Nendica/NEA Joint Ad Hoc on Cut-Through Forwarding: Status

Rev 2: 2022-05-11: new Slides 8-13
Rev 1: 2022-04-27: added Slides 7-8
Rev 0: 2022-04-20

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2022-05-11

Background

- Nendica: IEEE 802 "Network Enhancements for the Next Decade" Industry Connections Activity
- Nendica Study Item: Cut-Through Forwarding in Bridges and Bridged Networks [CTF] active since 2021-03-11
- Organized IEEE 802 Plenary Tutorial (2021-07-07): "Cut-Through Forwarding (CTF) among Ethernet networks"
- Nendica Consensus (2021-09-16) that "further discussion should be brought to the 802.1 WG or a Task Group"
- 802.1 WG submitted draft PAR 802.1DU ("Cut-Through Forwarding Bridges and Bridged Networks") PAR and CSD, 2022-01-31 for IEEE 802 March Plenary
- Comments developed in 802.3 WG, with 802.3 and 802.1 members
- Comment responses developed in 802.1 WG, with 802.1 and 802.3 members
- 802.1 WG decided not to pursue PAR in March

802.1 WG Motions

- 802.1 WG Motions, 2022-03-15:
  - *Authorize the 802.1 WG to hold joint meetings with the 802.3 WG to discuss cut-through forwarding.*
  - *802.1 authorizes the 802.1 WG chair to present status of P802.1DU to the 802.3 WG and request joint meetings to continue discussion.*
  - *802.1 authorizes the TSN TG to generate PAR and CSD for pre-circulation to the EC for the July 2022 plenary session for an IEEE 802.1 standard on Cut-Through Forwarding.*

802.1/802.3 WG Actions

- 802.3 Closing Plenary (2022-03-17)
  - 802.1 WG Chair presentation recounted history of CTF activity in 802 back to 2016 and reported:
    - *P802.1DU PAR is deferred…*
    - *Consensus in 802.1 WG to discuss further with 802.3 WG jointly*
    - *Proposed venue*
      - *Joint NEA and Nendica Industry Connections ad hoc*
        - Note: "NEA" is IEEE 802.3 Industry Connections New Ethernet Applications Ad Hoc
        - https://www.ieee802.org/3/ad_hoc/ngrates
    - 802.3 Chair verbally accepted the proposal, with details to be determined

Ad Hoc Initiation

- Discussions in Nendica meetings
  - 2022-03-24, 2022-03-31, 2022-04-07
- Coordination with NEA and 802.3 leadership
- Polled potential participants regarding time slot
- Agreed to meet Wed 12:00-13:00 ET
  - 2022-04-20, 2022-04-27, 2022-05-04
  - Ad hoc can schedule further meetings
  - https://1.ieee802.org/802-nendica/ctf-adhoc/
  - Contributions to Nendica mentor, or via 802.3
  - Nendica Chair and NEA Chair to alternate as meeting chair and meeting secretary

Summary of First Meeting

- 2022-04-20, 12:00-13:00 ET
- 66 people
  - 17 registered in just 802.1 IMAT
  - 22 registered in just 802.3 IMAT
  - 1 registered in 802.1 and 802.3 IMAT
  - 26 additional on Webex seemed to not be in IMAT
- Contribution by NEA Chair on 802.3/NEA process
- Contribution by Nendica Chair on ad hoc background
- Contribution by Johannes Specht: “Cut-Through Forwarding (CTF) in Bridges and Bridged Network – Status Update”
- very little technical discussion
- request made for a contribution to detail the 802.3 perspectives; none offered yet

Summary of Second Meeting

- 2022-04-27, 12:00-13:00 ET
- 52 people
  - 18 registered in just 802.1 IMAT
  - 23 registered in just 802.3 IMAT
  - 11 additional on Webex seemed to not be in IMAT
- NEA Chair presided
- Contribution by Peter Jones: “802.3 NEA CTF: CTF concerns”
- extensive technical discussion
- continued objections to CTF from 802.3 participants

Summary of Third Meeting

- 2022-05-04, 12:00-13:00 ET
- Nendica Chair presided
  - awaiting distribution of minutes
- 45 people
  - 17 registered in just 802.1 IMAT
  - 15 registered in just 802.3 IMAT
  - 13 additional on Webex seemed to not be in IMAT
- extensive discussion of future meetings per 802.1-22-0020
  - Agreed to plan meeting 2022-06-01 12:00 ET
    - Pending NEA agreement, 2022-05-19
- Presentation of contribution 802.1-22-0021
  - through Slide 10 only
  - insufficient time for assessing a reaction

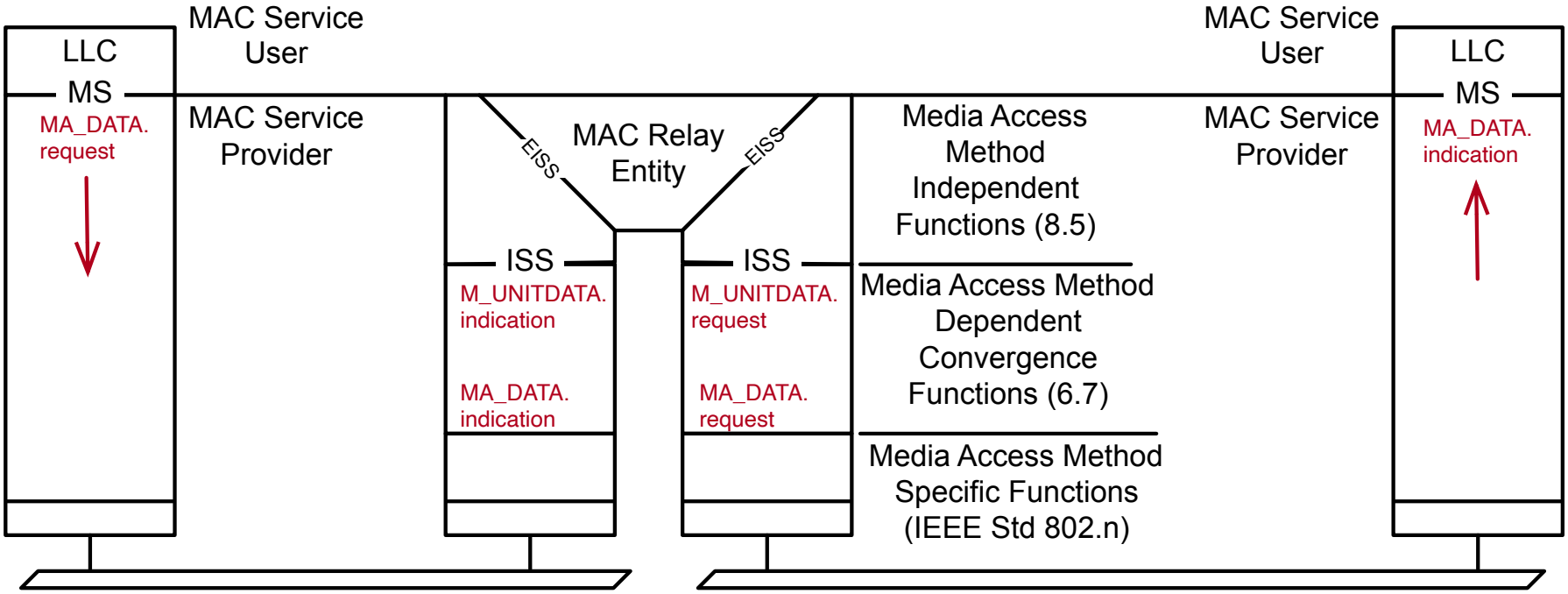
Nendica CTF-focus meetings

- Nendica (2022-05-05) scheduled two additional Friday meetings with a CTF focus, prior to Joint Ad Hoc meeting:
  - 2022-05-20 11:00-13:00 ET
  - 2022-05-27 11:00-13:00 ET

Views on perspective from 802.3

- Views from 802.3 perspective presented on 2022-04-27
  - Individual contribution,
- Key points from 802.3
  - CTF would require a revision of the MAC service in 802.1AC and then a revision of 802.3 to address the documented behavior
  - A CTF bridge cannot conform to the externally-observable behavior specified for the 802.3 MAC
  - CTF would pass errored frames, contrary to IEEE Std 802.3
  - CTF would break management
  - CTF is a layer violation
  - 802.3 rarely changes the MAC and will be reluctant to do so
- In summary, the view is that 802.1 should not open a CTF PAR.
  - very little focus on possible changes to 802.1DU PAR to address concerns

ISS, not MAC Service, is relevant



NOTE-The notation IEEE Std 802.n in this figure indicates that the specifications for these functions can be found in the relevant standard for the media access method concerned; for example, n would be 3 (IEEE Std 802.3) in the case of Ethernet.

Figure 6-1—Internal organization of the MAC sublayer

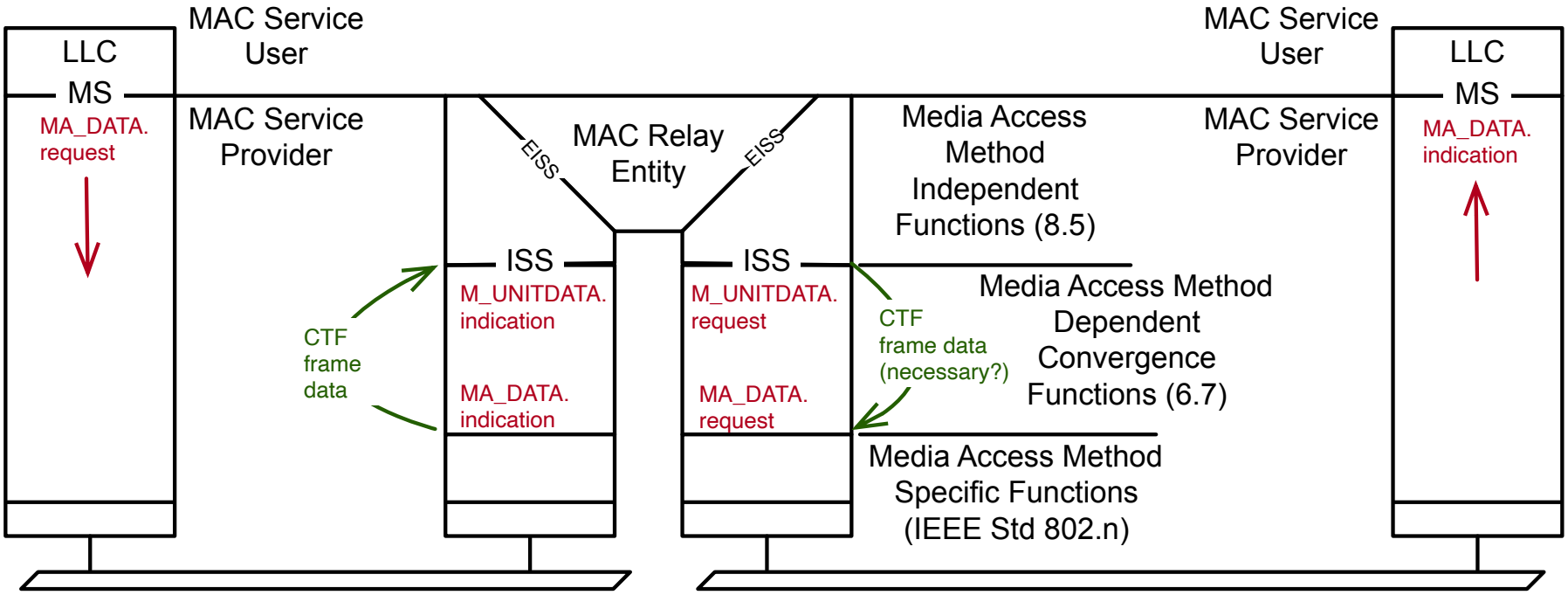
- IEEE Std 802.3: "The contents of invalid MAC frames shall not be passed to the LLC or MAC Control sublayer." [doesn't mention to Convergence Function]
  - but 802.3 MAC does not seem to know whether the recipient is a Convergence Function
- IEEE Std 802.3: "Invalid MAC frames may be ignored, discarded, or used in a private manner by MAC clients other than LLC or MAC control. The use of such frames is beyond the scope of this standard."
  - So does that open the door to relaying them? [LLC will eventually filter them.]

Possible compromises?

- Possible constraints could be added to PAR (see 802.1-22-0020)
  - no forwarding before 64 bytes (runt frame check)
  - no CTF on slow-to-fast link speed transition
  - no CTF to LLC
  - other conditions (e.g. slide 53 of CTF tutorial)
- Possible points to add
  - Standardize a CRC "stomp" localizing the frame error
    - as noted in prior contribution
    - stomp applied by the bridge
  - Standardize counter behavior on errored frames
    - as noted in prior contribution
- Clarification of service primitives?
  - Amend 802.1AC?
    - specify meaning of "atomic"?
- 802.1AC does not seem to prohibit action without M_UNITDATA.indication

Early availability of frame data

- MAC is not required to share frame content serially, but that's not prohibited either
- M_UNITDATA.indication occurs at end of frame
- Alternatively, see "lookahead" model 802.1-22-0021



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