Ninth joint IEEE 802 and ITU-T Study Group 15 Workshop

Wrap-up, Takeaways, Closing
James Gilb, Chair, IEEE 802 & Glenn Parsons, Chair, ITU-T SG15

July 13, 2024

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Workshop Agenda

- Opening Remarks
    - James E. Matthews, President, IEEE SA
    - Seizo Onoe, Director, TSB, ITU
    - James Gilb, Chair, IEEE 802
    - Glenn Parsons, Chair, ITU-T SG15

- Session 1: Exploration of Optical PHYs Addressing 800 Gb/s and Beyond
    - Moderators: John D'Ambrosia, Futurewei, IEEE P802.3dj Task Force Chair & Steve Gorshe, Microchip, ITU-T Q11/15 Rapporteur

- Session 2: Access and In-Premises Networks
    - Moderators: George Zimmerman, CME Consulting, IEEE P802.3dg Task Force Chair & Frank Effenberger, Futurewei, ITU-T Q2/15 Rapporteur

- Session 3: Synchronization and TSN
    - Moderators: János Farkas, Ericsson, IEEE 802.1 TSN Task Group Chair & Stefano Ruffini, Calnex, ITU-T Q13/15

- Session 4: YANG and Data Modelling
    - Moderators: Scott Mansfield, IEEE 802 YANGsters Chair, ITU-T Q14/15 Rapporteur, Principal Researcher, Ericsson: Session 4 Introduction – YANG and Data Modelling

- Wrap-up, Takeaways, Closing
    - Moderators: James Gilb, Chair, IEEE 802 & Glenn Parsons, Chair, ITU-T SG15

Workshop objectives

- This workshop focused on topics of common interest such as:
  - Optical interfaces beyond 1T transmission,
  - Access and in-premises networks,
  - Synchronization and time-sensitive networking (TSN),
  - YANG and data modelling.

- The objectives of this workshop include, but are not limited to, enhancing long-standing collaboration and coordination between IEEE 802 and ITU-T Study Group 15 through discussion and information exchange on topics of common interest.

Session 1: Exploration of Optical PHYs Addressing 800 Gb/s and Beyond – Takeaways

- G.652 Fibre
  - On-going work between ITU-T and IEEE.
    - Liaison from ITU-T to IEEE on recent progress to be considered by IEEE P802.3dj/dk
  - Progress made @ ITU-T
    - Clarity of statistical analysis work made by each group on Chromatic dispersion (CD)
    - PMD_Q : ITU-T responded to IEEE query with theoretical analysis on shorter links
      - No further work is planned at this time
  - Observation – fibre vendors have been working on aspects other than CD to improve medium

- >= 800G Coherent Optics
  - On-going communications between ITU-T and IEEE.
    - Liaison from ITU-T to IEEE on recent progress made to be considered by IEEE P802.3dj
  - Observations –
    - New TQM approach (alternative to EVM) proposed at most recent ITU-T Meeting – "Extended TCC"
    - Proposal Reference receiver – comparable to "real world" performance

- Successful examples of the groups in the two organizations working together

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Session 2: Access Networks – Takeaways

- Both ITU-T SG15 and IEEE 802.3 have defined optical access networks, and both have produced series of PON systems
  - Overall deployments have exceeded a Billion users
  - Coordination at the physical layer has enabled the reuse of optical components
- Similarly, both groups have worked on bidirectional optical access physical layers
  - Major application of these are wireless fronthauling
  - The bidirectional access PHYs are essentially equivalent between the two groups
- Future higher speed systems will be challenging as we approach the physical limits of low-cost technology
  - Time horizon for Very High Speed PON is 2035 – a long-term project!

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Session 2: In-Premises Networks – Takeaways

- Fiber In-home Networks are being studied in ITU-T Q3
  - These aim to provide very high-speed distribution inside of homes, businesses, and factories using newly installed fiber cabling
  - Recommendations for P2MP and P2P versions of this have recently been completed
  - Integration with Wi-Fi is essential, because Wi-Fi will be the final link to the users
- Wi-Fi is subject of a huge body of work in IEEE 802.11
  - Wi-Fi 6 is currently moving into the market
  - Wi-Fi 7 standardization is nearly complete
  - Wi-Fi 8 will tackle higher reliability
  - Applications are extending beyond simple connectivity: location, sensing, security, privacy
- Copper PHYs and Powering are evolving in IEEE 802.3
  - Premises networks are highly variable, and strong tendency to reuse existing wiring
  - There is a huge embedded base of CAT5-6 cable, to be leveraged for many applications
  - Power over these links is a key feature, but it also presents challenges
  - There is a range of new infrastructure applications driving new work on single-pair, lower-speed Ethernet

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Session 3: Synchronization & TSN - Takeaways

- Synchronization continues to be a fundamental function of networks incl. support for connected applications (e.g. Industrial Automation, Data Centers, etc.)
- Some new applications may place new requirements, e.g., 6G, quantum key distribution
- Improving synchronization resiliency and security is essential
- Synchronization standards evolve to address these new requirements and use cases, incl.:
  - IEEE 1588
  - ITU-T SG15/Q13
  - 802.1AS
- Evolution of transport technologies and the Ethernet PHY should enable the distribution of accurate timing
- Transfer to inclusive terminology

Session 4: YANG and Data Modelling – Takeaways

- YANG and NETCONF have broad acceptance in the standards community
- YANG and NETCONF are being enhanced and community feedback and support is encouraged
- Tooling to support development, validation, and maintenance are constantly evolving
- Industrial Applications are driving development of profiles