

Further Consideration on Preamble/SFD

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Industry Interests

- SDOs (e.g., UEC/OCP ESUN) are working to improve packet efficiency for short messages in AI/HPC applications (e.g., 128/256B/512B/1KB memory semantics and 8B/16B/64B HPC applications).
- UALink is based on Ethernet PHYs but eliminates IPG and preamble/SFDs by using fixed data-link flits to provide better wire efficiency.
- Additionally, during our pre-CFI discussions, people are considering features that would use per-packet (preamble) metadata. However, what do we do if there isn't enough space in the default preamble/SFD?

Packet efficiency improvements in the industry

- L2/L3 header compression: 14B+20B (standard) to 14B/6B (optimized)

- UFH (Unified Forwarding Header) in UEC
- Header compression in ESUN

(more information can be found at:

<https://1.ieee802.org/workshop-agenda-2026-04-23/>)

- Shorter preamble under discussion in UEC

- Preamble can be reduced to 4B to work with LLR.

- Some evaluation shows that Ethernet (UALoE/SUE) bandwidth gets close to UALink if IPG(/Preamble) reduced from 20B.

- See: “performance evaluation of Interconnect Technologies for AI Scale-Up Computing: UAL vs UALoE/SUE vs RoCE”, Srihari Vegesna Srinivas Gangam, Upscale AI@2025 OCP Summit

.../128/256/5 12/1KB...
20
14
12
8

Upper layer message
IPv4 header
Ethernet MAC header
Inter-packet Gap (IPG)
Preamble

Preamble for other use cases

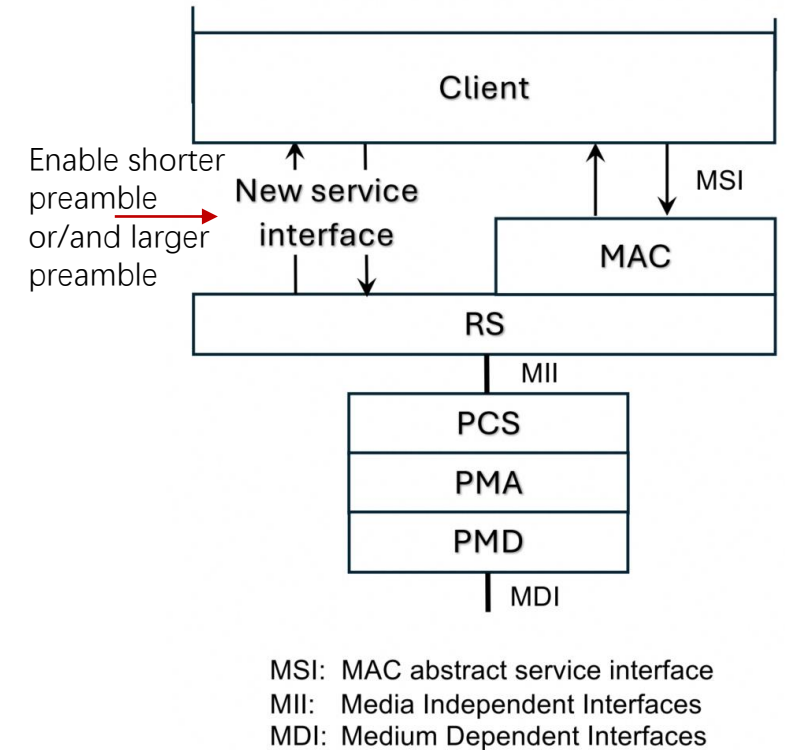
Other Industrial Automation use cases

- Add security to PTP without altering frame payload at each hop
- Timestamp data packets at egress and ingress for network performance characterization
- Redundant transmission without altering the payload
- Pre-notification of bursts for congestion control

These use cases are not fully
considered...

Question: should we extend 802.3dt to cover shorter and/or larger preamble?

- Benefits:
 - IEEE 802.3 can provide a standardized service interface and guidance for the industry to define new features for AI/HPC applications, while remaining compliant.
 - It mitigates the risks of designs that are inconsistent with or non-compliant with Ethernet families.
- If yes, what we will do:
 - Extend the per-packet metadata to enable shorter preamble or/and larger preamble (while leaving the format open for industry extension).



Thanks!