Standards to Support 5G Mobile Transport:

ITU-T Q11/15 Work on Transport Protocols and new IEEE 802.3cx Work on the Required Improvements to PTP Timestamping Accuracy

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Improving Ethernet PTP Timestamping Accuracy

- IEEE 802.3 had previously added support for carrying IEEE 1588 PTP timestamps (Clause 90)
  - Subsequently amended for supporting multi-lane PHYs
- Recent developments have driven the need for further enhancement

Improving Ethernet PTP Timestamping Accuracy

- Drivers for enhancing the accuracy
  - Some of the newer Ethernet PHY introduced complexity that can impact timestamp transport accuracy
    - E.g., inserting lane alignment markers requires removing Ethernet Idles to create the required bandwidth, but different transmitter/receiver implementations can interact to limit the achievable accuracy
  - New Ethernet applications (e.g., using Ethernet in 5G/IMT-2020 Radio Access Networks) requires improved timestamp accuracy
    - This is reflected in the recent addition of “Class C” and “Class D” system time error performance requirements in G.8273.2.

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Improving Ethernet PTP Timestamping Accuracy

- In July 2019, IEEE 802.3 launched the “Improving PTP Timestamping Accuracy” Study Group (ITSA) to study the problem and propose a new project
  - Three potential issues have been identified to date
- The project was approved at the November 2019 IEEE 802.3 Working Group meeting to become the new P802.3cx Task Force
  - Official launch expected in February, pending RevCom and SASB approval
  - ITSA/P802.3cx began meeting this week to work on the topic

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ITU-T Q11/15 Work on 5G Transport

- The Q11/15 work has two elements
  - Adding 25 and 50Gbit/s interface rates for OTN, in order to take advantage of the corresponding Ethernet PHY technologies
    - The associated recommendations are scheduled for consent in Feb. 2020
  - Defining a new Metro Transport Network (MTN) with optimizations for 5G transport
    - Work is in progress, with very active participation

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ITU-T Q11/15 – MTN Work background

- Network operators are interested in using Ethernet as part of the 5G RAN infrastructure
  - Enterprise network clients are also expected to primarily be Ethernet based
- There are multiple advantages to having a TDM technology for multiplexing and switching in the transport layer
- These considerations led to the desire for a transport network that builds on elements of Ethernet technology, supplemented with additional elements required for a transport network

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ITU-T Q11/15 – MTN Overview

- The MTN Section/PHY layer reuses FlexE implementation logic, with some functional modifications
  - Provides a TDM structure with 5Gbit/s granularity
- The MTN Path layer (end-to-end connection across a network with multiple Section hops) also functions as a shim within the IEEE 802.3 clause 82 PCS
  - Path layer overhead is inserted and extracted as 66B blocks
  - Remaining within the PCS domain allows switching streams/sequences of 66B clients without the processing and latency required for Layer 2/3 switching
  - Multiple proposals are currently under study
- Publication of the “G.mtn” standard is expected in 2021

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Summary

- The ITU-T Q11/15 and IEEE 802.3 work is complementary, each contributing a crucial piece of the solution for allowing widespread use of Ethernet technology in 5G RAN applications


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