IEC / IEEE 60802 - IA profile

Example for Configuration Model Alignment
–
Integration of Network Management, Communication Relation Management and Topology Discovery and Checking needed
–
Mainly focusing on Machine and Cell level

-To be discussed-

Prepared by
Günter Steindl
(Siemens AG)

Basic scope

Assumptions:

- All managed objects are available as YANG
- IP based managed object access protocol defined
- IP suite available
- LLDP based TSN domain boundary detection available and working

Definition

Terms:

NM – Network Management

- Needed to load all static network configuration and stream configuration data into bridges and end-stations

CM – Communication Relation Management

- Needed to load the individual communication relations into the end-stations

TD – Topology Discovery

- Needed to discover all links, bridges and end-stations of the TSN domain

TC – Topology Checker

- Checks whether the real topology is identical to the expected topology

PF – Path finder

- Computes the needed path for a stream

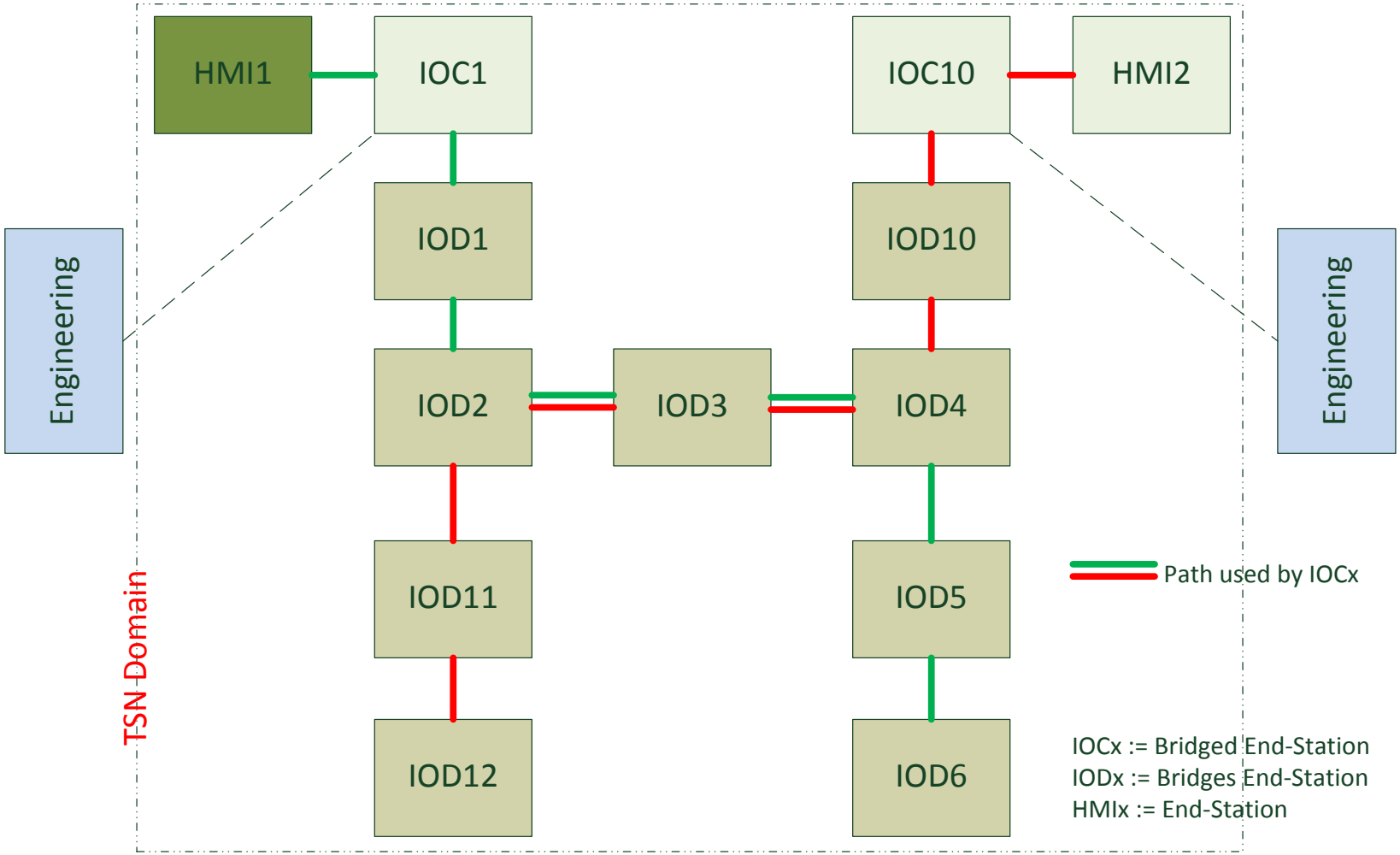
IOC – IO Controller

- Initiator of communication with Remote IO

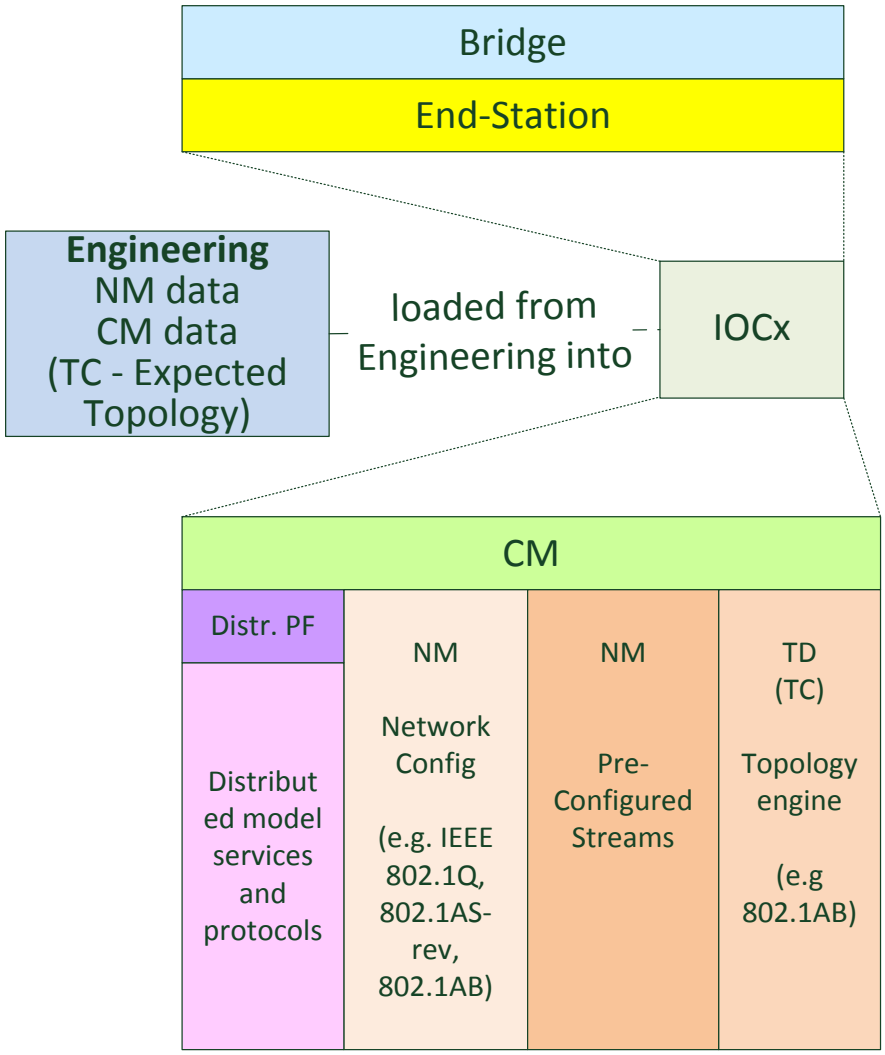
IOD – IO Device

- Responder of communication – Remote IO

Example Topology 1



Network and Stream Configuration

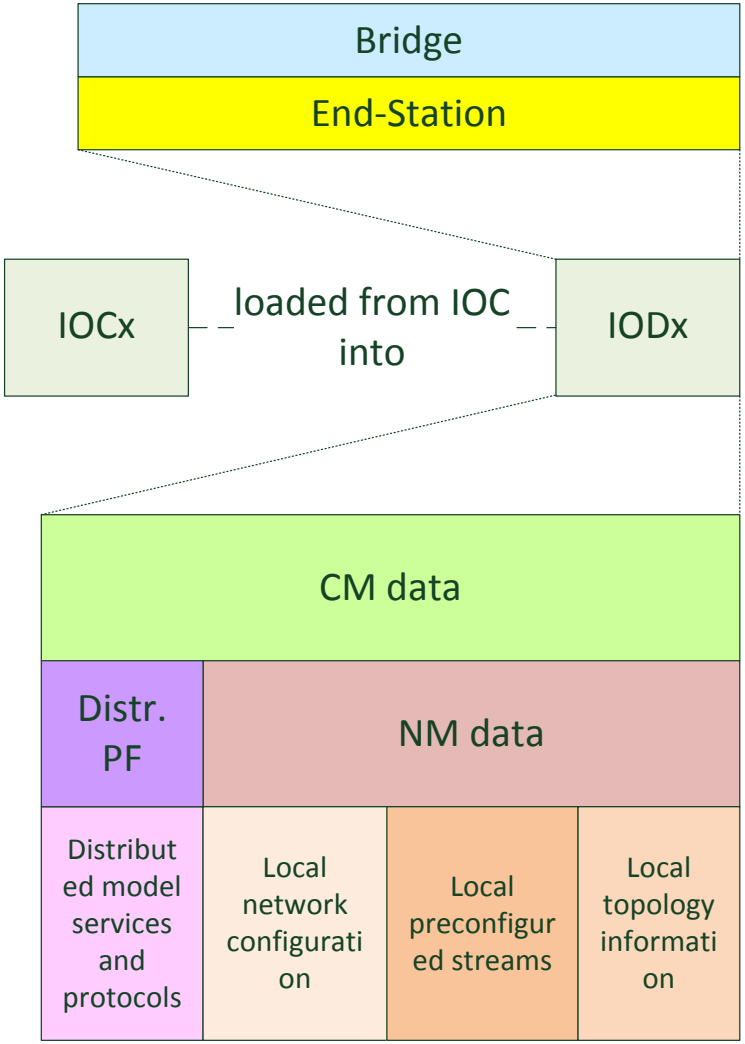


IOC loaded by engineering, with NM, CM and if required by customer with expected topology data. Engineering is afterwards removed from the system.

IOCs topology engine TD discovers topology and uses it together with the loaded NM data to create node specific NM data which is loaded into any bridge and end-station of the TSN domain.

Thus, the IOCs NM portion loads the bridges and end-stations in the TSN domain and IOCs CM portion the end stations with their stream information.

Network and Stream Configuration



- IOD loaded by IOC, with NM and CM data. NM data is persistent stored in IOD.
- NM data configures the local bridge and end-station.
- CM data is used for stream establishment and may be dynamically changed by the IOC over time.
- Topology information is provided for TD and offers checking of expected neighbors, too.

Stream establishment - distributed

End-stations use a to be specified UNI interface defined for the distributed stream establishment to setup paths and streams.

Distributed PF uses CM data and NM data, e.g. network cycle, reduction ratio and sequence as criteria's for the paths.

Details for distributed PF are not covered in this presentation!

Two (or more) IOCs

Each IOC is loaded from its Engineering with its devices and the TSN domain setup.

Thus, each IOCs NM is able to configure all bridges and end-stations with the provided TSN domain NM data, and uses its CM data to setup the streams.

If two or more IOCs (and thus two or more CMs) are in one TSN domain, each one is able to configure the whole TSN domain.

Open:

How could unneeded multiple writing of the same NM data into Bridges and End-Station be avoided?

Multiple NMs / CMs (together with multiple TSN-domains)

Assumption:

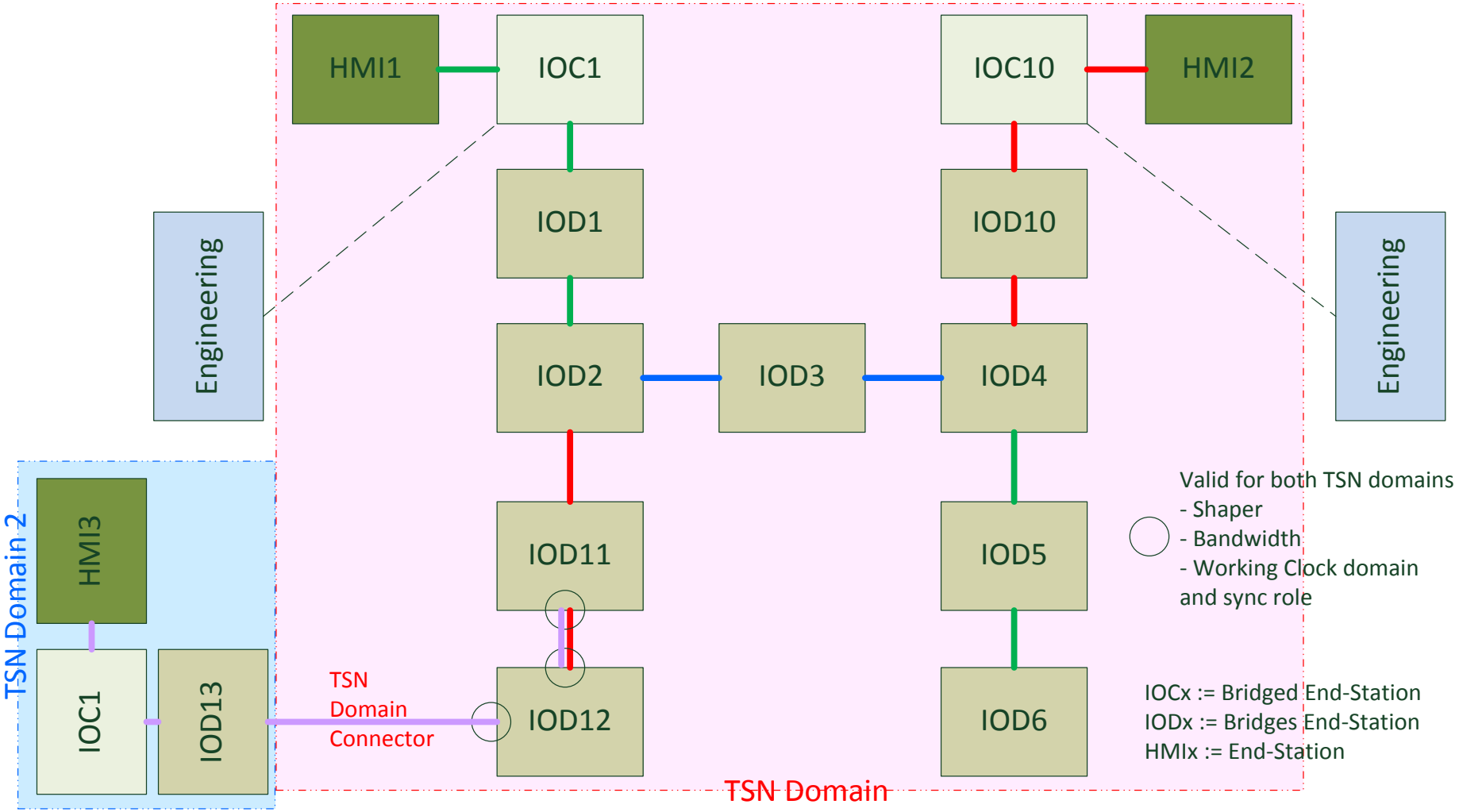
Inter-TSN-domain establishment will be solved without physically overlapping TSN-Domains

Open:

How will this be solved? How is a path detected to a node which is not part of the TSN-domain?

Do we have a new role “TSN-Domain-Connector”? How do we discover the fitting “TSN-Domain-Connector” crossing multiple TSN Domains.

Example Topology 2



Alignment with CNC and CUC

How does this model/roles fit to the model/roles defined for CNC and CUC?

NM, TD and TC are missing issues which needs to be covered by the models derived from IEEE802.1Qcc!

Do we need to cover this in the TSN-IA profile?

Thank you

Questions?