



**Terrestrial Trunked Radio (TETRA);  
Voice plus Data (V+D) and Direct Mode Operation (DMO);  
Part 18: Air interface optimized applications;  
Sub-part 4: Net Assist Protocol 2 (NAP2)**

PREVIEW  
https://standards.iteh.ai/catalog/standards/sist/d111b14a8-ae00-489b-a2d4-b72c5e5b172c/etsi-ts-100-392-18-4-v1.2.1-201507

---

**Reference**

RTS/TCCE-03230

---

**Keywords**

air interface, location, TETRA, V+D

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.  
**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	7
1 Scope .....	8
2 References .....	8
2.1 Normative references .....	8
2.2 Informative references.....	9
3 Definitions and abbreviations.....	10
3.1 Definitions.....	10
3.2 Abbreviations .....	10
4 Net Assist Protocol.....	12
4.1 General .....	12
4.2 Location information protocol system architecture.....	12
4.3 Net assist protocol service description .....	13
4.3.1 General on services.....	13
4.3.2 Services available at the NAP-SAP.....	13
4.3.3 Service primitives at the NAP-SAP.....	13
4.3.4 Service primitive parameters at the NAP-SAP.....	14
4.3.5 State description.....	14
5 Net assist protocol description .....	14
5.1 Description of information elements.....	14
5.1.1 General on network assistance information elements.....	14
5.2 Information flows.....	14
5.2.1 General on information flows.....	14
5.2.2 Transport layer requirements.....	15
5.2.3 Pseudo-segmentation .....	15
5.2.4 NAP2 duplicate detection .....	16
5.2.5 NAP2 Acknowledgement .....	17
5.2.5.1 General.....	17
5.2.5.2 Procedure related to acknowledgement.....	17
5.2.6 NAP2 retransmission.....	17
5.2.6.1 General.....	17
5.2.6.2 Procedure related to Retransmission.....	17
5.2.7 MS receiving network assistance.....	18
5.2.8 MS receiving network assistance and sending response.....	19
5.2.9 MS requesting network assistance.....	19
5.2.10 MS requesting network assistance and receiving a reject.....	19
5.2.11 Allocation of entities.....	20
5.3 Procedures .....	20
5.3.1 General on procedures .....	20
5.3.2 Service availability .....	20
5.3.3 Rejection of request for assistance.....	20
5.3.4 Routing net assistance to specific terminal groups .....	20
5.4 GNSS assistance types .....	21
5.4.0 General.....	21
5.4.1 GNSS Ephemeris assistance .....	22
5.4.2 GNSS Almanac assistance.....	22
5.4.3 GNSS Ionosphere and UTC correction assistance.....	22
5.4.4 GNSS Time assistance.....	22
5.4.5 Location assistance .....	22
6 Net assist protocol coding requirements.....	23
6.1 General .....	23
6.2 Net assist protocol PDU definitions .....	24
6.2.1 Net assist protocol description tables.....	24

6.2.1.0	General .....	24
6.2.1.1	LPP-PDU-Definitions .....	24
6.2.1.2	NAP-Message .....	25
6.2.1.3	LPP-MessageBody .....	26
6.2.1.4	NAP-TransactionID .....	26
6.2.2	Common IEs .....	26
6.2.2.0	General principle .....	26
6.2.2.1	Abort .....	27
6.2.2.2	Error .....	27
6.2.2.3	CommonIEsRequestAssistanceData .....	27
6.2.2.4	CommonIEsProvideAssistanceData .....	27
6.2.2.5	CommonIEsAbort .....	28
6.2.2.6	CommonIEsError .....	28
6.2.2.7	RequestAssistanceData .....	29
6.2.2.8	ProvideAssistanceData .....	29
6.2.2.9	A-GNSS-ProvideAssistanceData .....	30
6.2.2.10	GNSS-CommonAssistData .....	30
6.2.2.11	GNSS-GenericAssistData .....	30
6.2.3	GNSS Assistance Data Elements .....	30
6.2.3.1	GNSS-ReferenceTime .....	30
6.2.3.2	GNSS-SystemTime .....	32
6.2.3.3	GPS-TOW-Assist .....	33
6.2.3.4	NetworkTime .....	33
6.2.3.5	GNSS-ReferenceLocation .....	34
6.2.3.6	EllipsoidPointWithAltitudeAndUncertaintyEllipsoid .....	34
6.2.3.7	GNSS-IonosphericModel .....	34
6.2.3.8	KlobucharModelParameter .....	35
6.2.3.9	NeQuickModelParameter .....	36
6.2.3.10	GNSS-EarthOrientationParameters .....	36
6.2.3.11	GNSS-TimeModelList .....	37
6.2.3.12	GNSS-DifferentialCorrections .....	38
6.2.3.13	GNSS-NavigationModel .....	40
6.2.3.14	StandardClockModelList .....	42
6.2.3.15	NAV-ClockModel .....	43
6.2.3.16	CNAV-ClockModel .....	44
6.2.3.17	GLONASS-ClockModel .....	45
6.2.3.18	SBAS-ClockModel .....	45
6.2.3.19	NavModelKeplerianSet .....	46
6.2.3.20	NavModelNAV-KeplerianSet .....	47
6.2.3.21	NavModelCNAV-KeplerianSet .....	48
6.2.3.22	NavModel-GLONASS-ECEF .....	50
6.2.3.23	NavModel-SBAS-ECEF .....	51
6.2.3.24	GNSS-RealTimeIntegrity .....	51
6.2.3.25	GNSS-DataBitAssistance .....	52
6.2.3.26	GNSS-AcquisitionAssistance .....	53
6.2.3.27	GNSS-Almanac .....	56
6.2.3.28	AlmanacKeplerianSet .....	57
6.2.3.29	AlmanacNAV-KeplerianSet [8] .....	58
6.2.3.30	AlmanacReducedKeplerianSet .....	60
6.2.3.31	AlmanacMidiAlmanacSet .....	60
6.2.3.32	AlmanacGLONASS-AlmanacSet .....	61
6.2.3.33	AlmanacECEF-SBAS-AlmanacSet .....	62
6.2.3.34	GNSS-UTC-Model .....	63
6.2.3.35	UTC-ModelSet1 .....	64
6.2.3.36	UTC-ModelSet2 .....	64
6.2.3.37	UTC-ModelSet3 .....	65
6.2.3.38	UTC-ModelSet4 .....	66
6.2.3.39	GNSS-AuxiliaryInformation .....	67
6.2.4	GNSS Assistance Data Request .....	68
6.2.4.1	A-GNSS-RequestAssistanceData .....	68
6.2.4.2	GNSS-CommonAssistDataReq .....	68
6.2.4.3	GNSS-GenericAssistDataReq .....	68

6.2.5	GNSS Assistance Data Request Elements .....	69
6.2.5.1	GNSS-ReferenceTimeReq .....	69
6.2.5.2	GNSS-ReferenceLocationReq .....	70
6.2.5.3	GNSS-IonosphericModelReq.....	70
6.2.5.4	GNSS-EarthOrientationParametersReq .....	70
6.2.5.5	GNSS-TimeModelListReq.....	71
6.2.5.6	GNSS-DifferentialCorrectionsReq.....	71
6.2.5.7	GNSS-NavigationModelReq.....	72
6.2.5.8	GNSS-RealTimeIntegrityReq .....	73
6.2.5.9	GNSS-DataBitAssistanceReq .....	73
6.2.5.10	GNSS-AcquisitionAssistanceReq .....	74
6.2.5.11	GNSS-AlmanacReq .....	74
6.2.5.12	GNSS-UTC-ModelReq .....	75
6.2.5.13	GNSS-AuxiliaryInformationReq .....	76
6.2.6	GNSS Error Elements .....	76
6.2.6.1	A-GNSS-Error .....	76
6.2.6.2	GNSS-LocationServerErrorCauses .....	76
6.2.6.3	GNSS-TargetDeviceErrorCauses .....	76
6.2.7	Common GNSS Information Elements.....	77
6.2.7.1	GNSS-ID .....	77
6.2.7.2	GNSS-ID-Bitmap.....	77
6.2.7.3	GNSS-SignalID.....	77
6.2.7.4	GNSS-SignalIDs .....	78
6.2.7.5	SBAS-ID .....	79
6.2.7.6	SBAS-IDs .....	79
6.2.7.7	SV-ID .....	79
6.2.7.8	EPDU-Sequence.....	80
6.2.8	TETRA Network related IEs .....	80
6.2.8.0	Guiding principle .....	80
6.2.8.1	Tetra Local Area and Mobile Network Identifier.....	81
6.2.8.2	Net assist group address .....	81
6.2.8.3	CellGlobalIdTETRA .....	81
6.2.8.4	Result code .....	82
6.2.8.5	Net assist type .....	82
6.2.8.6	Retry interval.....	83
<b>Annex A (informative):</b>	<b>Change Requests.....</b>	<b>84</b>
History .....		85

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee TETRA and Critical Communications Evolution (TCCE).

The present document is part 18, sub-part 4 of a multi-part deliverable covering the Voice plus Data (V+D), as identified below:

- ETSI EN 300 392-1: "General network design";
- ETSI EN 300 392-2: "Air Interface (AI)";
- ETSI EN 300 392-3: "Interworking at the Inter-System Interface (ISI)";
- ETSI ETS 300 392-4: "Gateways basic operation";
- ETSI TS 100 392-5: "Peripheral Equipment Interface (PEI)";
- ETSI TS 100 392-7: "Security";
- ETSI EN 300 392-9: "General requirements for supplementary services";
- ETSI EN 300 392-10: "Supplementary services stage 1";
- ETSI TS 100 392-11: "Supplementary services stage 2";
- ETSI EN 300 392-12: "Supplementary services stage 3";
- ETSI ETS 300 392-13: "SDL model of the Air Interface (AI)";
- ETSI ETS 300 392-14: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- ETSI TS 100 392-15: "TETRA frequency bands, duplex spacings and channel numbering";
- ETSI TS 100 392-16: "Network Performance Metrics";
- ETSI TR 100 392-17: "TETRA V+D and DMO specifications";

**ETSI TS 100 392-18: "Air interface optimized applications":**

- Sub-part 1: "Location Information Protocol (LIP)";
- Sub-part 2: "Net Assist Protocol (NAP)";
- Sub-part 3: "Direct mode Over The Air Management protocol (DOTAM)";
- Sub-part 4: "Net Assist Protocol 2 (NAP2)";**
- Sub-part 5: "SDS Based Supplementary Service Management (SBSSM)".

NOTE 1: Part 3, sub-parts 6 and 7 (Speech format implementation), part 4, sub-part 3 (Data networks gateway), part 10, sub-part 15 (Transfer of control), part 13 (SDL) and part 14 (PICS) of this multi-part deliverable are in status "historical" and are not maintained.

NOTE 2: Some parts are also published as Technical Specifications such as ETSI TS 100 392-2 and those may be the latest version of the document.

---

## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/d11b14a8-ae00-489b-a2d4-b72c5eb357ba/etsi-ts-100-392-18-4-v1.2.1-2015-07>

# 1 Scope

The present document defines Net Assist Protocol 2 that is optimized for TETRA air interface. It defines services:

- allowing information to be passed to a location determining entity also called MS (Mobile Station);
- allowing a location determining entity to request assistance information to an assistance server.

The information passed to the location determining entity by the assistance server, when relevant, reflects the content and format of the equivalent information (navigation data) which passes from satellites to the location determining entity.

The protocol is capable of supporting more than one position determining technology. Presently it covers multiple GNSS, and is extensible to all network positioning methods.

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] IS-GPS-200H (September 2013): "Navstar GPS Space Segment/Navigation User Interfaces".

NOTE: Available at: <http://www.gps.gov/technical/icwg/#is-gps-200>.

- [2] ETSI EN 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".
- [3] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".
- [4] ETSI TS 100 392-18-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 18: Air interface optimized applications; Sub-part 1: Location Information Protocol (LIP)".
- [5] IS-GPS-705B (September 21, 2011): "Navstar GPS Space Segment/User Segment L5 Interfaces".
- [6] IS-GPS-800 (September 4, 2008): "Navstar GPS Space Segment/User Segment L1C Interfaces".
- [7] IS-QZSS (Ver.1.1, July 31, 2009): "Quasi Zenith Satellite System Navigation Service, Interface Specifications for QZSS".
- [8] European GNSS: "Galileo OS SIS ICD (Open Service Signal-in-Space Interface Control Document)", Issue 1.1 September 2010, Galileo Joint Undertaking.

NOTE Available at: [http://ec.europa.eu/enterprise/policies/satnav/galileo/open-service/index\\_en.htm](http://ec.europa.eu/enterprise/policies/satnav/galileo/open-service/index_en.htm).

- [9] Russian Institute of Space Device Engineering: "Global Navigation Satellite System GLONASS, Interface Control Document", Version 5.1, 2008.



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

NOTE Available at:

[http://www.faa.gov/about/office\\_org/headquarters\\_offices/ato/service\\_units/techops/navservices/gnss/library/documents/media/waas/2892bC2a.pdf](http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/library/documents/media/waas/2892bC2a.pdf).

- [11] RTCM 10402.3 (August 20, 2001): "RTCM Recommended Standards for Differential GNSS Service (v.2.3)".
- [12] Recommendation ITU-T X.680: "Information technology - Abstract Syntax Notation One, (ASN.1): Specification of basic notation".
- [13] Recommendation ITU-T X.681: "Information technology - Abstract Syntax Notation One, (ASN.1): Information object specification".
- [14] Recommendation ITU-T X.690: "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".
- [15] Recommendation ITU-T X.691: "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 136 355 (V10.4.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP) (3GPP TS 36.355 version 10.4.0 Release 10)".
- [i.2] LPP Extensions Specification, Open Mobile Alliance OMA-TS-LPPE-V1-0-20110929-C.
- [i.3] ETSI TS 144 031 (V10.0.0): "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Mobile Station (MS) - Serving Mobile Location Centre (SMLC) Radio Resource LCS Protocol (RRLP) (3GPP TS 44.031 version 10.0.0 Release 10)".
- [i.4] ETSI TS 100 392-18-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 18: Air interface optimized applications; Sub-part 2: Net Assist Protocol (NAP)".
- [i.5] ETSI TS 143 059 (V10.0.0): "Digital cellular telecommunications system (Phase 2+); Functional stage 2 description of Location Services (LCS) in GERAN (3GPP TS 43.059 version 10.0.0 Release 10)".
- [i.6] ETSI TS 123 032 (V10.0.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Universal Geographical Area Description (GAD) (3GPP TS 23.032 version 10.0.0 Release 10)".
- [i.7] ETSI TS 100 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".
- [i.8] ETSI TR 102 300-5: " Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Designers' guide; Part 5: Guidance on numbering and addressing".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 300 392-2 [3] and the following apply:

**assistance server:** entity that maintains location assistance information and sends location assistance information to its clients

**navigation data:** data that is passed from satellites to the location determining entity and supports location determination, for example by defining satellite positioning

NOTE: For GPS assistance this data is defined by ICD-GPS-200H [1], IS-GPS-705 [5], IS-GPS-800 [6], for QZSS, it is defined in IS-QZSS, [7], for Galileo in OS SIS ICD [8], and for GLONASS in GLONASS ICD [9].

**TETRA domain:** all entities that are addressed using TETRA defined addresses and understand the binary format of Net Assist Protocol

### 3.2 Abbreviations

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

ACK	ACKnowledgement
AGNSS	Assisted Global Navigation Satellite System
A-GNSS	Assisted- Global Navigation Satellite System
AI	Air Interface
ASN.1	Abstract Syntax Notation 1
BIPM	Bureau International des Poids et Mesures
BS	Base Station
BTS	Base Transceiver Station
C	Conditional
CA	Conventional Access
CGI	Cell Global Identification
CMCE	Circuit Mode Control Entity
CNAV	Civil Navigation
CRL	Communications Research Laboratory
DGNSS	GNSS Differential Corrections
DMO	Direct Mode Operation
DN	Day Number
ECEF	Earth Centred Earth Fixed (coordinate system)
ECI	Earth Centered Inertial (coordinate system)
EGNOS	European Geostationary Navigation Overlay Service
EOP	Earth Orientation Parameters
EPDU	Extended Protocol Data Unit
FDMA	Frequency Division Multiple Access
FE	Functional Entity
FEC	Forward Error Correction
GAGAN	GPS Aided Geo Augmented Navigation
GEO	Geostationary
GLONASS	GLObal'naya NAVigatsionnaya Sputnikovaya Sistema

NOTE: English: Global Navigation Satellite System.

GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSSI	Group Short Subscriber Identity
HOW	Handover Word
ICD	Interface Control Document
IE	Information Element
IGS	International GNSS Service

IOD	Issue of Data
IODC	Issue of Data Clock
IRNSS	Indian Regional Navigation Satellite System
ISI	Inter System Interface
ITU-T	International Telecommunications Union - Telecommunication
LA	Location Area
LIP	Location Information Protocol
LOC	LOCation group (at OMA)
LPP	LTE Positioning Protocol
LSB	Least Significant Bit
M	Mandatory
MN	Multiframe Number
MNI	Mobile Network Identity
MO-LR	Mobile Originated Location Request
MS	Mobile Station
MSAS	MTSAT Satellite Augmentation System
MTSAT	Multifunctional Transport Satellites
MSB	Most Significant Bit
NAP	Net Assist Protocol
NAV	Navigation
OMA	Open Mobile Alliance
PDU	Protocol Data Unit
PEI	Peripheral Equipment Interface
PICS	Protocol Implementation Conformance Statement
PLMN	Public Land Mobile Network
PRC	Pseudo-Range Correction
PRN	Pseudo Random Noise
QZSS	Quasi-Zenith Satellite System
QZST	Quasi-Zenith Satellite Time
RRC	Range-Rate Correction
SAP	Service Access Point
SBAS	Space Based Augmentation System
SDL	Specification and Description Language
SDS	Short Data Service
SDS-TL	Short Data Service - Transport Layer
SFN	Single Frequency Network
SNDCP	SubNetwork Dependent Convergence Protocol
SNDCP SAP	SubNetwork Dependent Convergence Protocol Service Access Point
SSI	Short Subscriber Identity
SV	Space Vehicle
SV-ID	Satellite Vehicle Identifier
TBD	To Be Defined
TCP	Transmission Control Protocol
TLM	Telemetry
TOD	Time Of Day
TOW	Time Of Week
UDP	User Datagram Protocol
UDRE	User Differential Range Error
URA	User Range Accuracy
USNO	U.S. Naval Observatory
UTC	Universal Coordinated Time
WAAS	Wide Area Augmentation System
WGS-84	World Geodetic System 1984

## 4 Net Assist Protocol

### 4.1 General

The Net Assist Protocol (NAP) is a TETRA air interface optimized application layer protocol that can utilize various transport mechanisms.

The net assist protocol may use SDS-TL service at SDS-TL SAP, refer to ETSI EN 300 392-2 [3], clauses 29.1.1 to 29.5.12 in the case of TETRA MS, though it does not use SDS-TL transport mechanisms to ensure delivery. The same protocol can use packet data at SndCP SAP as defined in ETSI EN 300 392-2 [3], clause 28 in the case of TETRA MS.

The net assist protocol defines an extendable protocol that can provide net assist information, initially in a GNSS technology based location determination scenario. Resource optimization is achieved by ensuring data is transported in its most compact form as binary data and not in an expanded human readable form. Because of the volume of data and because of the number of satellites it should be noted that some messages have a length which exceeds 500 bits and multiple messages (one for each satellite) may need to be sent.

The net assist protocol can be used in various system configurations including:

- MS to assistance server communication (request for assistance information).
- Assistance server to MS communication (transmission of assistance information).
- MS to MS communication (request for and transmission of assistance information).

NOTE: Although NAP2 supports direct MS to individual MS communication; the use of it is discouraged as the optimized air interface usage may be compromised. One possibility to maintain air interface optimization is the use of a group address as the destination address.

### 4.2 Location information protocol system architecture

Physical entities identified for the purpose of the present document are:

- Mobile Station (MS) and location accessory requiring net assist information. It is referred as the "*Target Device*" of location.
- Assistance server inside the TETRA domain with available net assist information (which may have been sourced outside the TETRA domain and passed to it using a suitable protocol which is outside the scope of the present document). It is also called a "*Location Server*".

How the assistance server acquires its net assist information and how it decides when to make that information available are outside the scope of the present document.

Similarly, how the MS determines when and what assistance information is required is outside the scope of the present document.

The assistance information exchange contains scenarios:

- MS determines the type of assistance that it would like and makes a request to the assistance server for information.
- Assistance server to MS, where the assistance server has net assist information, and the assistance server distributes the information to MS.
- MS to MS net assist information exchange without any action in any other entities.

For the purposes of the present document, the TETRA domain consists of entities that are addressable using TETRA addressing and understand the net assist protocol NAP in the binary format of the protocol.

For the purposes of the present document protocol Functional Entities (FE) are used in some clauses instead of physical entities:

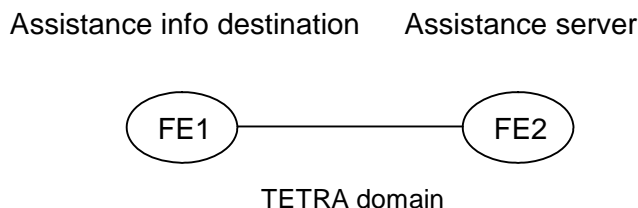
FE1: MS requiring net assist information.

FE2: Assistance server.

Figure 4.2.1 defines a typical scenario for the net assist protocol usage.

In figure 4.2.1 the MS FE1 requests assistance information from the assistance server FE2.

In figure 4.2.1 the assistance server FE2 acts as the distribution point for assistance information to one or more MSs FE1 requiring and able to accept assistance information.



**Figure 4.2.1: Simple system with assistance server in TETRA domain**

## 4.3 Net assist protocol service description

### 4.3.1 General on services

The majority of the location information protocol (ETSI TS 100 392-18-1 [4]) is independent of position determination technology. Assistance data, delivered via the TETRA network, can improve the performance of some GNSS receivers, particularly when they are in areas of poor GNSS satellite signal reception, such that they cannot reliably receive navigation data from the satellites themselves. Additional information is made available in the form of time and location (with uncertainty) assistance data. This release support all known Global Navigation Satellite System (GNSS) covering GPS as well as other constellations such as GLONASS, GALILEO, BEIDOU as well as satellite based augmented systems (EGNOS, WAAS, MSAS) and regional navigation systems (IRNSS, QZSS). Support of various GNSS allow better position determination in polar region, sub-tropical regions, or difficult environment where only a few satellites are visible, and more service availability, accuracy and integrity. The structure of the assistance is consistent with the AGNSS data in the LPP [i.1] from 3GPP, established for the 4<sup>th</sup> generation of Public Mobile Land Network (PLMN), and its semantic and usage is based on the relevant ICD for each supported constellation.

### 4.3.2 Services available at the NAP-SAP

FE2 may support network assistance delivery to FE1s, typically using group addressing. For the case that network assistance is delivered to an individual FE1, FE2 may ask for and receive an acknowledgement.

FE1 may support requesting network assistance from FE2. FE2 may respond by delivering network assistance as above.

### 4.3.3 Service primitives at the NAP-SAP

Service primitives at the NAP-SAP define service access. This service primitive definition assumes that the entity using these service primitives gets all trigger invocations by other means and those are outside the scope of the present document.

**NAP-Net assist provide request:** this primitive is used to send network assistance data.

**NAP-Net assist provide indication:** this primitive is used to receive network assistance data.

**NAP-Net assist provide response:** this primitive is used to acknowledge network assistance data.

**NAP-Net assist provide confirmation:** this primitive is used to receive network assistance data acknowledgements.

**NAP-Net assist demand request:** this primitive is used to request (demand) network assistance.

**NAP-Net assist demand indication:** this primitive is used to receive requests (demands) for network assistance.