Position Paper for W3C Workshop on the Web of Things
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Abstract

The accelerating growth of the web of things has led to an increase in the need to provide standard ways for things (e.g. devices) to be identified uniquely and to communicate. Open standards for identification, capturing information, and describing things are each critical for Application Programming Interfaces (APIs) to work effectively across the semantic web.

GS1 is an open, neutral, industry-driven standards organization responsible for defining unique identifiers for items, organisations, documents, locations, events and other "things" for more than 40 years. Our standards for identification, semantics and communication are used directly by over 1.5 million companies and indirectly by billions of consumers every day. Barcodes, RFID tags and the underlying, globally-unique numbering system are just a few examples of such standards.

A major challenge has been defining the core set of semantics required for applications built for the web of things across various domains. Connecting our industry community to W3C, including its possible new work around the web of things, has the potential to significantly drive adoption, and to increase relevance of any developed standards across GS1's core sectors of healthcare, commerce, and transportation/logistics.

Additionally, we are actively working on expansion of the GS1 system of standards that will leverage Linked Data representations of defined facts about products (and, eventually, things) to enable more open connection of people to asserted facts about uniquely-identified products on the open Web. This work may be extensible to the scope of the web of things, and it would be valuable to assure consistency in approach between the GS1 community and the W3C community, as much as such consistency makes sense and is valuable to the community.

Ongoing Work

The Web of Things continues to evolve using multiple technologies and applications to identify, capture and share information. GS1 continues to develop standards for identifying things and activities (e.g. organisations, items, instances, locations, and documents), capturing data (e.g. RFID and barcodes) and sharing information about these objects through semantic standards. For example, GS1's Global Data Dictionary contains thousands or attributes defining organisations, products and events along with underlying data models. These semantics have been important to ensuring interoperability within GS1 developed standards, but can have broad based applicability.

GS1 has seen massive adoption of unique instance identification and EPC-enabled Radio-Frequency Identification (RFID) technologies driven by a need for inventory management accuracy and fight against theft. Our recent work with ISO to create the Gen2v2 specification for EPC-enabled RFID has set the standard for expansion of RFID tag capability from simple selection, location and authentication to include access control, loss-prevention enablement, write capability, file structures, and privacy features. We're confident that zero-power communication will increase in relevance over the coming years, and that solutions based on this new EPC RFID specification revision will expand from traditional locate/read applications to fully-interactive locate/read/access/write/authenticate applications. Such applications will have far-reaching implications to consumer privacy, anti-counterfeiting, security, file management, and loss prevention. And, as far as scope is concerned, we expect that the annual number of deployed RFID tags to exceed 35 billion units by 2020.

In the fields of pharmaceuticals and medical devices, we are seeing a significant increase of item identification at the instance level (represented in both barcodes and RFID) and in plans to share information about custody of items along the supply chains using the Internet and GS1 standard applications (Electronic Product Code Information Services - EPCIS).

Such combinations of GS1 technologies are foundational examples of the power of the web of things: consistent identification of things for representation on open networks, consistent communication about (and by) things, and robust discovery services for information that has been shared about things.

In the future, there will be a significant increase in web-based applications developed by industry that are focused on improving the consumer experience. Standards will be required to better enable these new applications. A critical issue for GS1's community is further defining the data standards for various APIs built to provide better service for consumers. Common vocabularies are critical, but how to most clearly define the data that needs to be standardized for these applications in various domains of use is of paramount importance. It is also important to understand the best representation for identifiers and data on the web that can be leveraged by solution providers and future discovery services.

Conclusion

The Web of Things will increase the need for standardization and management of unique identifications, as well as semantics describing people, places, tasks and things. There is a need to understand the best way to standardize the semantics required by the various existing and future applications that will take advantage of the power of the semantic web.

As we analyze the landscape, GS1 feels strongly that leveraging existing standards for serialized identification, for URI representations of these identifiers, and for open network communication by (and between) devices will further accelerate progress toward a truly-connected web of things. Our existing body of work may be of interest to a future working group, and we would be pleased to share it at an appropriate level of detail to facilitate conversation and forward progress.