

# It is time to support 10BASE-T1S in IEEE 802.1AS-2020

Don Pannell, Fellow  
Automotive Ethernet Networking, NXP Semiconductor

IEEE 802.1DG preview of this presentation for:  
IEEE 802.1 TSN Plenary – July 2021



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# History

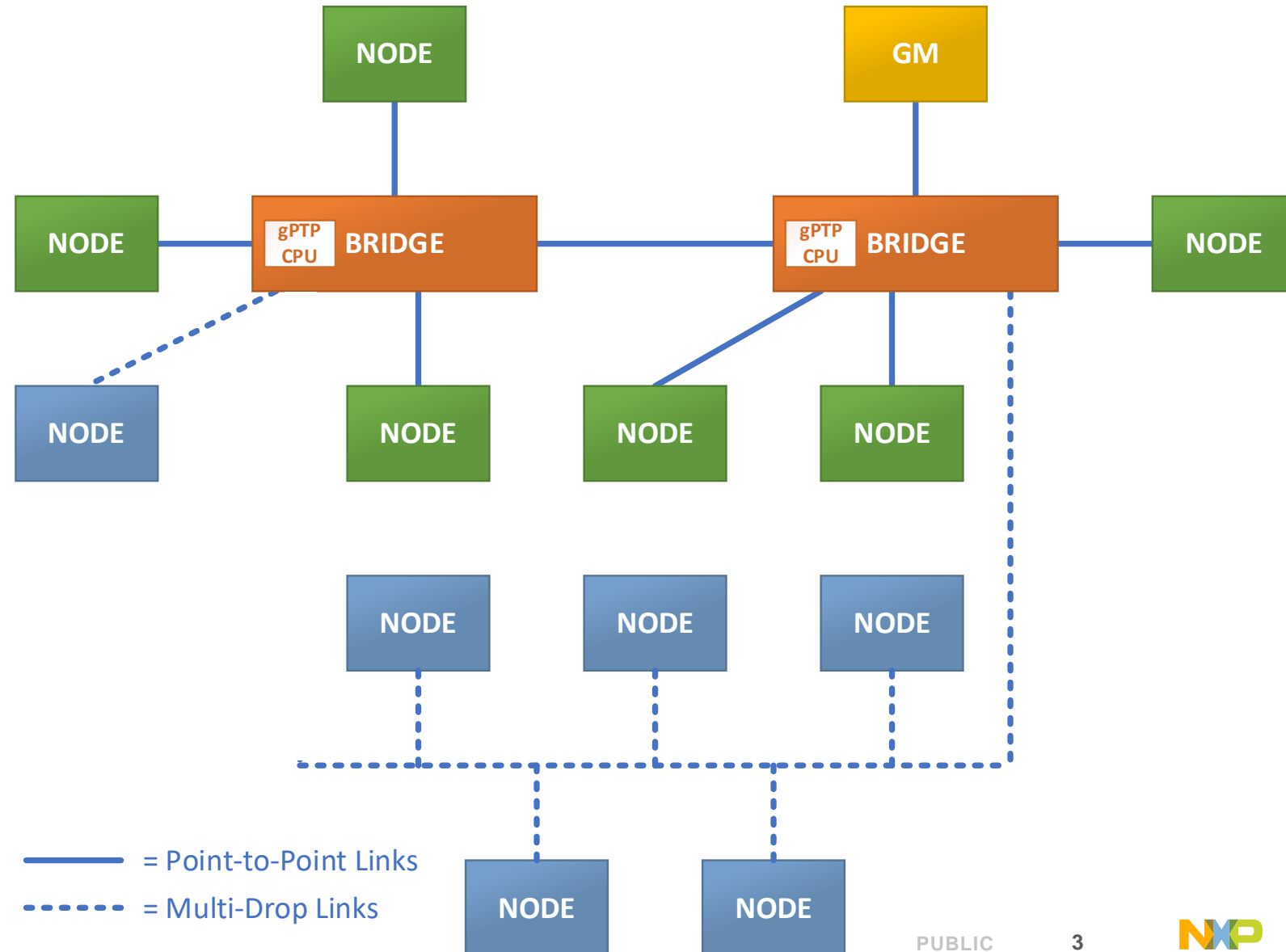
- IEEE 802.1AS-2011 gPTP specifically prohibited Ethernet shared media (CSMA-CD) as that media could not support the initial AVB plug-n-play use cases.
- IEEE 802.3cg-2019 standardized single pair 10Mb/s shared media PHYs (10BASE-T1S).
- IEEE 802.1AS-2020 gPTP continued the shared media restriction.
  - Many saw this need coming, but no one wanted to propose a late change to the AS-Rev timeline.
- Automotive is a main driver for 10BASE-T1S and Automotive needs gPTP for TSN.
  - In the last year, this group has seen multiple presentations on this topic:
    - <https://www.ieee802.org/1/files/public/docs2020/dg-janker-timesync-in-10BASE-T1S-networks-0920-v02.pdf>
    - <https://www.ieee802.org/1/files/public/docs2020/dg-rentschler-802-1as-MD-multidrop-0920-v01.pdf>
    - <https://www.ieee802.org/1/files/public/docs2021/dg-janker-timesync-in-10BASE-T1S-networks-0521.pdf>
- Now is the time to enhance IEEE 802.1AS-2020 to support 10BASE-T1S links.

# Goal

- Make a motion at the July 2021 802.1 closing Plenary to allow the TSN group to draft a PAR and CSD during the Sep 2021 Interim for an amendment to IEEE 802.1AS-2020 to support 10BASE-T1S.
- Make a 2<sup>nd</sup> motion at the July 2021 802.1 closing Plenary to allow pre-circulation of the above PAR and CSD ahead of the Nov 2021 Plenary such that it can be voted on by the other 802 groups in Nov. <<motion text to be supplied by Janos before the Plenary>>
  - This timeline allows this work to start at the Jan 2022 Interim.
- Get this work done in time so it can be referenced in IEEE P802.1DG.
  - This requires a narrowly focused PAR to address support for 10BASE-T1S only!
  - The changes need to be minimal for faster time to standardization and for smallest code footprint and ease of code implementation.
    - Many devices (Bridges and End Stations) that need to support 10BASE-T1S gPTP also need to support gPTP on point-to-point links (using AS-2020) so the more the algorithms and state machines stay the same the better.

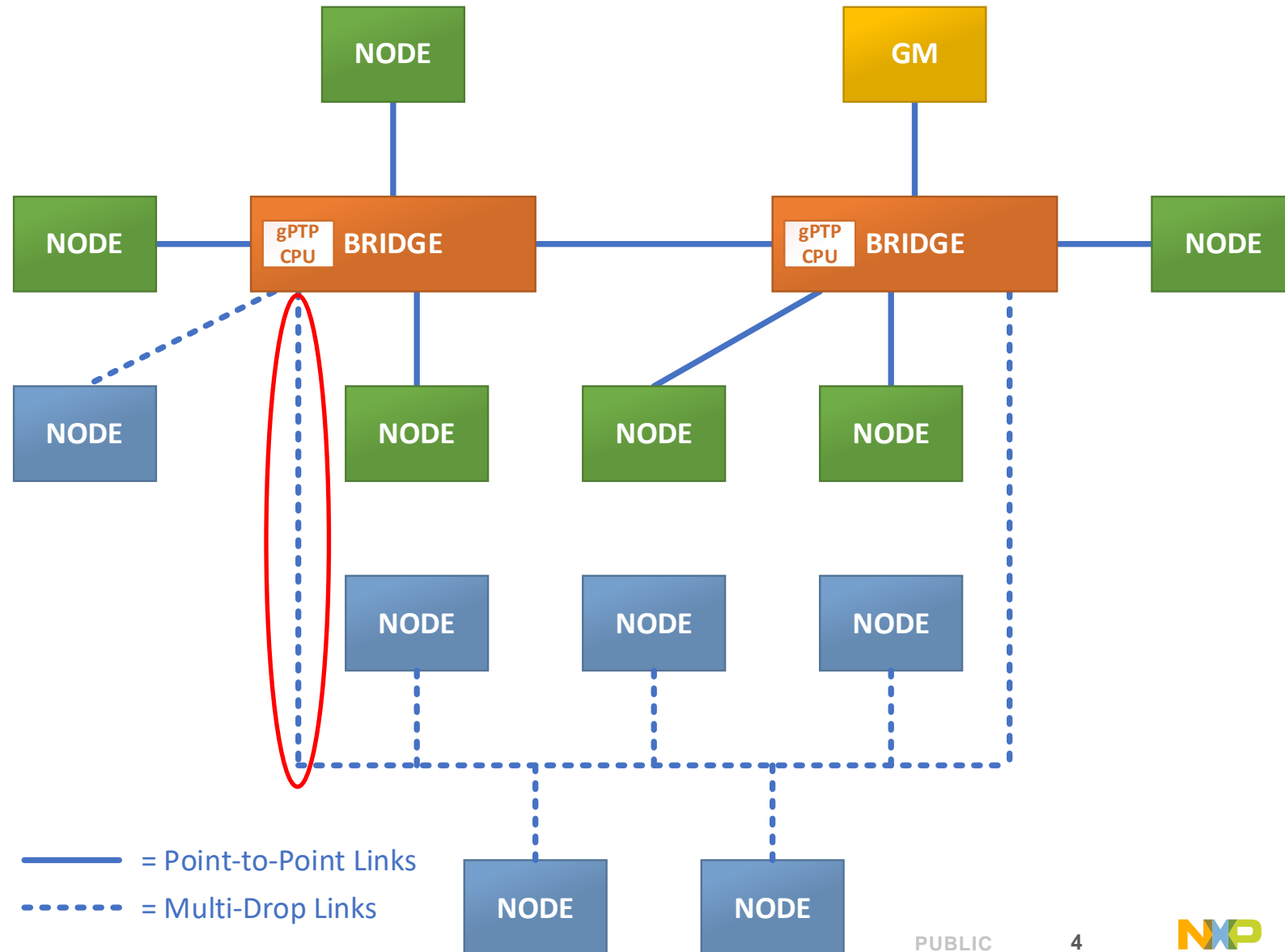
# Typical TSN Network with Point-to-Point & Multi-Drop Links

- Bridges will need to support both kinds of links
- Bridges are constrained devices usually with no external code memory
- Their on-die code memory is sized to support gPTP for Point-to-Point links
- Support for Multi-Drop links needs to keep these code changes to a minimum so it can fit!



# Do we need to support Redundancy (the added red oval)?

- This needs to be decided when work on this project can start (after PAR approval)
- But the more similar the 10BASE-T1S solution is to the current IEEE 802.1AS-2020, the more likely any features AS supports will work on both media – including redundancy
- This is another reason to keep the changes to a minimum!
- And the need to stay consistent w/ IEEE 1588 too!



# Supporters

- Avnu Automotive:
  - Ionel Ghita, Keysight
  - Alon Regev, Keysight
  - Vlad Lyalikov, Microchip
  - Bob Noseworthy, UNH-IOL
- OEMs:
  - Olaf Krieger, Volkswagen AG
  - Helge Zinner, CARIAD SE
- 802.1:
  - Rodney Cummings, NI
- If you wish your name on this list, please send an e-mail to: [donald.pannell@nxp.com](mailto:donald.pannell@nxp.com)



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