

Convergent & Elastic Ethernet Networking for Industry

Huajie Bao (baohuajie@huawei.com, Huawei)

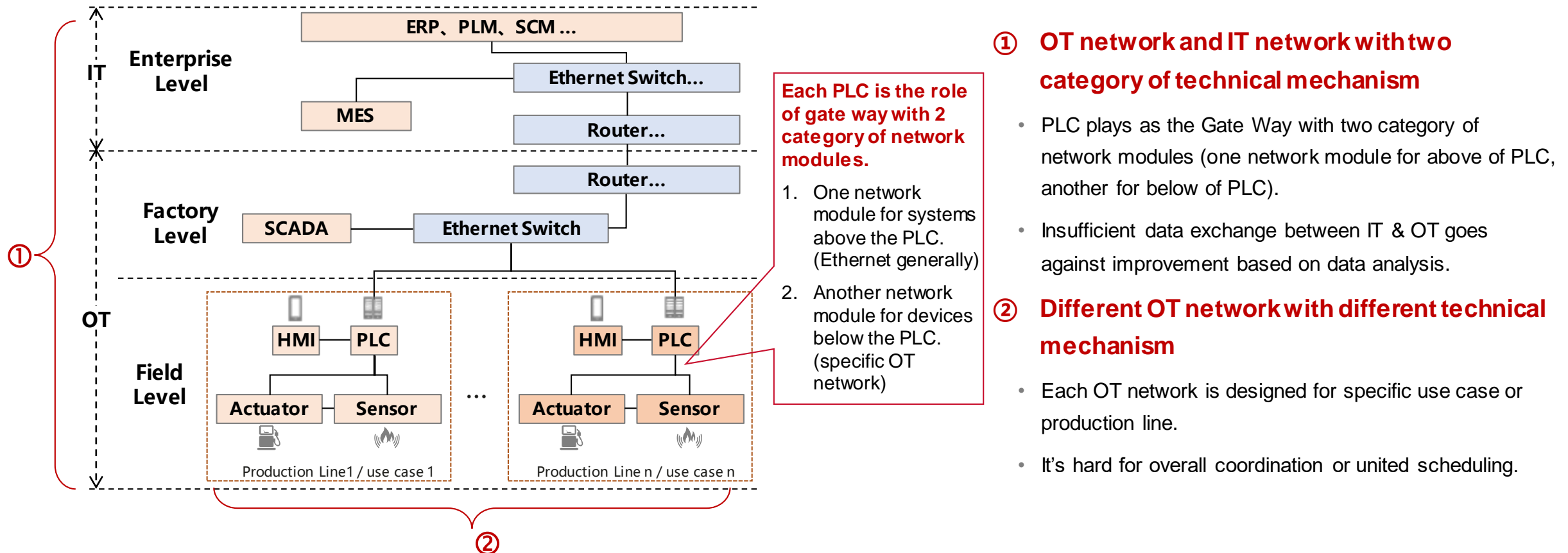
Background

- The presentation [*Elastic Ethernet Networking for Industry*](#) was discussed in Nendica in April 7.
- During the discussion, the main issue raised was about the convergent industrial network, both of the presentation and 60802 are targeting the convergent industrial network, what's the difference?
- This presentation intends to talk this issue, and discuss the difference and the next step.

Vertical Architecture of Traditional Factory Network

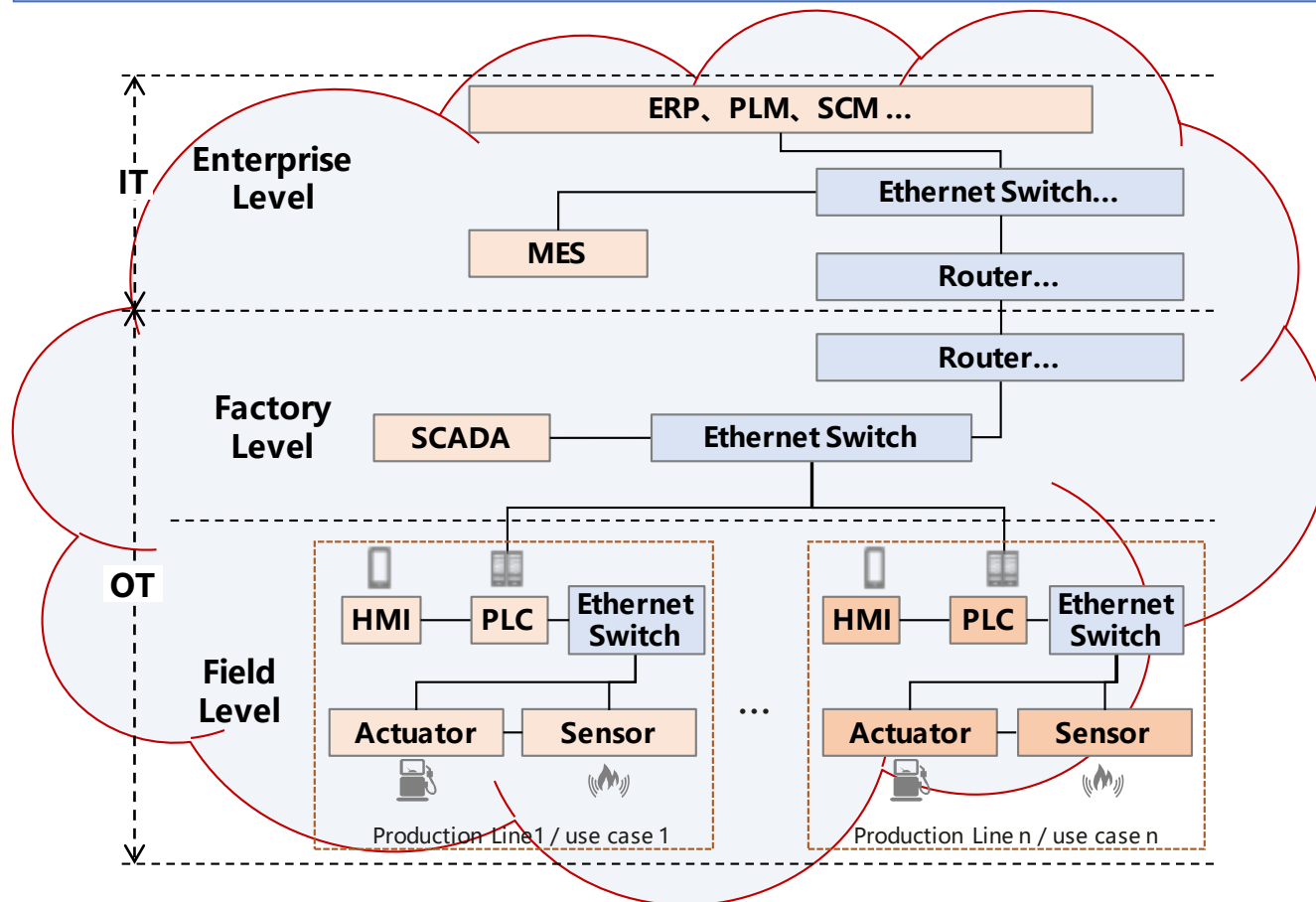
The traditional factory network architecture is derived from the ISA 95, and is not convenient for communication across levels, it mainly focuses on production automation control and supports the massive producing efficiently.

But, the Smart Manufacturing is to use the industrial data from field level and computing / AI capability from IT level, **it's necessary to build a convergent network infrastructure.**



To Imagine the Convergent Industrial Network

The converged industrial network connects all systems and devices, covered from enterprise level to field level, with only one category of network module, **that is Ethernet network**.



◆ All systems & devices of IT / OT share one network infrastructure using Ethernet / IP network

- All systems and devices will only need one network module to communicate.
- The PLC will not play as the Gate Way with two category of network modules.
- Communication across levels will be simple and general. The device of field level could report the running status data to IT system directly via Ethernet / IP network.
- Based on the convergent network with the united scheduling and forwarding policy, the traffic routing path will be more efficient.

* The field level network scope is limited as field bus based on Ethernet, not including the field bus not based on Ethernet.

The Main Requirement for Converged Industrial Network Using Ethernet

The converged industrial network implements IT & OT to share one network infrastructure via Elastic Topology, Elastic Forwarding & Elastic Orchestration.

- To satisfy the **agile adjustment** triggered by smart manufacturing
- To be **compatible** to existing industrial Ethernet mechanism (not including the field bus not based on Ethernet)

① Elastic Topology

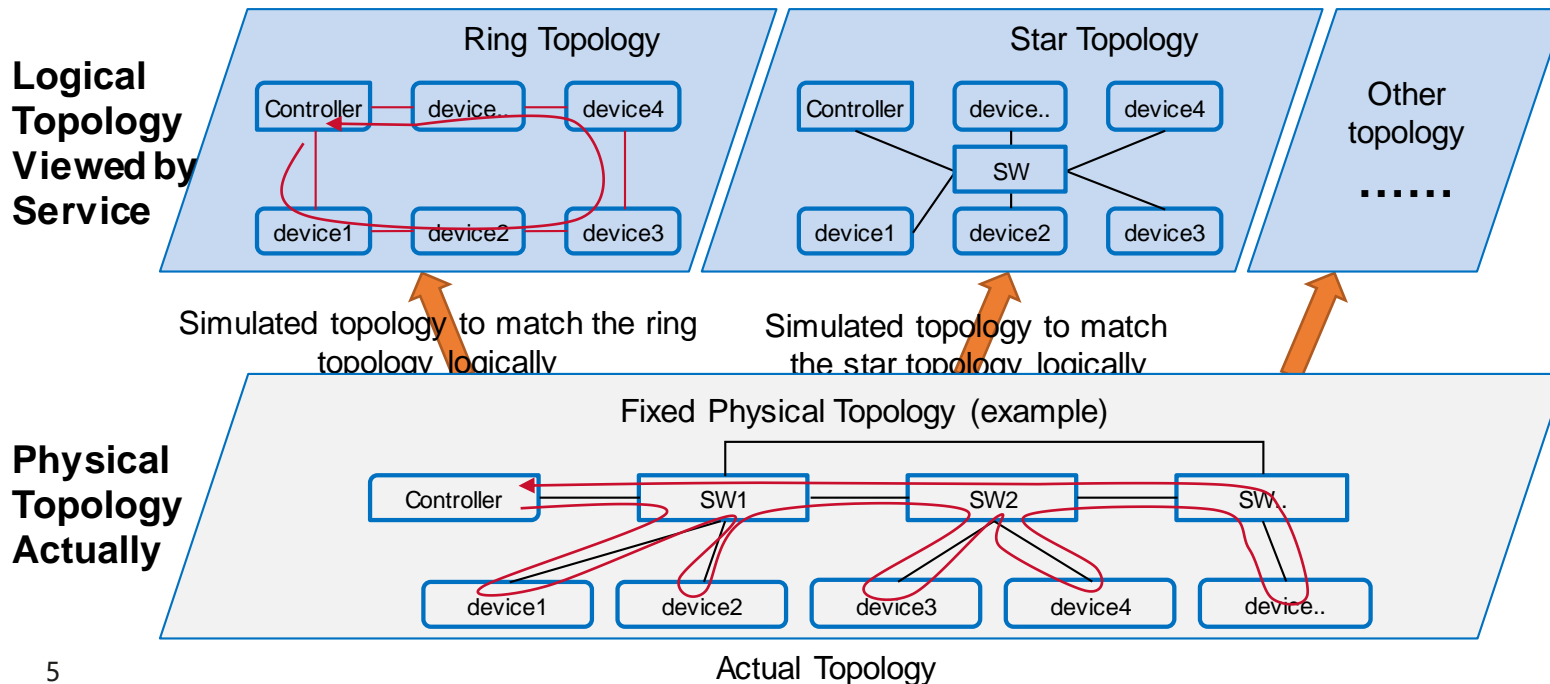
- Based on one fixed physical Ethernet network topology, to support different kinds topology requested by service level

② Elastic Forwarding

- Based on elastic topology, to support different kinds of forwarding mode requested by service level

③ Elastic orchestration

- Agile adjustment & scheduling, and quickly match the service or network changing



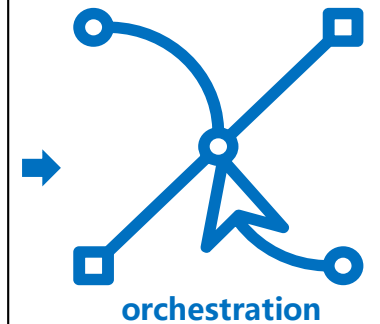
Smart manufacturing drives service & network changing:

◆ Service changing

- Service flow procedure changing
- Service flow attribute changing
- ...

◆ Network changing

- Topology changing
- Network device changing
- Service device changing
- ...



Next Steps

- This issue: how to build a convergent industrial network connecting all systems and devices covered from enterprise level to device level, and each system or device only need one network module (Ethernet) to communicate with each other?
- This issue is not covered by 60802, so, consider to initiate a new study item in Nendica.
 - ✓ Based on the convergent industrial network, other issues items including performance, adaption and security should be studied together in Nendica.
 - ✓ During the study progress, if some new issue is related with 60802, it could be raised up to 60802 to discuss.

Thank you.