

Considerations on GMP bypass for 800G-LR1/ER1

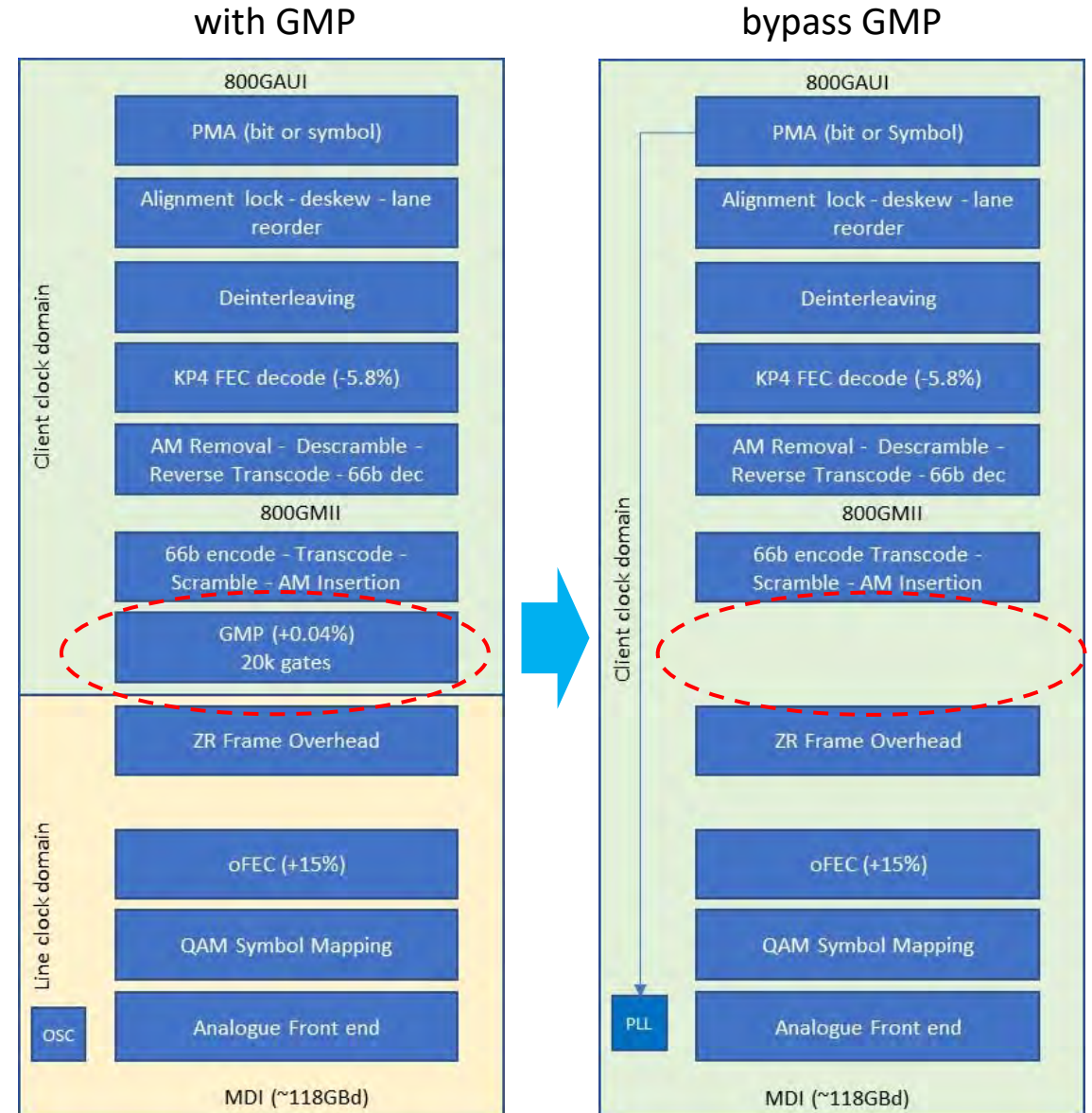
- Haojie Wang, *China Mobile*
- Weiqiang Cheng, *China Mobile*
- Ruibo Han, *China Mobile*

Supporters

- Tom Williams, Cisco
- Aihua Liu, ZTE
- Chengbin Wu, ZTE
- Huijun Sha, Viavi
- Xue Wang, H3C
- Yanjun Zhu, Hisense
- Zhan Su, Ruijie Networks
- Yu Zhu, Hengtong Group
- ChiYuan Chen, Spirent
- Greg LeCheminant, Keysight Technologies

Background

- [nicholl_3dj_optx_01_230413](#) presented a synchronous mapping (GMP bypass) scheme for 800GBASE-LR1/ER1 to mitigate the impacts of GMP on PTP time synchronization accuracy.
- GMP mapping can incur latency fluctuation (PDV) that impact PTP accuracy. More details are presented in [nicholl_3dj_optx_01_230413](#)
- PDV in PTP synchronization is vulnerable to GMP mapping, which is adverse to time-sensitive applications, such as AI-Generated Content.
- GMP bypass is a more harmonious scheme for 800GBASE LR1/ER1 in terms of Ethernet application.
- Considerations on the necessity of GMP bypass are put forward.

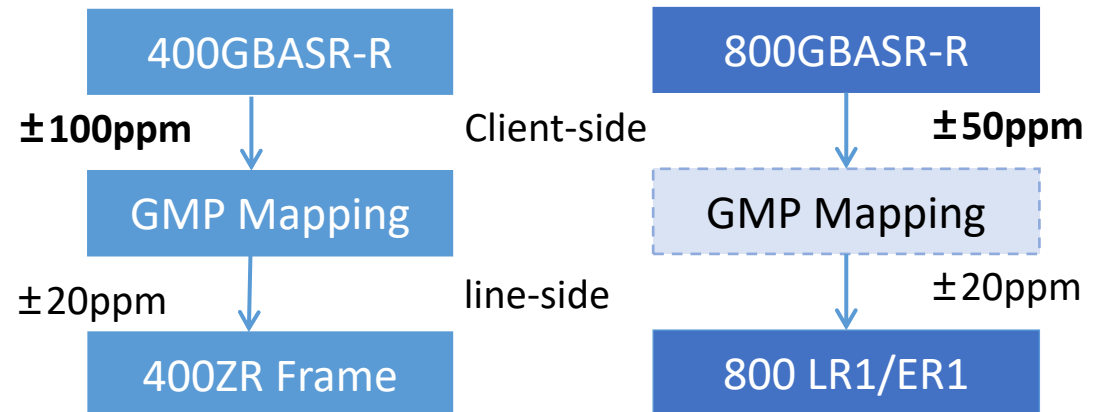


GMP overview

- Principle of GMP mapping
 - The generic mapping procedure (GMP) is a mapping process proposed in ITU, which promises to deliver a flexible mapping for clients on any speed rates.
 - It is based on dividing the OPU segment into 1.25 Gbps slots and filling them with client signals using a sigma-delta distribution method. The details of this method is defined into the ITU-T G.709 specification.
 - Unlike other mapping methods such as BMP and AMP, GMP uses stuffing bytes for rate adaptation between the client and ODU signals.
 - GMP does not mandate any synchronization or frequency offset requirements, which can apply any variable byte-stuffing. Hence, de-mapping jitter will be induced.
- Applications of GMP mapping
 - GMP is used to map any non-OTN client signals into an OTN signal (server) regardless of their rate differences, on condition that the latter is faster.
 - OTN has different hierarchies to carry SONET/SDH, GbE, 10GbE, 40GbE, 100GbE, and 400GbE.
 - These additions impose the client/server mapping scenarios that require more rate adaptation range.

Why GMP is not necessary for Ethernet applications

- OTN has a specified channel (OSMC) for PTP messages, which is separated from the data path. Thus, the PTP accuracy would not be affected by GMP.
- In contrast, Ethernet does not have such complex hierarchies of client rates. However, PTP and other messages are multiplexed into Ethernet data path, and impacted with each other.
- On the other hand, the rate mismatching between client and line side in 800GBASE-R is reduced significantly compared to 400GbE, which makes GMP by pass possible.
- 400ZR utilizes GMP to map the 400GBASE-R with 400ZR frame (OTN frame), where their rate tolerances are $\pm 100\text{ppm}$ and $\pm 20\text{ppm}$ respectively.
- For 800G-LR1/ER1, the rate tolerance of the client side has been constrained into $\pm 50\text{ppm}$, which is a relatively small difference from that of line-side, making direct through the data path without GMP possible.



Summary

- This contribution underlines the necessity of GMP bypass for 800GBASE-LR1/ER1.
 - Ethernet does not have the complex hierarchies of client rates like OTN which needs GMP mapping to match rate adaptation between the client and ODU signals.
 - OTN has a specified channel (OSMC) for PTP messages, which is separated from data path. Ethernet data path is shared by PTP and other messages, leading to impacting with each other.
 - The rate mismatching between client and line side in 800GBASE-R is reduced significantly compared to 400GbE, which makes GMP bypass possible.
 - Bypassing GMP makes 800G-LR1/ER1 more friendly to Ethernet applications, and will be more like an Ethernet module.

- Thank you!
- Q&A