Real Time Information Exchange Using the SIRI Standard

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Status of this document

This document is Published.

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1   Overview of SIRI

1.1   About SIRI

1.1.1   On behalf of the UK, RTIG has contributed to the definition of a European standard to define a "Service Interface for Real-time Information" (SIRI). It is intended to be used to exchange information between servers containing real-time public transport vehicle or journey time data. These include the control centres of transport operators and information systems that utilise real-time vehicle information, for example, to deliver services such as travel information.
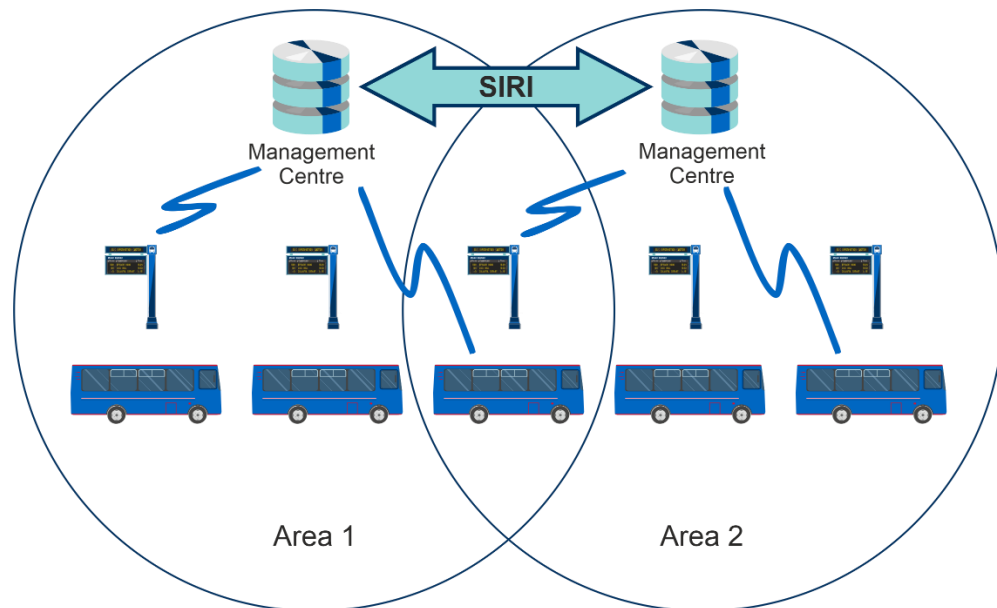
1.2   Why was SIRI Developed?

1.2.1   Well-defined, open software interfaces have a crucial role in improving the economic and technical viability of Public Transport Information Systems of all kinds.

1.2.2   Using standardised interfaces, systems can be implemented as discrete pluggable modules that can be chosen from a wide variety of suppliers in a competitive market - rather than as monolithic proprietary systems from a single supplier.

1.2.3   Well defined interfaces also allow the systematic automated testing of each functional module - vital for managing the complexity of the increasingly large and dynamic systems that internetworking leads to. Individual functional modules can be replaced or evolved, without unexpected breakages of obscurely dependent functions.

1.2.4   The use of common interfaces allows real-time data from different areas to be linked up seamlessly both within, and across borders.

1.2.5   SIRI has been developed to deliver as many use cases for the use of real-time information across as wide a range of public transport services as possible. The core high level use cases that SIRI is designed to satisfy are:

- to provide "real time-departure from stop" information for display on stops, internet, and mobile delivery systems;

- to provide real-time progress information about individual vehicles;

- to manage the movement of buses roaming between areas covered by different servers;

- to manage the synchronisation of guaranteed connections between fetcher and feeder services;

- to exchange planned and real-time timetable updates;

- to distribute status messages about the operation of the services; and

- to provide performance information to operational history and other management systems.

2   Technical Standard

2.1   SIRI is a CEN Technical Standard managed by the CEN TC 278 Working Group 3: Subgroup 7.

2.2   SIRI is built on other standards - in line with normal CEN practice. The base standard is Transmodel, and SIRI can be seen as an implementation of part of Transmodel for the specific purposes of real-time information exchange. In addition, SIRI was evolved from a number of national standards, notably VDV453, VDV454, Trident and the draft RTIG XML (which it has superseded).

2.3   The SIRI schema is available for use free of charge and without warranty under public licence on the *github* website at https://github.com/SIRI-CEN/SIRI

2.4   The published SIRI documents are copyright to CEN and available, at a cost, through national standards bodies (e.g. BSI in the UK).

2.5   There are five parts to the formal standard - each compliant with CEN Transmodel:

- Part 1: Context and framework (CEN/TS 15531-1:2015);

- Part 2: Communications infrastructure (CEN/TS 15531-2:2015);

- Part 3: Functional service interfaces (CEN TS/15531-3:2015);

- Part 4: Functional service interfaces: Facility Monitoring (CEN/TS 15531-4:2011);

- Part 5: Functional service interfaces – Situation Exchange (CEN/TS 15531-05:2016)

3   SIRI Services

3.1   The SIRI architecture breaks down into two key areas:

- communication protocols - common to all services; and

- message structures for specific 'functional services.'

3.2   The modular approach of SIRI gives users the ability to adopt whichever functions are relevant to their specific business requirements, without having to build them all. Similarly, new functional services that use the common protocols may be added with minimal effort.

3.2   Communications

3.2.1   The SIRI communications specification makes use of mainstream internet standards: specifically XML over IP networks. The Communications layer upholds a consistent approach for all the functional services to Security, Authentication, Version Negotiation, Recovery/Restart, and Access Control/Filtering.

3.2.2   There are two basic approaches to using SIRI communications; and either can be used with any functional service:

- 'publish/subscribe': server A registers with server B an interest in receiving information of a certain sort, and whenever server B is updated, it automatically passes the data to server A.

- 'request/response': if server A wants some information, it sends a request to server B, which will then send a response.
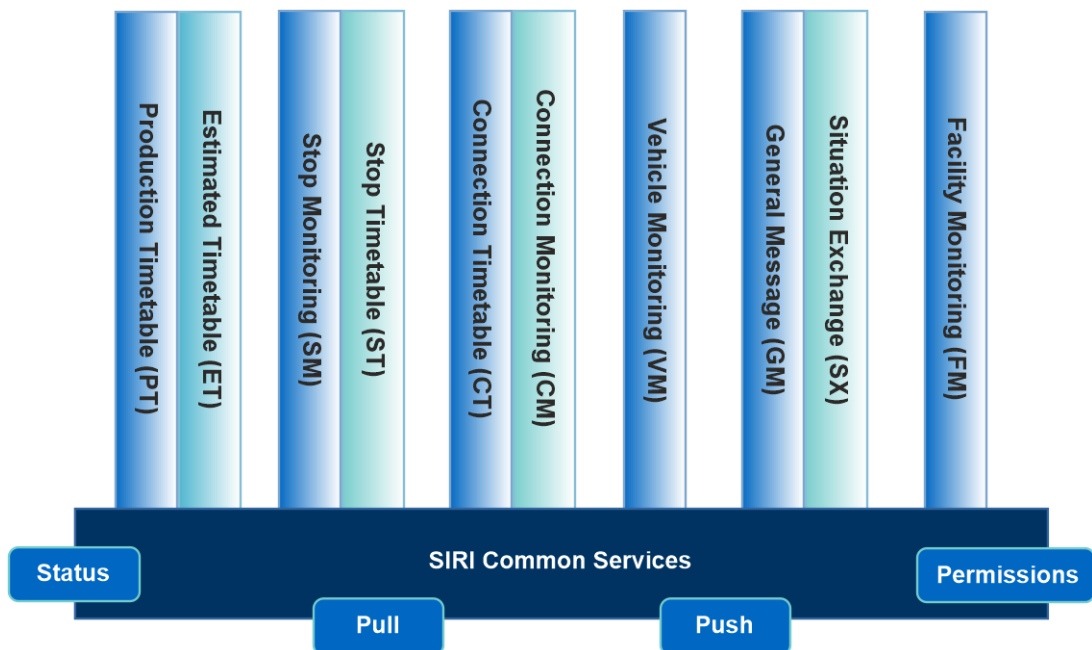
3.3   Functional Services

3.3.1   The functional services relate, in the main, to either timetable or real-time running information: filtered and presented in different ways which are geared to different purposes. Ten functional services are currently defined:

- The "Production Timetable" service provides an up-to-date timetable, including updates. It exchanges the planned schedules of vehicles operating a specific service at a specific time on a particular operational date - giving the vehicle time of arrival and departure at all the timing points on a planned route.

- The "Estimated Timetable" service provides a 'real-time timetable'. It reports progress against the actual schedule of vehicles operating a specific service in real time - detailing expected arrival and departure times at subsequent stops on a planned route. There will be recorded data for stops which have been passed, and predicted data for stops not yet passed. This service allows journeys to be cancelled, added, or changed. The service can be used to feed real-time journey planners and to exchange predicted progress with UTMC systems.

- The "Stop Timetable" service provides a stop-centric view of timetabled vehicle arrivals and departures at a designated stop. It provides an up-to-date stop timetable and is primarily intended as reference data for the Stop Monitoring Service.

- The "Stop Monitoring" service provides real-time information on services due to call at a specific stop. This can be used to provide live departure boards, for example through a web/mobile service provider.

- The "Connection Timetable" service provides information about the scheduled arrivals of vehicles to an interchange point that are designated as making connecting journeys. It is primarily intended as reference data for the Connection Monitoring Service.

- The "Connection Monitoring" service provides updated information in real-time about the arrivals and departures of connecting journeys at an interchange. It is intended to inform passengers on incoming ("feeder"), and outgoing ("distributor") vehicles about the status of their connections.

- The "Vehicle Monitoring" service provides information on the current location and status of a specified set of vehicles. It relates to vehicles rather than to specific stops and can be used to support roaming. For instance, a bus operator could use this service to monitor the running of their vehicles which are being tracked across a number of LA areas.

- The "General Message" service is used to exchange general operational information. Effectively, it provides an email service within the SIRI system that can convey arbitrary structured and unstructured messages.

- The "Situation Exchange" service is used to exchange situation content in real-time. It uses a structured situation model for describing disruptions to services. Through this, information about incidents can be directly linked to stop points, lines, journeys, pathways, stops etc: to provide an explanation of the disruption to passengers that enables them to understand the impact of the situation on their journey.

- The "Facility Monitoring" service is used to exchange the real-time status of facilities at a stop such as lifts, escalators, etc. It provides a short description of the facility itself, the availability status and specifically, the impact of the availability status for various categories of disabled or incapacitated people.

3.4   **Extensibility**

3.4.1   SIRI has been developed to be as flexible as possible, and in particular, the separation of common services allows for the re-use of these aspects for other purposes; and the easy development of extensions.

3.4.2   Using this flexibility, both the NeTEx and open journey planner standards re-use the common service parts of SIRI to enable the transfer of data elements in real-time.

4 Using SIRI in the UK

4.1 Implementations

4.1.1   SIRI is widely adopted as the standard for the sharing and distribution of real time data. It is widely understood and there are informal agreements for the interpretation of the more complex elements between suppliers.

4.1.2   New real time system implementation is now a much simpler process because of supplier's experience. Most implementations have used SIRI VM and SIRI SM. The use of PT and ET is increasing particularly between bus operators and authority systems.

4.2 Profiles

4.2.1   All the modules and optional features of SIRI are presented in a way that can be unambiguously referenced in specifications. A profile allows for additional processing rules and constraints that are not enforceable in the XML of the schema because they only apply to a specific implementation of SIRI.

4.2.2   For certain options, for example, the use of ATCOCodes from NaPTAN for Stop identifiers, there is a preferred UK profile of particular options to mandate to facilitate interoperability. RTIG members are encouraged to consider where they could benefit from implementing SIRI interfaces in order to make cross-boundary working simpler and more robust; and to specify the relevant parts of the SIRI standard in their procurement specifications

4.2.3   The following SIRI service-based profiles have been developed in the UK:

- SIRI SX – was developed initially for Transport for the North for use in their disruptions data hub and is available as RTIG T038 v1.1

- SIRI VM – to provide location data for use in the Department of Transport Bus Open Data Service.

4.3 How can I specify SIRI in a tender?

4.3.1   Tenders need to state the specific SIRI functional services that are in scope, and what variant options should be used, for example, the data system for stop numbering. SIRI is a quite large, modular standard that allows appropriate subsets to be deployed for particular implementations. For certain aspects of the standard, SIRI offers alternative variants of specific functions to allow efficient deployment.

4.3.2   In order to fully specify SIRI in a tender, some further details as to the specific variants and options to be provided should be given not just a broad reference to the formal standard. This could be in the form of a reference to a published profile or a bespoke specification that identifies how the required variant features should be interpreted.

5   RTIG recommendations

5.1.1   RTIG supports the use of SIRI as an interoperability standard: wherever an RTI system may need to exchange real-time data with other systems. SIRI's standardised interfaces mean that:

- systems can be implemented as modules chosen from a wide variety of suppliers, improving competition;

- systems from different suppliers can be readily connected;

- suppliers can focus on their own product's functionality rather than having to put lots of effort into special adapters for every system;

- individual modules can be replaced with upgrades or replacements from other suppliers without difficulty; and

- a system can evolve over time, with enhancements being added as they become affordable, rather than having to procure the whole system at once.