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Electronic fee collection - Secure monitoring for autonomous toll systems - Part 2: Trusted recorder

Perception du télépéage - Surveillance sécurisée pour systèmes autonomes de péage - Partie 2: Enregistreur fiabilisé

Elektronische Gebührenerhebung - Sichere Überwachung von autonomen Mautsystemen - Teil 2: Zuverlässige Datenaufzeichnung

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Foreword

This document (CEN/TS 16702-2:2015) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This part 2, the trusted recorder is the second part of the standard suite of the secure monitoring for autonomous toll systems. The overall concept of secure monitoring is defined in part one, CEN/TS 16702-1:2014.

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Introduction

The widespread use of tolling requires provisions for users of vehicles that are roaming through many different toll domains. Users should be offered a single contract for driving a vehicle through multiple toll domains and those vehicles require onboard equipment (OBE) that is interoperable with the toll systems in these toll domains. Thus, there is a commercial and economic justification both in respect of the OBE and the toll systems for enabling interoperability. In Europe, for example, this need has been officially recognized and legislation on interoperability has been adopted (see directive 2004/52/EC) and the associated commission decision.

The Technical Specification “Electronic fee collection – Security framework” (CEN/TS 16439) provides an overview of general security requirements of the stakeholders and provides a comprehensive threat analysis for the assets in an interoperable EFC scheme. A number of identified threats may result into less revenue of the Toll Charger, undercharging and/or not meeting required service levels between the Toll Service Provider and the Toll Charger. Some of these threats can be eliminated by implementing the security measures specified in CEN/TS 16439. However, most of the security measures necessary to combat the identified threats are to be addressed and specified in other standards.

One example of threats that cannot be mitigated by security measures specified in CEN/TS 16439 concerns the trustworthiness of Toll Declarations in autonomous toll systems. Toll declarations are statements that a vehicle has been circulating in a particular toll domain within a particular time period. In autonomous toll systems, the circulation of vehicles is measured by Toll Service Providers, using GNSS-based OBE. Toll service providers then send Toll Declarations to the Toll Charger, based on which the Toll Charger will charge the Toll Service Provider. The correctness and completeness of these declarations is obviously of paramount interest to Toll Chargers, Toll Service Providers and users alike.

The secure monitoring compliance checking concept provides a solution that allows a Toll Charger to check the trustworthiness of the Toll Declarations from a Toll Service Provider, while respecting the privacy of the user. This concept is defined in two Technical Specifications. CEN/TS 16702-1:2014 “Secure monitoring for autonomous toll systems – Part 1: Compliance checking” gives the full description of the secure monitoring compliance checking concept. The current Technical Specification, CEN/TS 16702-2 “Secure Monitoring for autonomous toll systems – Part 2: Trusted recorder” defines the Trusted Recorder, a secure element required for some of the different types of secure monitoring compliance checking defined in CEN/TS 16702-1:2014.

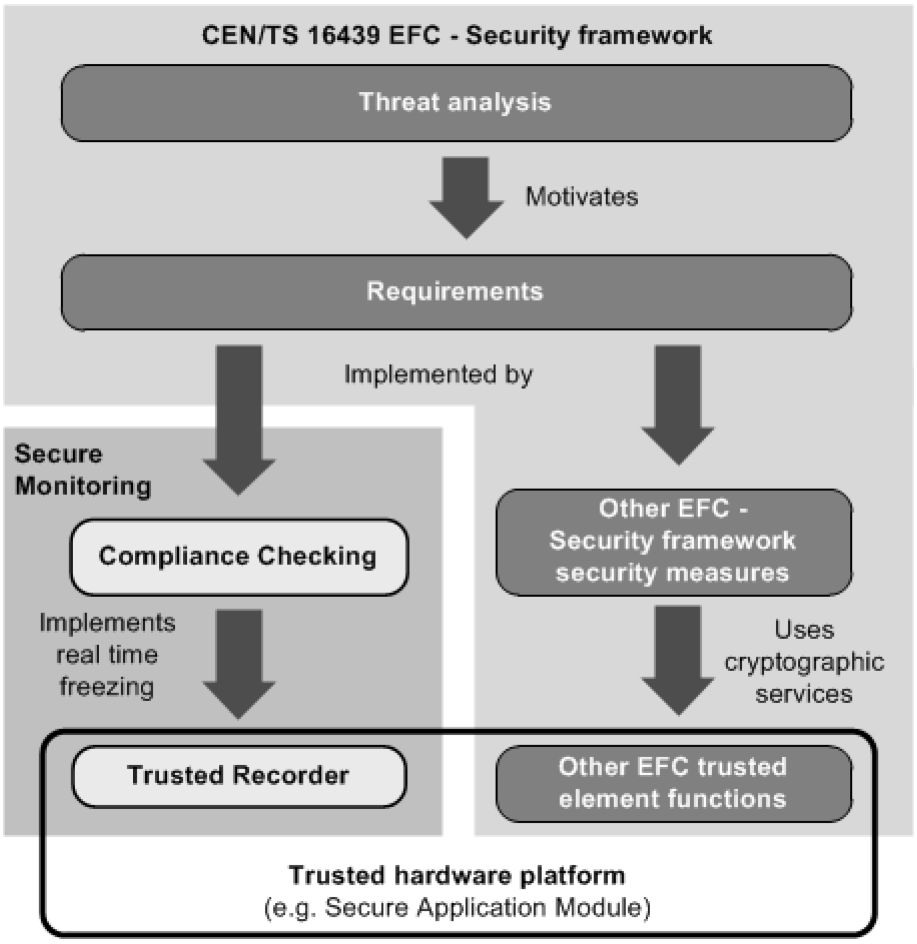

Figure 1 — Relation between EFC - Security framework and the overall secure monitoring concept

Figure 1 shows the relations between the CEN/TS 16439 EFC Security Framework and EFC Secure monitoring for autonomous toll systems, i.e. the two parts Compliance Checking and Trusted Recorder. The threat analysis in the Security Framework motivates the security requirements of an EFC system. The requirements are implemented and fulfilled by several security measures. One of these measures is Secure Monitoring, specified in “Secure Monitoring for autonomous toll systems – Part 1: Compliance checking”. The “Secure Monitoring for autonomous toll systems – Part 2: Trusted Recorder” specifies the cryptographic services necessary for the secure monitoring compliance checking concept.

Figure 1 indicates also that a Trusted Recorder will most likely be implemented on trusted hardware, e.g. on Secure Application Module (SAM), inside the OBE or on a general trusted platform of a vehicle. Such a trusted device could support more functions, which may be required for EFC or other services.