ITU-T Q13/15 UPDATES

TICTOC / IETF-83

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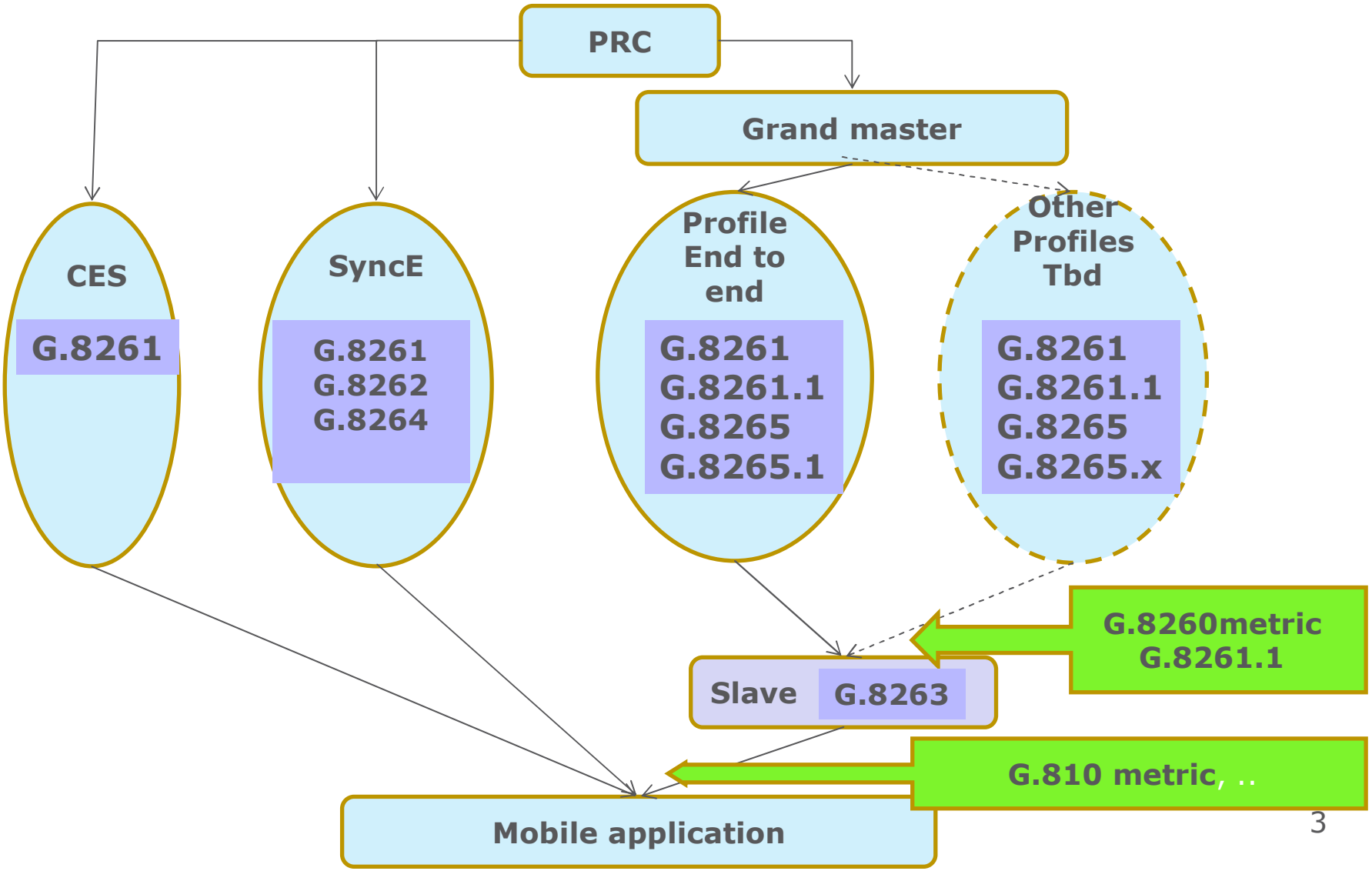
INTRODUCTION

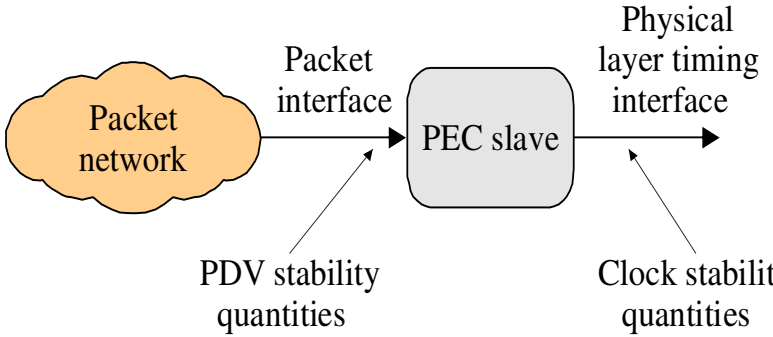
- Q13/15 met at the SG15 in December and held Interim meeting in March 2012 hosted by NIST
- Next meeting:
  - June 2012, hosted by NSN (Helsinki)
- A number of recommendations have been approved at the last SG15 meeting,
  - Frequency sync packet timing: G.8261.1 (PDV Limits), G.8263 (Packet Clock), G.8260/Appendix I (PDV metrics)
  - First recommendation on time sync: G.8271 (high level requirements, time sync interfaces)
  - Others: G.8262 Amd (SyncE), G.8251 Amd (OTN), G.8264 Amd (SyncE)
- Some progress on Time sync at last meeting (G.827x series)

TRANSPORT OF FREQUENCY IN PACKET NETWORKS



G.8260 APPENDIX I: PDV METRICS

- Packet Delay Variation metrics



[*Clock stability quantities estimation*] = *function* (*PDV stability quantities*)

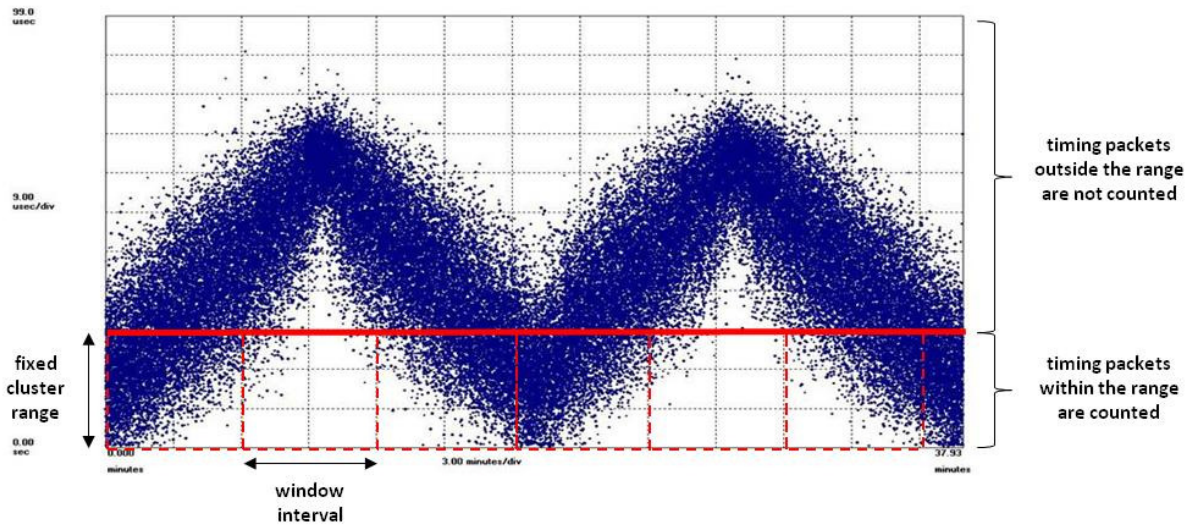
G.8260(10) FI.1

Figure I.1 Packet equipment clock interfaces

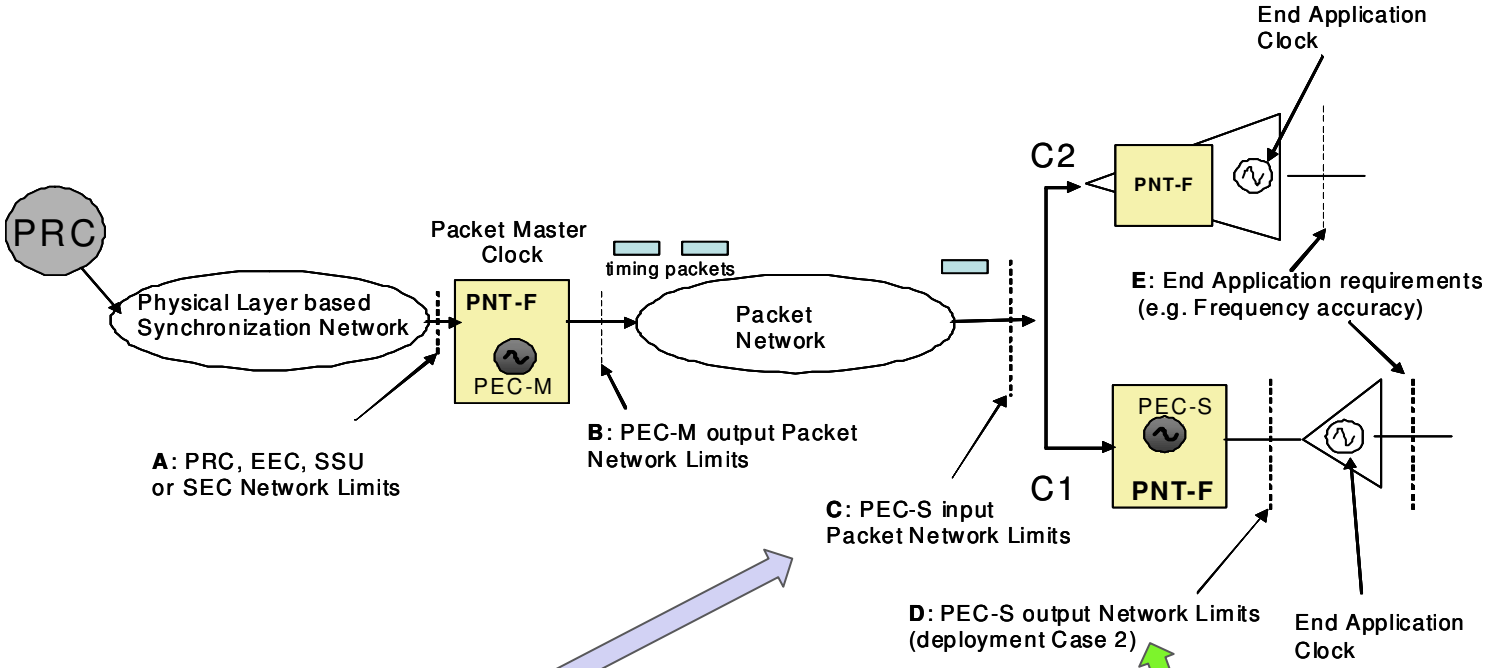
- Two categories of PDV metrics
  - Metrics for specifying PDV network limits
    - metrics studying floor delay packet population
    - Possibly others in the future
  - Metrics for studying the characteristics of the network
    - minTDEV, etc.

G.8260 APPENDIX I: PDV METRICS, CONT.

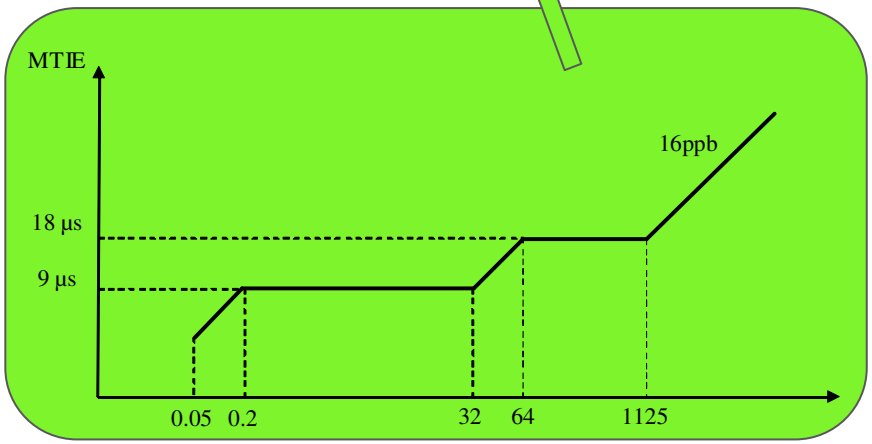
- PDV metrics studying floor delay packet population
  - Study Timing packets within a fixed cluster range starting at observed floor delay
  - Compare population with acceptance thresholds



G.8261.1: NETWORK LIMITS FOR FREQUENCY TRANSPORT

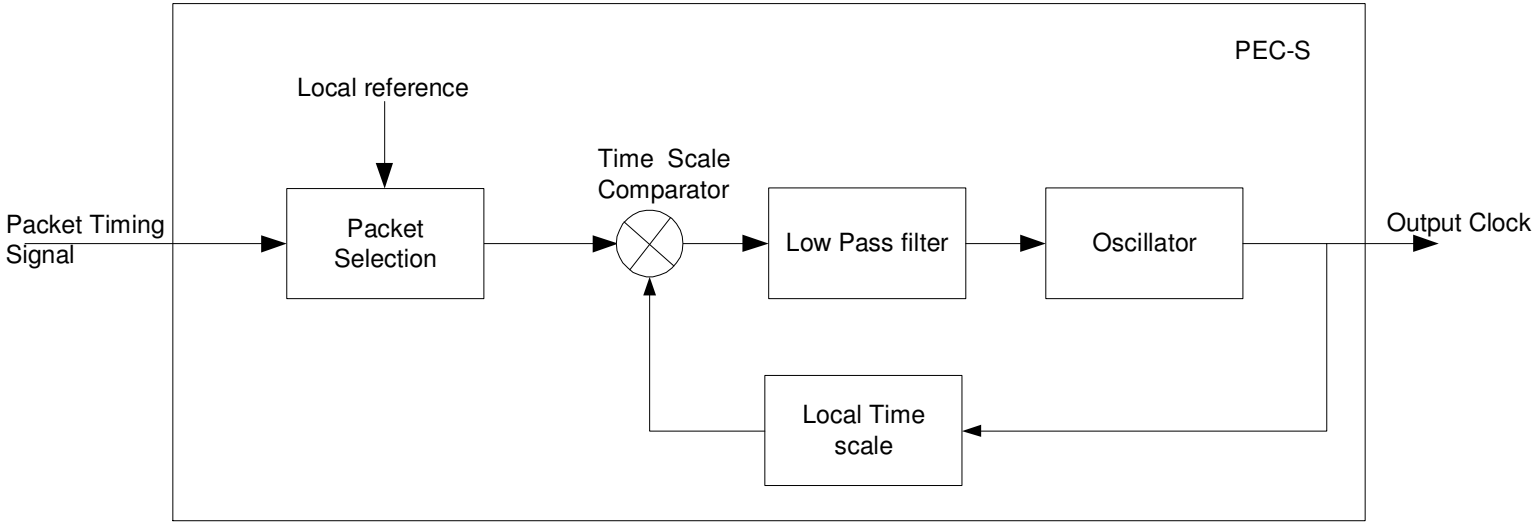


For any window interval of 200 seconds at least 1% of transmitted timing packets shall be received within a fixed cluster, starting at the observed floor delay, and having a range of 150 µs.

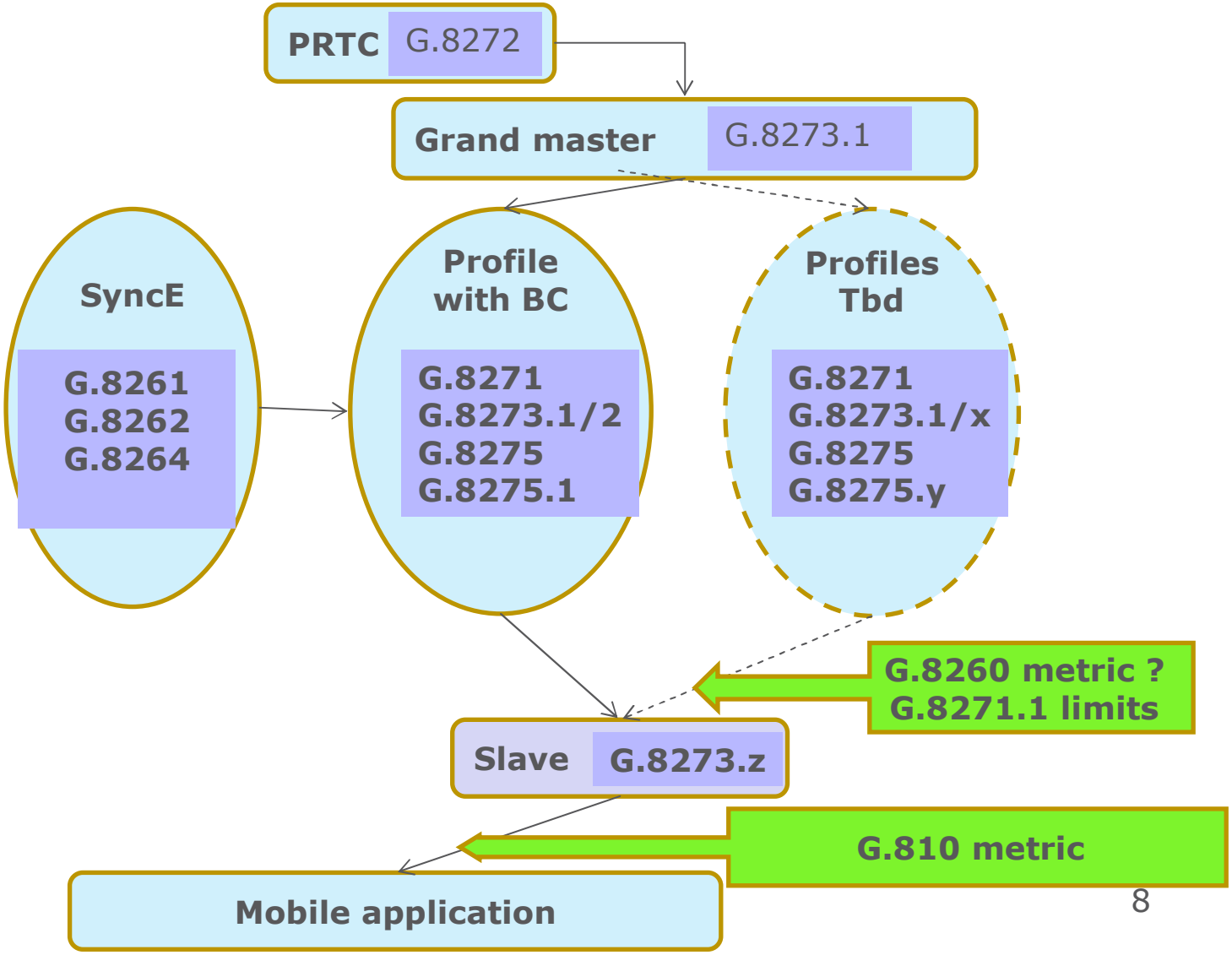


G.8263: PACKET CLOCK FOR FREQUENCY

- G.8263 outlines minimum requirements for the timing functions of the Packet Slave Clocks as defined in G.8265:
  - Frequency accuracy
  - Tolerance
  - Noise generation
  - Etc.
- It supports frequency synchronization distribution when using packet based methods.
- It focuses on mobile applications, and in particular on the delivery of frequency synchronization for end applications such as mobile base stations.

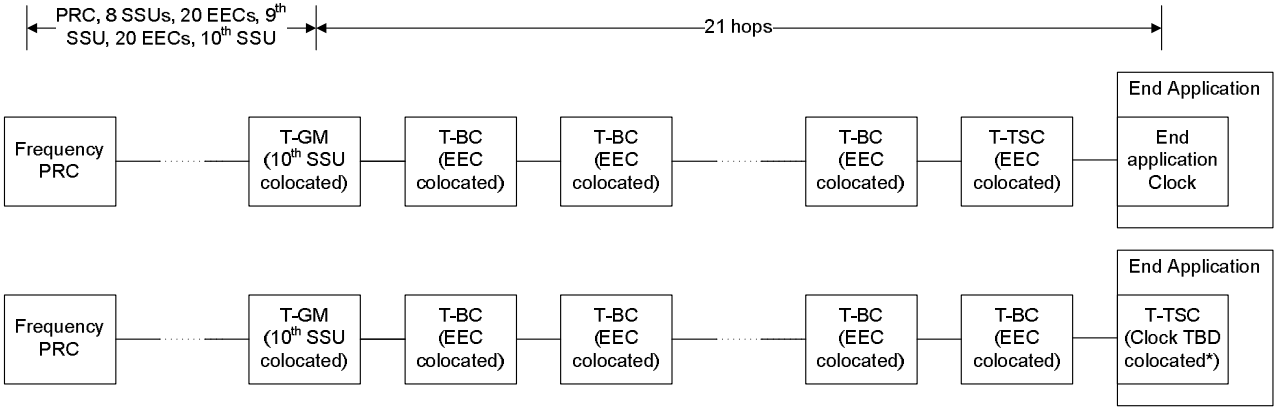


TRANSPORT OF TIME IN PACKET NETWORKS



TIME SYNC UPDATES: NETWORK LIMITS

- G.8271 approved
  - High level Requirements (e.g. +/-1.5 us)
  - Time sync interface (1PPS)
- Network Limits moved into new G.8271.1
  - Planned for consent in September 2012
  - Various HRMs have been defined with and without SyncE support
  - Additional results from simulations for Time sync over 20 BC chain with SyncE support :
    - Random noise in the 100 ns range
    - Additional time error in case of SyncE rearrangements



* The initial assumption is that the type of oscillator is assumed to be equivalent to an SSU, but other characteristics may differ.

TIME SYNC ARCHITECTURE, PROFILE AND CLOCKS

- Time Sync Architecture and PTP Profile (G.8275)
  - Recommendation planned to be consented in 2013
  - Initial discussion on the Best Master Clock Algorithm (G.781-like vs. Defualt BMCA)
- Time sync Profile (G.8275.1)
  - Recommendation planned to be consented in 2013
  - Default mapping: Ethernet with Link local addressing (possible optional IP mapping; under discussion)
  - Ongoing discussion on packet rate (between 8 pps and 64 pps)
  - Path delay mechanism: Delay Request/Response provisionally agreed
- PRTC (G.8272)
  - Recommendations planned to be consented in September 2012
  - Initial agreement: +/-100 ns max Time Error
- Telecom GM (T-GM): G.8273.1
  - Recommendation planned to be consented in september 2012
- Telecom BC (T-BC): G.8273.2
  - Recommendation planned to be consented in 2013
  - 0.1 Hz filtering on time sync provisionally agreed

SYNCE

- G.8264 Amendment consented at the SG15 meeting, December 2011
  - Clarification on SyncE over LAG
- G.8262 Amendment consented at next SG15 meeting, December 2011
  - Clarification on SyncE over copper 1G and 10 G (Autonegotiation issue)

CURRENT DOCUMENT STRUCTURE

Completed | Ongoing | Future ?