Er3GPP TSG-RAN WG2 #118-e R2-22xxxxx

Online Meeting, May 9th – May 20th, 2022

Agenda Item: 6.21.2

Source: Ericsson

Title: [AT118-e][628][POS] NMEA GGA string for HA-GNSS reporting

(Ericsson)

Document for: Discussion, Decision

# Introduction

This email discussion addresses the following contribution about a correction to add information corresponding to the NMEA GGA string to HA-GNSS reporting.

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| [R2-2206329](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Inbox/R2-2206329.zip) (revision of R2-2205845) | Remaining details for high-precision GNSS reporting | ESA, Ericsson, Deutsche Telecom, T-Mobile USA, Swift Navigation, Hexagon, MediaTek Inc., u-blox |

* [AT118-e][628][TEI17] NMEA GGA string for HA-GNSS reporting (Ericsson)

      Scope: Discuss the contribution in R2-2205845 and determine if a CR is agreeable.

      Intended outcome: Agreed CR (without CB if possible)

      Deadline:  Tuesday 2022-05-17 1800 UTC

The email discussion is in two phases, where the first phase ends ***Friday 2022-05-13 1800 UTC.***

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# Discussion

The 3GPP-based high precision GNSS has been leveraged by the RTCM work when introducing support for OSR in Rel 15. RTCM distribution is based on NTRIP signalling, where NMEA GGA strings are used to provide device feedback with position estimate and quality and positioning details (no of satellites used, dilution of precision, quality indicator for position fix and age of assistance data). In 3GPP, location information feedback in terms of position estimates and quality is handled by the LPP *CommonIEsProvideLocationInformation* IE, with the possibility to add specific information per positioning method. For GNSS, this is handled via the *GNSS-LocationInformation* IE which optionally for capable devices could be hosting the positioning details. The contribution [1] [R2-2206329](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Inbox/R2-2206329.zip) suggests that the remaining positioning information from the NMEA GGA string is added to the *GNSS-LocationInformation* IE.

Question 1: The contribution [1] is signed and co-signed by ESA, Ericsson, Deutsche Telecom, T-Mobile USA, Swift Navigation, Hexagon, MediaTek Inc., u-blox. In addition to these companies, do you support the addition of the remaining positioning information from the NMEA GGA string (no of satellites used, dilution of precision, quality indicator for position fix and age of assistance data) to the LPP *GNSS-LocationInformation* IE?

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| Company | Yes/No | Comments |
| Intel | Yes |  |
| Huawei, HiSilicon | Yes |  |
| ESA | Yes |  |
| Apple | Yes |  |
| Qualcomm | No | This is a late and unmotivated proposal with unclear benefits. It is completely unclear what a server is supposed to do with this information and why this is "missing information". Most implementations support NMEA and/or the 3GPP AT commands for testing, verification, etc. anyhow, but LPP is a positioning protocol.    In particular, the proposed "fix quality indicator" in *GNSS-LocationInformation* includes the following:   * 0 = Invalid, no position available.   There is LPP error handling defined, and in the case of "no fix" is available no *GNSS-LocationInformation* can be provided. However, with the proposal it seems the target device would now be required to report a *GNSS-LocationInformation* even in the case "no position available" (to include the HA-GNSS-Metrics-r17). It is unclear what *GNSS-LocationInformation* should be provided if no position is available, and which benefit this provides.   * 1 = Autonomous GPS fix, no correction data used. * 2 = DGPS fix, using a local DGPS base station or correction service such as WAAS or EGNOS. * 3 = PPS fix * 4 = RTK fix * 5 = RTK Float * 6 = Estimated fix (dead reckoning).   This seems to propose that a UE is allowed to select the positioning method and/or mode autonomously. E.g., if UE-based GNSS is requested, the UE is allowed to use "Autonomous GPS fix" (e.g., NMEA string supports GPS only).  It seems the proposal is even that a UE can select a non-3GPP defined positioning method (like WAAS/EGNOS correction services or "dead reckoning"). This needs to be clarified in e.g., Stage 2 as well, and should then not be restricted to this set of non-3GPP methods only.   * 7 = Manual input mode. * 8 = Simulation mode.   It seems the contribution [1] proposes that a UE/user can enter a location estimate manually or via some undefined simulation mode. This seems to have serious impacts on e.g., regulatory services.  age  This field specifies the age of the used assistance data for HA GNSS, scale factor 0.1 seconds.  This is also completely unclear and seems to introduce new UE requirements. It is unclear how a UE should determine the age of the used assistance data, and which assistance data are meant. I.e., individual assistance data may have a wide range of "age" (e.g., *GNSS-ReferenceLocation* or *GNSS-IonosphericModel* may be "very old" compared to the proposed scale factor of 0.1 seconds). A UE seems now be required to time stamp received assistance data with 0.1 seconds granularity. The benefit of all this is completely unclear (the network is providing the assistance data to the UE and should know its age).  ***nrofUsedSatellites***  ***hdopi***  ***pdopi***  Similar to the above, the purpose of this information reporting is unclear. A UE reports a location estimate according to the requested QoS. If a location server would like to know more information of the position calculation function (e.g., for debugging purposes, comparing different UE implementations, etc.), it can use UE-assisted mode. But LPP is a positioning protocol, not a testing/debugging protocol. |
| CATT | Not clear | What’s the reference file if the IE *HA-GNSS-Metrics* is introduced? Usually we review the reference file and make the decision how to capture the data. Not sure how 3gpp captures the data defined by National Marine Electronics Association (NMEA).  Proposal 2 Add GNSS-LocationInformation attributes based on NMEA-GGA attributes number of detected/used satellites, satellite geometry in terms of dilution of precision, and positioning engine location estimate classification |
| Ericsson | Yes | In response to CATTs comment. We agree that this reference is missing. The reference is: [x] NMEA standard 0183, Version 4.11, November 2018 and the reference could be made similar to how RTCM references are made like:  – HA-GNSS-Metrics The IE *HA-GNSS-Metrics* is included by the target device when GNSS positioning metrics associated to a location estimate is provided to the location server. The parameters provided in IE *HA-GNSS-Metrics* are used as specified for sentence type GGA in [x]. |
| Ericsson | Yes | Most companies have seen the benefits of this information, which is standard feedback from GNSS receivers. In response to Qualcomms question about motivation – it is highly relevant for an operator to assess the service behavior of a provided service.  For devices from which it is legitimate to request obtain location information, it is natural to also obtain high accuracy GNSS details if this is a provided service. Parameters such as number of satellites and DOP are interesting even though they change over for time also for specific locations, since it can explain a certain fix quality and enable to operator to understand the overall performance in a region, for example as input to a process to decide where to complement with 5G positioning.  Age is not always possible to determine for the server, for example in the case when assistance data has been provided via broadcast, while the location information feedback is provided via unicast. Therefore, it is also a natural part. For use of the age field, it could be good to clarify that it concerns the age of the latest used AD for HA GNSS (also with the scale factor mistake corrected, see Q2 below).  ***age***  This field specifies the age of the most recent used assistance data for HA GNSS, scale factor 0.1 seconds.  Regarding the set of GNSS fix quality information, the listed set of indicators is directly adopted from the NMEA 0183 standard, and it is natural that this serves as a baseline for the LPP correction. However, it can be good to separate these indicators in one subset that is seen as obvious and one subset that can be seen as questionable, either because it is covered by other parts of LPP already. In those cases, it could be clarified in the specification text.  In our view, this is the obvious indicator subset   * 1 = Autonomous GPS fix, no correction data used. * 2 = DGPS fix, using a local DGPS base station or correction service such as WAAS or EGNOS.   4 = RTK fix   * 5 = RTK Float   and could be represented by an ENUMERATED such as:  fixq-r17 ENUMERATED (HA-GNSS-AD-unused, DGNSS-fix, RTK-fix, RTK-float, ...}, |
| vivo | Yes |  |
| Qualcomm |  | Regarding: "In response to Qualcomms question about motivation – it is highly relevant for an operator to assess the service behavior of a provided service."  Could someone clarify this please? How can this information be used to "assess service behavior"? Service behavior seems an SA1 issue.  We would need to understand the benefit before adding new features (to a "frozen Release").  The UE can already report the *LocationSource.* Autonomous GPS, DGPS, etc. are all unrelated to HA-GNSS (i.e., supported since Rel-9). |
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Question 2: Any technical comments to the text proposal to TR 37.355 in R2-2206329?

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| Company | Comments |
| Intel | Editorial issues:  nrofUsedSatellites-r17 should be nrOfUsedSatellites-r17  ***ha-GNSS-MetricsReq***  This field, if present, indicates that any location estimate provided by the target device should be reported with GNSS positioning metrics---- full stop is missing.  ***ha-gnss-MetricsSupport***  This field specifies that high accuracy GNSS positioning metrics are supported by the target device ---- full stop is missing. |
| Huawei, HiSilicon | Since this is a TEI17 CR, there should be a tag for it attached to the title of the CR according to previous agreement in RANP. |
| Apple | Some editorials:   1. The acronym “HA” is used, e.g. in “This field specifies the age of the used assistance data for HA GNSS, scale factor 1 seconds”. Is the acronym defined somewhere? 2. Suggest adding “high accuracy” (or “HA”) to “This field, if present, indicates that any location estimate provided by the target device should be reported with GNSS positioning metrics”. |
| CATT | Being short of reference file. |
| Ericsson | Agree with the above suggested editorials  In addition, we note that there is a mistake with the age scale factor, which shall be 0.1 seconds:  ***age***  This field specifies the age of the used assistance data for HA GNSS, scale factor 0.1 seconds. |
| vivo | 1. “ *GNSS-LocationInformation* field descriptions” should be “ *HA-GNSS-Metrics* field descriptions”.  2. “ with same encoding as hdopi” should be “ with the same encoding as the *hdopi* field.”  3. “ scale factor 1 seconds” should be “ scale factor 1 second”. |
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# Conclusion

# References

[1] [R2-2206329](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Inbox/R2-2206329.zip) Remaining details for high-precision GNSS reporting, ESA, Ericsson, Deutsche Telecom, T-Mobile USA, Swift Navigation, Hexagon, MediaTek Inc., u-blox