

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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SG15 mandate

SG15 is responsible for the development of **standards** on:

**optical transport
network**

systems

**instrumentation
and
measurement
techniques**

access network

equipment

maintenance

management

test

**home network and
power utility network
infrastructures**

**optical fibres and cables and
their related installation**

control plane technologies

to enable the evolution toward intelligent transport networks, including the support of smart-grid applications.



SG15 Working Parties

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

WP1 – Broadband Access

G.FAST

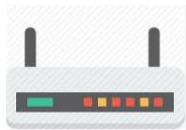
Broadband access
up to 2 Gbps

G.mgfast

Next generation
G.fast targeting 5-10 Gbps

DTA

G.fast dynamic time assignment
(DTA) – downstream/upstream
bit-rates responsive to
customer traffic



Continue collaboration with



G.RoF

Radio over fiber
for mobile fronthaul



NG-PON2

Next generation of
converged fiber access
going to higher speeds



Visible Light
Communication
for home networking

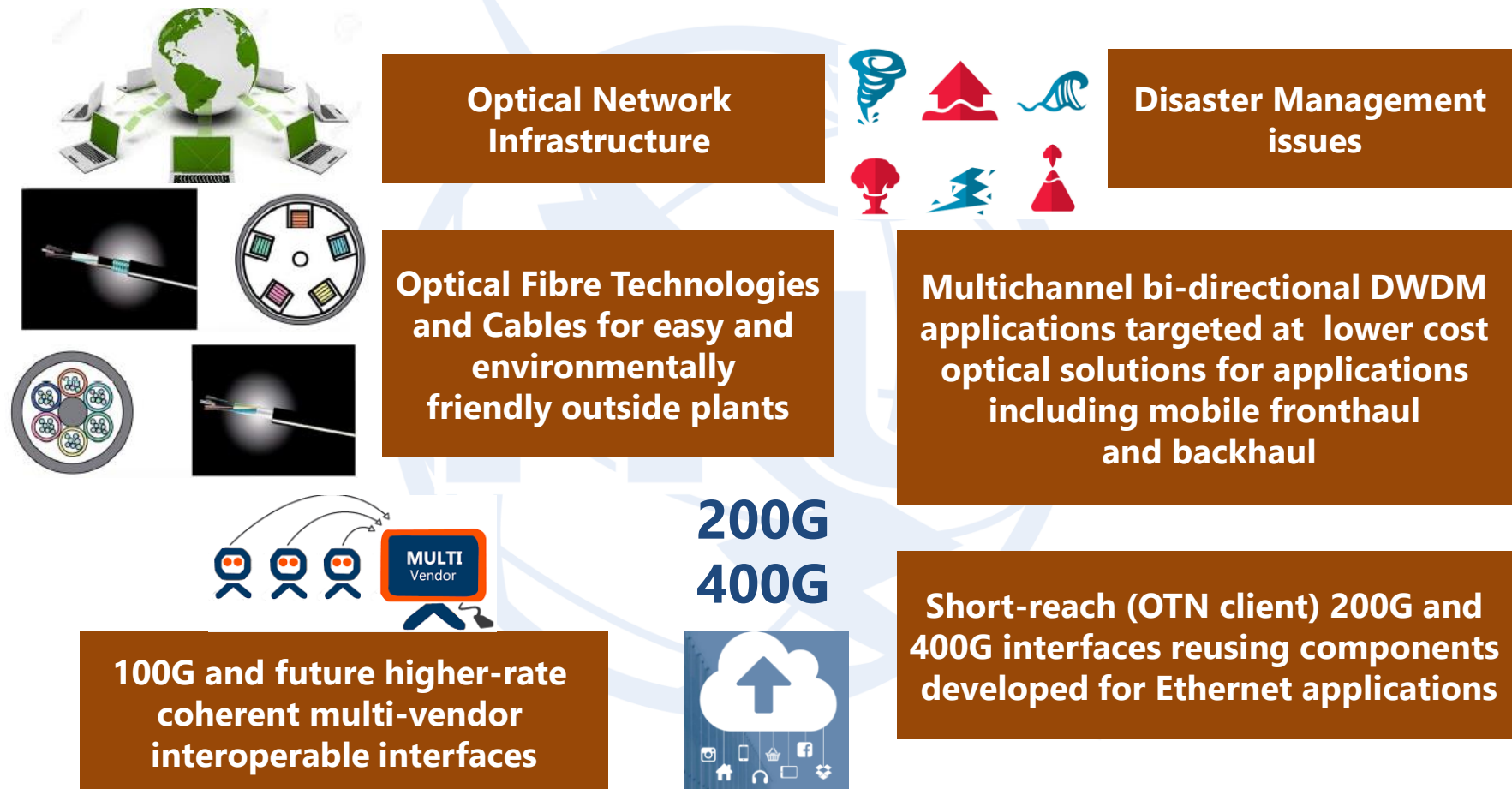


Powerline
communication
(PLC)

G.Hn

G.hn home networking over
indoor phone, power,
and coax wires >2 Gbps

WP2 – Optical Technologies



WP3 – Optical Transport Networks



5G

Transport and synchronization supporting 5G mobile fronthaul and backhaul



Optical Transport Networks

Synchronization of packet networks and future OTN networks, e.g., beyond 100G



Architecture and other Transport SDN Aspects



Network survivability (protection and restoration)



BEYOND 100G

New "B100G" OTN interfaces, including the use of coherent G.698.2 interfaces under development



Management aspects of control and transport planes



Equipment & management specifications for OTN, Ethernet and MPLS-TP



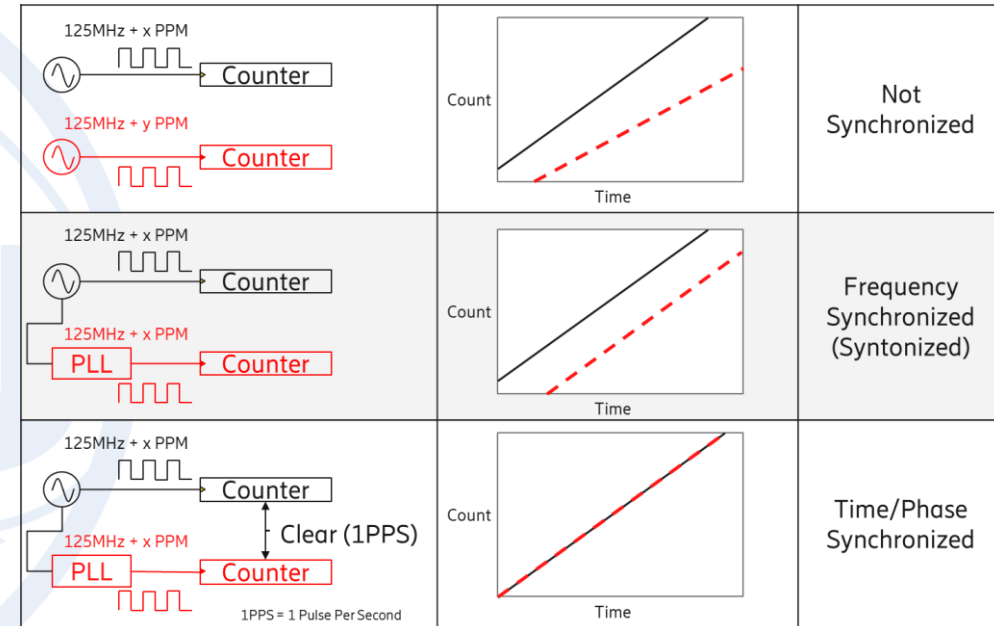
Core Information model enhancement for management of synchronization and optical media

Meetings

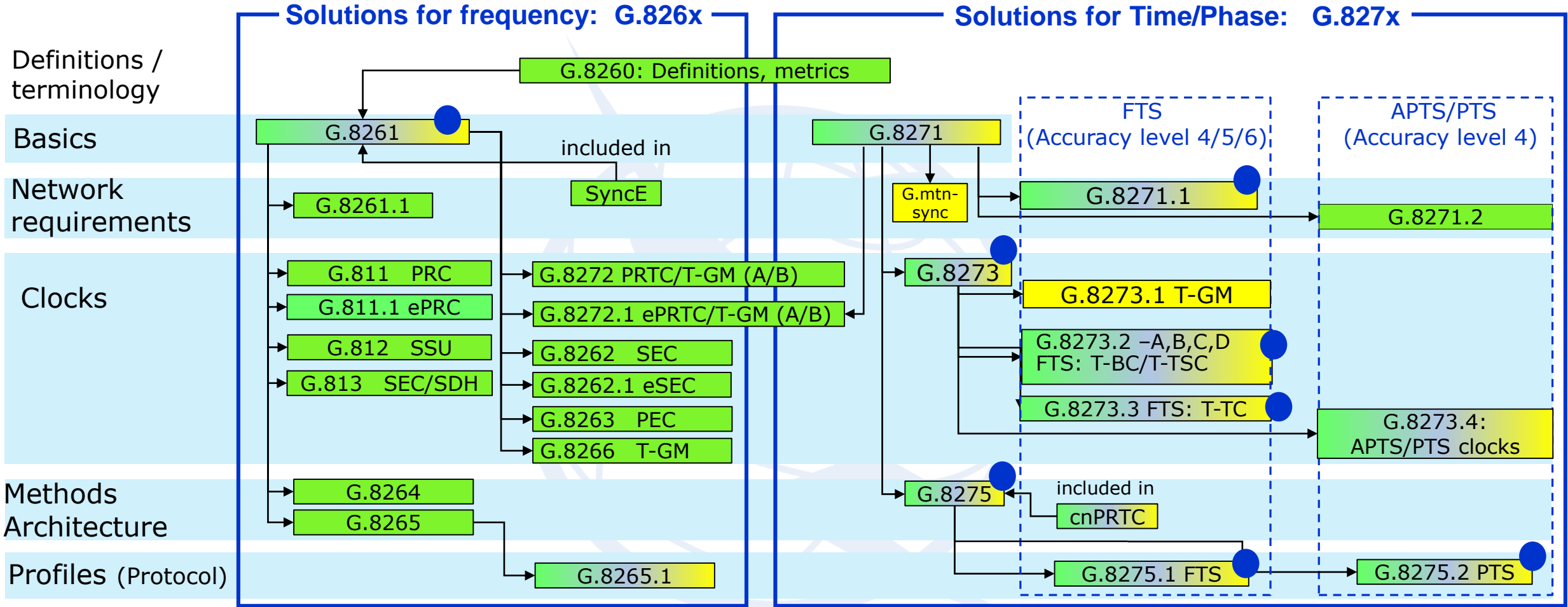
- Past meetings since 2017
 - Geneva, 19 – 30 June 2017
 - Geneva, 29 January – 9 February 2018
 - Geneva, 8-19 October 2018
 - Geneva, 1 – 12 July 2019
 - Geneva, 27 January – 7 February 2020
 - **“Virtual”, 7-18 September 2020** **Last SG Meeting of the Study Period**
 - Future SG15 meeting
 - Geneva, 21 June-02 July 2021 (Tentative)
- 2017-2020
Study Period
- 2021-2024
Study Period

Q13: Introduction

- Network synchronization and time distribution performance
 - Networks Timing Needs (e.g., OTN)
 - 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
 - IEEE 1588 profiles
 - Performance, Redundancy, Reliability, etc.
- Networks
 - From SDH to Ethernet, IP-MPLS, OTN, xPON, ... -> MTN
- Recommendations
 - G.826x series (distribution of frequency synchronization)
 - G.827x series (distribution of time synchronization)
 - G.781, G.781.1 (Sync Layer Functions)
 - «Historical» (G.803, G.810, G.811, G.812, G.813, G.823, G.824, G.825...)



Q13 Recommendations



Synchronization	Layer Functions	G.781	G.781.1
Interfaces	G.703	Technical Report	TR GSTR-GNSS
OAM	G.Suppl.68 (SyncOAM)	Simulation Background	G.Supp.65

Related recommendations

● New Rec/Rev/Amd/Corr 09-2020

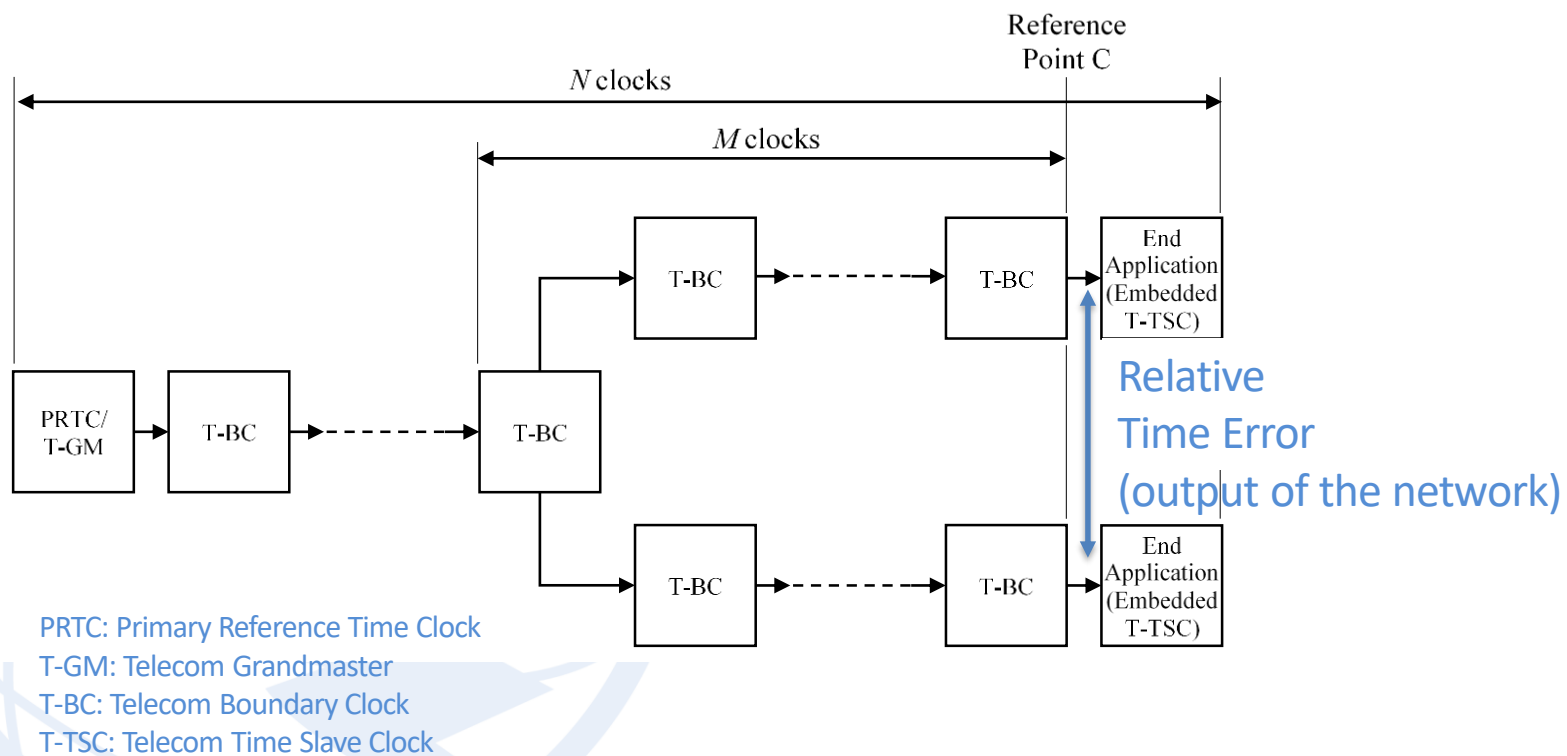
Legend:

- Agreed Progress based on contributions
- Work item: New rec. New work item
- Work item: Upgrade Planned updates

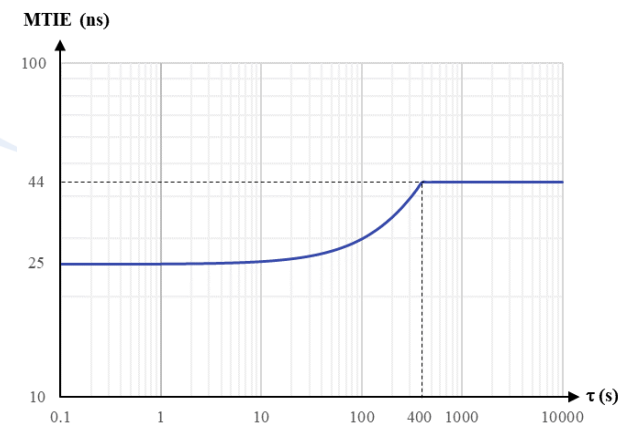


Latest Studies: Fronthaul (G.8271.1)

- Guidelines for network dimensioning
- Use of G.8273.2 Clock Class C (or B) are assumed
- Use of enhanced Synchronous Ethernet
- Short clock chain ($M \leq 4$ with class C and $M=1$ for class B)



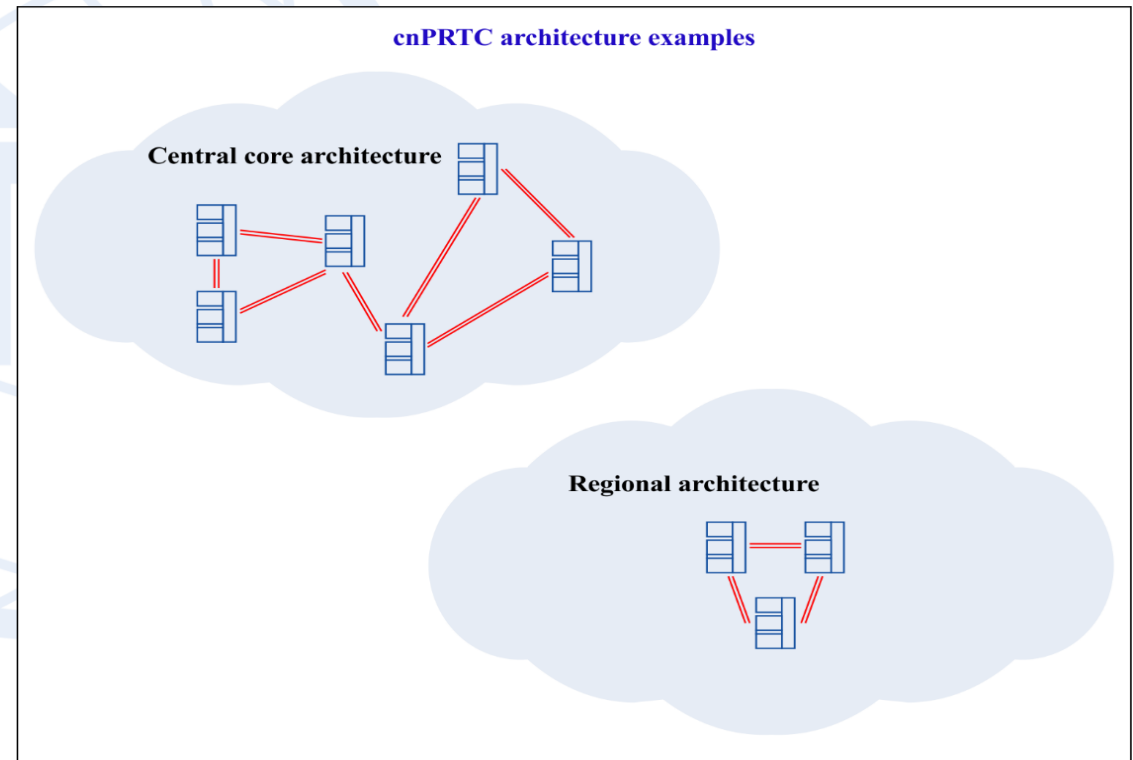
Network Performance measurement with respect to a PRTC deployed in the access



What is Next ?

- MTN, Metro Transport Network
 - Sync Requirements
 - Sync Architecture
 - PTP and syncE distribution
 - Clocks
- Complete work on Profile Interworking
- Complete work on cnPRTC (Coherent PRTC)
 - Requirements
 - Methods (high accuracy profile?)
- Address New Sync Requirements
 - Emerging needs in mobile networks (positioning or use cases with less stringent requirements)
 - Future needs ? (e.g., sync for Quantum Key Distribution ?)

The coherent network PRTC connects primary reference clocks at the highest core or regional network level. This provides the ability to maintain network-wide ePRTC time accuracy, even during periods of regional or network-wide GNSS loss (G.8275)



G.8275-Y.1369(17)-Amd.1(18)_Fv1.1

