# Enterprise Network Inventory Management

Side Meeting (Hybrid) 11/08/2022
Meeting **Room:** Mezzanine 12 – Tuesday
**Conferencing Link:**
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# Agenda

- Introduction -Qin Wu (5 minutes)
- Data Model for Lifecycle Management and Operations Marisol Palmero (10 minutes)
- Enterprise Network Inventory Model (10 minutes) Bo Wu (10 minutes)
- Hardware Inventory Model Chaode Yu/Aihua Guo/Italo (10 minutes)
- Open Discussion All (25 minutes)

# Goal and Motivation

- Goal:
  - Establish common understanding on the terminologies and scope
  - Identify the gap of these existing work
  - Explore 3 Questions:
    - Why the Enterprise Network Inventory is needed?
    - What is the Enterprise Network Inventory?
    - How Enterprise Network Inventory Information is used?
- There are several relevant drafts.
  - RFC8345 (Network Topology model: maintenance of an inventory of nodes contained in a network. )
  - RFC8348 (Hardware Management)
  - draft-ietf-opsawg-sbom-access (Software Transparency and Vulnerability Information Retrieval)
  - draft-palmero-opsawg-dmlmo (Network asset management)
  - draft-wzwb-opsawg-network-inventory-management (Physical, Virtual Network Inventory)
  - draft-yg3bp-ccamp-network-inventory-yang (Physical Network Inventory)

# Comments, Questions, Concerns?

# Why Enterprise Network Inventory Information is needed?

- Granting assets based solely on their physical or network location is insufficient
  - The network endpoints such as mobile device, laptop (BYOD device) can be unknown to the management system
  - The network Endpoint can move around in different location, enterprise network can be borderless
    - E.g, VM mobility in the server
    - Users move around with their laptop or mobile device
  - Network access control and authorization of both existing and unknown endpoints and prevention of malicious attack from them are important
- These inventory information are difficult to manage when they are built as a silo
  - E.g., they are modelled differently and tracked in different places.
  - Visual relationship maps for networks and endpoints with relationship types and dependencies can be built Using Digital Twin Network Technology to
    - track the root cause problem
    - Run what if scenarios to verify the correctness of the route configuration

# Taxonomy of Enterprise Network Inventory

- Base Network Inventory model is defined in RFC8345
  - Contain a inventory of nodes in the network
  - The nodes can be router, switch, etc
- Hardware Management model is defined in RFC8348
  - Further decomposes physical network node into a set of hardware components with dependency to each other.
- Physical Inventory defined in [draft-yg3bp-ccamp-network-inventory-yang]
  - Refactor hardware management model in RFC8348 and cover additional hardware classes such as racks and sub-slot
- Service attachment point network model is defined in [I-D.ietf-opsawg-sap]
  - Physical inventory and contains the points from which its services can be attached
  - Link service attachment point with physical interface or logical interface of a specific network node
- Network Device Software Inventory defined in [I-D.palmero-opsawg-dmlmo]
  - Software Update Information (Version and Patch, License, features)
- Additional inventory data related to **network endpoint defined in** I-D.wzwb-opsawg-network-inventory
  - IT endpoint: E.g., PC, laptop, Server
  - IoT endpoint: E.g., Sensor, Camera, Smoker
  - BYOD endpoint: BYOD devices
  - Software Vulnerability information
- Network Configuration Management Model that can be included in I-D.wzwb-opsawg-network-inventory
  - E.g., ACL configuration, BGP configuration, etc
  - Can be mounted together with Inventory Data

# Functional Requirements for Enterprise Network Inventory Information

- Hardware components dependency Management (RFC8348)
- Software components dependency Management (ISO/IEC 5926:2021)
- Location Management (RFC9179)
- License Management (widely used in ITAM)
- Version and Patch Management (widely used in ITAM)
- Network Endpoint Security Management (e.g.,RFC5209)

# Network Inventory Gap Analysis

| Functional Requirements | Network asset management | Enterprise Network Inventory | Physical Network Inventory |
|---|---|---|---|
| Hardware components dependency Management | N/A | √ | √ |
| Software components dependency Management | √ | √ | N/A |
| Location Management | √ | √ | Possible, but not geolocation |
| Network Endpoint Security Management | N/A | √ | N/A |
| License Management | √ | √<br>Possibile | N/A |
| Version and Patch Management | √ | √<br>Possible | N/A |
| Config Management | N/A | Possible with schema Mount | N/A |

# A few feedback From Eliot from IoT perspective

- I think the basis for this discussion was a comment I made some time ago in opsawg, in which at least the drafts you name, and probably others, deal with some form of inventory (software or hardware). And the question was whether it was worth putting together an architecture document mapping which was useful in what circumstances.
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- Also, is software config part of inventory?

# Way forward

- Question: Is Taxonomy of Enterprise Network Inventory useful to clear terminology confusion?
  - Action: Document Taxonomy of Enterprise Network Inventory
  - Action: Document Architecture mapping or big picture draft?

- Question:  what is the inventory management gap in RFC8345?
  - Action: Document Gap Analysis of Inventory Management