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

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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.

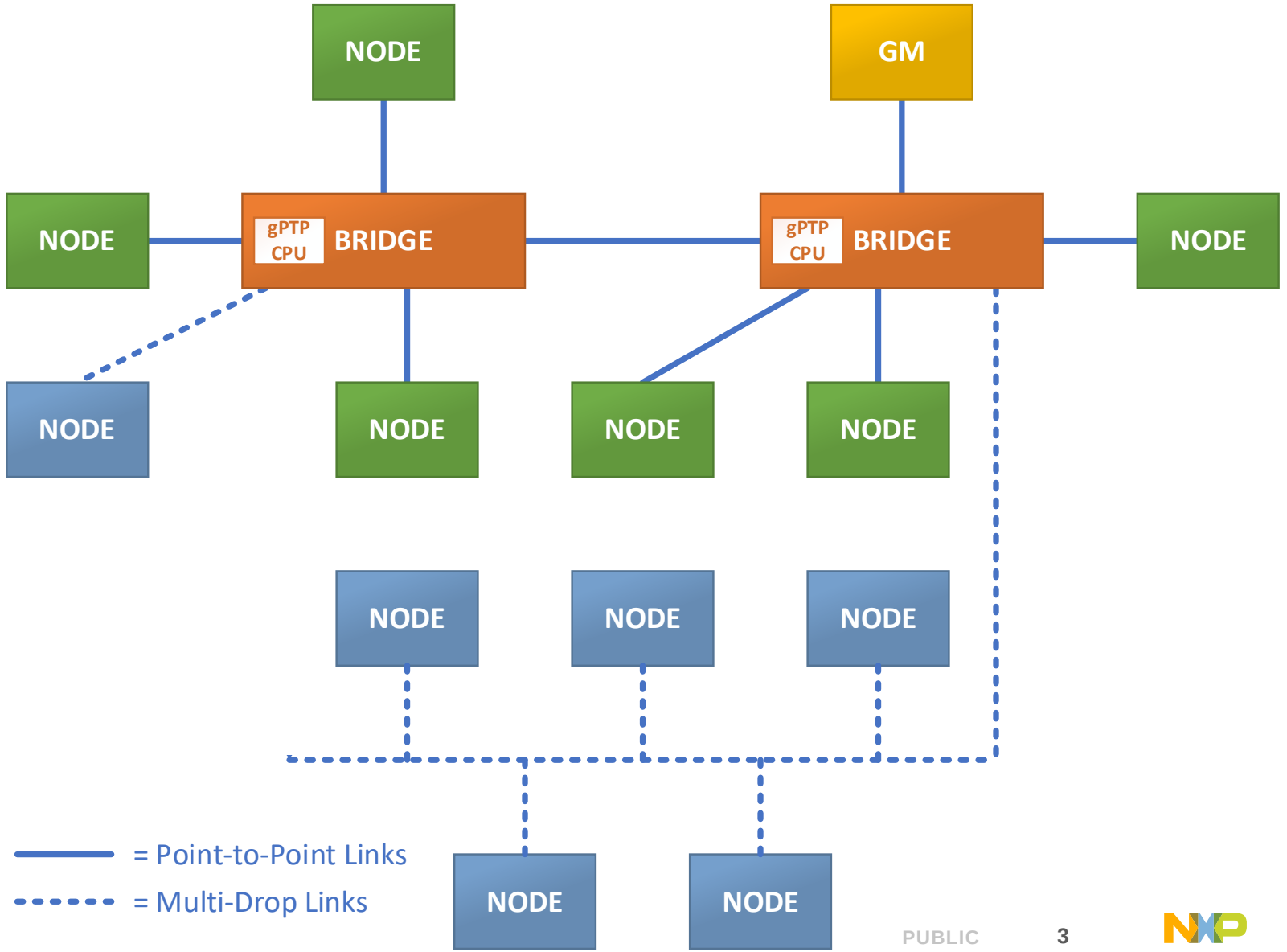
Goals

- Make a motion at the July 2021 802.1 Closing Plenary stating:
  - 802.1 authorizes the September 2021 interim to generate PAR & CSD for pre-circulation to the EC for an amendment to IEEE Std 802.1AS to add support for 10BASE-T1S.
- This timeline allows all of 802 to vote on the PAR & CSD at the November 2021 Plenary allowing this work to start in 802.1 at the January 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.

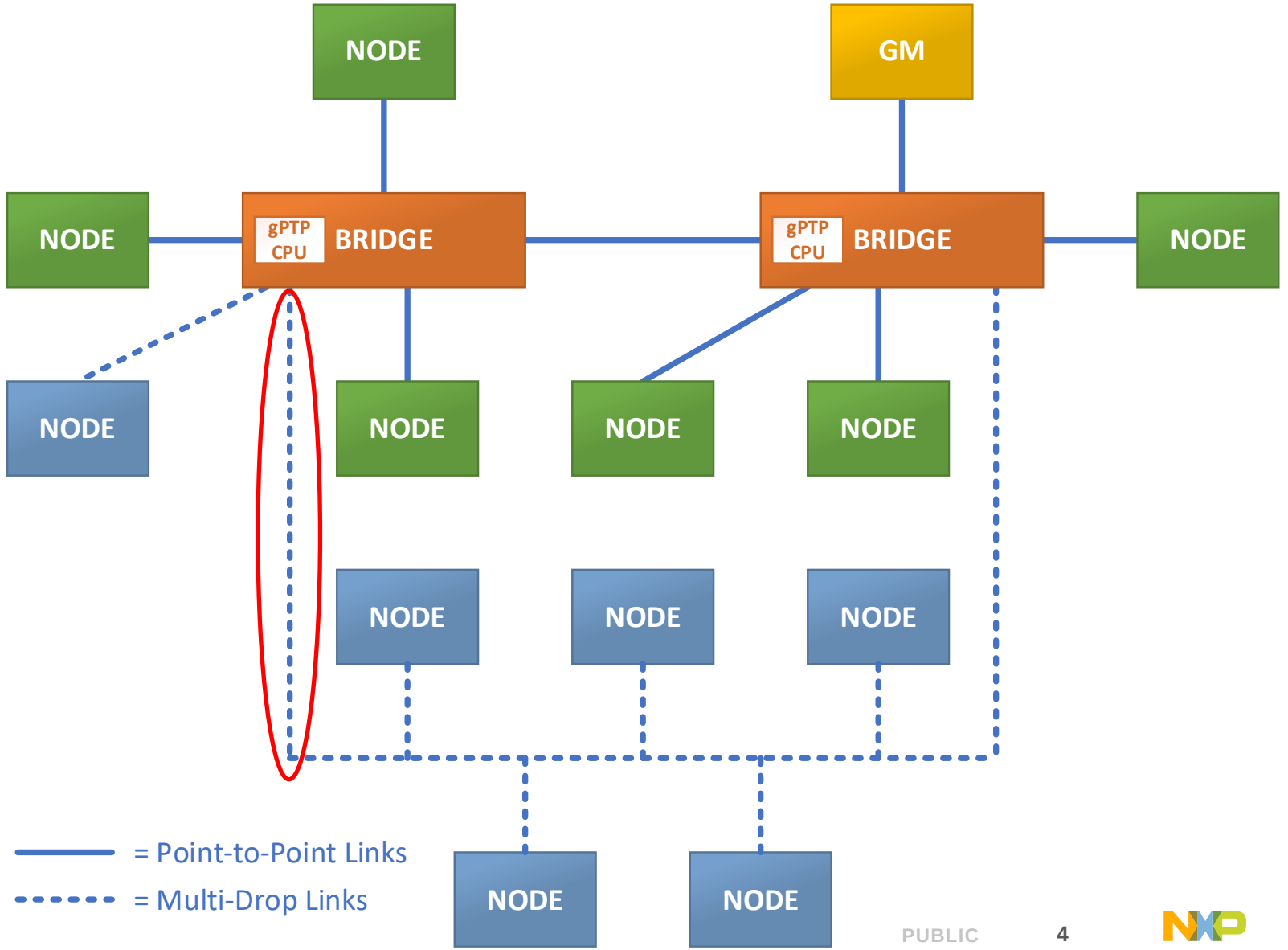
Typical TSN Network with Point-to-Point & Multi-Drop Links

- 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!
- AutoSAR's work may also need to be considered



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

- OEMs:
  - Helge Zinner, CARIAD SE (also 802.1)
  - Jim Lawlis, Ford (also 802.1)
  - Kirsten Matheus, BMW AG (also 802.3)
  - Olaf Krieger, Volkswagen AG (also 802.3)
- 802.1:
  - Harsh Bolia, Analog Devices
  - Georg Janker, Ruetz System Solutions
  - Maik Seewald, Cisco
  - Max Turner, Ethernovia
  - Rodney Cummings, National Instruments
- Avnu Automotive:
  - Alon Regev, Keysight
  - Bob Noseworthy, UNH-IOL
  - Ionel Ghita, Keysight
  - Vlad Lyalikov, Microchip

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