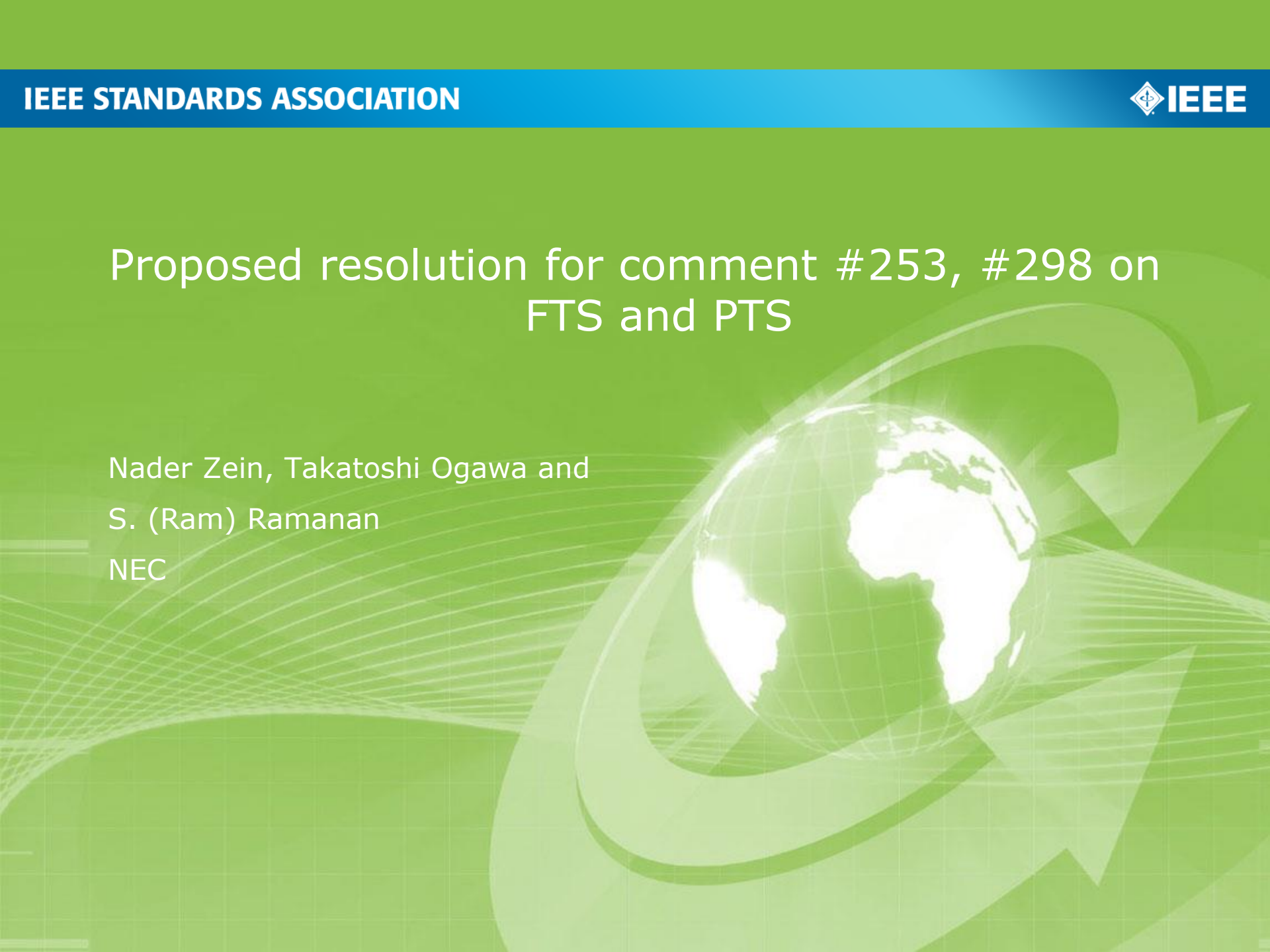


Proposed resolution for comment #253, #298 on FTS and PTS

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**Proposed resolution for comment #253, #298 on
FTS and PTS**

Date: 2019-01-15

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Contents

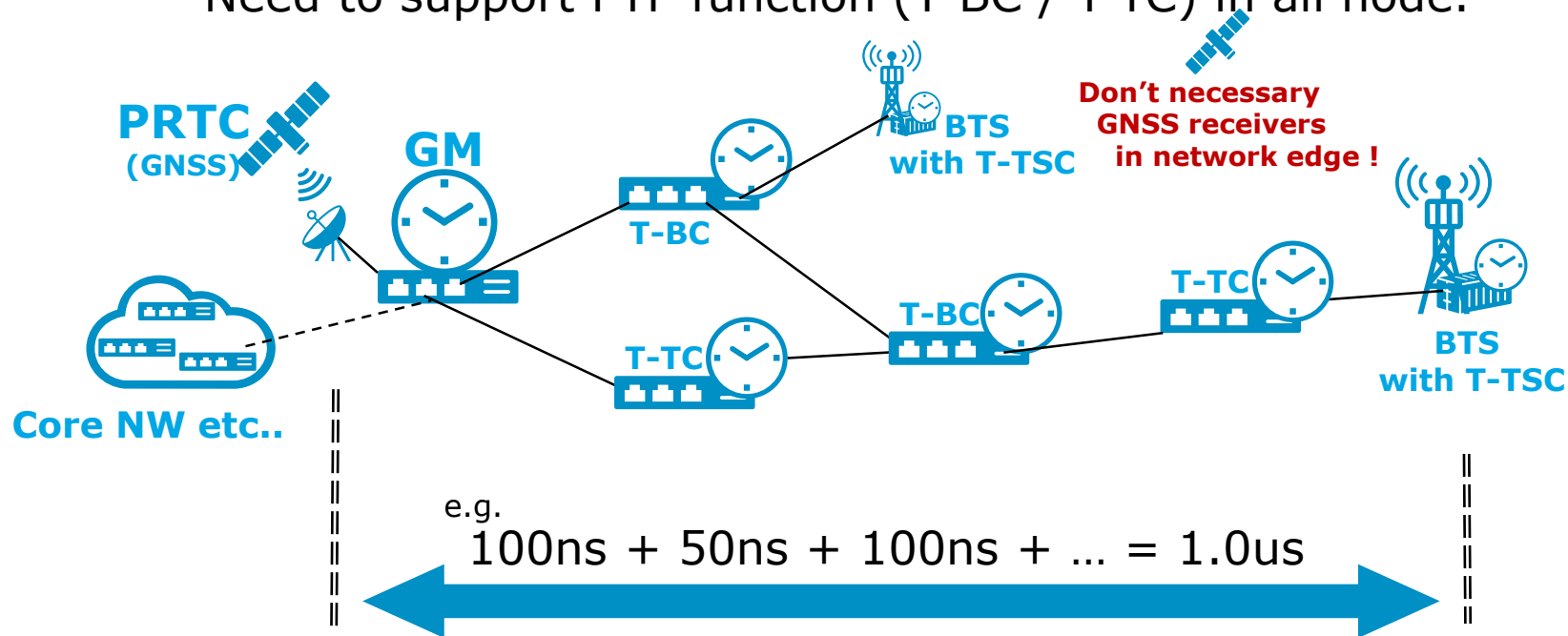
- Comparison between FTS and PTS
- Requirement for performance for FTS sync chain
- Performance differences between 8275.1 vs 8275.2?
- Example of Time budget for 5G MFH
- Proposed amendment.

What's differences of 75.1 vs 75.2 [NW Topology] (1/2)

G.8275.1 / Full Timing Support [FTS]

: PTP supported nodes

Need to support PTP function (T-BC / T-TC) in all node.



In the FTS network, satisfactory sync performance are specified for all nodes. And the test methodology of sync performance is clearly described on standardized documents.

Easy to planning accuracy performance in network !

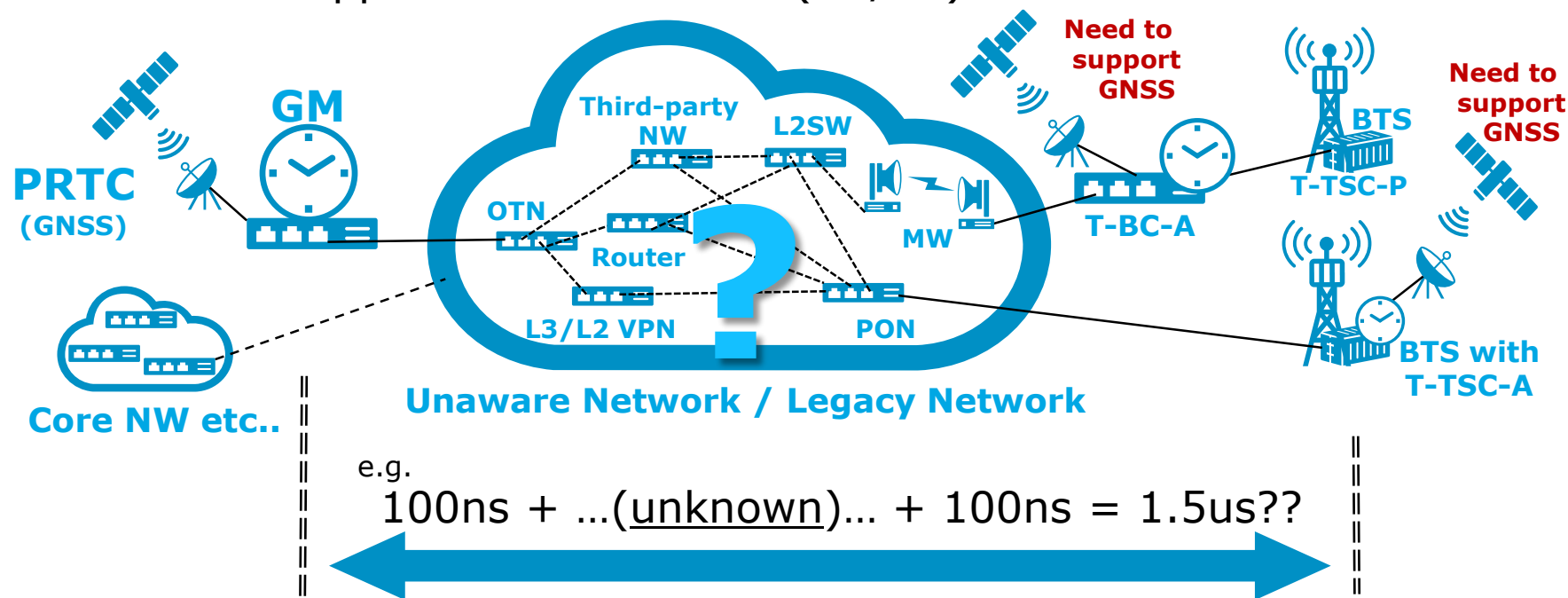
Easy to be able to troubleshoot for failure nodes !

What's differences of 75.1 vs 75.2 [NW Topology] (2/2)

G.8275.2 / Partial Timing Support [PTS]

: PTP supported nodes

Supported PTP function (BC/TC) in few node.



The real network has complex NW as Router, VPN, Media Convertors.
So, Need to care issue of Delay asymmetry / Huge PDV / different Path etc..

How do you decide on responsibility of performance for each nodes ?
How do you planning accuracy performance ?

Requirement for performance for FTS sync chain

Req-1 (Node for FTS):

$\max|TE|$ by nodes.

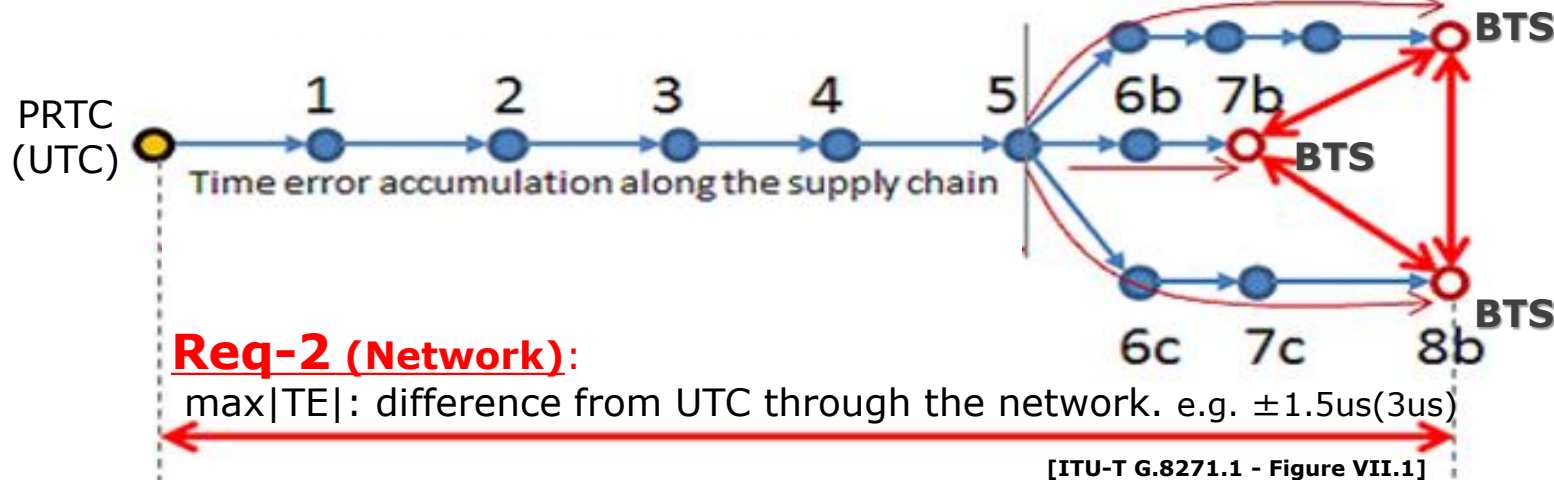
Single Node : ClassA: $\pm 100\text{ns}$ / ClassB: $\pm 70\text{ns}$ / ClassC: $\pm 30\text{ns}$

*NOTE: In the PTS, NO defined specs for the nodes.

Req-3 (BTSs):

$\max|TE_r|$:

difference from the BTSs.



Req-2 (Network):

$\max|TE|$: difference from UTC through the network. e.g. $\pm 1.5\mu\text{s}$ ($3\mu\text{s}$)

Network requirement [3GPP]

Mobile Application	Accuracy
W-CDMA (3G) (Home NodeB TDD mode)	No required ("ms" level)
LTE-TDD (4G) (Wide-Area Base station)	3 μs (<3 km) 10 μs (>3 km)
NR TDD (5G)	3 μs

BTS requirement for 5G [IEEE802.1CM]

802.1CM Category	KPI	Accuracy
A	$\max TE_r $ (btw. BTSs)	60 / 70ns
B	$\max TE_r $ (btw. BTSs)	100 / 190 / 200ns
C	$\max TE $ (whole network)	1.1 μs (include MBH)

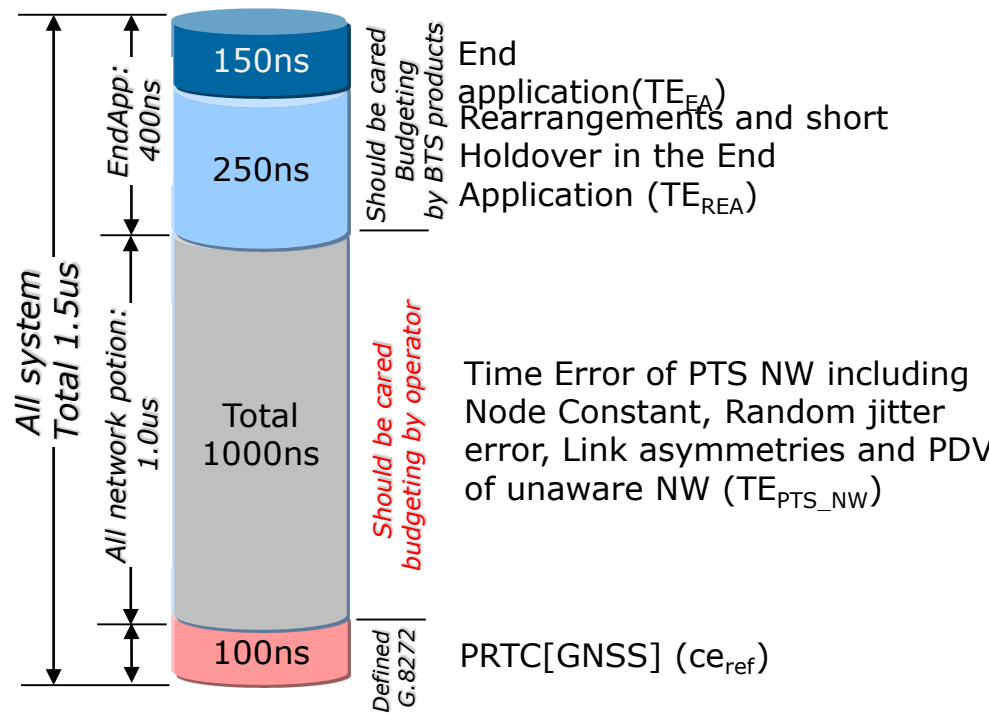
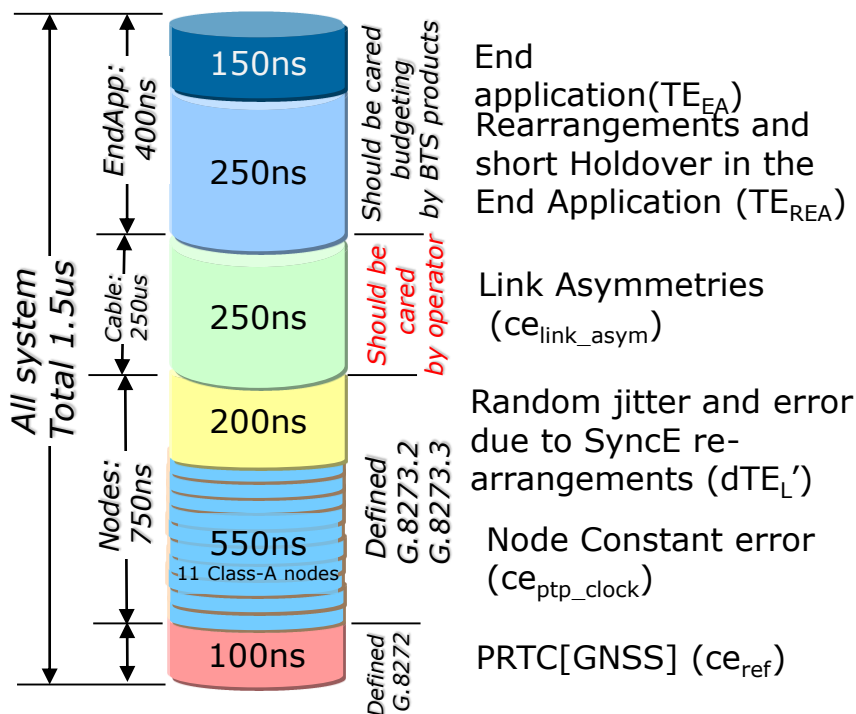
What's differences performance of 75.1 vs 75.2?

What is difference of FTS/PTS for the operators?

- Budget model of FTS, it is defined to care all Time Error portions. So, on the FTS NW can design Time Error budget easily. Because the provision of TimeError is divided finely.
- However, in budget model of PTS, it is defined TimeError very roughly. Any portion has its own TimeError specified vendor originate. Thus, Operator need to spend time and cost for interoperability and planning of TimeError budgeting on PTS NW!!

TimeError budget on FTS-NW

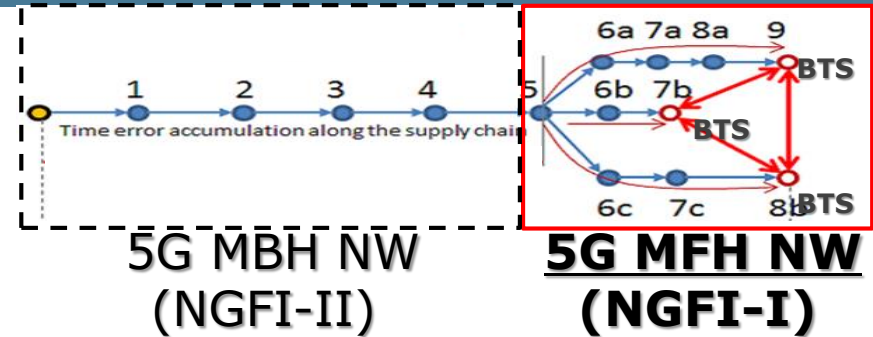
TimeError budget on PTS-NW



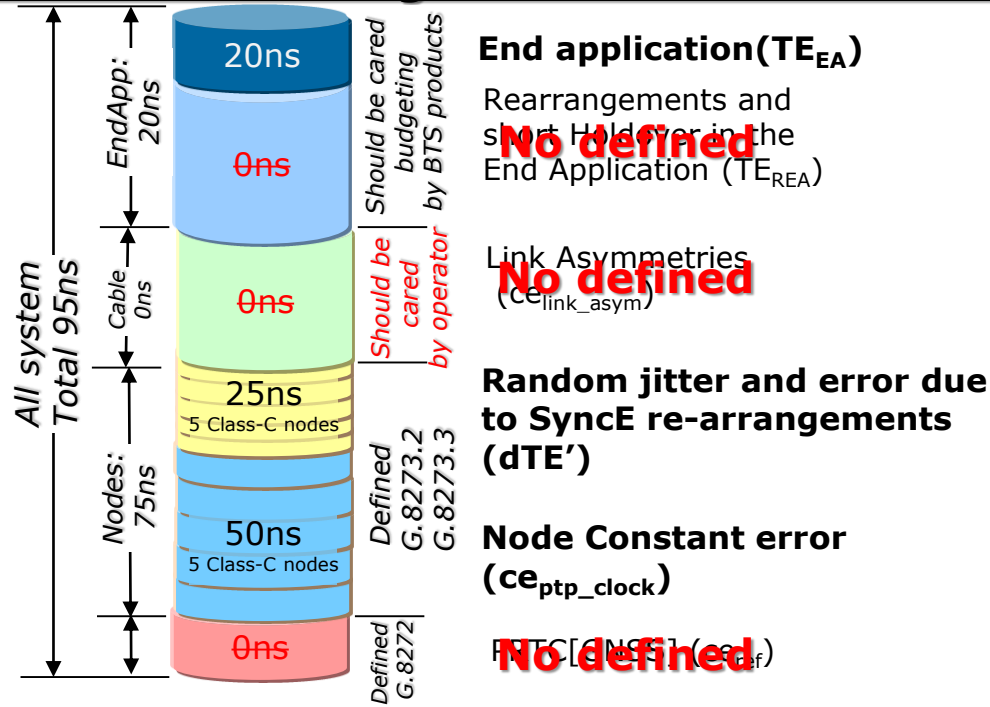
- This examples are based on ITU-T G.8271.1(FTS) and ITU-T G.8271.2(PTS).
- T-GM change (e.g., due to loss of PRTC traceability of one of the redundant GMs in the network).
- A typical case is when the End Application enters holdover for a short period (e.g. 1 minute)

Example of TimeError budgeting for 5G MFH (NGFI-I)

5G MFH has requirement of $\max|TE_r|$.
 Example of budgeting is shown below;



Relative TimeError budget on 5G MFH NW with FTS



- This examples are based on IEEE802.1CM-2018 and ITU-T G.8271.1(FTS).
- This case is not entered the End Application to holdover(because not using GNSS, and only using wire line).

Cai,Tazi Proposed Way forward – proposed Amendment

Proposed way forward made on IEEE 1914.1 TF call on Friday 11 January 2019.

We propose following amendment in red:

Case (1): Requirement for Fronthaul (NGFI-I) and midhaul (NGFI-II) ~~should~~ could be specified separately, considering differences in network topology, transport distance, and timing requirement, **if separate PRTC is supplied for the NGFI-I network.**

- For NGFI-I (fronthaul), ITU-T G.8275.1 (FTS) is mandatory while ITU-T G.8275.2 (PTS) is optional,
- For NGFI-II (midhaul), the standard specifies the requirement as it is today (either G.8275.1 or G.8275.2 shall be supported)

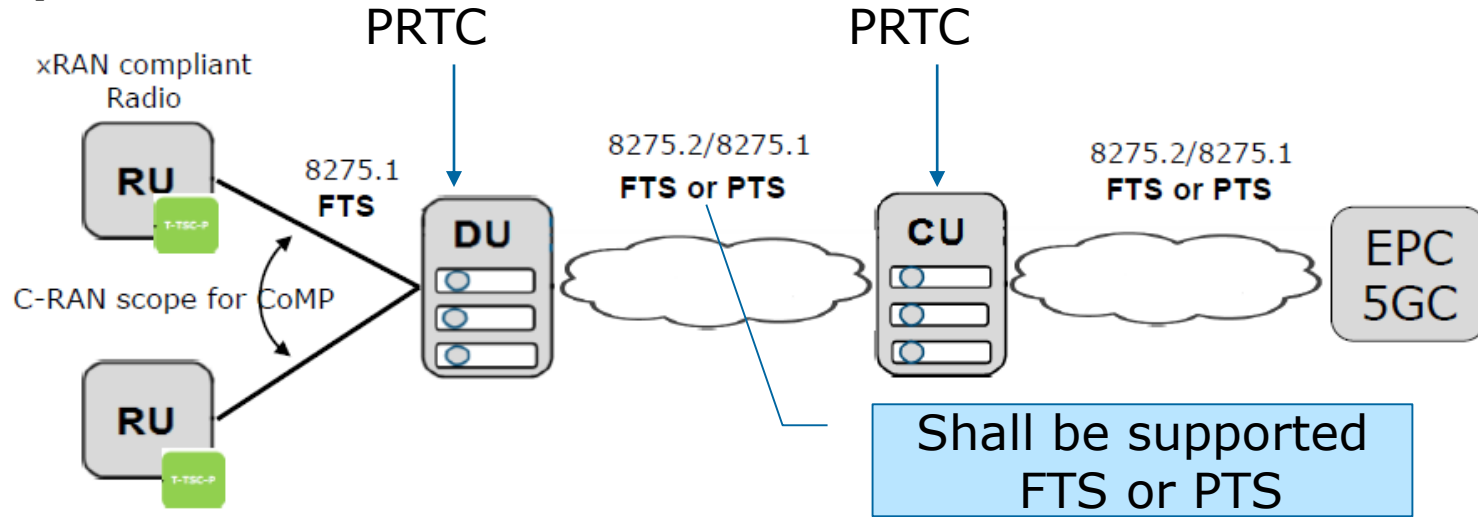
Case (2): In case the PRTC for the NGFI-I (fronthaul) is supplied via the NGFI-II (midhaul) Chain as shown in slide#7, then ITU-T G.8275.1 (FTS) should be used as mandatory for both NGFI-I and NGFI-II, ITU-T G8275.2 (PTS) is optional for both.

- Add notes where applicable that performance of PTS is FFS, and when applicable the kind of performance to use.
- Add clarification on the statement that SynchE is not required when G.8275.2

NGFI-I

NGFI-II

(Case 1)



(Case 2)

