

Standardization in ITU-T Study Group 15 and Q13/15

Networks, Technologies and Infrastructures for Transport,
Access and Home:
Network synchronization and time distribution performance

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Study Group 15 (SG15) mandate

New Study Period started in March 2022.

SG15 is confirmed as Lead Study Group on :

- access network transport
- home networking
- optical technology

✓ The **LARGEST** and **MOST PRODUCTIVE** group in ITU-T with broad, global industry participation

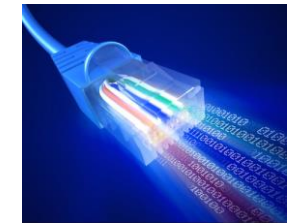


Home Networking



Smart Grid

High Speed Access



Transport Technologies

The Optical Transport Network



SG15 Working Parties (WPs)

- **WP1/15:** Transport aspects of access, home and smart grid networks
- **WP2/15:** Optical technologies and physical infrastructures
- **WP3/15:** Transport network characteristics

List of Questions

Question Number	Question title	Status
1/15	Coordination of Access and Home Network Transport Standards	Continued
2/15	Optical systems for fibre access networks	Continued
3/15 (former 18/15)	Technologies for in-premises networking and related access applications	Continued
4/15	Broadband access over metallic conductors	Continued
5/15	Characteristics and test methods of optical fibres and cables, and installation guidance	Continuation of Question 5/15 and part of Question 16/15
6/15	Characteristics of optical components, subsystems and systems for optical transport networks	Continued
7/15 (former 16/5)	Connectivity, Operation and Maintenance of optical physical infrastructures	Continuation of part of Question 16/15 and Question 17/15
8/15	Characteristics of optical fibre submarine cable systems	Continued
10/15	Interfaces, interworking, OAM, protection and equipment specifications for packet-based transport networks	Continued
11/15	Signal structures, interfaces, equipment functions, protection and interworking for optical transport networks	Continued
12/15	Transport network architectures	Continued
13/15	Network synchronization and time distribution performance	Continued
14/15	Management and control of transport systems and equipment	Continued

WP 3



SG15 Meetings, 2022-24* Study Period

- Past meetings
 - Geneva, 19-30 September 2022
- Future Meetings
 - Geneva, April 2023
 - Geneva, November 2023
 - TBD, mid-2024
- Interim Meetings, Correspondence activities, arranged by the Questions (on average 3 Interim meetings per year for Q13)

* Usually 4 years periods; it was adjusted this time due to impact from COVID-19

Q13: Scope of the Question

- Network synchronization and time distribution performance

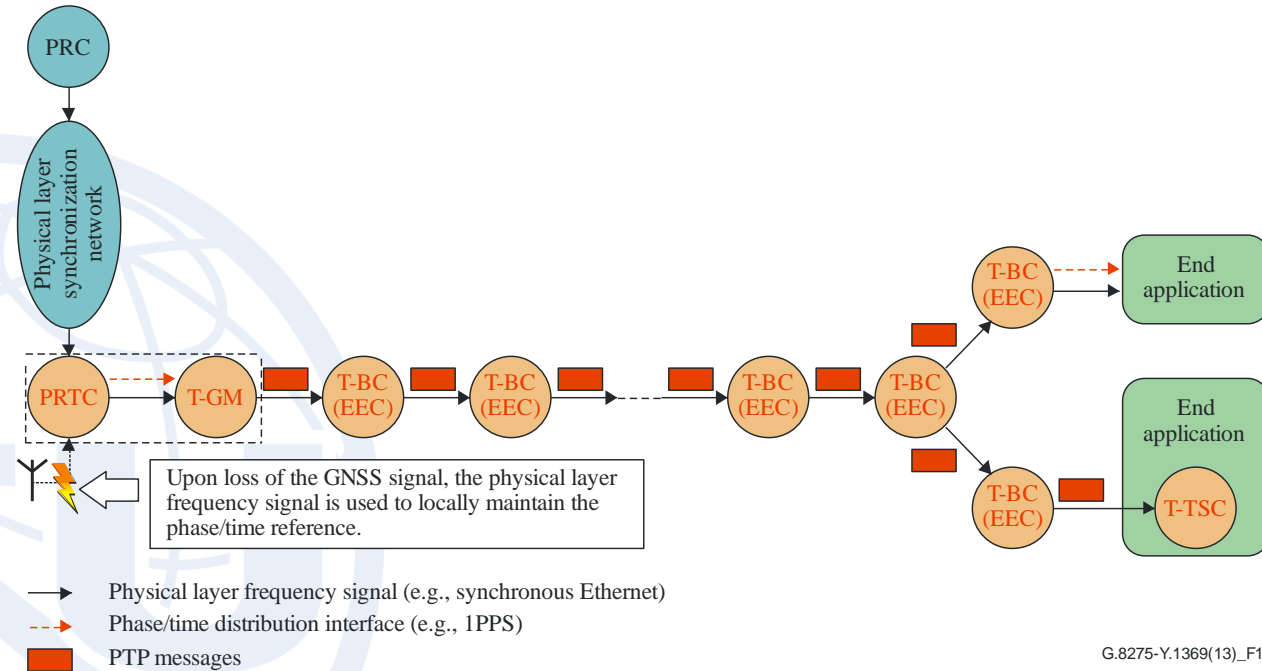
- Active since the 90s (sync for SDH in SG18)
- Networks Timing Needs (e.g., OTN, MTN)
- End Applications Timing Needs (e.g., 5G Base Stations)

- Distribution of Time-Phase and Frequency

- Methods (e.g., over physical layer, via packets, GNSS)
- Architectures
- Clocks
- PTP (IEEE 1588) profiles
- Performance, Redundancy, Reliability, etc.

- Networks

- Ethernet, IP-MPLS, OTN, xPON, MTN ...



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Cooperating with other Questions in SG15

Q11: sync for/over OTN , MTN

Q14: Sync Management

Q2, Q4: Sync in the access

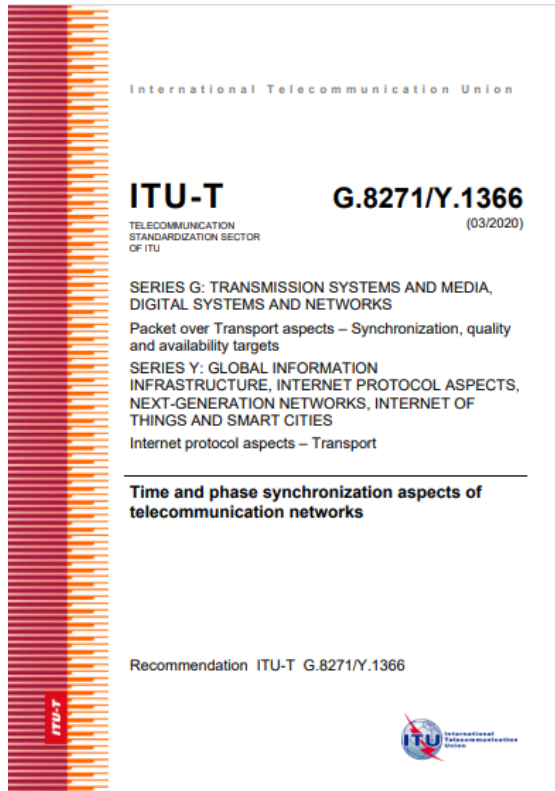
Q6: sync over fibers

.. and SDOs (IEEE1588, 3GPP, O-RAN, etc.)



Outputs from Q13

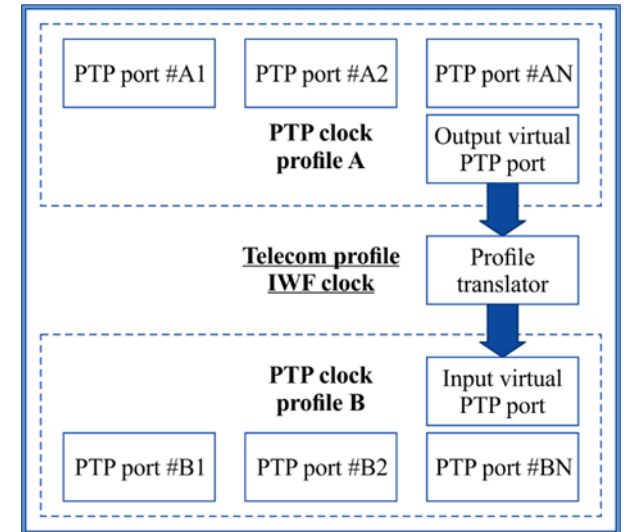
- SDH and before packet timing: G.803, G.810, G.811, G.812, G.813, G.823, G.824, G.825
- OTN: G.8251
- Enhanced Primary Reference Clocks: G.811.1
- Sync Layer Functions: G.781, G.781.1



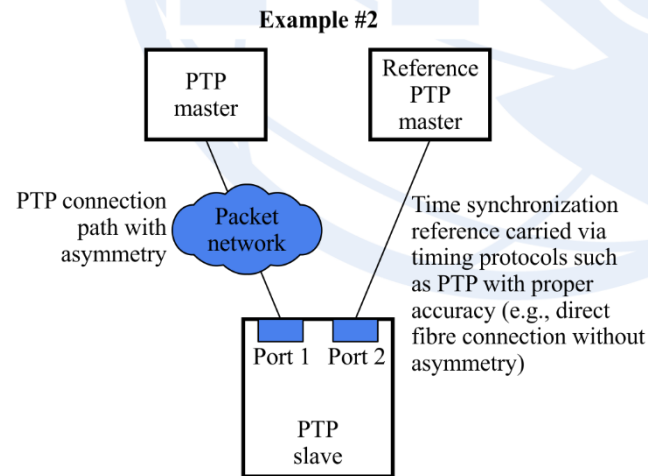
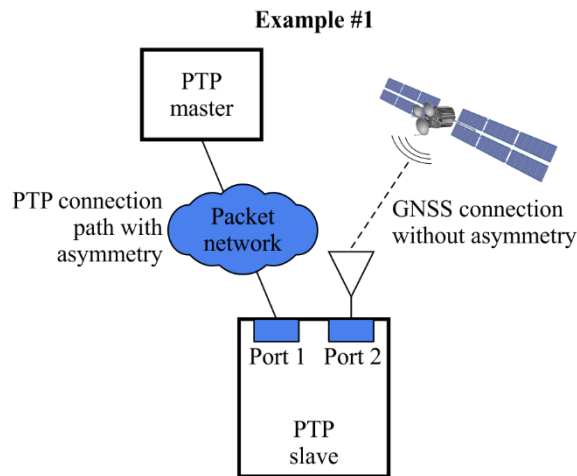
- G.826x series (distribution of **frequency synchronization**): Network requirements, Clocks, PTP Profiles
- G.827x series (distribution of **time synchronization**): Network Requirements, Clocks, PTP Profiles
- Supplements : G.Suppl65, G.Suppl68
- Technical Report: GSTR-GNSS

Ongoing Studies: PTP Profiles evolution

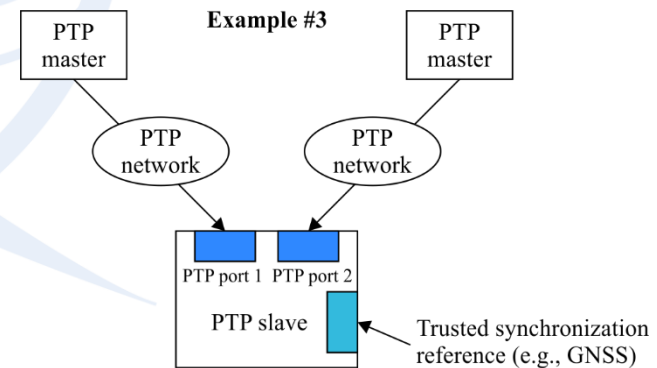
- Support for IEEE1588-2019 (all profiles) and details on Profile Interworking (G.8275) recently added
- Use of the «Enhanced Accuracy TLV» for estimating accumulated Time Error, with potential definition of a modified Alternate BMCA
- PTP Security: interest in adding an option for the security TLV
- PTP Monitoring
- options recently added to address various use cases :



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G.8271-Y.1366(12)-Amd.2(15)_FIV.3

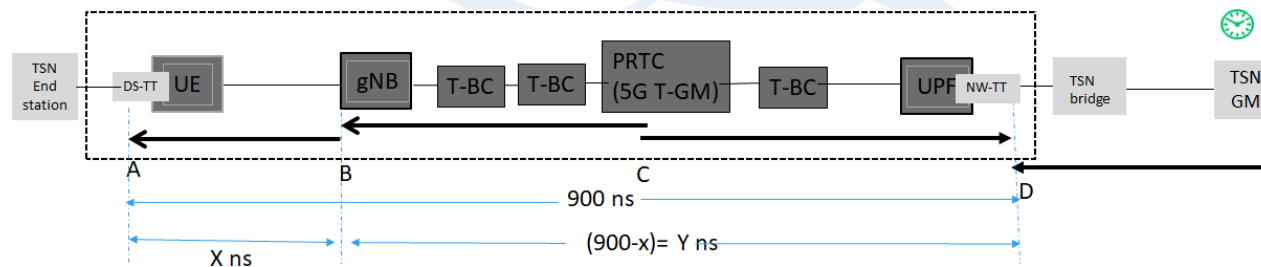
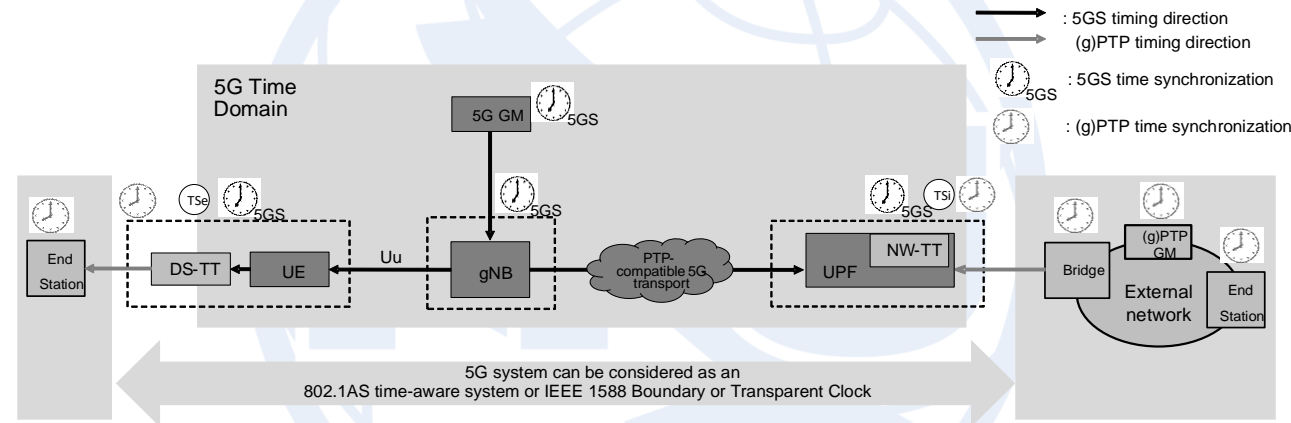


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New Studies:

5G integration with Industrial Automation ?

- Q13 is starting to consider the impact from integration of 5G with Industrial Automation
- Liaison recently exchanged with 3GPP to understand the impact on current time sync architecture



Future Items ?

- Synchronization continues to be a fundamental function as networks and applications evolve
- Among new items that may be studied in the future :
 - Emerging needs in mobile networks (e.g., 5G evolution) and connected applications
 - Support for enhanced synchronization network management and monitoring
 - Support for enhanced security solutions
 - Continue to enhance robustness and reliability in the network synchronization solutions (e.g., as related to GNSS backup synchronization references)
 - Timing resiliency over 5G is a new item of interest
 - Needs of new applications with particularly stringent timing requirements (e.g., quantum key distribution (QKD) related applications has been mentioned)

