation Model subtest2.csv
gloZ		See file: GNSS Navigation Model subtest2.csv
gloZdot		See file: GNSS Navigation Model subtest2.csv
gloZdotdot		See file: GNSS Navigation Model subtest2.csv

***GNSS-NavigationModel:* sub-test 3**

Information Element	Units	Value/remark
nonBroadcastFlag		0
gnss-SatelliteList		(SIZE) 6

***GNSS-NavModelSatelliteElement:* sub-test 3**

Information Element	Units	Value/remark
svID		PRNs: TBD
svHealth		0
iod		TBD
gnss-ClockModel		
standardClockModelList		(SIZE) 1
stanClockToc		See file: GNSS Navigation Model subtest3.csv
stanClockAF2		See file: GNSS Navigation Model subtest3.csv
stanClockAF1		See file: GNSS Navigation Model subtest3.csv
stanClockAF0		See file: GNSS Navigation Model subtest3.csv
stanClockTgd		See file: GNSS Navigation Model subtest3.csv
gnss-OrbitModel		
keplerianSet		
keplerToe		See file: GNSS Navigation Model subtest3.csv
keplerW		See file: GNSS Navigation Model subtest3.csv
keplerDeltaN		See file: GNSS Navigation Model subtest3.csv
keplerM0		See file: GNSS Navigation Model subtest3.csv
keplerOmegaDot		See file: GNSS Navigation Model subtest3.csv
keplerE		See file: GNSS Navigation Model subtest3.csv
keplerIDot		See file: GNSS Navigation Model subtest3.csv
keplerAPowerHalf		See file: GNSS Navigation Model subtest3.csv
keplerI0		See file: GNSS Navigation Model subtest3.csv
keplerOmega0		See file: GNSS Navigation Model subtest3.csv
keplerCrs		See file: GNSS Navigation Model subtest3.csv
keplerCis		See file: GNSS Navigation Model subtest3.csv
keplerCus		See file: GNSS Navigation Model subtest3.csv
keplerCrc		See file: GNSS Navigation Model subtest3.csv
keplerCic		See file: GNSS Navigation Model subtest3.csv
keplerCuc		See file: GNSS Navigation Model subtest3.csv

***GNSS-NavigationModel:* sub-test 4**

Information Element	Units	Value/remark
GNSS-GenericAssistData		(SIZE) 2
gnss-ID		0 (gps)
GNSS-NavigationModel		See GNSS-NavigationModel: sub-test 1
gnss-ID		4 (glonass)
GNSS-NavigationModel		See GNSS-NavigationModel: sub-test 2

GNSS ACQUISITION ASSISTANCE:

***GNSS-AcquisitionAssistance:* sub-test 1**

Information Element	Units	Value/remark
GNSS-AcquisitionAssistance		
gnss-SignalID		0 (GPS L1 C/A)
gnss-AcquisitionAssistList		(SIZE) 6

***GNSS-AcquisitionAssistElement:* sub-test 1**

Information Element	Units	Value/remark
svID		PRNs: TBD
doppler0		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
doppler1		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
dopplerUncertainty		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
codePhase		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
intCodePhase		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
codePhaseSearchWindow		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
azimuth		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)
elevation		Time varying. See file: GNSS Acquisition Assistance subtest1.csv (Note)

***GNSS-AcquisitionAssistance:* sub-test 2**

Information Element	Units	Value/remark
GNSS-AcquisitionAssistance		
gnss-SignalID		0 (GLONASS G1)
gnss-AcquisitionAssistList		(SIZE) 6

***GNSS-AcquisitionAssistElement:* sub-test 2**

Information Element	Units	Value/remark
svID		PRNs: TBD
doppler0		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
doppler1		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
dopplerUncertainty		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
codePhase		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
intCodePhase		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
codePhaseSearchWindow		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
azimuth		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)
elevation		Time varying. See file: GNSS Acquisition Assistance subtest2.csv (Note)

***GNSS-AcquisitionAssistance:* sub-test 3**

Information Element	Units	Value/remark
GNSS-AcquisitionAssistance		
gnss-SignalID		0 (Galileo E1)
gnss-AcquisitionAssistList		(SIZE) 6

***GNSS-AcquisitionAssistElement:* sub-test 3**

Information Element	Units	Value/remark
svID		PRNs: TBD
doppler0		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
doppler1		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
dopplerUncertainty		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
codePhase		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
intCodePhase		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
codePhaseSearchWindow		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
azimuth		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)
elevation		Time varying. See file: GNSS Acquisition Assistance subtest3.csv (Note)

Note: This field is "Time varying" and its value depends on the "current gnss-TimeOfDay". The value of this field to be used shall be determined by taking the "current gnss-TimeOfDay" value and selecting the field value in the GNSS Acquisition Assistance subtestX.csv file corresponding to the value of "current gnss-TimeOfDay".

***GNSS-AcquisitionAssistance:* sub-test 4**

Information Element	Units	Value/remark
GNSS-GenericAssistData		(SIZE) 2
gnss-ID		0 (gps)
GNSS-AcquisitionAssistance		See GNSS-AcquisitionAssistance: sub-test 1
gnss-ID		4 (glonass)
GNSS-AcquisitionAssistance		See GNSS-AcquisitionAssistance: sub-test 2

GNSS ALMANAC:

***GNSS-Almanac:* sub-test 1**

Information Element	Units	Value/remark
GNSS-Almanac		
weekNumber		TBD
toa		TBD
ioda		TBD
completeAlmanacProvided		1 (TRUE)
gnss-AlmanacList		(SIZE) 24

***GNSS-AlmanacElement:* sub-test 1**

Information Element	Units	Value/remark
keplerianNAV-Almanac		
svID		PRNs: TBD
navAlmE		See file: GNSS Almanac subtest1.csv
navAlmDeltaI		See file: GNSS Almanac subtest1.csv
navAlmOMEGADOT		See file: GNSS Almanac subtest1.csv
navAlmSVHealth		See file: GNSS Almanac subtest1.csv
navAlmSqrtA		See file: GNSS Almanac subtest1.csv
navAlmOMEGAo		See file: GNSS Almanac subtest1.csv
navAlmOmega		See file: GNSS Almanac subtest1.csv
navAlmMo		See file: GNSS Almanac subtest1.csv
navAlmaf0		See file: GNSS Almanac subtest1.csv
navAlmaf1		See file: GNSS Almanac subtest1.csv

***GNSS-Almanac:* sub-test 2**

Information Element	Units	Value/remark
GNSS-Almanac		
completeAlmanacProvided		1 (TRUE)
gnss-AlmanacList		(SIZE) TBD

***GNSS-AlmanacElement:* sub-test 2**

Information Element	Units	Value/remark
keplerianGLONASS		
gloAlm-NA		See file: GNSS Almanac subtest2.csv
gloAlmnA		See file: GNSS Almanac subtest2.csv
gloAlmHA		See file: GNSS Almanac subtest2.csv
gloAlmLambdaA		See file: GNSS Almanac subtest2.csv
gloAlmtlambdaA		See file: GNSS Almanac subtest2.csv
gloAlmDeltaIa		See file: GNSS Almanac subtest2.csv
gloAlmDeltaTA		See file: GNSS Almanac subtest2.csv
gloAlmDeltaTdotA		See file: GNSS Almanac subtest2.csv
gloAlmEpsilonA		See file: GNSS Almanac subtest2.csv
gloAlmOmegaA		See file: GNSS Almanac subtest2.csv
gloAlmTauA		See file: GNSS Almanac subtest2.csv
gloAlmCA		See file: GNSS Almanac subtest2.csv
gloAlmMA		TBD

***GNSS-Almanac:* sub-test 3**

Information Element	Units	Value/remark
GNSS-Almanac		
weekNumber		TBD
toa		TBD
ioda		TBD
completeAlmanacProvided		1 (TRUE)
gnss-AlmanacList		(SIZE) TBD

***GNSS-AlmanacElement:* sub-test 3**

Information Element	Units	Value/remark
keplerianAlmanacSet		
svID		PRNs: TBD
kepAlmanacE		See file: GNSS Almanac subtest3.csv
kepAlmanacDeltaI		See file: GNSS Almanac subtest3.csv
kepAlmanacOmegaDot		See file: GNSS Almanac subtest3.csv
kepSVHealth		See file: GNSS Almanac subtest3.csv
kepAlmanacAPowerHalf		See file: GNSS Almanac subtest3.csv
kepAlmanacOmega0		See file: GNSS Almanac subtest3.csv
kepAlmanacW		See file: GNSS Almanac subtest3.csv
kepAlmanacM0		See file: GNSS Almanac subtest3.csv
kepAlmanacAF0		See file: GNSS Almanac subtest3.csv
kepAlmanacAF1		See file: GNSS Almanac subtest3.csv

***GNSS-Almanac:* sub-test 4**

Information Element	Units	Value/remark
GNSS-GenericAssistData		(SIZE) 2
gnss-ID		0 (gps)
GNSS-Almanac		See GNSS-Almanac: sub-test 1
gnss-ID		4 (glonass)
GNSS-Almanac		See GNSS-Almanac: sub-test 2

GNSS UTC MODEL (FFS):

GNSS-UTC-Model (FFS)

Information Element	Units	Value/remark
GNSS-UTC-Model		
utcModel1	Sub-test 1, 3, 4	TBD
	Other sub-tests	Not present
utcModel2		TBD
utcModel3	Sub-test 2, 4	TBD
	Other sub-tests	Not present
utcModel4		TBD

GNSS AUXILIARY INFORMATION:

***GNSS-AuxiliaryInformation:* sub-test 1**

Information Element	Units	Value/remark
GNSS-AuxiliaryInformation		
gnss-ID-GPS		
svID		PRNs: TBD
signalsAvailable		L1C and others as supported by the UE

***GNSS-AuxiliaryInformation:* sub-test 2**

Information Element	Units	Value/remark
GNSS-AuxiliaryInformation		
gnss-ID-GLONASS		
svID		PRNs: TBD
signalsAvailable		G1
channelNumber		TBD

***GNSS- AuxiliaryInformation:* sub-test 4**

Information Element	Units	Value/remark
GNSS-GenericAssistData		(SIZE) 2
gnss-ID		0 (gps)
GNSS-AuxiliaryInformation		See GNSS-AuxiliaryInformation: sub-test 1
gnss-ID		4 (glonass)
GNSS-AuxiliaryInformation		See GNSS-AuxiliaryInformation: sub-test 2

6.2 GNSS Scenarios and Assistance Data for Assisted GNSS Minimum Performance tests

6.2.1 General

This subclause defines the GNSS scenarios and assistance data IEs which shall be available for use as specified in all A-GNSS Minimum Performance test cases defined in TS 34.172 [5] and in TS 36.571-1 [6].

Subclauses 6.2.2 and 6.2.3 list the assistance data IEs required for minimum performance testing of UE-based mode, and subclauses 6.2.4 and 6.2.5 list the assistance data available for minimum performance testing of UE-assisted mode. Subclause 6.2.7 lists the values of the assistance data IE fields for all minimum performance testing.

In all cases the Assistance Data is given in the two necessary formats, RRC format for TS 34.172 [5] and LPP format for TS 36.571-1 [6]. Other information is also given separately for TS 34.172 [5] and TS 36.571-1 [6] where it differs between the specifications.

The A-GNSS minimum performance requirements are defined by assuming that all relevant and valid assistance data is received by the UE in order to perform GNSS measurements and/or position calculation. This subclause does not include nor consider delays occurring in the various signalling interfaces of the network.

6.2.1.1 Satellite constellations and assistance data for minimum performance testing

Editor's note: This section has differences between GPS and GNSS and needs updating.

The satellite constellation shall consist of 24 satellites for GLONASS; 27 satellites for GPS, Modernized GPS and Galileo; 3 satellites for QZSS; and 2 satellites for SBAS. Almanac assistance data shall be available for all these satellites. At least 7 of the satellites per GPS, Modernized GPS, Galileo or GLONASS constellation shall be visible to the UE (that is, above 15 degrees elevation with respect to the UE). At least 1 of the satellites for QZSS shall be within 15 degrees of zenith; and at least 1 of the satellites for SBAS shall be visible to the UE. All other satellite specific assistance data shall be available for all visible satellites. In each test, signals are generated for only 6 satellites (or 7 if SBAS is included). The HDOP for the test shall be calculated using these satellites. The simulated satellites for GPS, Modernized GPS, Galileo and GLONASS shall be selected from the visible satellites for each constellation, consistent with achieving the required HDOP for the test.

6.2.1.2 GNSS Scenarios for minimum performance testing

Editor's note: in the following subclause values marked "TBD" need to be determined

Editor's note: in the following subclause in some cases the use of the term "PRN" is incorrect and needs to be reconsidered

This subclause defines the GNSS scenarios that shall be used for all Assisted GNSS minimum performance tests defined in TS 34.172 [5] and in TS 36.571-1 [6].

The GNSS scenarios achieve the required HDOP for the Test Cases and they also satisfy the requirement that for each test instance the reference location shall change sufficiently such that the UE shall have to use the new assistance data.

The viable running time during which the scenario maintains the required HDOP or HDOPs is given. Once this time has been reached the scenario shall be restarted from its nominal start time.

The test cases include sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below. For each GNSS scenario the parameters that vary with the sub-test are given for each sub-test.

Table 6.2.1.2-1: Sub-Test Case Number Definition for TS 34.172

Sub-Test Case Number	Supported GNSS
1	UE supporting A-GLONASS only
2	UE supporting A-Galileo only
3	UE supporting A-GPS and Modernized GPS only
4	UE supporting A-GPS and A-GLONASS only

Table 6.2.1.2-2: Sub-Test Case Number Definition for TS 36.571-1

Sub-Test Case Number	Supported GNSS
1	UE supporting A-GPS L1C/A only
2	UE supporting A-GLONASS only
3	UE supporting A-Galileo only
4	UE supporting A-GPS and Modernized GPS only
5	UE supporting A-GPS and A-GLONASS only

6.2.1.2.1 GNSS Scenario #1

The following GNSS scenario #1 shall be used during the TTFF tests defined in TS 34.172 [5] and in TS 36.571-1 [6] with the exception of the Nominal Accuracy test. The assistance data specified in the following subclauses for GNSS scenario #1 is consistent with this GNSS scenario.

Yuma Almanac data: the required file(s) in the GNSS data perf zip file specified in Annex B are given below.

Table 6.2.1.2.1-1: Yuma Almanac data files for TS 34.172

Sub-Test Case Number	Yuma file(s)
1	GNSS 1-1 Yuma.txt
2	GNSS 1-2 Yuma.txt
3	GNSS 1-3 Yuma.txt
4	GNSS 1-1 Yuma.txt and GNSS 1-3 Yuma.txt

Table 6.2.1.2.1-2: Yuma Almanac data files for TS 36.571-1

Sub-Test Case Number	Yuma file(s)
1	GNSS 1-3 Yuma.txt
2	GNSS 1-1 Yuma.txt
3	GNSS 1-2 Yuma.txt
4	GNSS 1-3 Yuma.txt
5	GNSS 1-1 Yuma.txt and GNSS 1-3 Yuma.txt

UE location: the UE location is calculated as a random offset from the reference location using the method described in subclause 6.2.1.2.5. The reference location is: latitude: 35 degrees 44 minutes 39.432 seconds north, longitude: 139 degrees 40 minutes 48.633 seconds east, (Tokyo Japan), height: = 300m.

Nominal start time: 1st January 2012 00:30:00.

Viable running time to maintain specified HDOP values: 30 minutes.

Visible satellites available for simulation and for which Assistance Data (other than Almanac) shall be generated are given below

Editor's note: the numbers of SVs in all tables for all scenarios below needs review.

Table 6.2.1.2.1-3: Visible satellites for TS 34.172

Sub-Test Case Number	PRNs of Visible satellites
1	3, 4, 9, 10, 18, 19, 20
2	[TBD]
3	1, 4, 7, 8, 11, 17, 19, 20, 27, 28
4	GPS: 1, 4, 7, 8, 11, 17, 19, 20, 27, 28. GLONASS: 3, 4, 9, 10, 18, 19, 20

Table 6.2.1.2.1-4: Visible satellites for TS 36.571-1

Sub-Test Case Number	PRNs of Visible satellites
1	1, 4, 7, 8, 11, 17, 19, 20, 27, 28
2	3, 4, 9, 10, 18, 19, 20
3	[TBD]
4	1, 4, 7, 8, 11, 17, 19, 20, 27, 28
5	GPS: 1, 4, 7, 8, 11, 17, 19, 20, 27, 28. GLONASS: 3, 4, 9, 10, 18, 19, 20

The satellites to be simulated in each test case have been selected in order to achieve the required HDOP. They are defined below.

Table 6.2.1.2.1-5: Satellites to be simulated for TS 34.172

Sub-Test Case Number	PRNs of Satellites to be simulated
1	3, 10, 20, [TBD], [TBD], [TBD]
2	[TBD]
3	8, 11, 17, 19, 27, 28 (Note)
4	GPS: 8, 19, 27. GLONASS: 3, 10, 20

Table 6.2.1.2.1-6: Satellites to be simulated for TS 36.571-1

Sub-Test Case Number	PRNs of Satellites to be simulated
1	8, 11, 17, 19, 27, 28
2	3, 10, 20, [TBD], [TBD], [TBD]
3	[TBD]
4	8, 11, 17, 19, 27, 28 (Note)
5	GPS: 8, 19, 27. GLONASS: 3, 10, 20

NOTE: For this sub-test the satellite simulator shall generate all the GPS signals supported by the UE for all the simulated satellites.

Ionospheric model: see values in subclause 6.2.7.

Tropospheric model: STANAG with SRI equal to 324.8, as defined in STANAG 4294 [17].

6.2.1.2.2 GNSS Scenario #2

The following GNSS scenario #2 shall be used during the TTFF tests defined in TS 34.172 [5] and in TS 36.571-1 [6] with the exception of the Nominal Accuracy test. The assistance data specified in the following subclauses for GNSS scenario #2 is consistent with this GNSS scenario.

Yuma Almanac data: the required file(s) in the GNSS data perf zip file specified in Annex B are below.

Table 6.2.1.2.2-1: Yuma Almanac data files for TS 34.172

Sub-Test Case Number	Yuma file(s)
1	GNSS 2-1 Yuma.txt
2	GNSS 2-2 Yuma.txt
3	GNSS 2-3 Yuma.txt
4	GNSS 2-1 Yuma.txt and GNSS 2-3 Yuma.txt

Table 6.2.1.2.2-2: Yuma Almanac data files for TS 36.571-1

Sub-Test Case Number	Yuma file(s)
1	GNSS 2-3 Yuma.txt
2	GNSS 2-1 Yuma.txt
3	GNSS 2-2 Yuma.txt
4	GNSS 2-3 Yuma.txt
5	GNSS 2-1 Yuma.txt and GNSS 2-3 Yuma.txt

UE location: the UE location is calculated as a random offset from the reference location using the method described in subclause 6.2.1.2.5. The reference location is: latitude: 37 degrees 22 minutes 0.009 seconds north, longitude: 121 degrees 58 minutes 59.972 seconds east, (San Jose, USA), height: = 100m.

Nominal start time: 10th November 2009, 14:30:15.

Viable running time to maintain specified HDOP values: 15 minutes.

Visible satellites available for simulation and for which Assistance Data (other than Almanac) shall be generated are given below.

Table 6.2.1.2.2-3: Visible satellites for TS 34.172

Sub-Test Case Number	PRNs of Visible satellites
1	7, 8, 9, 10, 18, 19, 20
2	[TBD]
3	5, 7, 10, 11, 13, 15, 17
4	GPS: 5, 7, 10, 11, 13, 15, 17. GLONASS: 7, 8, 9, 10, 18, 19, 20

Table 6.2.1.2.2-4: Visible satellites for TS 36.571-1

Sub-Test Case Number	PRNs of Visible satellites
1	5, 7, 10, 11, 13, 15, 17
2	7, 8, 9, 10, 18, 19, 20
3	[TBD]
4	5, 7, 10, 11, 13, 15, 17
5	GPS: 5, 7, 10, 11, 13, 15, 17. GLONASS: 7, 8, 9, 10, 18, 19, 20

The satellites to be simulated in each test case have been selected in order to achieve the required HDOP. They are defined below.

Table 6.2.1.2.1-5: Satellites to be simulated for TS 34.172

Sub-Test Case Number	PRNs of Satellites to be simulated
1	7, 8, 9, 10, 18, 19
2	[TBD]
3	5, 7, 10, 13, 15, 17 (Note)
4	GPS: 7, 10, 17. GLONASS: 8, 9, 18

Table 6.2.1.2.1-6: Satellites to be simulated for TS 36.571-1

Sub-Test Case Number	PRNs of Satellites to be simulated
1	5, 7, 10, 13, 15, 17
2	7, 8, 9, 10, 18, 19
3	[TBD]
4	5, 7, 10, 13, 15, 17 (Note)
5	GPS: 7, 10, 17. GLONASS: 8, 9, 18

NOTE: For this sub-test the satellite simulator shall generate all the GPS signals supported by the UE for all the simulated satellites.

Ionospheric model: see values in subclause 6.2.7.

Tropospheric model: STANAG with SRI equal to 324.8, as defined in STANAG 4294 [17].

6.2.1.2.3 GNSS Scenario #3

The following GNSS scenario #3 shall be used during the Nominal Accuracy test defined in TS 34.172 [5] and in TS 36.571-1 [6]. The assistance data specified in the following subclauses for GNSS scenario #3 is consistent with this GNSS scenario.

The scenario used varies dependent on the SBAS supported by the UE and also whether QZSS is supported. The scenario to be used is defined below. Where more than one SBAS is supported use the scenario for MSAS if MSAS and QZSS are supported, otherwise use the scenario for the first supported SBAS in the list.

Table 6.2.1.2.3-1: Scenarios used for Scenario #3

SBAS supported	Scenarios used	
	UE supports QZSS	UE does not support QZSS
None	GNSS Scenario #1 with QZSS Scenario #1	GNSS Scenario #1
WAAS	[FFS]	GNSS Scenario #2 with WAAS
EGNOS	[FFS]	GNSS Scenario #3A with EGNOS
MSAS	GNSS Scenario #1 with QZSS Scenario #1 and MSAS	GNSS Scenario #1 with MSAS
GAGAN	[FFS]	GNSS Scenario #3B with GAGAN

6.2.1.2.3.1 GNSS Scenario #3A

[FFS]

6.2.1.2.3.2 GNSS Scenario #3B

[FFS]

6.2.1.2.3.3 QZSS Scenario #1

Yuma Almanac data: see file QZSS 1 Yuma.txt in the GNSS data perf zip file specified in Annex B.

UE location: as for GNSS scenario #1.

Nominal start time: as for GNSS scenario #1.

Viable running time to maintain specified requirements: as for GNSS scenario #1.

Satellite meeting specified requirements to be used for simulation and for which Assistance Data (other than Almanac) shall be generated: PRN 193.

6.2.1.2.3.4 WAAS Scenario

Satellite positions: (PRN 135)133.0 degrees west, height: 35786037.417m, (PRN 138)107.3 degrees west, height: 35786037.417m.

UE location: as for related GNSS scenario.

Satellite used for simulation: PRN 135.

6.2.1.2.3.5 EGNOS Scenario

Satellite positions: (PRN 120)15.5 degrees west, height: 35786037.417m, (PRN 124) 21.5 degrees west, height: 35786037.417m.

UE location: as for related GNSS scenario.

Satellite used for simulation: PRN 120.

6.2.1.2.3.6 MSAS Scenario

Satellite positions: (PRN 129)140.0 degrees east, height: 35786037.417m, (PRN 137)145 degrees east, height: 35786037.417m

UE location: as for related GNSS scenario.

Satellite used for simulation: PRN 129.

6.2.1.2.3.7 GAGAN Scenario

[FFS]

6.2.1.2.4 GNSS Scenario #4

The following GNSS scenario #4 shall be used during the Nominal Accuracy test defined in TS 34.172 [5] and in TS 36.571-1 [6]. The assistance data specified in the following subclauses for GNSS scenario #4 is consistent with this GNSS scenario.

The scenario used varies dependent on the SBAS supported by the UE and also whether QZSS is supported. The scenario to be used is defined below. Where more than one SBAS is supported use the scenario for MSAS if MSAS and QZSS are supported, otherwise use the scenario for the first supported SBAS in the list.

Table 6.2.1.2.4-1: Scenarios used for Scenario #4

SBAS supported	Scenarios used	
	UE supports QZSS	UE does not support QZSS
None	GNSS Scenario #4D with QZSS Scenario #2	GNSS Scenario #2
WAAS	[FFS]	GNSS Scenario #4C with WAAS
EGNOS	[FFS]	GNSS Scenario #4A with EGNOS
MSAS	GNSS Scenario #4D with QZSS Scenario #2 and MSAS	GNSS Scenario #4D with MSAS
GAGAN	[FFS]	GNSS Scenario #4B with GAGAN

6.2.1.2.4.1 GNSS Scenario #4A

[FFS]

6.2.1.2.4.2 GNSS Scenario #4B

[FFS]

6.2.1.2.4.3 GNSS Scenario #4C

Yuma Almanac data: the required file(s) in the GNSS data perf zip file specified in Annex B are given below.

Table 6.2.1.2.4.3-1: Yuma Almanac data files for TS 34.172

Sub-Test Case Number	Yuma file(s)
1	GNSS 4C-1 Yuma.txt
2	GNSS 4C -2 Yuma.txt
3	GNSS 4C -3 Yuma.txt
4	GNSS 4C -1 Yuma.txt and GNSS 4C -3 Yuma.txt

Table 6.2.1.2.4.3-2: Yuma Almanac data files for TS 36.571-1

Sub-Test Case Number	Yuma file(s)
1	GNSS 4C -3 Yuma.txt
2	GNSS 4C-1 Yuma.txt
3	GNSS 4C -2 Yuma.txt
4	GNSS 4C -3 Yuma.txt
5	GNSS 4C -1 Yuma.txt and GNSS 4C -3 Yuma.txt

UE location: the UE location is calculated as a random offset from the reference location using the method described in subclause 6.2.1.2.5. The reference location is: latitude: 37 degrees 24 minutes 53.391 seconds north, longitude: 122 degrees 1 minutes 3.722 seconds east, (Sunnyvale, USA), height: = 50m.

Nominal start time: 1st June 2012, 00:00:00.

Viable running time to maintain specified HDOP values: 30 minutes.

Visible satellites available for simulation and for which Assistance Data (other than Almanac) shall be generated are given below.

Table 6.2.1.2.4.3.3: Visible satellites for TS 34.172

Sub-Test Case Number	PRNs of Visible satellites
1	8, 9, 10, 18, 19, 20, 21
2	[TBD]
3	7, 8, 10, 15, 17, 19, 25, 26, 27, 28
4	GPS: 7, 8, 10, 15, 17, 19, 25, 26, 27, 28. GLONASS: 8, 9, 10, 18, 19, 20, 21

Table 6.2.1.2.4.3.4: Visible satellites for TS 36.571-1

Sub-Test Case Number	PRNs of Visible satellites
1	7, 8, 10, 15, 17, 19, 25, 26, 27, 28
2	8, 9, 10, 18, 19, 20, 21
3	[TBD]
4	7, 8, 10, 15, 17, 19, 25, 26, 27, 28
5	GPS: 7, 8, 10, 15, 17, 19, 25, 26, 27, 28. GLONASS: 8, 9, 10, 18, 19, 20, 21

The satellites to be simulated in each test case have been selected in order to achieve the required HDOP. They are defined below.

Table 6.2.1.2.4.3.5: Satellites to be simulated for TS 34.172

Sub-Test Case Number	PRNs of Satellites to be simulated
1	9, 10,19, [TBD], [TBD], [TBD]
2	[TBD]
3	8, 15, 17, 26, 27, 28 (Note)
4	GPS: 15, 26, 27. GLONASS: 9, 10,19

Table 6.2.1.2.4.3.6: Satellites to be simulated for TS 36.571-1

Sub-Test Case Number	PRNs of Satellites to be simulated
1	8, 15, 17, 26, 27, 28
2	9, 10,19, [TBD], [TBD], [TBD]
3	[TBD]
4	8, 15, 17, 26, 27, 28 (Note)
5	GPS: 15, 26, 27. GLONASS: 9, 10,19

NOTE: For this sub-test the satellite simulator shall generate all the GPS signals supported by the UE for all the simulated satellites.

Ionospheric model: see values in subclause 6.2.7.

Tropospheric model: STANAG with SRI equal to 324.8, as defined in STANAG 4294 [17].

6.2.1.2.4.4 GNSS Scenario #4D

[FFS]

6.2.1.2.4.5 QZSS Scenario #2

Yuma Almanac data: see file QZSS 2 Yuma.txt in the GNSS data perf zip file specified in Annex B.

UE location: as for GNSS scenario #4D.

Nominal start time: as for GNSS scenario #4D.

Viable running time to maintain specified requirements: as for GNSS scenario #4D.

Satellite meeting specified requirements to be used for simulation and for which Assistance Data (other than Almanac) shall be generated: PRN [TBD].

6.2.1.2.3.6 WAAS Scenario

Satellite positions: (PRN 135)133.0 degrees west, height: 35786037.417m, (PRN 138)107.3 degrees west, height: 35786037.417m.

UE location: as for related GNSS scenario.

Satellite used for simulation: PRN 138.

6.2.1.2.3.7 EGNOS Scenario

Satellite positions: (PRN 120)15.5 degrees west, height: 35786037.417m, (PRN 124) 21.5 degrees west, height: 35786037.417m.

UE location: as for related GNSS scenario.

Satellite used for simulation: PRN 124.

6.2.1.2.3.8 MSAS Scenario

Satellite positions: (PRN 129)140.0 degrees east, height: 35786037.417m, (PRN 137)145 degrees east, height: 35786037.417m.

UE location: as for related GNSS scenario.

Satellite used for simulation: PRN 137.

6.2.1.2.3.9 GAGAN Scenario

[FFS]

6.2.1.2.5 UE Location for TTFF test cases

This subclause defines the method for generating the random UE locations that are required to be used for the TTFF tests defined in TS 34.172 [5] and in TS 36.571-1 [6].

For every Test Instance in each TTFF test case, the UE location shall be randomly selected to be within 3 km of the Reference Location. The Altitude of the UE shall be randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid. These values shall have uniform random distributions.

The UE location is calculated as an offset from the Reference Location.

6.2.1.2.5.1 UE Location Offset

The UE location offset shall be calculated by selecting the next pair of random numbers, representing a pair of latitude and longitude offsets in degrees, from a standard uniform random number generator, with the following properties:

The ranges of the latitude and longitude offsets values shall be such that when translated onto the surface of the earth they shall lie within a 3km radius circle, centred on the Reference location specified for the GNSS scenario under consideration. For the purposes of this calculation make the following assumptions:

a) Over the 3km radius circle at the Reference location the earth is flat and the meridians and parallels form a rectangular grid

b) The earth is spherical with a radius of 6371141m (equal to the WGS 84 value at 35 degrees latitude)

The resolution used for the latitude and longitude offsets values shall be 90/2E23 for the latitude offset values and 360/2E24 for the longitude offset values, representing the coding resolution in degrees specified in 3GPP TS 23.032.

6.2.1.2.5.2 UE Altitude

The UE altitude value shall be calculated by selecting the next random number from a standard uniform random number generator, in the range 0 to 500, representing meters. The resolution used for the random number shall be 1, representing 1 meter.

6.2.2 Information elements required for normal UE based testing for TS 34.172

The following A-GPS and A-GANSS assistance data IEs and fields shall be present for each test as appropriate for the GNSS(s) used during the test. Fields not specified shall not be present. The values of the fields are specified in subclause 6.2.7.

The information elements are given with reference to 3GPP TS 25.331 [34], where the details are defined.

a) GPS Reference Time IE.

Fields of the IE
GPS Week
GPS TOW msec
GPS TOW Assist
SatID
TLM Message
TLM Reserved
Alert
Anti-Spoof

b) GANSS Reference Time IE.

Fields of the IE
GANSS Day
GANSS TOD
GANSS TOD Uncertainty
GANSS Time ID

c) GANSS Time Model IE. This information element is only required for multi system tests.

Fields of the IE
GANSS Time Model Reference Time
T_{A0}
GNSS_TOD_ID For each GNSS included in the test.

d) GPS Reference UE Position IE.

Fields of the IE
Ellipsoid point with Altitude and uncertainty ellipsoid

e) GANSS Reference UE Position IE.

Fields of the IE
Ellipsoid point with Altitude and uncertainty ellipsoid

f) GPS Navigation Model IE.

Fields of the IE
All satellite information

g) GANSS Navigation Model IE.

Fields of the IE
All satellite information

GANSS	Clock and Orbit Model Choice
Galileo	Model-1

h) GANSS Additional Navigation Model IE.

Fields of the IE
All satellite information

GANSS	Clock and Orbit Model Choice
Modernized GPS	Model-3
GLONASS	Model-4
QZSS QZS-L1	Model-2
QZSS QZS-L1C/L2C/L5	Model-3
SBAS	Model-5

i) GPS Ionospheric Model IE.

Fields of the IE
All

j) GANSS Ionospheric Model IE.

Fields of the IE
All

k) GANSS Additional Ionospheric Model IE.

Fields of the IE
All

l) GANSS UTC Model IE.

Fields of the IE
GANSS UTC Model

m) GANSS Additional UTC Model IE.

Fields of the IE
GANSS Additional UTC Model

GANSS	UTC Model Choice
Galileo	Model-1
Modernized GPS	Model-2
GLONASS	Model-3
QZSS QZS-L1	Model-1
QZSS QZS-L1C/L2C/L5	Model-2
SBAS	Model-4

n) GANSS Auxiliary Information IE.

Fields of the IE
GANSS Auxiliary Information

6.2.3 Information elements required for UE based Sensitivity Fine Time Assistance test case for TS 34.172

The A-GPS and A-GANSS assistance data IEs and fields that shall be present for the Sensitivity Fine Time Assistance test case shall be those specified in subclause 6.2.2 with the following exception. Fields not specified shall not be present. The values of the fields are specified in subclause 6.2.7.

a) GPS Reference Time IE.

Fields of the IE
GPS Week
GPS TOW msec
UTRAN GPS reference time
UTRAN GPS timing of cell frames
CHOICE mode
FDD
Primary CPICH Info
SFN
UE Positioning GPS ReferenceTime Uncertainty
TUTRAN-GPS drift rate
GPS TOW Assist
SatID
TLM Message
TLM Reserved

b) GANSS Reference Time IE.

Fields of the IE
GANSS Day
GANSS TOD
GANSS TOD Uncertainty
GANSS Time ID
UTRAN GANSS timing of cell frames
CHOICE mode
FDD
Primary CPICH Info
SFN
TUTRAN-GANSS drift rate

6.2.4 Information elements available for normal UE assisted testing for TS 34.172

The following A-GPS and A-GANSS assistance data IEs and fields shall be present for each test as appropriate for the GNSS(s) used during the test. Fields not specified shall not be present. The values of the fields are specified in subclause 6.2.7.

a) GPS Reference Time IE.

Fields of the IE
GPS Week
GPS TOW msec
GPS TOW Assist
SatID
TLM Message
TLM Reserved
Alert
Anti-Spoof

b) GANSS Reference Time IE.

Fields of the IE
GANSS Day
GANSS TOD
GANSS TOD Uncertainty
GANSS Time ID

c) GANSS Time Model IE. This information element is only required for multi system tests.

Fields of the IE
GANSS Time Model Reference Time
T_{A0}
GNSS_TOD_ID For each GNSS included in the test.

d) GPS Reference UE Position IE.

Fields of the IE
Ellipsoid point with Altitude and uncertainty ellipsoid

e) GANSS Reference UE Position IE.

Fields of the IE
Ellipsoid point with Altitude and uncertainty ellipsoid

f) GPS Almanac IE.

Fields of the IE
Almanac Reference Week
All Satellite information

g) GANSS Almanac.

Fields of the IE
GANSS Almanac Model

GANSS	Almanac Model Choice
Galileo	Model-1
Modernized GPS	Model-3,4
GLONASS	Model-5
QZSS QZS-L1	Model-2
QZSS QZS-L1C/L2C/L5	Model-3,4
SBAS	Model-6

h) GPS Navigation Model IE.

Fields of the IE
All satellite information

i) GANSS Navigation Model IE.

Fields of the IE
All satellite information

GANSS	Clock and Orbit Model Choice
Galileo	Model-1
Modernized GPS	Model-3
GLONASS	Model-4
QZSS QZS-L1	Model-2
QZSS QZS-L1C/L2C/L5	Model-3
SBAS	Model-5

j) GPS Acquisition Assistance IE.

Fields of the IE
GPS TOW msec
Satellite information
SatID
Doppler (0^{th} order term)
Extra Doppler
Doppler (1^{st} order term)
Doppler Uncertainty
Code Phase
Integer Code Phase
GPS Bit number
Code Phase Search Window
Azimuth and Elevation
Azimuth

Elevation

k) GANSS Reference Measurement Information IE.

Fields of the IE
Satellite information
SatID
Doppler (0^{th} order term)
Extra Doppler
Doppler (1^{st} order term)
Doppler Uncertainty
Code Phase
Integer Code Phase
Code Phase Search Window
Azimuth and Elevation
Azimuth
Elevation

l) GANSS Auxiliary Information IE.

Fields of the IE
GANSS Auxiliary Information

6.2.5 Information elements available for UE assisted Sensitivity Fine Time Assistance test case for TS 34.172

The A-GPS and A-GANSS assistance data IEs and fields that shall be available for use for the Sensitivity Fine Time Assistance test case shall be those specified in subclause 6.2.4 with the following exceptions. Fields not specified shall not be present. The values of the fields are specified in subclause 6.2.7.

a) GPS Reference Time IE.

Fields of the IE
GPS Week
GPS TOW msec
UTRAN GPS reference time
UTRAN GPS timing of cell frames
CHOICE mode
FDD
Primary CPICH Info
SFN
UE Positioning GPS ReferenceTime Uncertainty
TUTRAN-GPS drift rate
GPS TOW Assist
SatID
TLM Message
TLM Reserved

b) GANSS Reference Time IE.

Fields of the IE
GANSS Day
GANSS TOD
GANSS TOD Uncertainty
GANSS Time ID
UTRAN GANSS timing of cell frames
CHOICE mode
FDD
Primary CPICH Info

SFN
TUTRAN-GANSS drift rate

c) GPS Acquisition Assistance IE.

Fields of the IE
GPS TOW
GPS TOW msec
UTRAN GPS reference time
UTRAN GPS timing of cell frames
CHOICE mode
FDD
Primary CPICH Info
SFN
UE Positioning GPS ReferenceTime Uncertainty
Satellite information
SatID
Doppler (0^{th} order term)
Extra Doppler
Doppler (1^{st} order term)
Doppler Uncertainty
Code Phase
Integer Code Phase
GPS Bit number
Code Phase Search Window
Azimuth and Elevation
Azimuth
Elevation

6.2.6 Information elements available for A-GNSS test cases in TS 36.571-1

The following A-GNSS assistance data elements shall be provided to the UE in the tests. The assistance data provided depends on the mode being used in the test case, the assistance data supported by the UE and the GNSSs supported by the UE. Assistance data IEs not supported by the UE shall not be sent. Assistance data IEs supported by the UE but not listed below shall not be sent. The values of the fields are specified in subclause 6.2.7.

The information elements are given with reference to 3GPP TS 36.355 [8], where the details are defined.

Assistance Data to be provided to the UE for A-GNSS test cases in TS 36.571-1

Assistance Data IE supported by UE	Mode used in test case		
	UE-based	UE-assisted, GNSS-AcquisitionAssistance supported by UE	UE-assisted, GNSS-AcquisitionAssistance not supported by UE
GNSS-Reference Time	Yes	Yes	Yes
GNSS-ReferenceLocation	Yes	No	Yes
GNSS-IonosphericModel	Yes	No	No
GNSS-TimeModelList	Yes (1)	No	Yes (1)
GNSS-NavigationModel	Yes	No	Yes
GNSS-AcquisitionAssistance	No	Yes	No
GNSS-Almanac	No	No	Yes
GNSS-UTC-Model	Yes	No	No
GNSS-AuxiliaryInformation	Yes (2)	Yes (2)	Yes (2)
NOTE 1: In case more than a single GNSS is supported by the UE. NOTE 2: In case the UE supports GLONASS, or more than one GNSS signal.			

a) **GNSS- Reference Time IE.**

GNSS- Reference Time IE

Information Element	All tests except Sensitivity Fine Time Assistance	Sensitivity Fine Time Assistance test
GNSS-ReferenceTime		
gnss-SystemTime		
gnss-TimeID	Yes	Yes
gnss-DayNumber	Yes	Yes
gnss-TimeOfDay	Yes	Yes
gnss-TimeOfDayFrac-msec	Yes	Yes
notificationOfLeapSecond	Yes if gnss-TimeID = 'glonass'	Yes if gnss-TimeID = 'glonass'
gps-TOW-Assist	Yes if gnss-TimeID = 'gps'	Yes if gnss-TimeID = 'gps'
referenceTimeUnc	Yes	No
gnss-ReferenceTimeForOneCell	No	Yes
networkTime		Yes
secondsFromFrameStructureStart		Yes
fractionalSecondsFromFrameStructureStart		Yes
frameDrift		Yes
cellID		Yes
physCellId		Yes
cellGlobalIdEUTRA		Yes
referenceTimeUnc		Yes

b) **GNSS-ReferenceLocation IE.**

GNSS-ReferenceLocation IE

Name of the IE	Fields of the IE
GNSS-ReferenceLocation	threeDlocation

c) **GNSS-IonosphericModel IE.**

GNSS-IonosphericModel IE

Name of the IE	Fields of the IE
GNSS-IonosphericModel	KlobucharModelParameter
	NeQuickModelParameter(1)
NOTE 1: Only required if GNSSs supported include Galileo.	

d) **GNSS-TimeModelList IE.** This information element is only required for multi system tests.

GNSS-TimeModelList IE

Name of the IE	Fields of the IE
GNSS-TimeModelList	
	gnssTOID For each GNSS included in the test.
	deltaT

e) **GNSS-NavigationModel IE.**

GNSS-NavigationModel IE

Name of the IE	Fields of the IE
GNSS-NavigationModel	

GNSS Clock and Orbit Model Choices

GNSS	Clock and Orbit Model Choice
GPS	Model-2
Modernized GPS	Model-3
GLONASS	Model-4
QZSS QZS-L1	Model-2
QZSS QZS-L1C/L2C/L5	Model-3
SBAS	Model-5
Galileo	Model-1

f) **GNSS-AcquisitionAssistance IE.**

GNSS-AcquisitionAssistance IE

Name of the IE	Fields of the IE
GNSS-AcquisitionAssistance	

g) **GNSS-Almanac IE.**

GNSS-Almanac IE

Name of the IE	Fields of the IE
GNSS-Almanac	

GNSS Almanac Choices

GNSS	Almanac Model Choice
GPS	Model-2
Modernized GPS	Model-3,4
GLONASS	Model-5
QZSS QZS-L1	Model-2
QZSS QZS-L1C/L2C/L5	Model-3,4
SBAS	Model-6
Galileo	Model-1

h) **GNSS-UTC-Model IE.**

GNSS-UTC-Model IE

Name of the IE	Fields of the IE
GNSS-UTC-Model	

GNSS UTC Model Choices

GNSS	UTC Model Choice
GPS	Model-1
Modernized GPS	Model-2
GLONASS	Model-3
QZSS QZS-L1	Model-1
QZSS QZS-L1C/L2C/L5	Model-2
SBAS	Model-4
Galileo	Model-1

i) **GNSS-AuxiliaryInformation IE.**

GNSS-AuxiliaryInformation IE

Name of the IE	Fields of the IE
GNSS-AuxiliaryInformation	

6.2.7 Contents of Information elements for A-GNSS Minimum performance testing

6.2.7.1 General

Editor's note: in the following subclause in some cases the use of the term "PRN" is incorrect and needs to be reconsidered

This subclause defines the assistance data values that shall be used for all Assisted GNSS minimum performance tests defined in TS 34.172 [5] and in TS 36.571-1 [6]. It is given for GNSS scenarios #1, #2, #3 and #4 and QZSS Scenarios #1 and #2, where it is different for each scenario; otherwise it is marked "All" where the same value is used for all scenarios.

Where assistance data is required on a per-satellite basis, or where the values of the data also varies with time it is specified in comma-separated-variable files in the GNSS data perf zip file specified in Annex B. These files specify the values to be used for each satellite, indexed by satellite PRN, and, where applicable, the values to be used indexed by both time and satellite PRN.

Assistance data that is marked as "time varying" is specified and used in 80 [FFS] ms increments. Interpolation between these values shall not be used.

Assistance data Information Elements and fields that are not specified shall not be used.

6.2.7.2 IE Random Offset Values

This subclause defines the methods for generating the random offsets that are required to be applied to some assistance data IEs for certain tests defined in TS 34.172 [5] and in TS 36.571-1 [6].

6.2.7.2.1 GNSS TOW

For every Test Instance in each TTFF test case, the IE GPS TOW msec or GANSS TOD or gnss-TimeofDay plus gnss-TimeofDayFrac-msec shall have a random offset, relative to GNSS system time, within the allowed error range of Coarse Time Assistance defined in the test case. This offset value shall have a uniform random distribution.

The offset value shall be calculated by selecting the next random number from a standard uniform random number generator, in the range specified for the GNSS Coarse Time assistance error range in the Test Requirements, Test parameters table for the test under consideration. The resolution used for the random number shall be 0.01, representing 10ms.

6.2.7.2.1 GNSS/cellular time offset

In addition, for every Fine Time Assistance Test Instance the IE UTRAN GPS timing of cell frames or the UTRAN GANSS timing of cell frames or fractionalSecondsFromFrameStructureStart shall have a random offset, relative to the true value of the relationship between the two time references, within the allowed error range of Fine Time Assistance defined in the test case. This offset value shall have a uniform random distribution.

The offset value shall be calculated by selecting the next random number from a standard uniform random number generator with the following properties:

For UTRAN GPS timing of cell frames the range shall be the number of UMTS chips whose duration is less than the range specified for the GNSS Fine Time assistance error range in the Test Requirements, Test parameters table for the test under consideration. For UTRAN GANSS timing of cell frames or fractionalSecondsFromFrameStructureStart the range shall be the range specified for the GNSS Fine Time assistance error range in the Test Requirements, Test parameters table for the test under consideration.

For UTRAN GPS timing of cell frames the resolution used for the random number shall be 1, representing 1 UMTS bit. For UTRAN GANSS timing of cell frames or fractionalSecondsFromFrameStructureStart the resolution used for the random number shall be 1us.

6.2.7.3 Contents of Information elements for A-GNSS Minimum performance testing in TS 34.172

Editor's note: in the following subclause values marked "TBD" need to be determined

Assistance Data Reference Time

[TBD]

Assistance Data Reference Location

[TBD]

Assistance Data Navigation Model

[TBD]

Assistance Data Ionospheric Model

[TBD]

Assistance Data Almanac

[TBD]

Assistance Data Acquisition Assistance

[TBD]

Assistance Data UTC Model

[TBD]

Assistance Data Auxiliary Information

[TBD]

6.2.7.4 Contents of Information elements for A-GNSS Minimum performance testing in TS 36.571-1

Editor's note: in the following subclause values marked "TBD" need to be determined

Assistance Data Reference Time

[TBD]

Assistance Data Reference Location

[TBD]

Assistance Data Navigation Model

[TBD]

Assistance Data Ionospheric Model

[TBD]

Assistance Data Almanac

[TBD]

Assistance Data Acquisition Assistance

[TBD]

Assistance Data UTC Model

[TBD]

Assistance Data Auxiliary Information

[TBD]

7 OTDOA

7.1 OTDOA Scenario and Assistance data for OTDOA signalling tests

7.1.1 General

Editor's note: the following subclauses are provided as a skeleton and are waiting for RAN 4 to finish defining test cases and conditions.

This subclause defines the OTDOA scenario and the associated assistance data that shall be used for the OTDOA signalling tests defined in TS 36.571-2 [7].

7.1.2 OTDOA Scenario

FFS

7.1.3 OTDOA Assistance Data

This subclause defines the OTDOA assistance data elements which shall be provided to the UE in the OTDOA signalling tests defined in TS 36.571-2 [7].

OTDOA REFERENCE CELL INFO:

OTDOA-ReferenceCellInfo

Information Element	Value/remark	Comment
OTDOA-ReferenceCellInfo		
physCellId	TBD	
cellGlobalId	TBD	
earfcnRef	TBD	
antennaPortConfig	TBD	
cpLength	TBD	
prsInfo SEQUENCE {		
prs-Bandwidth	TBD	
prs-ConfigurationIndex	TBD	
numDL-Frames	TBD	

OTDOA NEIGHBOUR CELL INFO LIST:

OTDOA-NeighbourCellInfoList

Information Element	Value/remark	Comment	Condition
OTDOA-NeighbourCellInfoList ::= SEQUENCE (SIZE(1..3)) OF SEQUENCE {			
SEQUENCE (SIZE(1..24)) OF SEQUENCE {			
physCellId	TBD		
cellGlobalId	TBD		
earfcn	TBD		
cpLength	TBD		
prsInfo	TBD		
antennaPortConfig	TBD		
slotNumberOffset	TBD		
prs-SubframeOffset	TBD		
expectedRSTD	TBD		
expectedRSTD-Uncertainty	TBD		

7.2 OTDOA Scenario and Assistance data for OTDOA minimum performance tests

7.2.1 General

Editor's note: the following subclauses are provided as a skeleton and are waiting for RAN 4 to finish defining test cases and conditions.

This subclause defines the OTDOA scenario and the associated assistance data that shall be used for the OTDOA minimum performance tests defined in TS 36.571-1.

7.2.2 OTDOA Scenario

FFS

7.2.3 OTDOA Assistance Data

This subclause defines the OTDOA assistance data elements which shall be provided to the UE in the OTDOA minimum performance tests defined in TS 36.571-1.

OTDOA REFERENCE CELL INFO:

OTDOA-ReferenceCellInfo

Information Element	Value/remark	Comment
OTDOA-ReferenceCellInfo		
physCellId	TBD	
cellGlobalId	TBD	
earfcnRef	TBD	
antennaPortConfig	TBD	
cpLength	TBD	
prsInfo SEQUENCE {		
prs-Bandwidth	TBD	
prs-ConfigurationIndex	TBD	
numDL-Frames	TBD	

OTDOA NEIGHBOUR CELL INFO LIST:

OTDOA-NeighbourCellInfoList

Information Element	Value/remark	Comment	Condition
OTDOA-NeighbourCellInfoList ::= SEQUENCE (SIZE(1..3)) OF SEQUENCE {			
SEQUENCE (SIZE(1..24)) OF SEQUENCE {			
physCellId	TBD		
cellGlobalId	TBD		
earfcn	TBD		
cpLength	TBD		
prsInfo	TBD		
antennaPortConfig	TBD		
slotNumberOffset	TBD		
prs-SubframeOffset	TBD		
expectedRSTD	TBD		
expectedRSTD-Uncertainty	TBD		

8 ECID

FFS

Editor's note: this subclause is waiting for RAN 4 to finish defining test cases and conditions.

Annex A (normative): GPS data files

A.1 GPS data files for signalling tests

The GPS data files for use in GPS signalling tests defined in TS 34.123-1 [3] subclauses 17.2.1 to 17.2.4 are contained in archive GPS_Data_Sig_V2.zip which accompanies this document. [Editor's note: for ease of distribution, the data files are not attached to this draft version of the specification]

A.2 GPS data files for Minimum Performance tests

The GPS data files for use in GPS Minimum Performance tests defined in TS 34.171 [4] are contained in archive GPS_Data_Perf_V5.zip which accompanies this document. The different scenarios are designated with suffixes XX in the zip file, where XX is 01, 02, 03 etc. for scenarios #1, #2, #3 etc. [Editor's note: These files are not yet available.

Annex B (normative): GNSS data files

B.1 GNSS data files for signalling tests

The GNSS data files for use in GNSS signalling tests defined in TS 34.123-1 [3] subclauses 17.2.5 to 17.2.7 and in TS 36.571-2 [7] are contained in archive GNSS_Data_Sig_V1.zip which accompanies the present document. [Editor's note: for ease of distribution, the data files are not attached to this draft version of the specification]

B.2 GNSS data files for Minimum Performance tests

The GNSS data files for use in GNSS Minimum Performance tests defined in TS 34.172 [5] and in TS 36.571-1 [6] are contained in archive GNSS_Data_Perf_V1.zip which accompanies the present document. The different scenarios are designated with suffixes XX in the zip file, where XX is 01, 02, 03 etc. for scenarios #1, #2, #3 etc. [Editor's note: These files are not yet available.

Annex C (normative): OTDOA data files

C.1 OTDOA data files for signalling tests

FFS Editor's note: this subclause is waiting for RAN 4 to finish defining test cases and conditions.

C.2 OTDOA data files for Minimum Performance tests

FFS Editor's note: this subclause is waiting for RAN 4 to finish defining test cases and conditions.

Annex D (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2010-08	RAN5#48	R5-104318			Initial draft created as TS 36.571-5		0.0.0
2010-11	RAN5#49	R5-106146			Initial draft created from TS 36.571-5 with minor updates	0.0.0	0.1.0
2010-11	RAN5#49	R5-106615			Editor's notes added	0.1.0	0.1.1
2010-11	RAN5#49	R5-106614			Version 1.0.0 prepared for presentation to RAN Plenary	0.1.1	1.0.0