MSAN
(Muliti Service Access Node)
Soft switches

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ITSF 2009 ROM

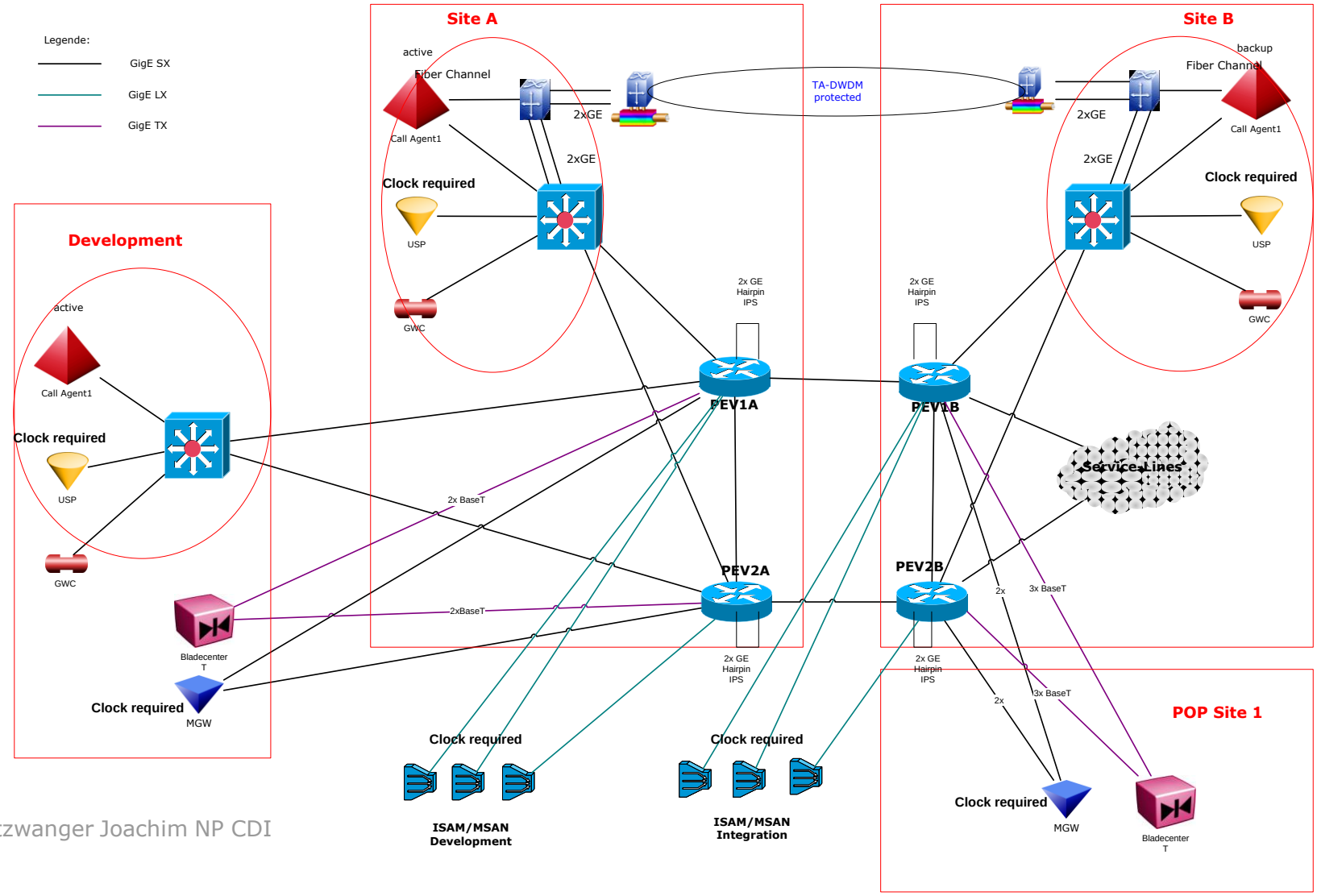
Overview

- Challenge for Telekom Austria
- Clock requirements
- Syncronisation Concept
- 10GWAN contra 10GLAN
- MSAN synchronisation
- Testresults

Challenge

- Mobil Backhauling
  - Sync supply with 1588 via Fiber over GbE
- Substitution of digital exchanges
  - Maintain Sync requirements for ISDN BRA&PRA
- Reduce maintanance costs per year

Overview MSAN, Soft switch

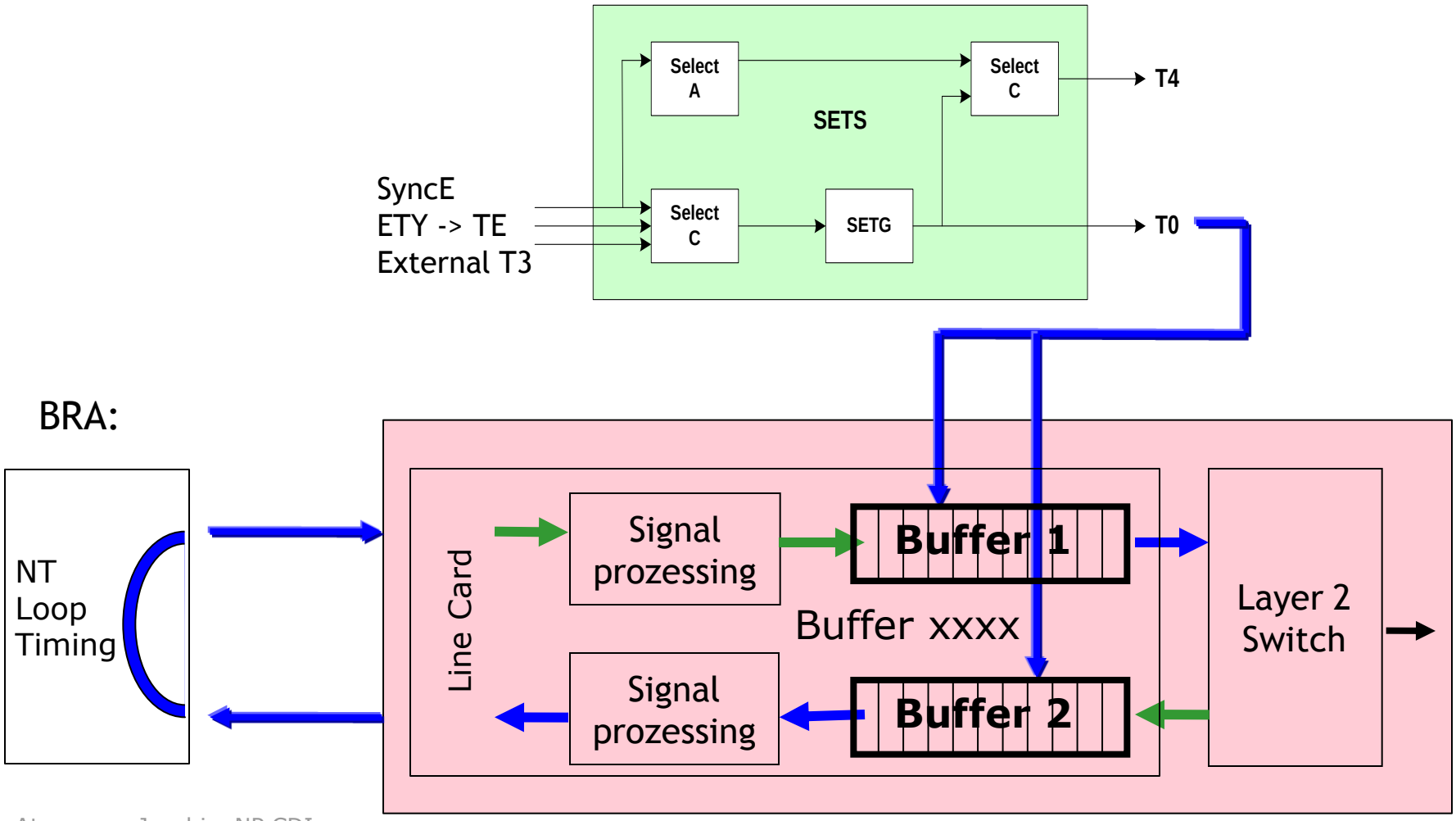


Clock requirement ISDN

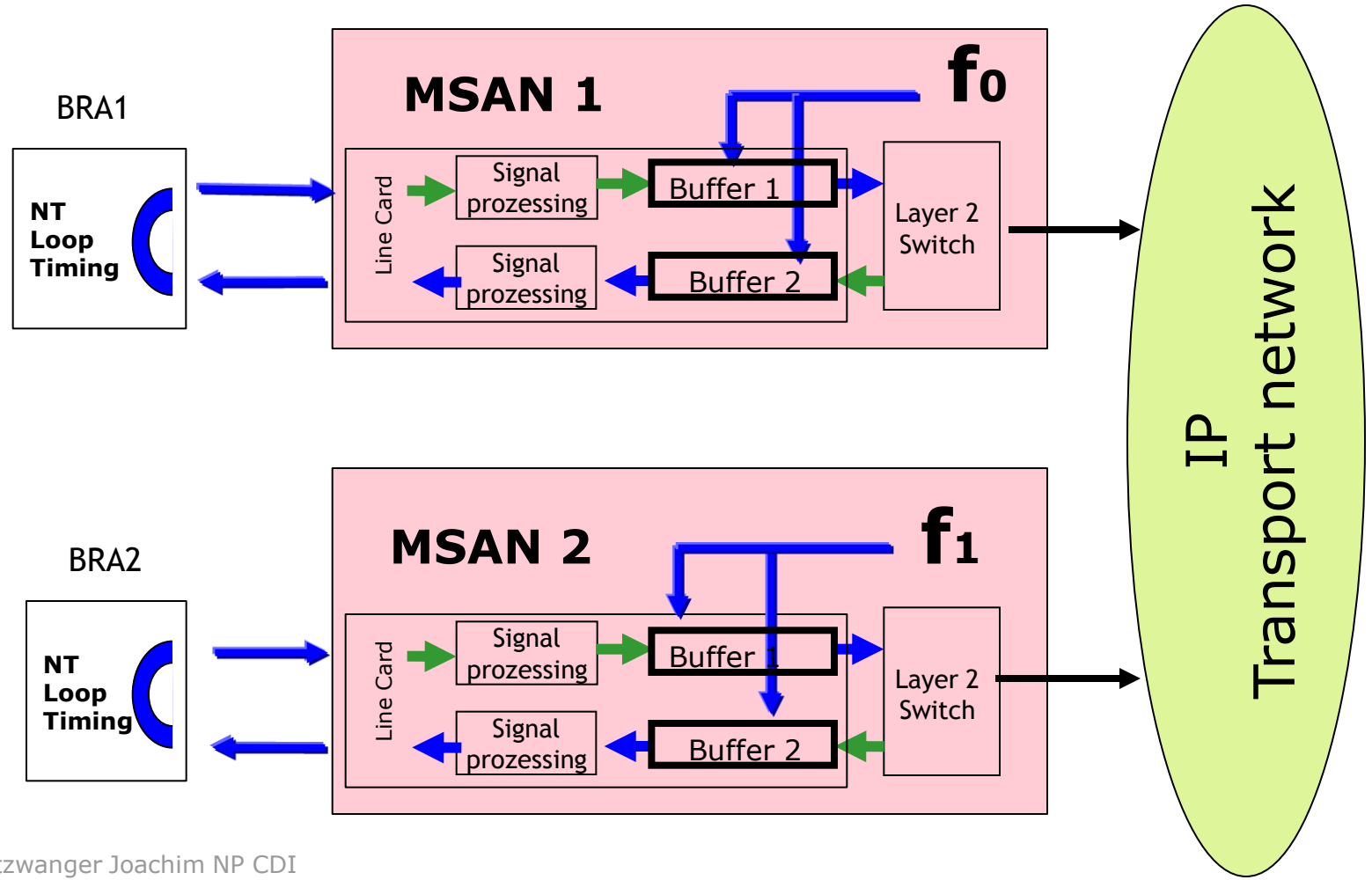
- Sliprats G.822, ETR 299 for IDSN BRA und PRA
  - Transit Network: 0,3 slip/day
  - Local Network: 2 Slips/day

0,3 Slips/day should be reached

Clock concept MSAN ISDN BRA



Clock concept MSAN ISDN BRA



Why Slips

If $f_0 \neq f_1$ one of the buffer will come to his max. threshold and then Bits will be droped.

Frameslips: PCM31, Buffer 125µsec

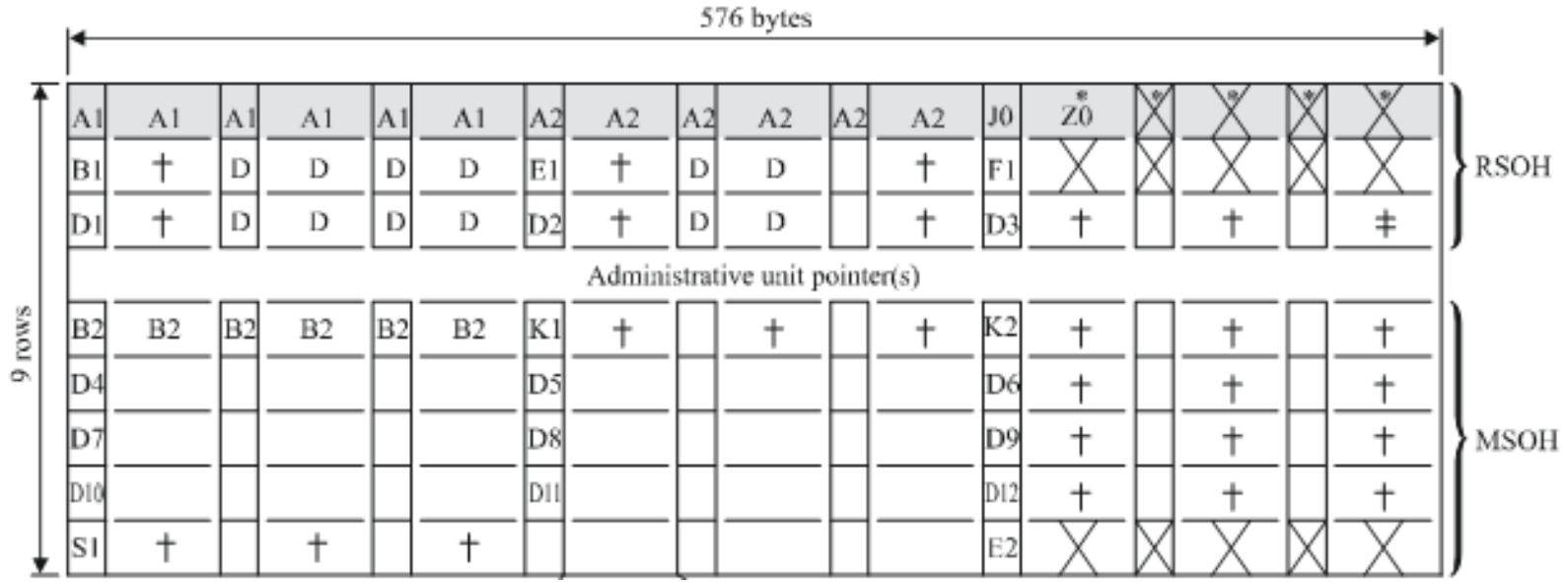
Comply to 15ppb for UMTS →

Clock accuracy	1 Frameslip in
10E-12	700 days
10E-11	70 days
10E-10	7 days
10E- 9	17 days
10E- 8	11,75 hours
10E- 7	10 hours
10E -6	1 minute
10E -5	6 seconds

10GWAN contra 10GLAN

10G-WAN = Layer 1 STM-64 Interface => STM N Overhead

STM64-OH: B1, B2, S1 + AIS/RDI



10GWAN contra 10GLAN

WAN PHY mode (10GWAN = STM64) on 10GE Interfaces

detect bit-errors on underlying WDM-Systems per Segment - so it´s needed to troubleshoot complex networks

Multiplex section

B2 parity

N x 3 bytes for Bit error monitoring over the whole multiplex section are availabel. The BIP 24 value will be calculated to even parity over all Bits of the frame exept the lines 1 to 3 of the ROHS (Regenrater section overhead) and transmitted in the next frame

10GE WAN Synchronization: Standards Conflict

802.3ae std

- Ethernet transport was not intended to be used for network synchronization
  Prohibits “network” clock recovery: pg 372 table 50-2
  - Relies upon free-running OSC
- Since WAN framing based on SDH/SONET
  - SSM conveyed in physical layer S1 byte
  - S1 set to a fixed QL=DUS (do not use for sync): pg 372 table 50-2

G.8262 & G.8264

- Defines network timing distribution support using Ethernet transport physical layer
  - Requires “network” clock recovery based on hierarchical clock distribution
- All framing convention references IEEE 802.3
  - Therefore, physical layer assumes std Ethernet framing/preamble
  - Conveys network clock quality level via (L2) messaging defined by slow protocol

Overview: 10GE WAN Synchronization Feature Issue

IEEE 802.3ae

The WAN Interface Sublayer (WIS) is an optional PHY sublayer that may be used to create a 10GBASE-W PHY that is data-rate and format compatible with the SONET STS-192c transmission format defined by ANSI, as well as the Synchronous Digital Hierarchy (SDH) VC-4-64c container specified by ITU.

The purpose of the WIS is to allow 10GBASE-W equipment to generate Ethernet data streams that may be mapped directly to STS-192c or VC-4-64c streams at the PHY level, without requiring MAC or higher-layer processing.

ITU-T G.8262 & G.8264

G.8262 specifies the Ethernet clock performance

G.8264 specifies the Ethernet SSM equivalent process

SSM is based on a L2 802.3 slow protocol

- Clock recovery based on network traceable coordination of physical layer signal

Overview: 10GE WAN Synchronization Feature Issue

Option 1

- Address conflict between IEEE & ITU-T and modify 802.3 to allow
  - Clock recovery
  - S1 byte sync messaging
- Risk/Benefit
  - Slow process, but consistent & coordinated result
  - Assures network interoperability

Option 2

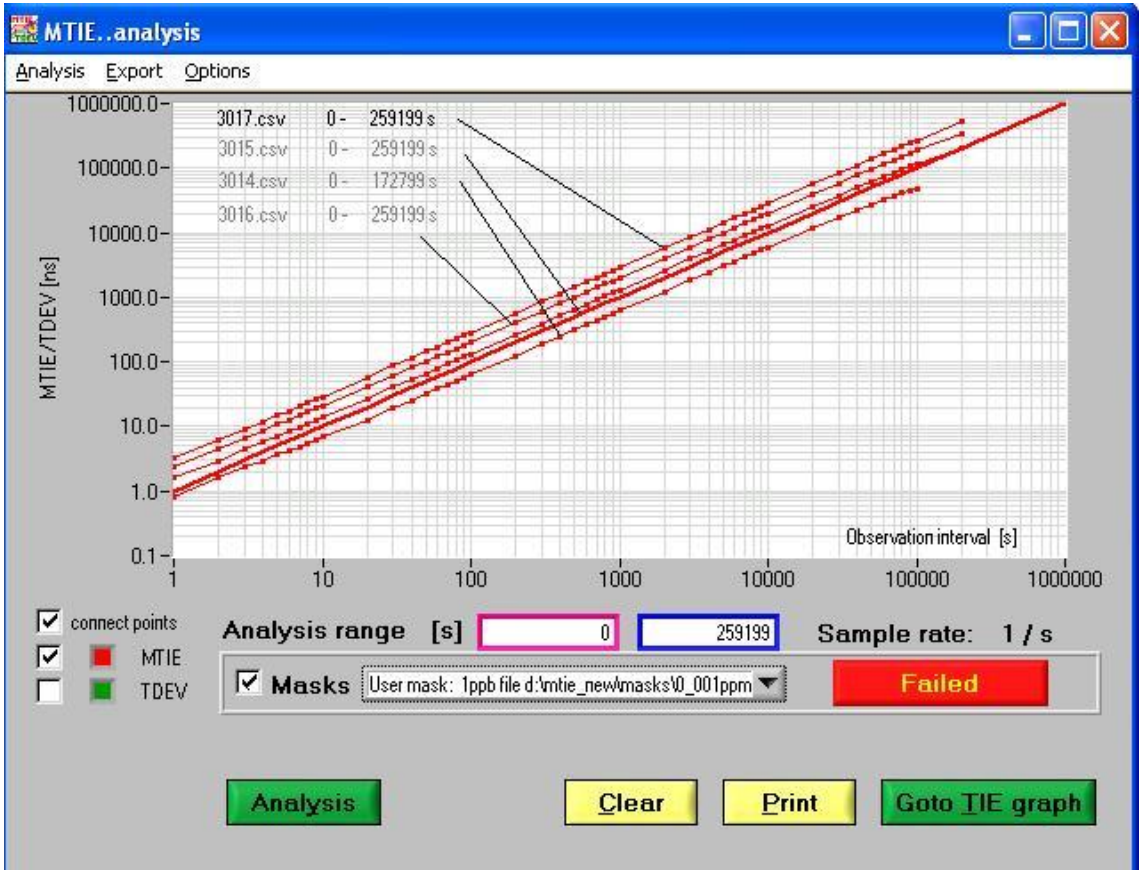
- Provide proprietary solution:
  - Enable SONET/SDH L1 clock recovery
  - Enable SSM messaging via L2 Ethernet slow protocol
- Risk/Benefit
  - Quick process
  - Proprietary solution – no/little interoperability

Additional frequency back up points

- GPS OK
- SSU OK
- PTP Slaves OK

Stressd Slave:
Frequency
accuracy 1ppb

Holdover PTP Slave: 1 Week about 15ppb



SyncE contra 1588

Feature	SyncE	IEEE1588	Command
Transient response	+	To 10 times longer *as SyncE −	*Will be inproved with Fast Lock etc.
Frequency accuracy	Better 1xE-10 +	x ppb* −	•With traffiv >50% etc…
Clock accuracy independent from trafficload, framesizes,	Yes +	No − Compensation with transparent Clock	
Clock selection	with SSM +	Yes 2. Grandmaster +	
Frequenzsynchronisation	Very good +	good +	
Phasensynchronisation	no −	Yes +	

SyncE contra 1588

Feature	SyncE	IEEE1588	Command
Bandwith	No +	Down 148kBit/sec Up ca. 45kBit +	64 Syncmessages/sec
Pollicy MPLS	No +	Yes +	
Holdover	2 days G.813 Option 1	Better 15ppb/week +	
Alarms, metrics suitable for SLA	SSM + ?	In future +	

Impelementation ruls:

- Clock distribution over 2 Ways:

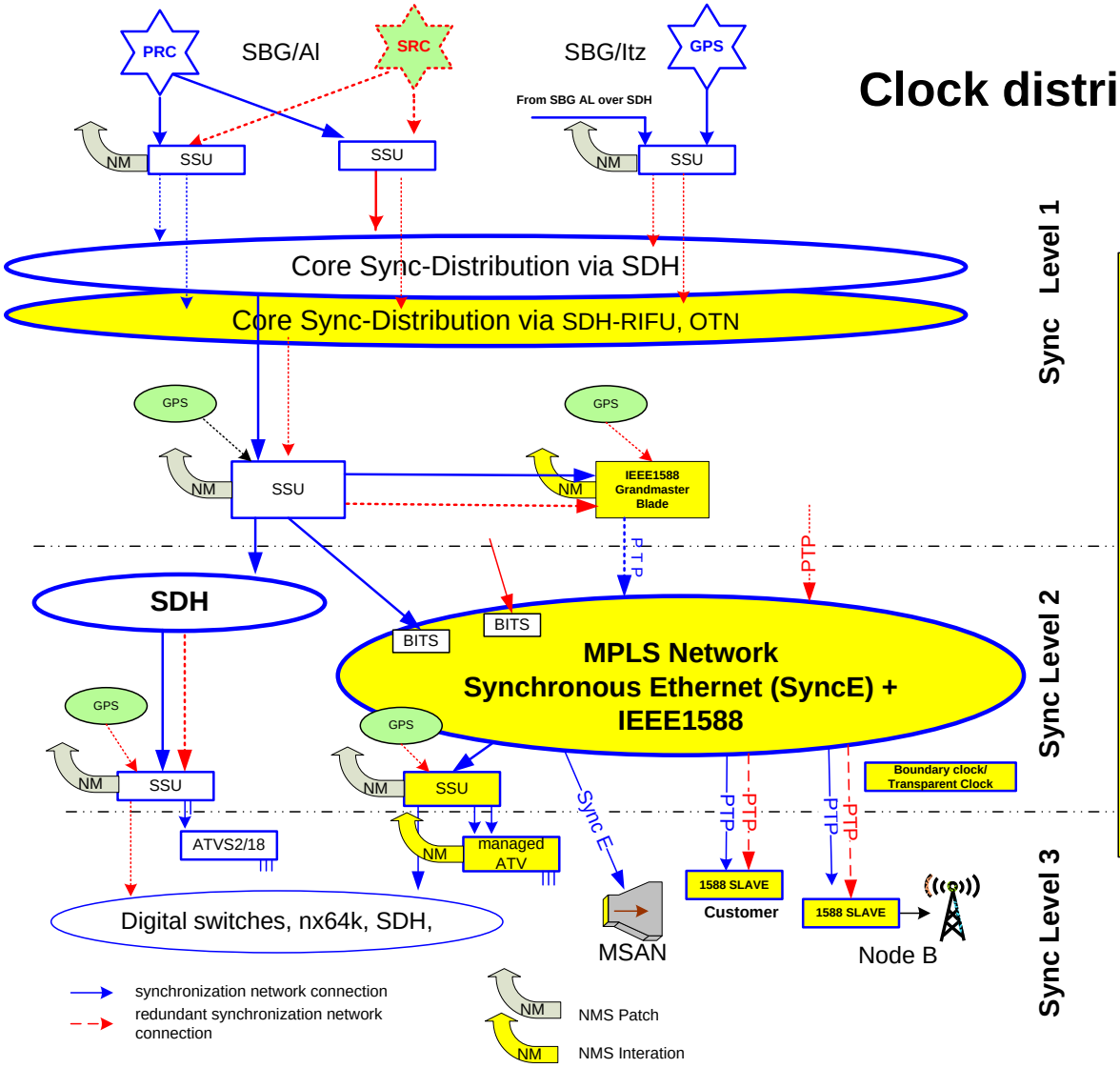
  Aggregation 1 and 2

  Topology: Ring: OK

  Chain: addtional frequency input points

- SSM from source (MPLS Node) to sink (MSAN)
- Alarms MSAN: Holdover, Change of SSM Value
- SNMP Traps

Clock distribution



Clock distribution 2009

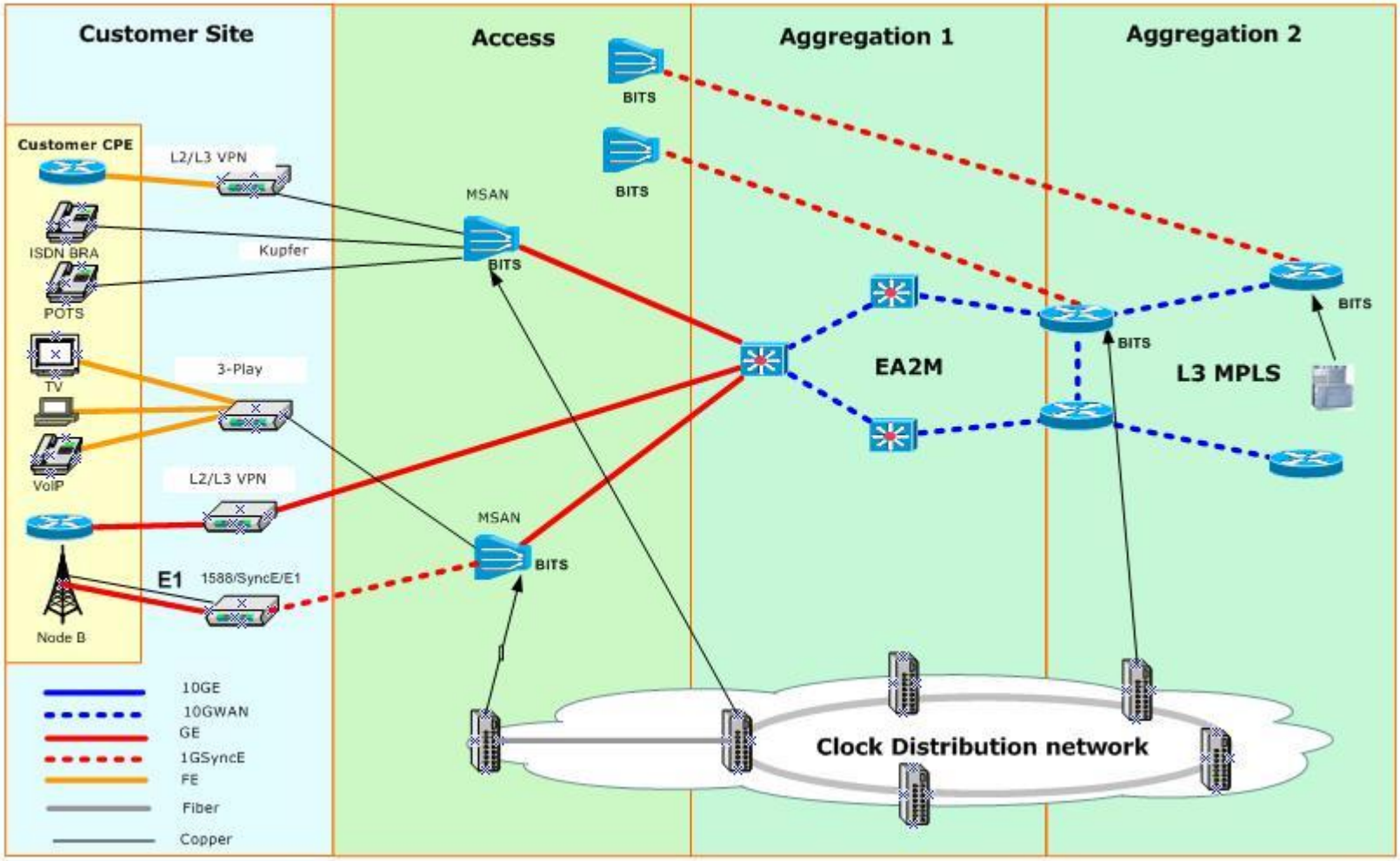
FOKUS 2009

- SSU
- Upgrade NMS
- Rollout 1588 Mobile Synchronisation

Forecast 2010/11

- e2e Sync-Services
- Rollout SyncE
- Redesign Core-Sync

MSAN Syncronisation Concept Phase 1



MSAN Platform:

Services:

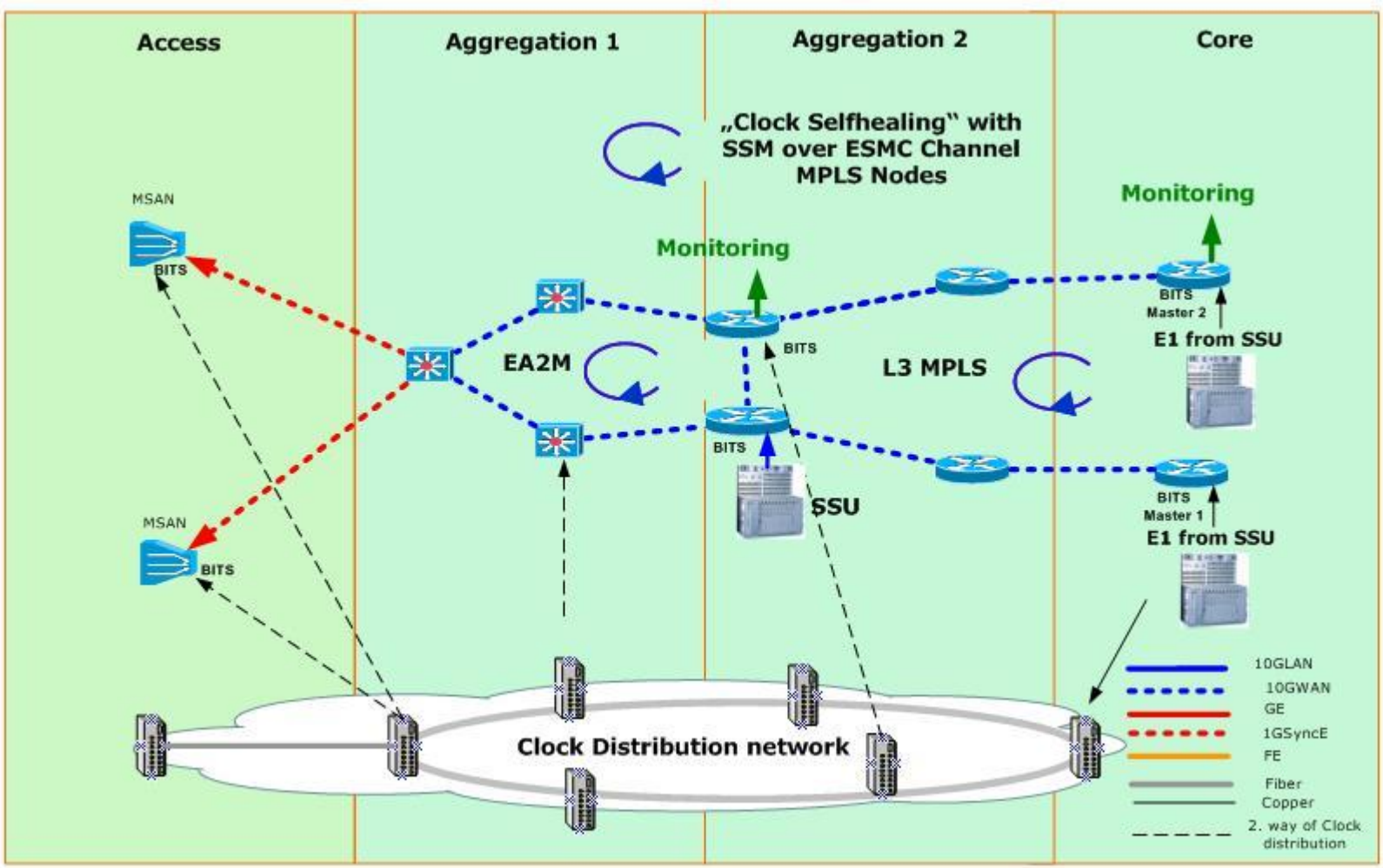
- Pots
- IDSN BRA & PRA
- Leased Lines

Technologie

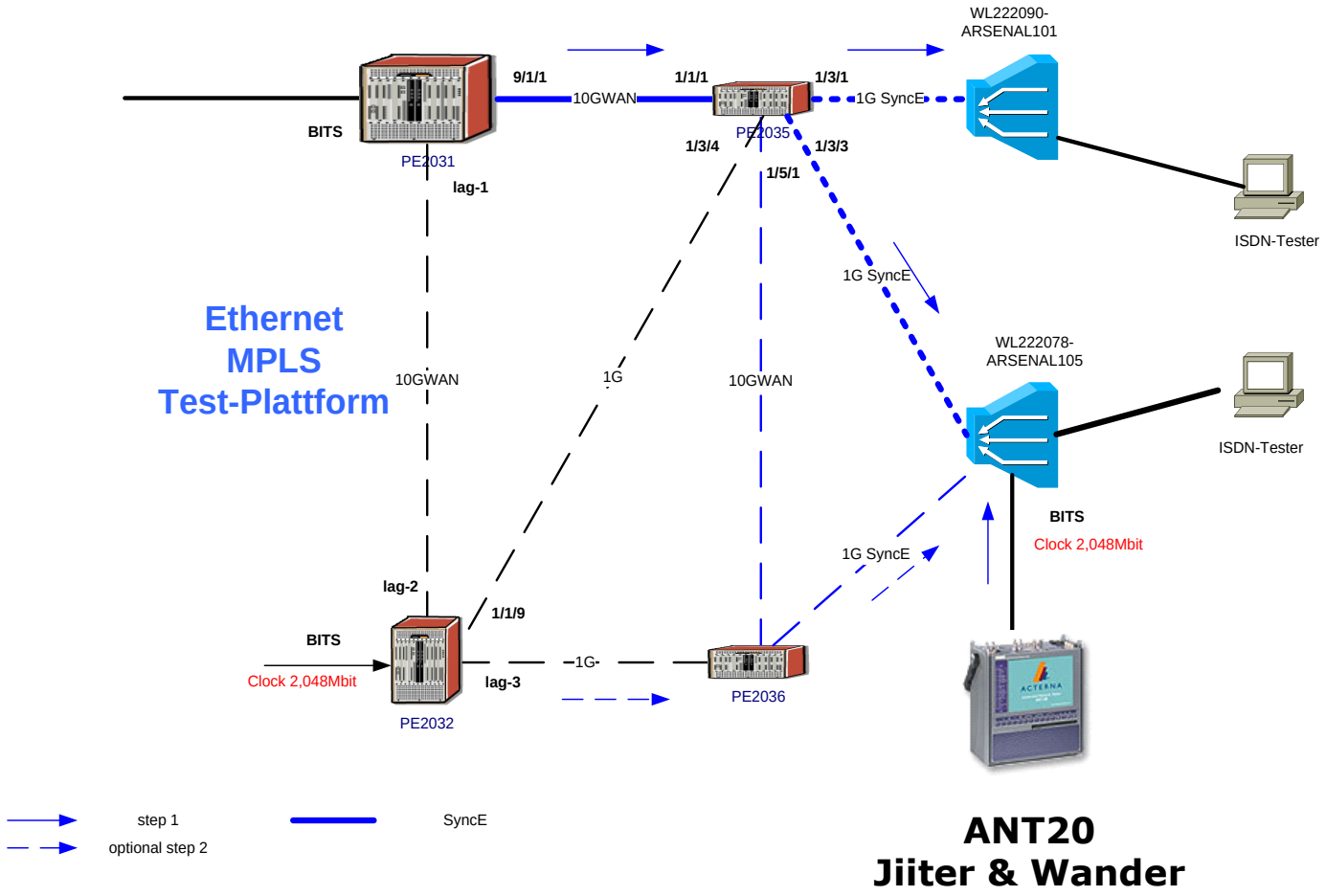
- SHDSL
- VDSL
- GPON

10G Uplinks in future

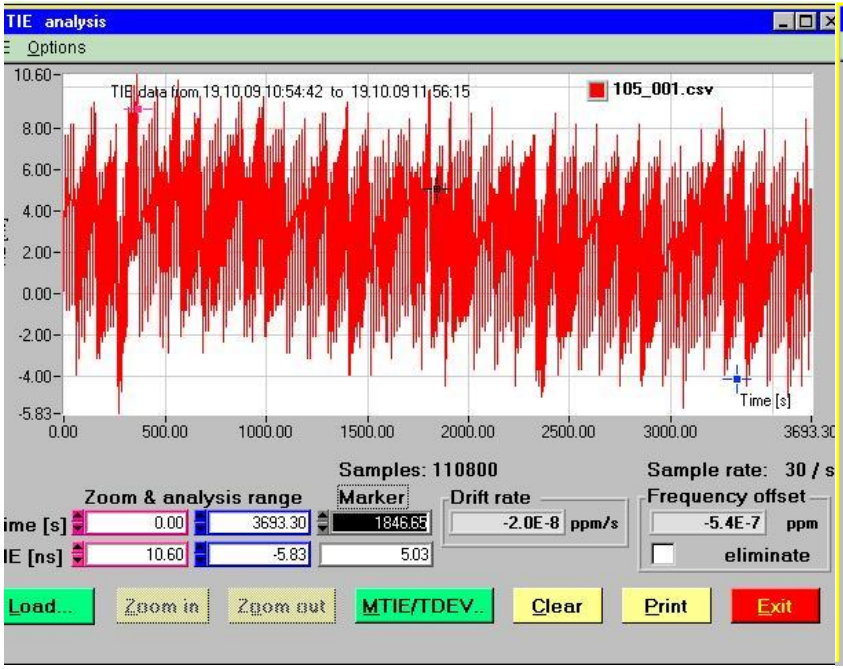
MSAN Syncronisation Concept Phase 3

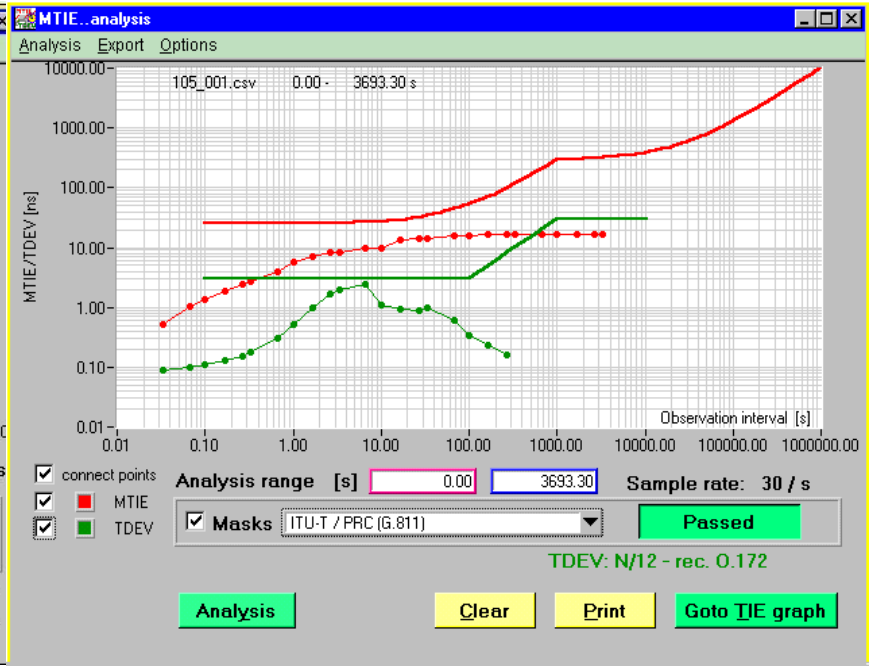


Test environment for SyncE tests



MSAN: Wander generation





Comply with:
G.8262 8.1.1 EEC Option 1
Wander generation

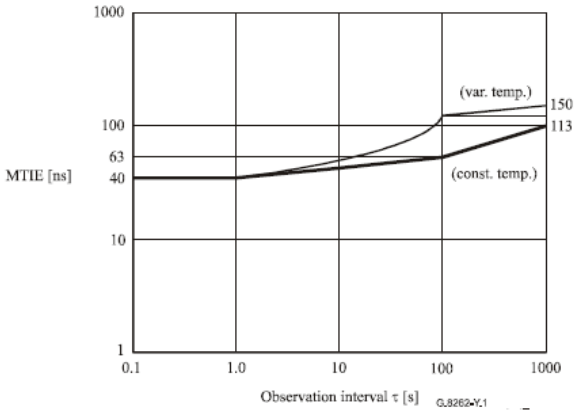
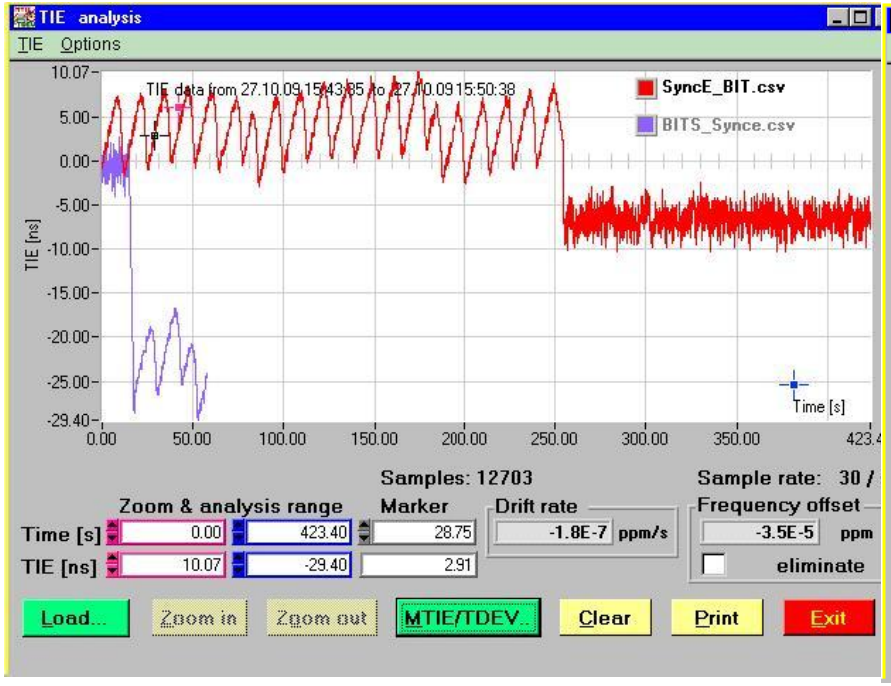
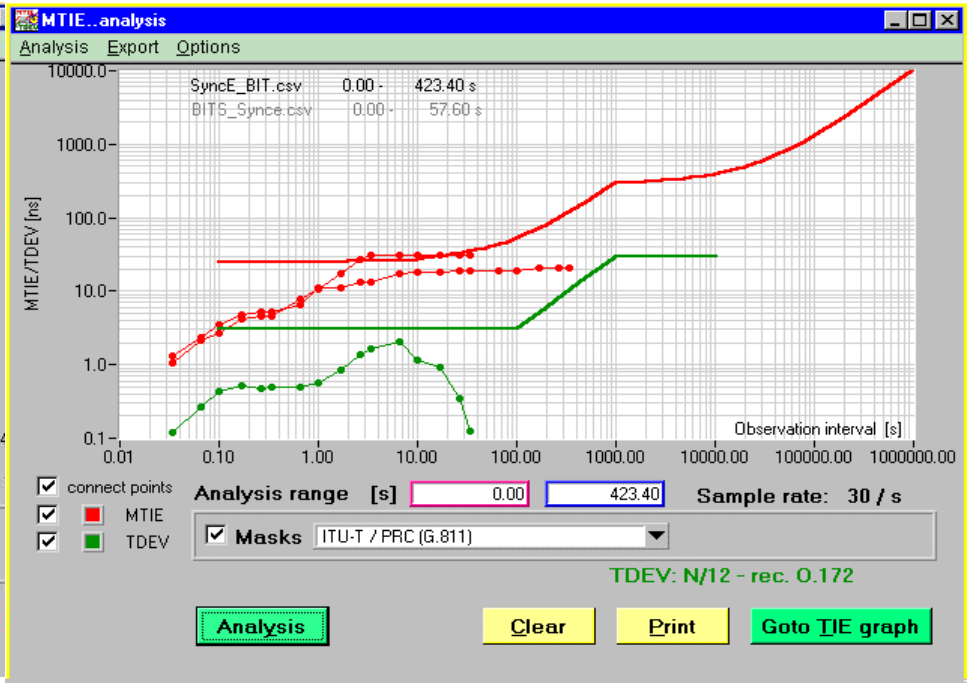


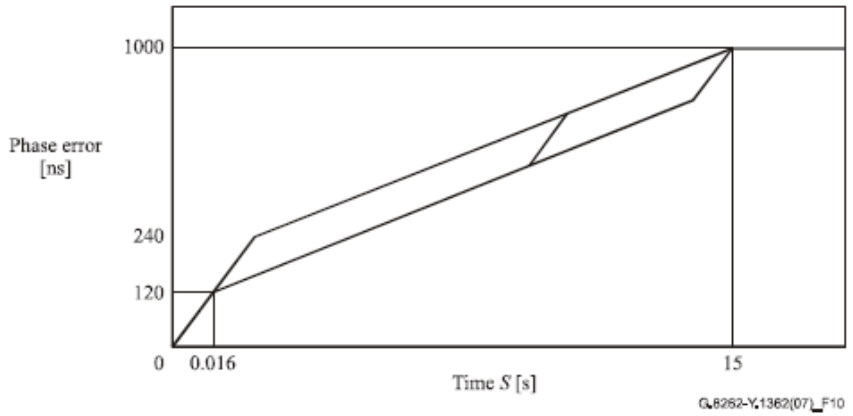
Figure 1 – Wander generation (MTIE) for EEC-Option 1

MSAN: Short-term phase transient response

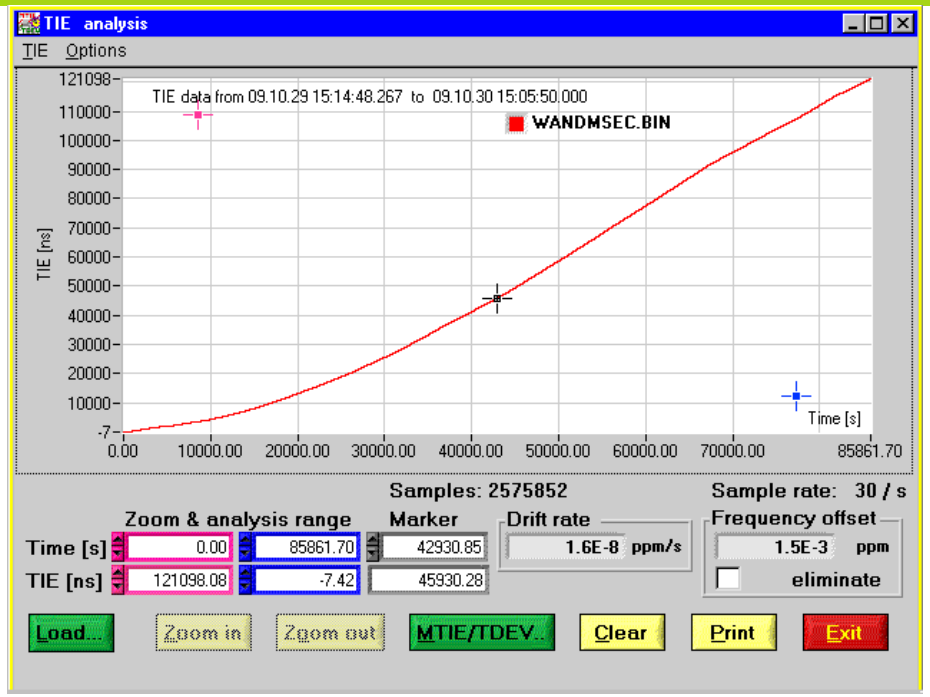




Comply with:
G.8262 11.1.1 EEC-Option 1
Short-term phase transient response



MSAN: Holdover



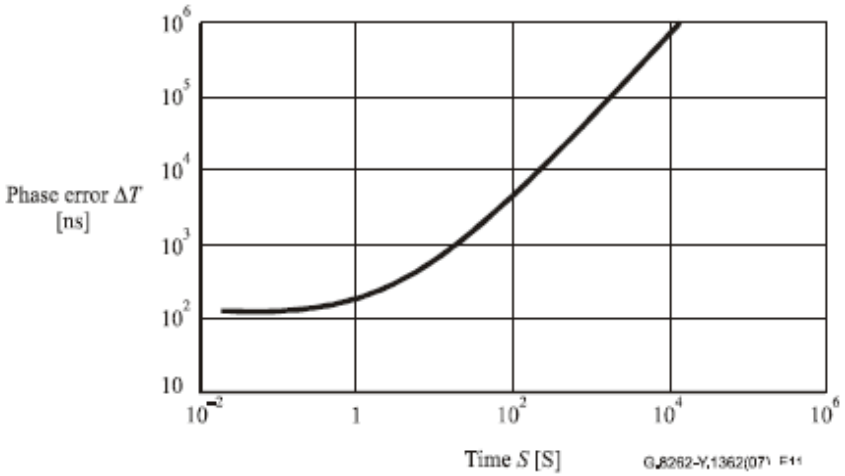


Figure 11 – Permissible phase error for an EEC-Option 1 under holdover operation at constant temperature

Comply with:
G.8262 11.1.1 EEC-Option 1
Long-term phase transient response

Holdover 1,5 ppb
After about 23h!

Better than G.8262

Many Thanks!

Questions?

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