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The OGC API - Connected Systems: An emerging standard for interoperable sharing of observation data

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The Open Geospatial Consortium (OGC) API standards offer a modern approach to accessing geospatial data and services on the web, promoting interoperability and simplicity. These standards, developed by the OGC, improve upon older OGC standards by embracing web-centric practices and resource-oriented designs. They use a RESTful architecture, enabling developers to interact with geospatial resources through standardized HTTP mechanisms and JSON encoding, ensuring ease of integration, discoverability, and scalability.

The OGC API family comprises several key standards, each tailored for specific functionalities. Notable examples include OGC API - Features, succeeding the Web Feature Service (WFS); OGC API - Maps, succeeding the Web Mapping Service (WMS); and OGC API - Coverages, succeeding the Web Coverage Service (WCS). Together, they address a wide range of geospatial data types, creating a robust framework for interoperable geospatial applications.

However, a direct successor to SensorWeb standards, such as the Sensor Observation Service (SOS) or Sensor Planning Service (SPS), was missing from the OGC API suite. The SensorThingsAPI, developed earlier, follows a different architectural model. To address this gap, the OGC Connected Systems Standards Working Group (SWG) introduced a draft specification for the OGC API - Connected Systems. This standard focuses on managing descriptions of sensor systems, networks, and their data, building on established models such as the Sensor Model Language (SensorML), SWE Common, and Observations, Measurements, and Samples (OMS). It also aligns with contemporary standards like the Semantic Sensor Network Ontology (SOSA/SSN).

The OGC API - Connected Systems draft consists of two parts. Part 1 extends the OGC API - Features standard to manage static resources, such as systems, procedures, deployments, and sampling features. Systems encompass entities such as sensors, platforms, actuators, and processing components that produce data or receive commands. Procedures define the processes undertaken by systems, while deployments detail where and when systems are used. Sampling features represent real-world objects observed by systems. This part supports various data formats, allowing for both rich metadata descriptions in SensorML and simpler representations such as GeoJSON.

Part 2 addresses dynamic data, including datastreams of observations, control channels for sending commands to systems, and historical data on system events. Datastreams enable flexible grouping of observations, such as by sensor network or observed property. Control channels allow systems to receive commands, such as initiating measurements or altering states. Historical events, now managed as dedicated datastreams, avoid overloading system descriptions with excessive details.

The draft specification foresees integrating publish/subscribe patterns, such as MQTT, for managing data streams, control channels, and events.

With this contribution we aim to provide an insight into how the emerging OGC API - Connected Systems standard provides a modern successor to Sensor Web technologies. We discuss how this initiative empowers data managers and scientists to efficiently exchange observational data and metadata, ensuring compatibility and interoperability across diverse applications.