Cut-Through Forwarding (CTF) - Updates since July 2022

Johannes Specht

(Self; Analog Devices, Inc.; Mitsubishi Electric Corporation; Phoenix Contact GmbH & Co. KG; PROFIBUS Nutzerorganisation e.V.; Siemens AG; Texas Instruments, Inc.)

July 802.1 Closing Plenary Meeting Motions

Motion

- 802.1 authorizes the IEEE 802 Nendica to hold joint meetings with the 802.3 NEA to discuss cut-through forwarding.
- Dates, times and agenda to be announced subject to notice of at least 10 days to the 802.1 Minutes email list .
- Access information is posted on the Nendica page and will be updated as necessary.

- Proposed: Johannes Specht
- Second: Paul Congdon
- Approved by acclamation

Source: https://www.ieee802.org/1/files/public/minutes/2022-07-closing-plenary-slides.pdf

Motion

- 802.1 authorizes the TSN TG to generate PAR and CSD at the September 2022 interim session for pre-circulation to the EC for an IEEE 802.1 standard on Cut-Through Forwarding.

- Proposed: Johannes Specht
- Second: Jordon Woods

  – Move to call the question:
  – In the WG (y/n/a): 21, 16, 6

- In the WG (y/n/a): 16, 23, 8

Source: https://www.ieee802.org/1/files/public/minutes/2022-07-closing-plenary-slides.pdf

No Objection

Objections Raised
- 3rd motion in series on the same subject.
- Prior to another motion, provide more technical clarity on uncertainties.
    - Uncertainty about the technical scope of P802.1DU.
    - Uncertainty on support for CTF below the ISS.

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EC Reports on the Nendica/NEA Joint Activity

IEEE 802 Nendica perspective on the NEA/Nendica joint ad-hoc activity on CTF

Nendica CTF History & 802.1 Status

- Nendica CTF Study Item opened in March 2021 and has met many times since
- 802.1 WG pre-submitted CTF PAR (P802.1DU) Jan. 2022
  - Withdrew the request in March in the face of comments
- held 7 Joint CTF meetings along with 802.3 NEA
  - April-June 2022
  - Outcome: no consensus yet
- Nendica met about 3 hours on CTF at July 2022 Plenary
  - No consensus on what supporting MAC an 802.1 Cut-Through Forwarding standard would use and, if needed, where to specify it.
- At 802.1 WG Closing of 2022-07-14, motions were made
  - *802.1 authorizes the IEEE 802 Nendica to hold joint meetings with the 802.3 NEA to discuss cut-through forwarding.*
    - *Dates, times and agenda to be announced subject to notice of at least 10 days to the 802.1 Minutes email list.*
    - *Access information is posted on the Nendica page and will be updated as necessary.*
    - In the 802.1 WG: approved by acclamation
  - *802.1 authorizes the TSN TG to generate PAR and CSD at the September 2022 interim session for pre-circulation to the EC for an IEEE 802.1 standard on Cut-Through Forwarding.*
    - In the 802.1 WG (y/n/a) 16/23/8 (motion failed)

Source: https://mentor.ieee.org/802.1/dcn/22/1-22-0037-00-ICne-cut-through-forwarding-status-update-from-nendica-perspective.pdf

IEEE 802.3 NEA perspective on the NEA/Nendica joint ad-hoc activity on CTF

- Discussion of joint 802.1 Nendica / 802.3 NEA Ad Hoc meetings
  - NEA has completed the scope of the charter by the 802.3 Working Group Chair with joint meetings with 802.1 Nendica.
  - If the cut-through proponents wish to change IEEE Std 802.3-2022 they need to follow the 802.3 process. The cut-through proponents may use the NEA for consensus building in preparation for a Call for Interest in the 802.3 Working Group (but are not required to utilize the NEA).
  - Other discussion is better suited for an architectural discussion and not the scope of the NEA.
  - Review NEA conclusion

Source: https://www.ieee802.org/3/minutes/jul22/0722_NEA_close_report.pdf

IEEE 802.3 NEA Conclusion from the joint NEA / 802.1 Nendica meetings on cut-through forwarding.

The IEEE 802.3 Ethernet Media Access Control (MAC) and MAC Client service interface specified in IEEE Std 802.3-2022 only supports store and forward operation and is unable to support cut-through operation. To provide cut-through capability, a new definition of the IEEE 802.3 MAC is required.

Source: https://www.ieee802.org/3/minutes/jul22/0722_NEA_close_report.pdf

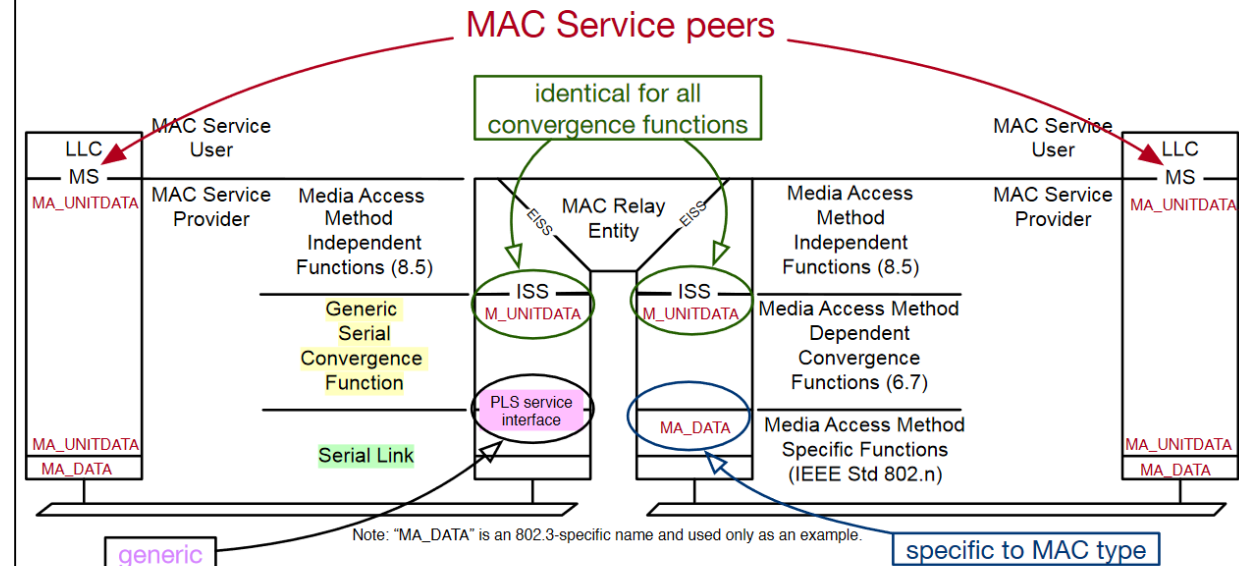Johannes Specht

GSCF – below the ISS (1)

Addressing the MAC Roadblock

- Approach:
  - Bypass the MAC roadblock by eliminating the MAC.
    - This could help enable cut-through forwarding (CTF).
    - Perhaps other advantages might also result.
- Presumption
  - collision-free LAN
    - support for only for full-duplex
    - medium access needs no control

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Architectural Model with GSCF & PLS

All Ethernet LANs support the PLS interface.
Other LANs might, in principle, also support "reconciliation" to PLS.

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GSCF – below the ISS (2)

GSCF is not "a MAC"

- It does not initiate or terminate the MAC service.
- It does not operate at a MAC SAP or have a MAC address.
- It is not a peer.
- It can function with a variety of MAC specs
- It does not match the functionality of any existing MAC.
  - e.g. it does not match the 802.3 MAC spec
  - though it includes some functions of the 802.3 MAC spec
- Its upper interface can be described by transactions that are more granular than a frame.
- The bridge using GSCF and CTF is closer to a repeater or hub.
  - But the bridging function makes it a selective repeater.

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Recommendations

- Future CTF project proposals could consider GSCF as a basis of documenting feasibility
  - Should determine whether the existing ISS M_UNITDATA primitive specifications are compatible with using GSCF for CTF
    - If not, should consider supplementing ISS with the additional primitives based on transferring octets, DA, SA, and FCS
- Specification of GSCF could be developed as an amendment to IEEE Std 802.1AC.
  - That's where the "Media Access Method Dependent Convergence Functions" are specified.
    - Although the title is "Media Access Control (MAC) Service Definition," the scope includes much more, including:
      - ISS specification
      - Media Access Method Dependent convergence functions supporting ISS
- CTF functionality at the bridge would be better specified elsewhere.

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Providing Technical Clarity to WG 802.1

Contents

Source:

Work-in-progress → Early feedback welcome!

Next Steps - in IEEE 802 Nendica and IEEE WG 802.1

- Continue to develop "Technical Descriptions for Cut-Through Forwarding in Bridges" and gather feedback in IEEE Nendica, by e-mail, etc.

- Determine the "vehicles" for the next steps in standardization

- On the basis of "Technical Descriptions for Cut-Through Forwarding in Bridges", ask 802.1 WG, at IEEE 802 Plenary Session in November 2023, to authorize TSN for PAR/CSD pre-submission(s) towards IEEE 802 Plenary Session in March 2023

Johannes Specht

Thank You for Your Attention!

<p style="text-align:center; color:#4472C4; font-size:3em;">Questions,
Comments,
Opinions,
Ideas?</p>

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