Space - Use of GNSS-based positioning for road Intelligent Transport Systems (ITS) - Part 2: Assessment of basic performances of GNSS-based positioning terminals

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NATIONAL FOREWORD

See Eesti standard EVS-EN 16803-2:2020 sisaldab Euroopa standardi EN 16803-2:2020 ingliskeelset teksti.	This Estonian standard EVS-EN 16803-2:2020 consists of the English text of the European standard EN 16803-2:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.09.2020.	Date of Availability of the European standard is 23.09.2020.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English version

Space - Use of GNSS-based positioning for road Intelligent Transport Systems (ITS) - Part 2: Assessment of basic performances of GNSS-based positioning terminals

Espace - Utilisation du positionnement GNSS pour les systèmes de transport routier intelligents (ITS) - Partie 2 : Évaluation des performances de base des terminaux de positionnement GNSS

Raumfahrt - Anwendung von GNSS-basierter Ortung für Intelligente Transportsysteme (ITS) im Straßenverkehr - Teil 2: Bestimmung der grundlegenden Leistungen von GNSS-basierten Ortungsendgeräten

This European Standard was approved by CEN on 15 June 2020.

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European foreword

This document (EN 16803-2:2020) has been prepared by Technical Committee CEN-CENELEC/TC 5 “Space”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2021, and conflicting national standards shall be withdrawn at the latest by March 2021.

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Introduction

The EN 16803 series of CEN-CENELEC standards deals with the use of GNSS technology in the intelligent transport domain and address more particularly the issue of performance assessment.

As recalled in the generic functional architecture of a road ITS based on GNSS, two main sub-systems can be considered: the positioning system (GNSS-based positioning terminal (GBPT) + external sources of data) and the road ITS application processing the position quantities output by the terminal to deliver the final service to the user.

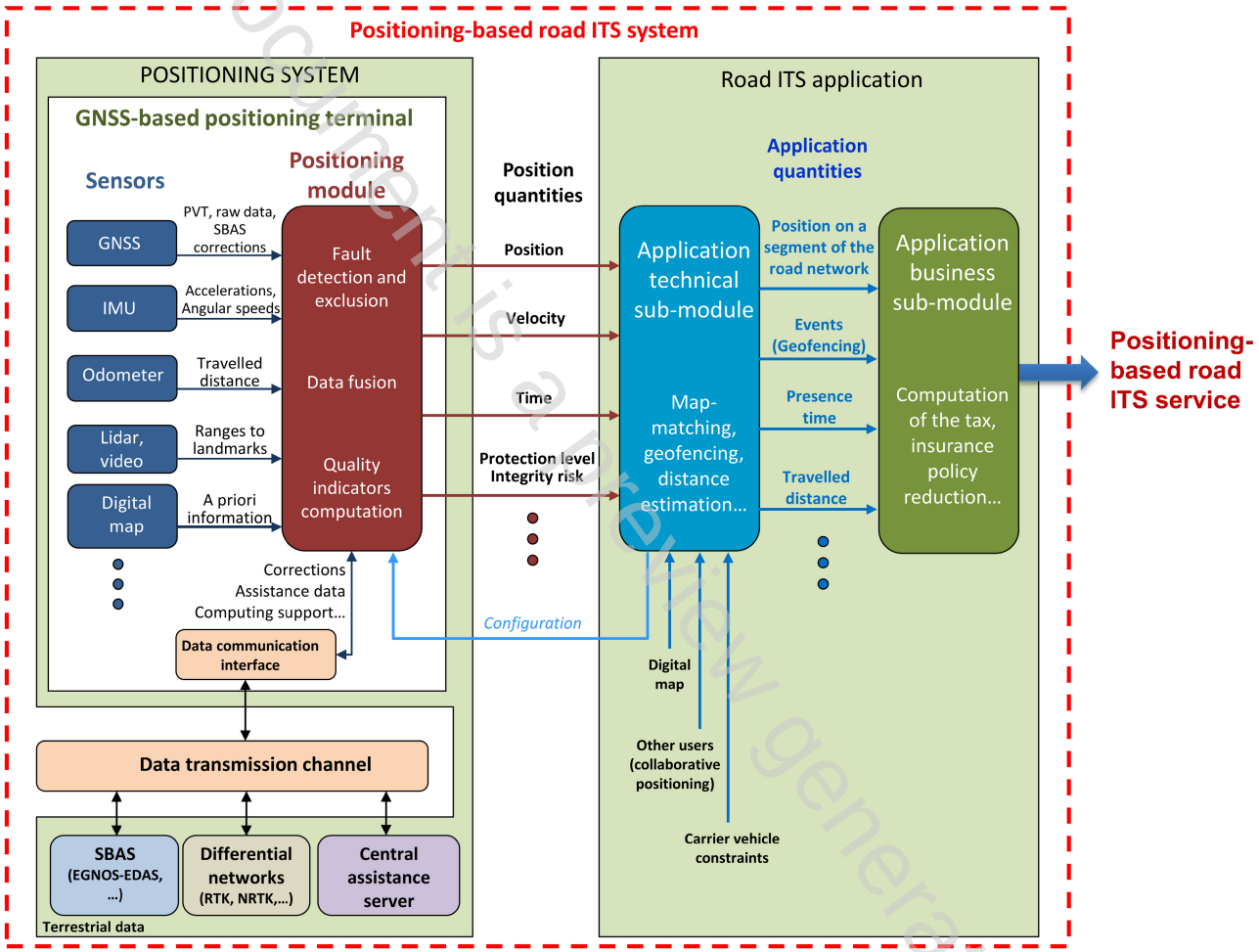

Figure 1 — Generic functional architecture of a Positioning-based road ITS system

This document is the second one of the EN 16803 series.

The performance assessment issue can also be considered at these two levels.

According to Figure 3 in the Introduction of EN 16803-1, the performances of the application cannot be assessed independently from the GBPT and the adequacy of the GBPT's performances to the end-to-end performance of the system cannot be assessed independently from the application. For these two kinds of assessment, the EN 16803-1 standard proposed a method called "Sensitivity analysis". In addition, this first document defined the generic architecture, the generic terms and the basic performance metrics for the Positioning quantities.

EN 16803-1 can be of interest for many different stakeholders but is targeting mainly the ITS application developers.

EN 16803-2, EN 16803-3 and EN 16803-4 address specifically the performances of the GBPT itself, as they can be measured by the metrics defined in EN 16803-1:

— EN 16803-2 proposes a test methodology based on the replay in the lab of real data sets recorded during field tests, assuming no security attack during the test.

— EN 16803-3 proposes a complement to this test methodology to assess the performance degradation when the GNSS signal-in-space (SIS) is affected by intentional radio-frequency (RF) perturbations such as jamming, spoofing or meaconing, also applicable to unintentional RF perturbations.

These 2 (two) ENs are targeting mainly the generalist RF test laboratory that will be in charge of assessing the performances of GBPTs for different applications.

EN 16803-4 (in preparation) will propose the methodology for the recording of the real data sets and is targeting mainly the GNSS-specialized test laboratories that will be in charge of elaborating the test scenarios that will be replayed by the previous category of test laboratories.

1 Scope

Like the other documents of the whole series, this document deals with the use of GNSS-based positioning terminals (GBPT) in road Intelligent Transport Systems (ITS). GNSS-based positioning means that the system providing position data, more precisely Position, Velocity and Time (PVT) data, comprises at least a GNSS receiver and, potentially, for performance improvement, other additional sensor data or sources of information that can be hybridized with GNSS data.

This new document proposes testing procedures, based on the replay of data recorded during field tests, to assess the basic performances of any GBPT for a given use case described by an operational scenario. These tests address the basic performance features **Availability**, **Continuity**, **Accuracy** and **Integrity** of the PVT information, but also the **Time-To-First-Fix** (TTFF) performance feature, as they are described in EN 16803-1, considering that there is no particular security attack affecting the SIS during the operation. This document does not cover the assessment tests of the timing performances other than TTFF, which do not need field data and can preferably be executed in the lab with current instruments.

"Record and Replay" (R&R) tests consist in replaying in a laboratory environment GNSS SIS data, and potentially additional sensor data, recorded in specific operational conditions thanks to a specific test vehicle. The data set comprising GNSS SIS data and potential sensor data resulting from these field tests, together with the corresponding metadata description file, is called a "**test scenario**". A data set is composed of several data files.

This EN 16803-2 addresses the "**Replay**" part of the test scenario data set. It does not address the "Record" part, although it describes as informative information the whole R&R process. This "Record" part will be covered by EN 16803-4 under preparation.

Although the EN 16803 series concerns the GNSS-based positioning terminals and not only the GNSS receivers, the present release of this document addresses only the replay process of **GNSS only terminals**. The reason is that the process of replaying in the lab additional sensor data, especially when these sensors are capturing the vehicle's motion, is generally very complex and not mature enough to be standardized today. It would need open standardized interfaces in the GBPT as well as standardized sensor error models and is not ready to be standardized. But, the procedure described in the present EN has been designed to be extended to GBPT hybridizing GNSS and vehicle sensors in the future.

This EN 16803-2 does not address R&R tests when specific radio frequency signals simulating security attacks are added to the SIS. This case is specifically the topic of EN 16803-3.

Once standardized assessment tests procedures have been established, it is possible to set minimum performance requirements for various intelligent transport applications but it makes sense to separate the assessment tests issue from minimum performance requirements, because the same test procedure may be applicable to many applications, but the minimum performance requirements typically vary from one application to another. **So, this document does not set minimum performance requirements for any application**.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16803-1:2016, *Space - Use of GNSS-based positioning for road Intelligent Transport Systems (ITS) - Part 1: Definitions and system engineering procedures for the establishment and assessment of performances*

EN 16803-3, *Space — Use of GNSS-based positioning for road Intelligent Transport Systems (ITS) — Part 3: Assessment field tests for security performances of GNSS-based positioning terminals*