Demo: Seamless Producer Mobility for the Industrial Information-Centric Internet

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CCS CONCEPTS

• **Networks** → **Network design principles**; **Sensor networks**; *Naming and addressing*; • **Computer systems organization** → *Embedded and cyber-physical systems*;

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1 MOTIVATION & USE CASE

The Industrial IoT commonly couples sensors and actuators with remote cloud services to facilitate business and safety critical requirements. In our use case, IoT systems are deployed in hazardous environments attached to field workers who move freely, while being threatened of exposure to combustible or toxic gases. Sensor alerts are used to trigger alarms both to the local vicinity and to remote rescuers. In addition, regulatory processes require sensor readings to be aggregated and persisted for later analysis and complex evaluations. Delivering sensor data continuously from mobile workers to the IoT network and towards the cloud is vital and demands for a seamless and resilient mobility support of data sources throughout the network.

We approach these challenges based on Named Data Networking (NDN) [3]. Stateful forwarding and in-network caching of this ICN technology offers high potentials for resilience on the network layer. We deploy our Publish–Subscribe scheme HoPP [2] that seamlessly supports producer mobility and other topological changes. It further provides disruption tolerance and ensures extended sleep cycles for a prolonged battery lifetime in the IoT.

2 DEMO SETUP & DESCRIPTION

Our demonstration showcases a mobile worker with an intelligent helmet that is equipped with gas sensors and an IoT node (see Fig. 1).

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The IoT node periodically reads the sensors and initiates a regular recording or triggers an alarm once a threshold is exceeded. The worker moves within the hazardous environment sketched in Fig. 2.

Figure 1: Intelligent Helmet

Operating the *HoP and Pull* pub/sub scheme, upstream communication is initiated whenever possible. In the presence of mobility-related disconnects of the worker or intermediate wireless nodes, the store-and-forward capabilities propagate data hopwise towards the IoT gateway. During a mobility handover, the NDN content store caches sensor readings until the node is able to reattach to a network.

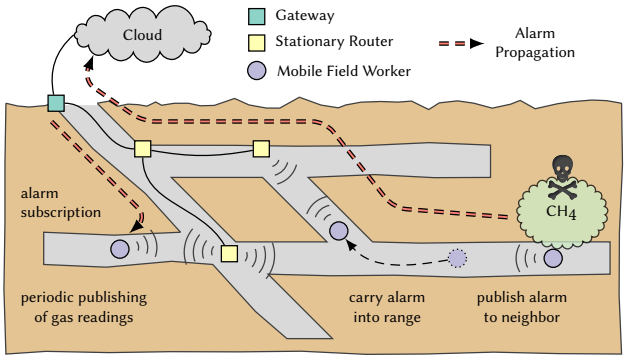

Figure 2: Mobility resilience in harsh environments for the Industrial IoT with HoPP.

In our demo, we use a Raspberry Pi with IEEE 802.15.4 transceiver as the gateway between sensors and Altair Grid, our industrial cloud service. We use two battery-operated ARM Cortex-M4 devices as stationary routers and another device equipped with a gas sensor that integrates into the helmet. These devices run RIOT [1] as operating system and make use of its integrated NDN network stack. As mobile demonstrators move, a live monitor screen visualizes the topological changes and the traffic flows to illustrate the mobility management.

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