# Discovery for Edge Computing in Industrial IoT

Eve Schooler Mike McBride

### **IIoT Discovery Overview**

#### 1. New devices added to environment.

Discover their capabilities/services in client/server environment. Discover them automatically. Discovery is the process of finding a device and then synchronizing the device inventory and configuration with Edge Services. Many solutions: UPnP, mDNS, DNS-SD, SSDP, NFC, XMPP, W3C network service discovery...

2. Edge devices discover each other.

Can we just use DHCP, SNMP, SMS, COAP, LLDP, OSPF?

- 3. Discovery of aggregated data on edge compute device. How to discover aggregated data across the network.
- 4. Directory discovery

Dictionaries/ontologies/vocabularies. WISHI. RDA (the folks who brought us DOIs). Discover edge device functions. Data as a name of a function using NDN.

### Existing Discovery Protocols

- 1. CoAP resource directory provides a way to discover the properties of nodes on a network. A client server protocol between sensors, etc and server. Not as a L3 solution between edge comp devices.
- 2. LLDP works at L2 to facilitate exchange of device info between directly connected devices. Not as a L3 solution between ECDs.
- SNMP does allow automatic discovery of network devices and their attributes. As does Netconf. But we don't need to manage devices and probably need something much more feature rich.
- 4. OSPF, etc routing protocols provide networking devices to discover one another and share routing info but we likely need more, something less, something different.
- 5. DHT. Distributed hash table. A DHT is a class of a decentralized distributed system that provides a lookup service similar to a hash table.

## What we may need for edge device discovery

- 1. We need discovery of aggregated data on edge compute devices across IT/OT.
- 2. We need edge compute devices (ecd) to discover one another across IT/OT domains.
- 3. We need ecd's to share their capabilities/services.
- 4. We need ecd's to share info about connected devices.
- 5. We need ecd's to make fast, low latency decisions between each other for emergency, etc situations.
- 6. We need ecd's to be able to migrate functionality between each other.
- 7. We need a routing protocol specifically for an IIoT environment beyond a higher layer messaging bus like OPC-UA and DDS.