IEC/IEEE 60802

Boundary Port Isolation
Requirements and assigned features

(Draft IEC/IEEE 60802 D1.3 already contains the port isolation use case)

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Günter Steindl (Siemens AG)

Recap:
Automation systems supporting Plug & Produce

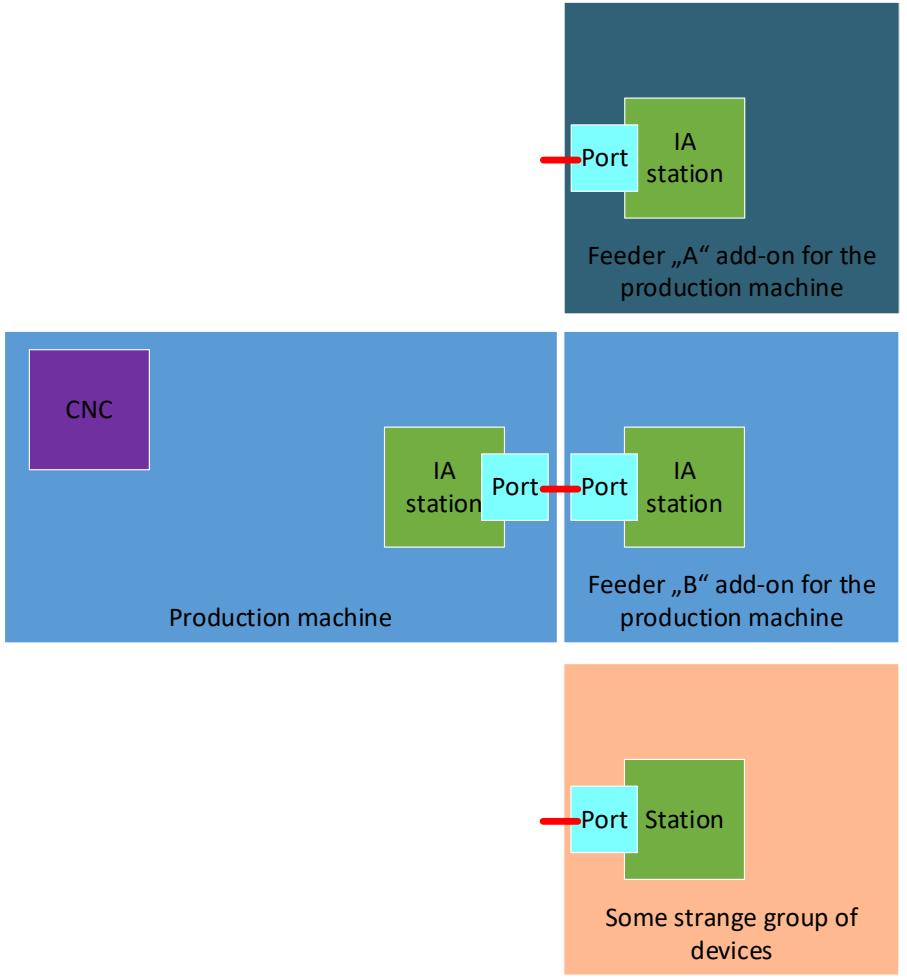
Machines are designed in a module based manner. Thus, the customer can use the base machine or the extended versions whenever needed.

In the rush of production, wrong connections happens.

Making a wrong connection shall not disturb the production machine.

Thus, any unintended use of network resource of the production machine shall be avoided.

How can we achieved this goal?



Boundary Port Isolation

How can we avoid any unintended use of network resource of the production machine?

Remote management model:

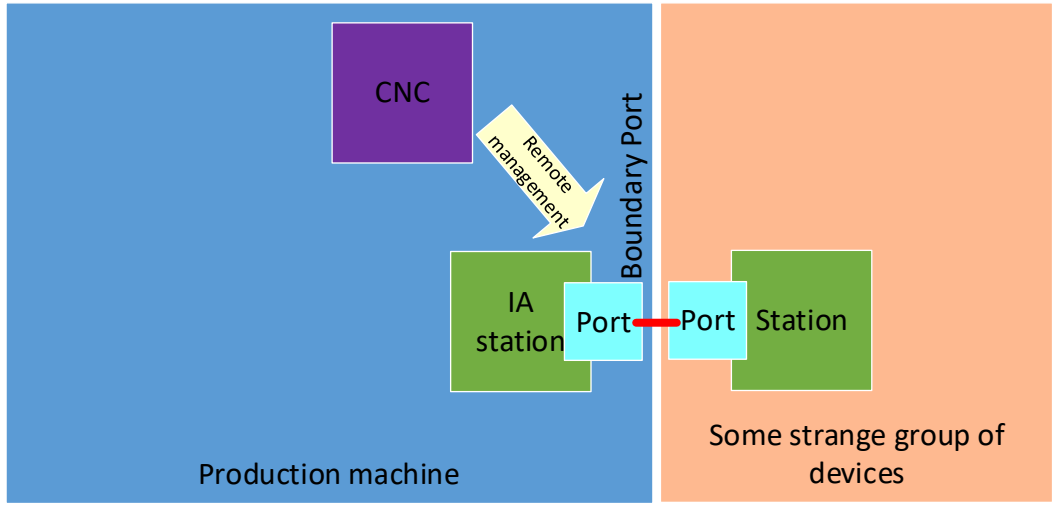
TDE / NPE entities of the CNC monitor the topology and can configure the setting at the boundary port depending on its neighborhood.

Scanning approach:

TDE scans a TSN domain with up to 1000 stations. How long will it take before the TDE discovers a change in neighborhood?

Subscription approach:

TDE uses Netconf push/Netconf subscription “on data change” to observe the port states. Any change will be indicated to the TDE and the NPE can react and change the configuration for the port to protect the network resources of the production machine.



Boundary Port Isolation Timespan

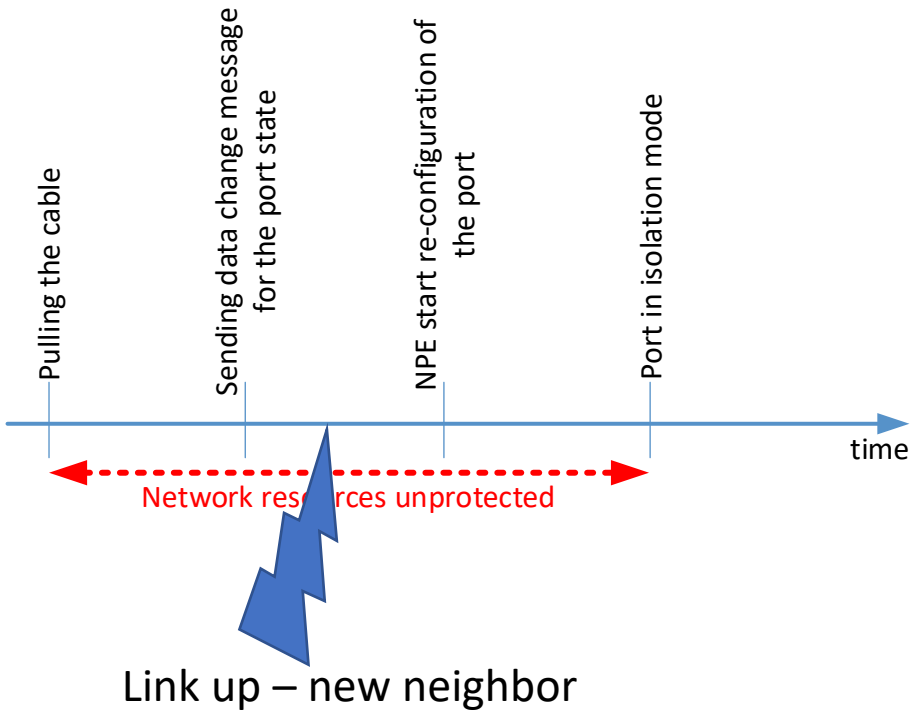
Can the subscription approach solve the problem?

The subscription approach also leaves a time gap between pulling the cable and completing the reconfiguration of the port.

How long this timespan will be is hard to state. Performance of the station, performance of the CNC, message queue size, … are influencing factors.

Thus, it seems that even the subscription approach isn't good enough.

But how can this problem be solved?



Boundary Port Isolation Protocol entity

How can we avoid any unintended use of network resource of the production machine?

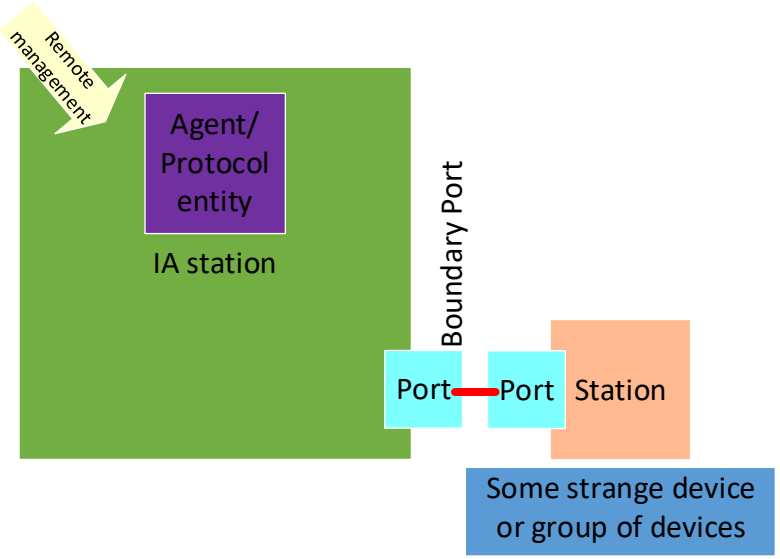
This problem can be solved by an agent/Protocol entity “sitting” in the station itself.

This agent, if active, would switch the configuration of a port into an to be defined isolation mode.

Any change of the local port state due to a new link can be delayed until the isolation mode is reached.

Remote management is used to release the isolation mode if applicable.

Now is no longer any dependency on the Netconf performance for the resource protection.



This basic principle of an agent/Protocol entity is for example used in IEEE802.1X to avoid an unprotected timespan.

Conclusion

Protecting the network resource of a TSN domain requires a fitting configuration of the boundary ports.

Any port of a station of a TSN domain can be at some time a boundary port due to the modular machine / dynamic machine setup principle.

Remote management can not guarantee the “fitting configuration” at any time.

A protocol entity residing in the stations can avoid unprotected timespans.

- Can we define such protocol entity in 60802 or .1Qdj project?
- Do we want to define such protocol entity in 60802 or .1Qdj project?
- Shall we directly move to IEEE 802.1X for port isolation?
- Does IEEE 802.1X fit for “connecting machine parts”?

Questions ?