THE EBSF IT ARCHITECTURE
Author
EBSF project partners in the framework of the activities of the Sub-Project 4 “Validate, Evaluate, Disseminate and Exploit”.

Contact
Maeva Zebrowski, UITP Project Manager and Leader of Sub-Project 4
maeva.zebrowski@uitp.org

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Leader of the activity
Veolia Environnement Recherche et Innovation

Partners EBSF IT Architecture
ACTIA ★ ATAC ★ ATM Milan ★ ASSTRA ★ BERENDS ★ BIS BKV ★ BREMERHAVEN BUS ★ CRTM ★ DIGIGROUP ★ EVOBUS HOGIA ★ IFFSTAR ★ INEO SYSTRANS ★ INIT ★ IRISBUS IVECO MAN ★ PILOTFISH ★ RATP ★ TEKIA ★ VOLVO ★ VULTRON

UITP - International Association of Public Transport
Rue Sainte-Marie 6
BE - 1080 Brussels
Belgium

Design
http://charlottelambert.net
Today’s public transport passengers are taking an active role in choosing the best mobility option to suit them. They can no longer be considered as passive users carried from A to B. To be competitive with private transport modes, public transport must provide services of excellence.

To answer this challenge, EBSF has developed an intelligent transport system solution: the EBSF IT architecture. Based on open technology, this platform gives the possibility to operators and organizing authorities to use public transport data anywhere in Europe through common mechanisms, standard rules and protocols.

With the connection of all information systems (urban, suburban, regional, or national transport networks) real-time multimodal passengers’ information is now possible at the European scale and new public transport services can be developed infinitely from the common EBSF IT architecture.

Objectives

- Sustainable mobility
- Cost efficiency
- Integrated and standardized mobility services
- Cooperative and interoperable transport systems
The EBSF open IT architecture links sources of data from all onboard applications including operational control, passenger information, maintenance and diagnostics. With the harmonisation of information systems via open technology, the creation of new services is infinite: all applications can be developed further, modified or upgraded very easily.

The open EBSF approach is a stride for the whole sector and will boost innovations for all bus stakeholders. As a result, end users will be offered more new and efficient services.

For instance, the EBSF IT architecture makes it possible to deliver onboard personalized dynamic information by giving access to a range of diverse data such as:

- The bus position
- Passengers’ profiles and destinations
- The next stops
- Vehicle speed
- Traffic conditions
- Video streaming for driving assistance
- Doors monitoring
- Video-surveillance
- Electronic ticketing systems
Such a system will allow to computing a precise arrival time for each passenger’s destination and displaying it in his/her preferred language.

Communication between applications is facilitated and allows these applications to share onboard equipment, including GPS, the driver terminal and the communication gateway, hence avoiding redundancy of key functions. This reduces equipment costs and improves bus design significantly.

Although developed to be installed inside buses, the EBSF onboard IT architecture is also suitable for tramways vehicles and compatible with modularity concept based on bus convoys.
Standard bus installation

The EBSF project has defined standard installation requirements (hardware, cables, connectors, antennas, etc.) and installation rules to pre-equip vehicles. In the near future, Public Transport authorities and operators could buy EBSF compliant buses with:

• IP network and one antenna
• Standard plugs
• Dedicated areas for IT equipment
• Standard services such as GPS, vehicle data, external communication, equipment monitoring, etc.

New equipment can be automatically installed and configured, thus facilitating immensely both maintenance and daily operations.

For Public Transport operators this also means the possibility to be operational quickly and to lower integration costs!

All EBSF compliant equipments can:

- be plugged in on the bus in a standardized way
- communicate on the IP network
- access the available onboard services
Interoperability and multimodality

EBSF provides a solution to integrate public transport data and share the information sent by all stakeholders involved in the bus journey. This makes interoperable fleet management covering all vehicle modes possible.

Thanks to multimodal information, passengers will be provided with appropriate services including for example door to door and real time information applications (in stations, on smart phones, etc.), or eco-comparison tools encouraging the use of soft modes.

PT authority and operator organisation is becoming ever-more complex. Interoperable systems are therefore necessary to manage fleet and multimodal information.
EBSF Test bench:
Two EBSF-compliant bus architecture including dashboard were built and are being tested in Nanterre, France.

Smart power management

ITS devices are important consumers of energy inside the vehicle and have to be included in the calculation of the energy balance. In order to ensure a vehicle's battery life and reduce environmental impact, standard power management rules have to be defined.

In EBSF, power management modes have been specified according to the vehicle use. Results show that it is possible to reduce significantly the power consumption of an IT system.
The use of the EBSF standard interfaces and protocols will importantly reduce the costs of investment, installation, operation, maintenance and scalability:

- No more time and money are wasted on developing specific interfaces;
- Tenders can be open to more competitors thus helping to obtain better prices;
- No more money wasted on redundant equipment: bus equipments (driver terminal, gateway, GPS...) and infrastructures (stop signs, fleet management control, etc.) share the same architecture;
- No more need to change the whole system when the change of specific equipments is necessary;
- Plug and play integration of the new applications and IT devices facilitate installation and onboard maintenance;
- Operation costs are reduced through the integration of multimodal information systems that allows to better plan urban and regional transports and to optimize connections between all modes and operators as well as to take efficient actions in case of incidents.

Time and money can be now invested in new and innovative applications!
The EBSF IT architecture is integrated on a test bench in Nanterre, France. This platform represents the on-board and back-office architecture of the bus system. Advanced scenarios of bus in operation are tested through simulations and in real operational conditions. Five of the seven EBSF Use Cases, Bremerhaven, Brunoy (Paris), Budapest, Madrid and Rome have already validated applications of dynamic and multimodal passengers’ information or telediagnostic.

EBSF is working closely with the CENTC278WG3 group* in order to integrate the results of the project with existing European standards. EBSF will provide CEN with the requirements for common European interfaces, protocols, connectors (hardware) as well as rules of consumption for equipments.

* Group dedicated to public transport in the European Committee for Standardisation.
EBSF aims at developing a new generation of urban bus systems adapted to the specificities of the European cities; the project acts as a driver to increase the attractiveness and raise the image of the bus systems in urban and suburban areas, by means of developing new technologies on vehicles and infrastructures in combination with operational best practices.
EBSF is an initiative of the European Commission under the Seventh Framework Programme for Research and Technological Development. Starting in September 2008, EBSF is a four-year project with an overall budget of 26 million Euros (16 millions co-funded) and is coordinated by UITP, the International Association of Public Transport.

For the first time, EBSF brings together the five leading European bus manufacturers and forty-two other partners in 11 EU countries:

- **European bus manufacturers**
  - Evobus / Mercedes, Iveco Irisbus, MAN, Scania, Volvo

- **Public Transport operators and national public transport associations**
  - RATP, ATAC Rome, Veolia Transdev, TEC, Bremerhaven Bus, ATV Verona, ATM Milan, RATB, BKV, VDV, ASSTRA, UTP

- **The supply industry**
  - Hübner, Init, Digigroup, Ineo, Pilotfish, Actia, Hogia, Vultron, Tekia

- **Research / consultancy**
  - D’Appolonia, Berends, CERTU, Chalmers, CEIT, Fraunhofer, Transyt, FIT, Newcastle University, PE International, IFFSTAR, University of Rome 3, University of Rome / DICEA, TIS, CRF

UITP, the International Association of Public Transport (UITP) represents 3,400 members from 92 countries.

www.ebsf.eu

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**Contact Information**

Umberto Guida,
EBSF Project Director
umberto.guida@uitp.org

Maeva Zebrowski,
EBSF Project Manager
maeva.zebrowski@uitp.org

UITP
Rue Sainte-Marie 6,
B-1080 Brussels
Tel: +32 2 673 61 00
Fax: +32 2 660 10 72

www.uitp.org