Nendica Study Item (Forwarding of Fieldbus CPF 12 on 802.1 Bridges) Termination

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Progress Recap

- The Nendica Study Item (Forwarding of Fieldbus CPF 12 on 802.1 Bridges) initiated on July last year.
 - □ Study Item Initiation (2022-6-23): Proposal for Nendica Study Item: Forwarding of Fieldbus CPF 12 on 802.1 Bridges (802.1-22-0032)
 - □Contributions / Documents of the Study Item
 - ✓ EtherCAT Relay Function (follow-up discussion) (802.1-22-0043)
 - ✓ EtherCAT Relay Function (802.1-22-0041) Karl Weber, Marcel Kiessling
 - ✓ <u>draft-liaison-to-ETG-about-CPF12-report</u> (802.1-22-0047)
 - ✓ <u>Initial solution for Nendica Study Item (Forwarding of Fieldbus CPF 12 on 802.1 Bridges)</u> (802.1-22-0039)
 - Report of the Study Item
 - ✓ Nendica Study Item Report (Forwarding of Fieldbus CPF 12 on 802.1 Bridges) (802.1-22-0046)
 - ✓ Brief Introduction of Nendica Study Item Report (Forwarding of Fieldbus CPF 12 on 802.1 Bridges) (802.1-22-0052)

Termination of Study Item

- Currently, the items (to be studied) and deliverable are finished according to the initiation proposal of this Study Item.
- In this Study Item report slides, the industrial service (production line expansion) and network technical aspects are analyzed as the following steps, and getting the optimization directions finally.

Optimization Technical Requests Technical Issues Service Request Service Scenario **Technical Scenario Directions Production Lines** 802.1 Bridges to Mix-802.1 Bridges to To assure To combine As following points. Request 802.1 Transfer Different assure QoS for determinism but determinism and Kind of Frames. EtherCAT frames of implement complexly. complexity mitigation. Bridges to Support to **Expand New** different production To assure high To assure high EtherCAT devices. reliability but reliability without lines. replicate frame. frame replication.

- **Mix-transfer latency / jitter:** as analyzed, the 802.1Qbv could satisfy the low latency / jitter, but it's complicated to implement. The 802.1Qch could mitigate the complexity but it will increase the latency. In order to combine the complexity mitigation and low latency / jitter, the following optimization directions could be considered to assure the determinism of EtherCAT frames based on 802.1Qch.
 - ✓ To use fixed small period to minimize the wait duration for departure time of EtherCAT frame in each Bridge.
 - ✓ To build the explicit & tight period mapping relationship between all of the adjacent Bridges.
- □ **High reliability:** As analyzed, the following optimization directions could be considered to achieve the high reliability without frame replication.
 - ✓ To build the high reliability on lower layer of Ethernet network (of ring topology) to quickly detect link down and activate the backup link.
 - ✓ To avoid influence to end devices, keep compatible to device and minimize the bandwidth usage of detection frame (no more than 1%).
- Currently, there is no additional request to continue studies, it's appropriate to terminate this Study Item.

Thank you.