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

2023-5-11
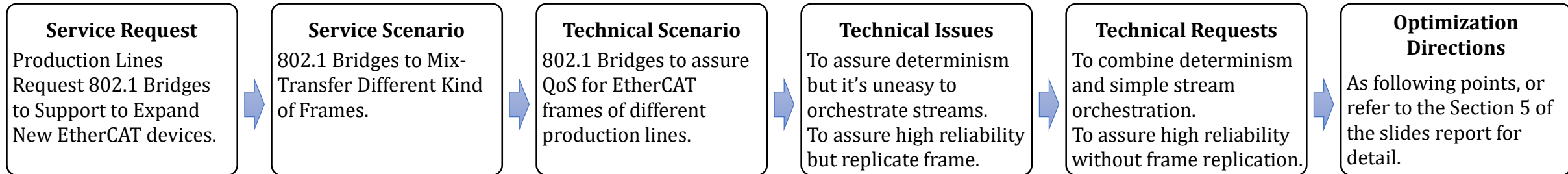
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Progress Recap

➢ 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

  ✓ [Brief Introduction of Nendica Study Item Report (Forwarding of Fieldbus CPF 12 on 802.1 Bridges)](#) (802.1-22-0052)

  ✓ [EtherCAT Relay Function (follow-up discussion)](#) (802.1-22-0043)

  ✓ [EtherCAT Relay Function](#) (802.1-22-0041) – Karl Weber, Marcel Kiessling

  ✓ [draft-liaison-to-ETG-about-CPF12-report](#) (802.1-22-0047)

  ✓ [Initial solution for Nendica Study Item (Forwarding of Fieldbus CPF 12 on 802.1 Bridges)](#) (802.1-22-0039)

☐ Informal report of the Study Item

  ✓ [Nendica Study Item Report (Forwarding of Fieldbus CPF 12 on 802.1 Bridges)](#) (802.1-22-0046)

Termination of Study Item

➤ Currently, the items (to be studied) and deliverable are finished according to the initiation proposal of this Study Item.

➤ The slides of Informal Report analyzes the industrial service (production line expansion) and network technical aspects as the following steps, and gets the optimization directions finally.

Service Request	**Service Scenario**	**Technical Scenario**	**Technical Issues**	**Technical Requests**	**Optimization Directions**
Production Lines Request 802.1 Bridges to Support to Expand New EtherCAT devices.	802.1 Bridges to Mix-Transfer Different Kind of Frames.	802.1 Bridges to assure QoS for EtherCAT frames of different production lines.	To assure determinism but it's uneasy to orchestrate streams. To assure high reliability but replicate frame.	To combine determinism and simple stream orchestration. To assure high reliability without frame replication.	As following points, or refer to the Section 5 of the slides report for detail.

The classic TDM scheduling requests to send specific frame at specific timepoint, and the streams are orchestrated according to the timeline.
◆ The orchestrated timeline with unfixed period facilitates low latency but it's uneasy to implement the streams orchestration.
◆ The orchestrated timeline with fixed period (sending cyclically) facilitates streams orchestration but it will increase the latency.

Optimization directions for determinism:
✓ 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.

The existing high reliable capabilities cannot achieve the high reliability of micro-second level recovery time (EtherCAT requirement) without frame replication.
◆ The FRER mechanisms replicate and transmit the frame along two different routine paths to achieve high reliability of zero recovery time, but twice of network bandwidth is needed.
◆ Other high reliable capabilities (RSTP, MRP, DRP, etc.) are built upon the level 2 or higher layer, and the recovery time is milli-second level, cannot satisfy the EtherCAT requirement.

Optimization directions for high reliability:
✓ To build the high reliability on lower layer of Ethernet network (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 & notification frame (no more than 1%).

➤ **Currently, there is no additional request to continue studies, it's appropriate to terminate this Study Item.**

Thank you.