Title: Interoperability between OPC UA and oneM2M

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Abstract: Since few years, the fourth industrial revolution, usually known as Industry 4.0, has attracted much attention in recent literatures. Keys concepts of industrial change are Cyber-physical Systems (CPS) and the Internet of Things (IoT). Internet of Things (IoT) technologies based on heterogeneous software of the hardware interfaces employed in IoT devices (i.e., Internet connected embedded systems). An IoT system, typically situates its devices within a global cloud network that allows larger-scale integration and more sophisticated applications. The term CPS is defined as the addition of computational and physical procedures on the technology of Internet of Things. Cybernetic-physical systems include built-in computing and storage capabilities. They considered as combinations of intelligent physical components. CPS are connect through networks and are the enablers of the intelligent factory concept of Industry 4.0 in an IoT environment. One of the aspects of the fourth industrial revolution is based on the heterogeneous integration of data and knowledge, the main roles of CPS and IoT technologies are to meet the agile and dynamic requirements of production and to improve the effectiveness and efficiency of the entire industry from field level to production level. Typically refers to as vertical integration. Vertical integration has become a topic of interest only in the recent past with Industry 4.0 and mostly concerns the interconnection of field-level networks and IP-based networks.
Vertical integration will make the traditional pyramid view of automation disappear. New vertical platforms that combine in an interoperable approach will replace traditional systems, through emerging applications within the industrial platforms of the Internet of Things.
In this way, connectivity and interoperability are crucial for the Industry 4.0 revolution, indeed interoperability is one of the major requirements of Industry 4.0.
However, it seems a challenging task to make different types of devices interoperable due to their heterogeneous hardware and software systems. Today, industry standards try to improve interoperability, however, such standards hold primarily within an industry. This is because wider interoperability on data models becomes a substantial problem when complexity and number of subsystems increase.
For this reason, during the last few years, different organizations have developed reference architectures to align standards in the context of the fourth industrial revolution like Industrial Internet Reference Architecture (IIRA). OPC UA and oneM2M are consider as the core connectivity standard from which industrial IoT system architects can choose to adopt based on their specific system needs. However, because of their restriction in their domain respectively, an interworking solution between OPC UA and oneM2M has not been provided yet. Actually, OPC UA is a standard widely used in the manufacturing industry, its integration into the IoT system is still under development. OneM2M provides a common services layer suitable for IoT applications. Several important scenarios may be realized if interworking between OPC UA and oneM2M was enabled. OPC UA is widely adopted in factories at the lower level of the production systems, they typically collect data coming from PLCs sensors and actuators. oneM2M applications are placed at the higher level of factory production systems, allowing realization of services like SCM (Supply Chain Management), also based on advanced data analytics. Interworking between OPC UA and oneM2M may allow data produced by OPC UA-based devices to be consumed by oneM2M applications; results coming from management applications may be easily sent back to OPC UA-based control devices at the field level, allowing optimization of the production and making it smarter. What is required is that information produced by oneM2M-based IoT devices could be published by an OPC UA Server and so consumed by industrial applications playing the client role. The research proposes a solution to realize the interworking between OPC UA and oneM2M in the direction from oneM2M to OPC UA. No interworking solution from oneM2M towards OPC UA has been proposed in the current literature. The interworking solution proposed allows an OPC UA Server to publish data produced by oneM2M-based IoT devices, so that this information may be consumed by industrial applications (i.e. OPC UA Client).