

WICE: Automotive telematics, fleet management, rapid prototyping and software download for connected vehicles

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Introduction

The WICE system is a powerful and flexible automotive telematics platform developed by Alkit Communications AB providing access to measurement data from connected vehicles, enabling fleet management and state-of-health services, rapid prototyping of new in-vehicle services and functions, and remote ECU software download.

The WICE platform and services

The WICE system consists of two main parts (see Figure 1):

1. An **in-vehicle data logging and measurement system** (also known as Wireless Communication Unit, WCU), including connectivity and telematics services. A number of different hardware platforms are available for in-vehicle installation, including the MX-4 platform from Host Mobility and the MIIPS platform from Fältcom. The in-vehicle hardware unit supports communication interfaces for measuring and logging vehicular data (including CAN and FlexRay buses, analog inputs, digital inputs, USB and Ethernet).
2. A **back-end server infrastructure** including data storage, database with meta-information, and a web-based front-end user interface (known as the “WICE Portal”).

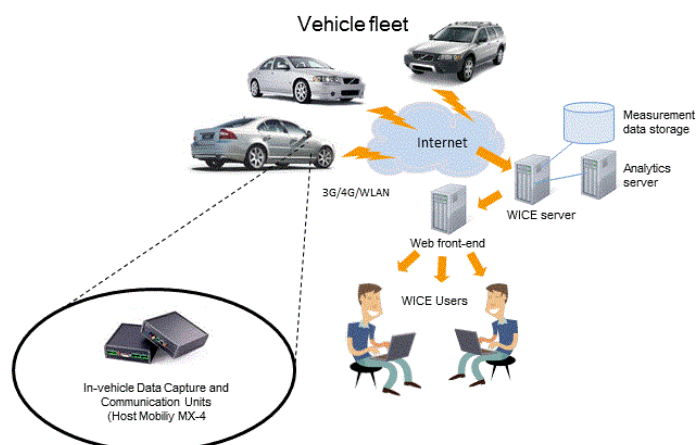


Figure 1. Overview of the WICE system

The following application services are supported by the WICE system:

- A **metrology service**, enabling engineers (or other users) to collect measurement data of different kinds (signals, frames, logs, video, etc.) from connected vehicles. Measurement task can be configured and assigned to connected vehicles through the WICE Portal interface, and measurement data can be accessed, visualized and downloaded for analysis.
- A **fleet management service**, keeping track of the status of fleets of connected vehicles, including map-based positioning, mileage, uptime, Diagnostic Trouble Codes, ECU software version numbers, etc.
- A rapid **prototyping platform**, enabling emulated execution of ECU services in the in-vehicle WICE unit, for proof-of-concept testing of new automotive functions and services.
- A **remote software download (SWDL)** service, making it possible to remotely re-program in-vehicle ECUs, enabling continuous deployment of ECU software in connected vehicle fleets.

The WICE Portal

The WICE Portal is the core software component realizing the main server-side functionality of the services for vehicle testing, verification and development. The WICE Portal is a complex software system composed of many parts. A high-level model of the system architecture is shown in Figure 2.

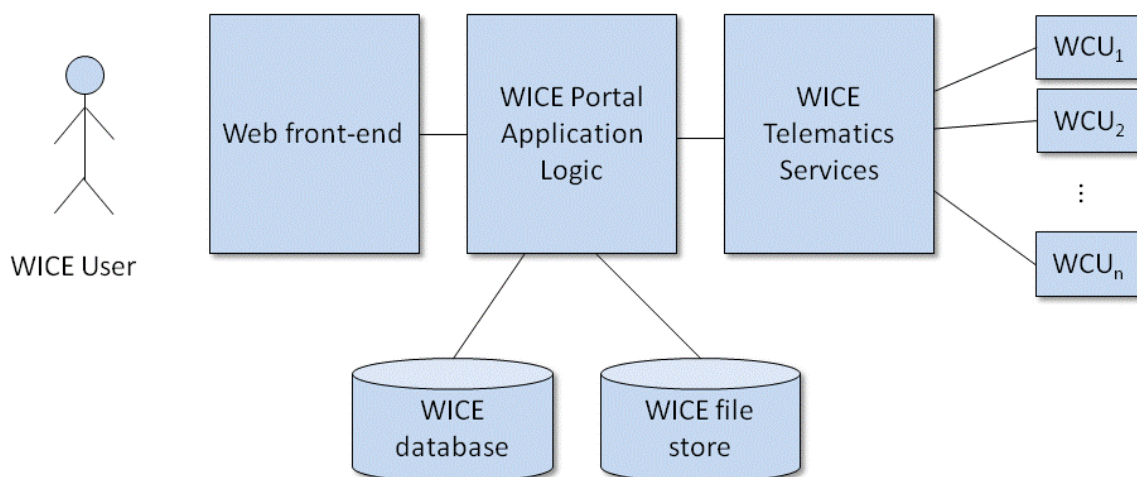


Figure 2. High level architecture of the WICE Portal and back-end infrastructure

The WICE Users interact with the system through a web front-end. The WICE Portal Application Logic implements the core functionality of the supported services, including management of measurements tasks and data, fleet management of connected vehicles, data

presentation, user management and administration. The Telematics Services provide the communication interface to the fleets of connected vehicles. Each connected vehicle has a WCU (Wireless Communication Unit) installed, which contains the vehicle side of the system, including data capture and monitoring modules, vehicle diagnostics modules, GPS positioning and vehicle status information.

The state of the WICE system is kept in the WICE database, which is a relational DBMS. The measurement data uploaded from vehicles is stored in the WICE File Store which is a large volume storage solution based on a data lake concept.

An access control framework based on user roles and resources regulates which users have access to particular data sets or application services.

The web-based User Interface

The web-based user interface gives users access to the WICE application services and data. An example screen-shot of a data visualization component of the user interface is shown in Figure 3.

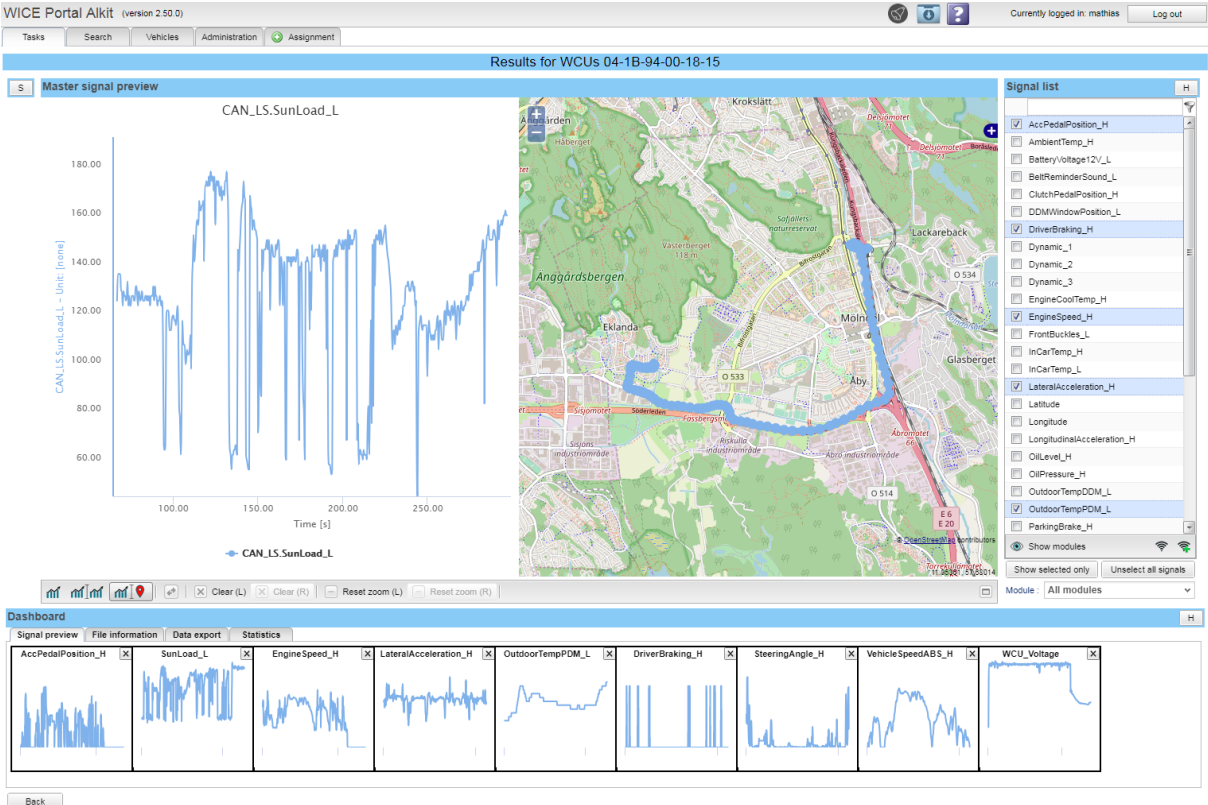


Figure 3: Example screen-shot of the web-based WICE user interface

The M2M API

In addition to the web-based user interface, there is an Application Programming Interface (API), called the M2M (Machine-to-Machine) API for programmatic access to the back-end services and data resources. The M2M API is based on the Representational State Transfer (REST) model, implemented using HTTP/HTTPS and JSON.

The Rapid Prototyping platform

When developing new automotive functions and services, there is a need for a powerful platform where prototype implementations can be tested and concepts validated before necessary hardware is available in the target vehicle platform and before the production cloud infrastructure software is deployed. This can be achieved using the WICE Rapid Prototyping service, which enables custom software components to be executed on the in-vehicle WICE units (WCUs), supported by WICE back-end services with open interfaces for accessing and processing streaming and bulk data from connected vehicles.

Contacts

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