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The OGC Publish/Subscribe specification in the context of sensor-based applications

Lorenzo Bigagli and the The OGC PubSub Standards Working Group Team
National Research Council of Italy - IIA, Firenze, Italy (lorenzo.bigagli@cnr.it)

The Open Geospatial Consortium Publish/Subscribe Standards Working Group (in short, OGC PubSub SWG) was chartered in 2010 to specify a mechanism to support publish/subscribe requirements across OGC service interfaces and data types (coverage, feature, etc.)

The Publish/Subscribe Interface Standard 1.0 – Core (13-131) defines an abstract description of the basic mandatory functionality, along with several optional, extended capabilities.
The Core is independent of the underlying binding, for which two extensions are currently considered in the PubSub SWG scope: a SOAP binding and RESTful binding.

Two primary parties characterize the publish/subscribe model: a Publisher, which is publishing information, and a Subscriber, which expresses an interest in all or part of the published information. In many cases, the Subscriber and the entity to which data is to be delivered (the Receiver) are one and the same. However, they are distinguished in PubSub to allow for these roles to be segregated. This is useful, for example, in event-based systems, where system entities primarily react to incoming information and may emit new information to other interested entities.

The Publish/Subscribe model is distinguished from the typical request/response model, where a client makes a request and the server responds with either the requested information or a failure. This provides relatively immediate feedback, but can be insufficient in cases where the client is waiting for a specific event (such as data arrival, server changes, or data updates).

In fact, while waiting for an event, a client must repeatedly request the desired information (polling). This has undesirable side effects: if a client polls frequently this can increase server load and network traffic, and if a client polls infrequently it may not receive a message when it is needed. These issues are accentuated when event occurrences are unpredictable, or when the delay between event occurrence and client notification must be small.

Instead, the Publish/Subscribe model is characterized by the ability for a Subscriber to specify an ongoing (persistent) expression of interest in some messages, and by the asynchronous delivery of such messages.
Hence, the publish/subscribe model can be useful to reduce the latency between event occurrence and event notification, as it is the Publisher's responsibility to publish a message when the event occurs, rather than relying on clients to anticipate the occurrence.

The following cross-service requirements have been identified for PubSub 1.0:
• Provide notification capabilities as a module to existing OGC services with no impact on existing service semantics and by reusing service-specific filtering semantics.
• Usable as a way to push actual data (not only references to data) from a data access service (i.e. WCS, WFS, SOS) to the client.
• Usable as a way to push notification messages (i.e. lightweight, no data but rather references to data) to the client.
• Usable as a way to provide notifications of service and dataset updates in order to simplify/optimize harvesting by catalogs.

The use-cases identified for PubSub 1.0 include:
• Service Filtered Data Push.
• Service Filtered Notification.
• Notification of Threshold Crossings.

• FAA SAA Dissemination Pilot.
• Emergency / Safety Critical Application.

The above suggests that the OGC Publish/Subscribe specification could be successfully applied to sensor-based monitoring. This work elaborates on this technology and its possible applications in this context.