

1588 TC SFP's in Microwave system

ITSF2014 Budapest

A1Telecom Austria: Atzwanger. J :



Common:

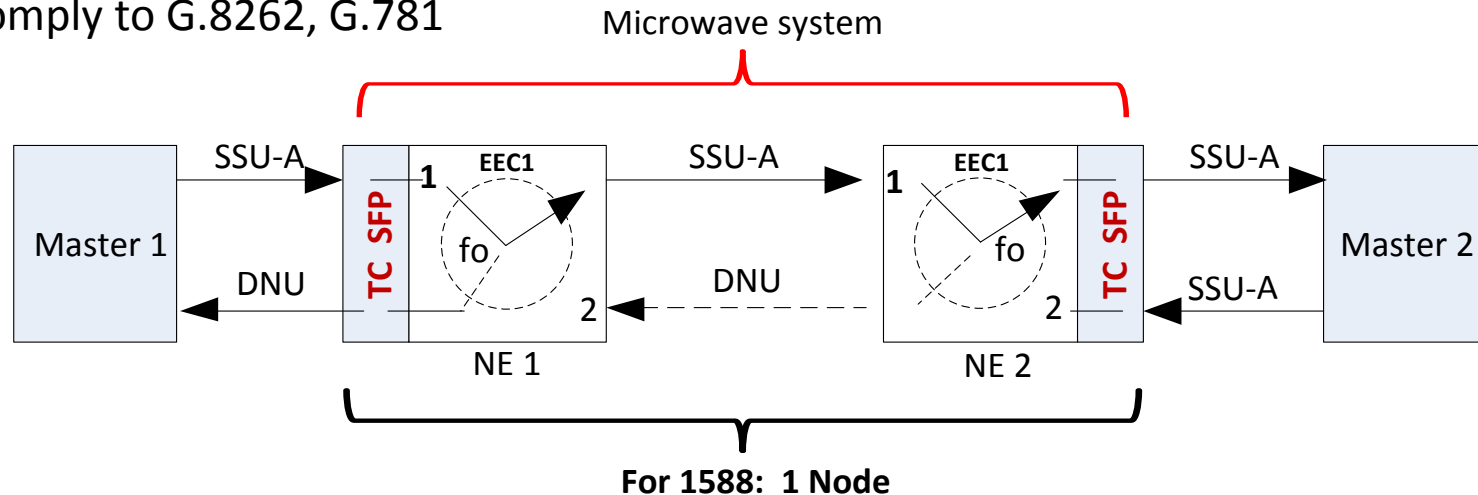
Phase synchronisation in telcos own ip network is principal possible with full 1588 aware Hardware. But what happens if 4G Station are connected over a 3rd party network wth no 1588 aware Hardware. GPS installations are at such places difficult. Is an alternative available?

A1 Telecom Austria tested therefore a non 1588 aware HW microwave system with SFP s with 1588 Transparent clock function of Aimvalley.

This could be a step towards a solution to transfere Time/Phase over non 1588 aware 3rd party network.

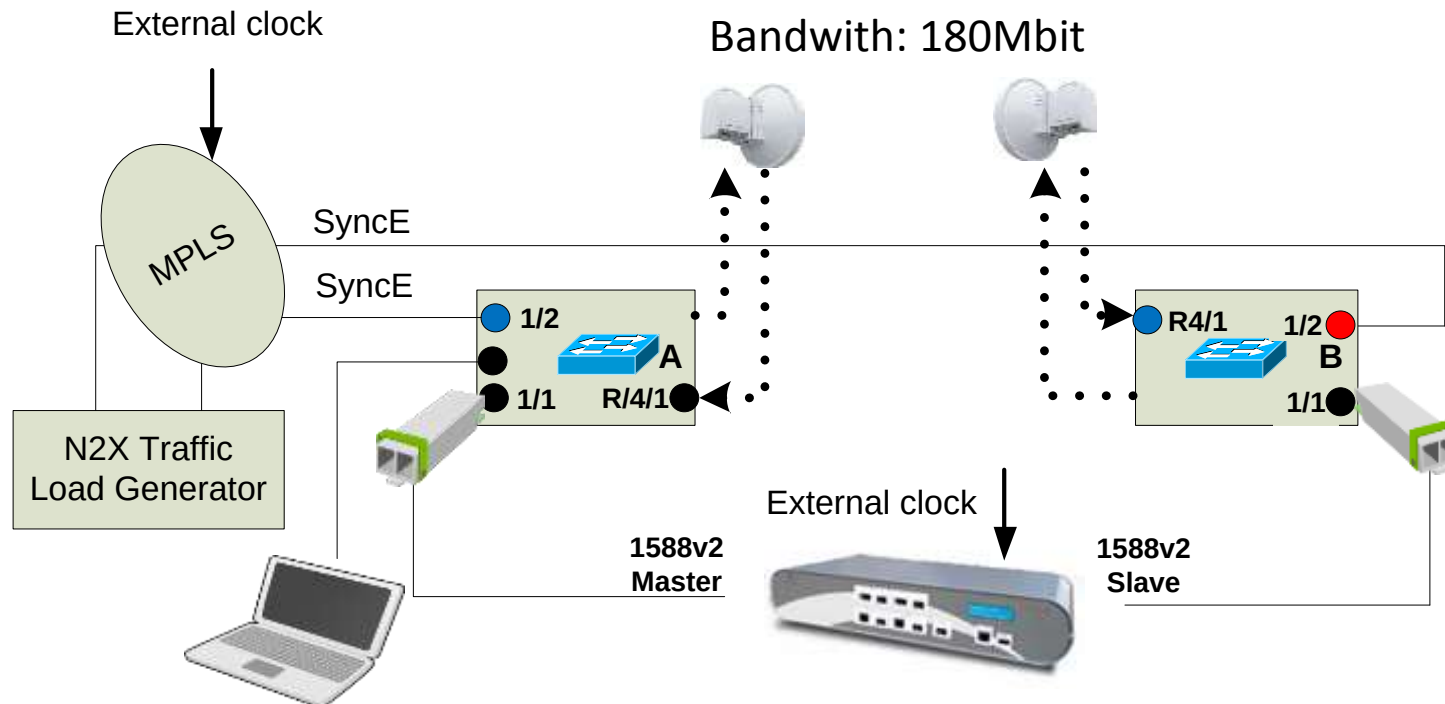
A1TA Requirements

Comply to G.8262, G.781



- TC SFP must be transparent for frequency. No influence allowed regarding the features of the NE: short term phase transient response (rearrangements), long time phase transient response:
- The synchronisation mechanism of the 2 TC STP must be:
 - Robustness against changes of: traffic load, modulation (QAM)
 - short term and long term phase transient response
- TC SFP status information have to be available for NMS etc..

Test Setup in Lab:



Vlan:

1500 = PTP Traffic from Paragon X

1588 = Connection between TC SFP1, TC SFP 2 and Laptop

900 = Traffic N2X Frame size 66 to 1518 Bytes

910 = Traffic N2X Frame size 66 to 1518 Bytes

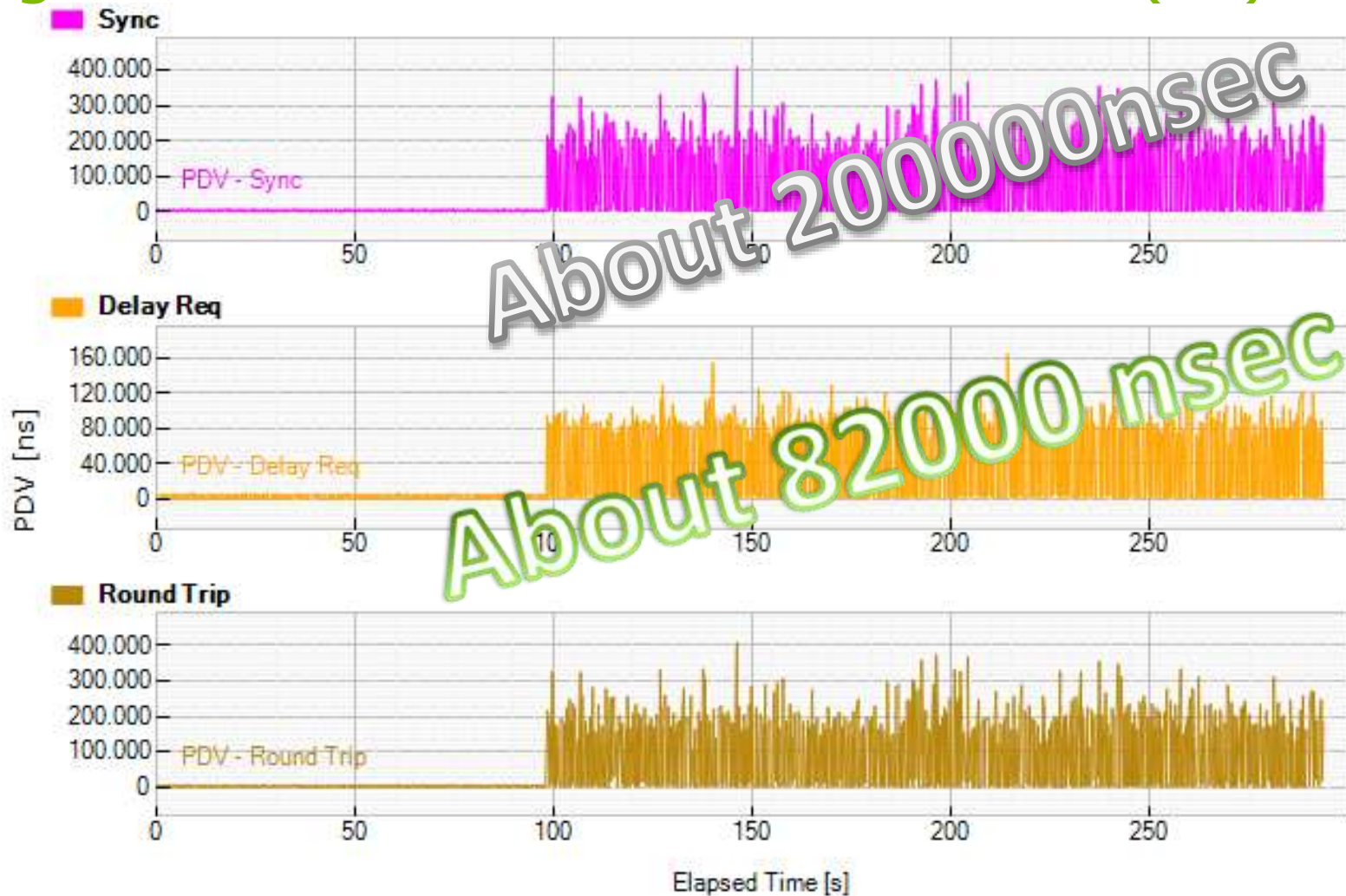
Traffic Loads:

Microwave system: Capacity: 180Mbit symmetrical

**N2X: Framesizes: 66 – 1518 Bytes both directions, P = Priority, Capacity in Mbit;
Upload 170Mbit, Download capacity see table.**

	P	Mbit	MBit	P	Mbit	Mbit
Vlan 900	4	80	140	4	80	80 - 140
Vlan 910	5	90	90	5	90	90
Vlan 1500 PTP Traffic	6			6		
Vlan 1588 Communication between SFP1 and 2	4			6		
Microwave overload		no	yes		no	yes
TC clock accuracy		OK	NOK		OK	OK
PDV Results Figure Nr		1	2		3	4

Figure 1: PDV without Correction Field (CF)



TC SFP Communication and Traffic in the same priority class

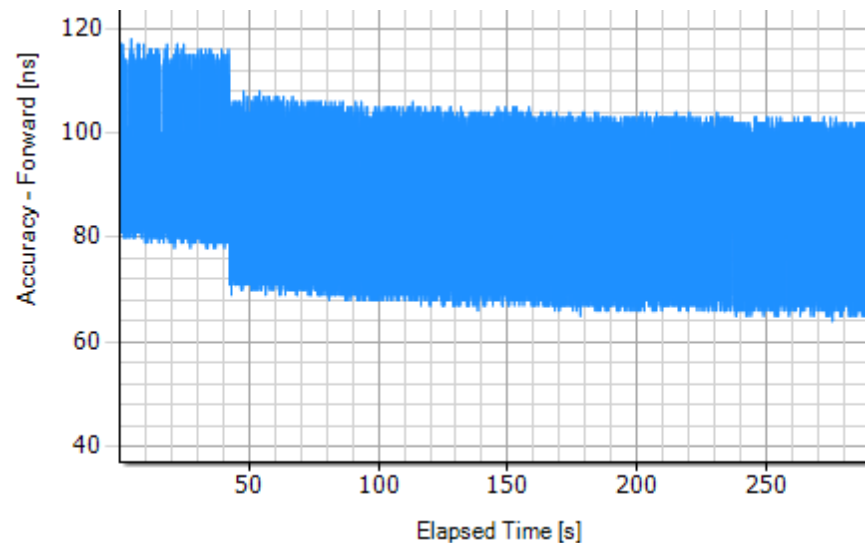


Figure 1:PDV with CF

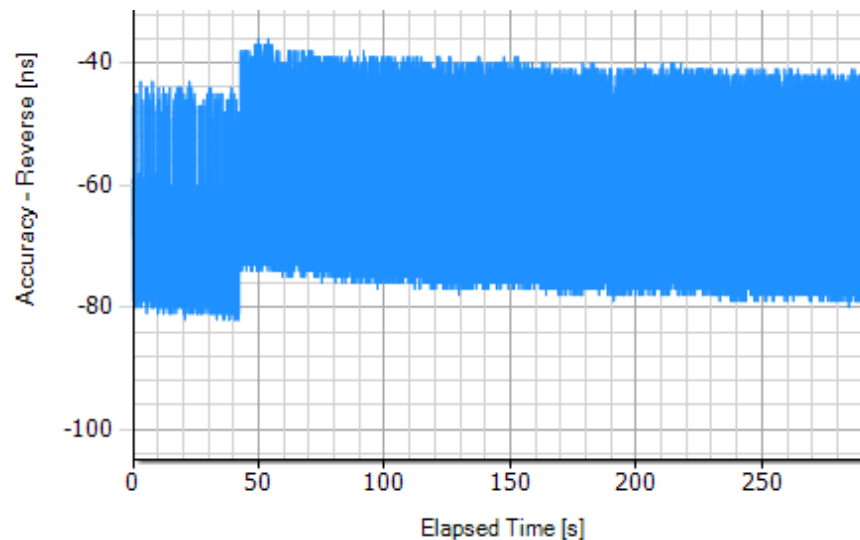


TC SFP Communication and Traffic in the same priority class

Figure 1: TC Clock Accuracy



Messages	18.790
Min [ns]	64
Max [ns]	118
Max-Min [ns]	54
Mean [ns]	85,713
Message rate	64/second



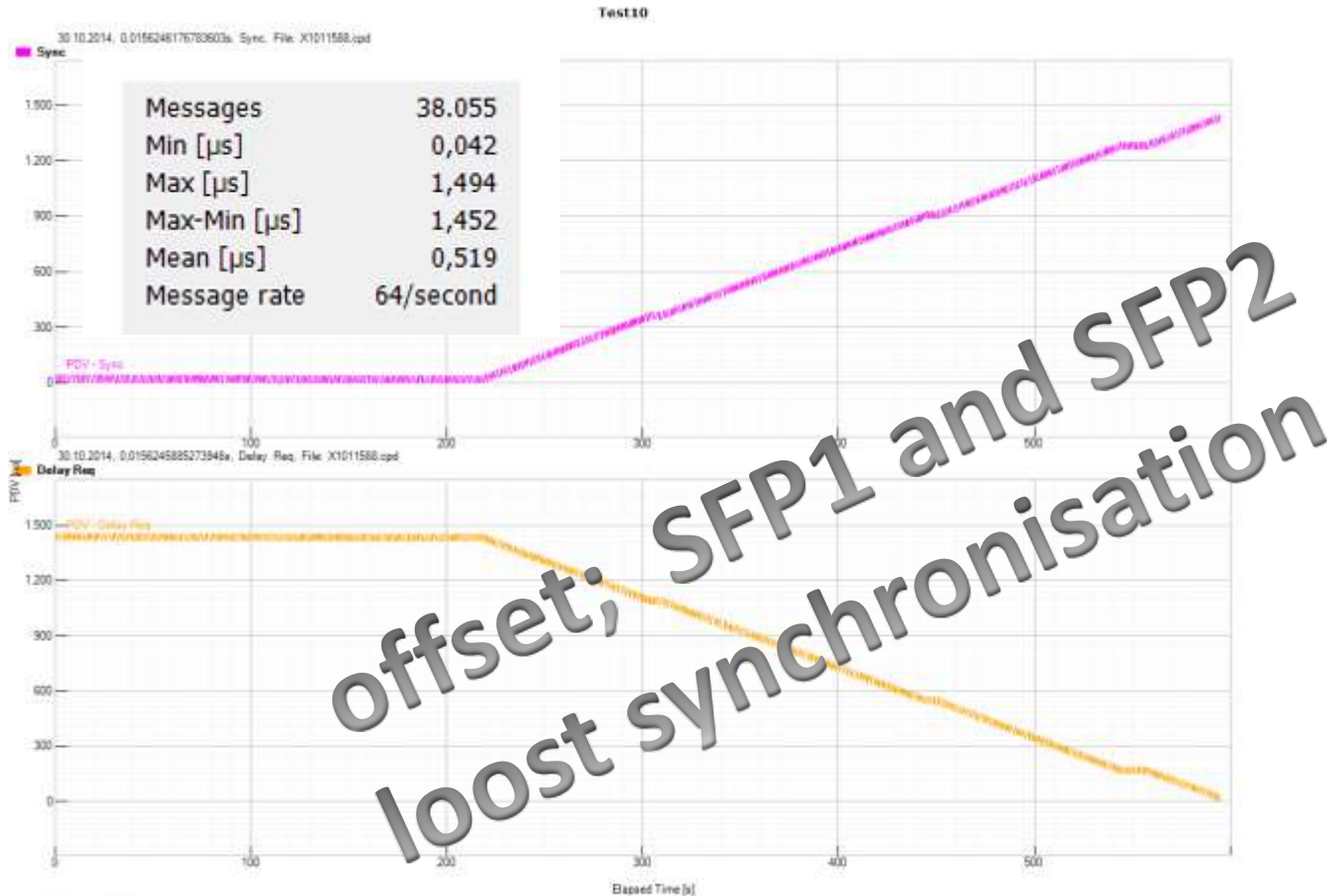
Messages	18.790
Min [ns]	-82
Max [ns]	-36
Max-Min [ns]	46
Mean [ns]	-62,487
Message rate	64/second

Figure 2: Overload in priority class 4; PDV without Correction Field



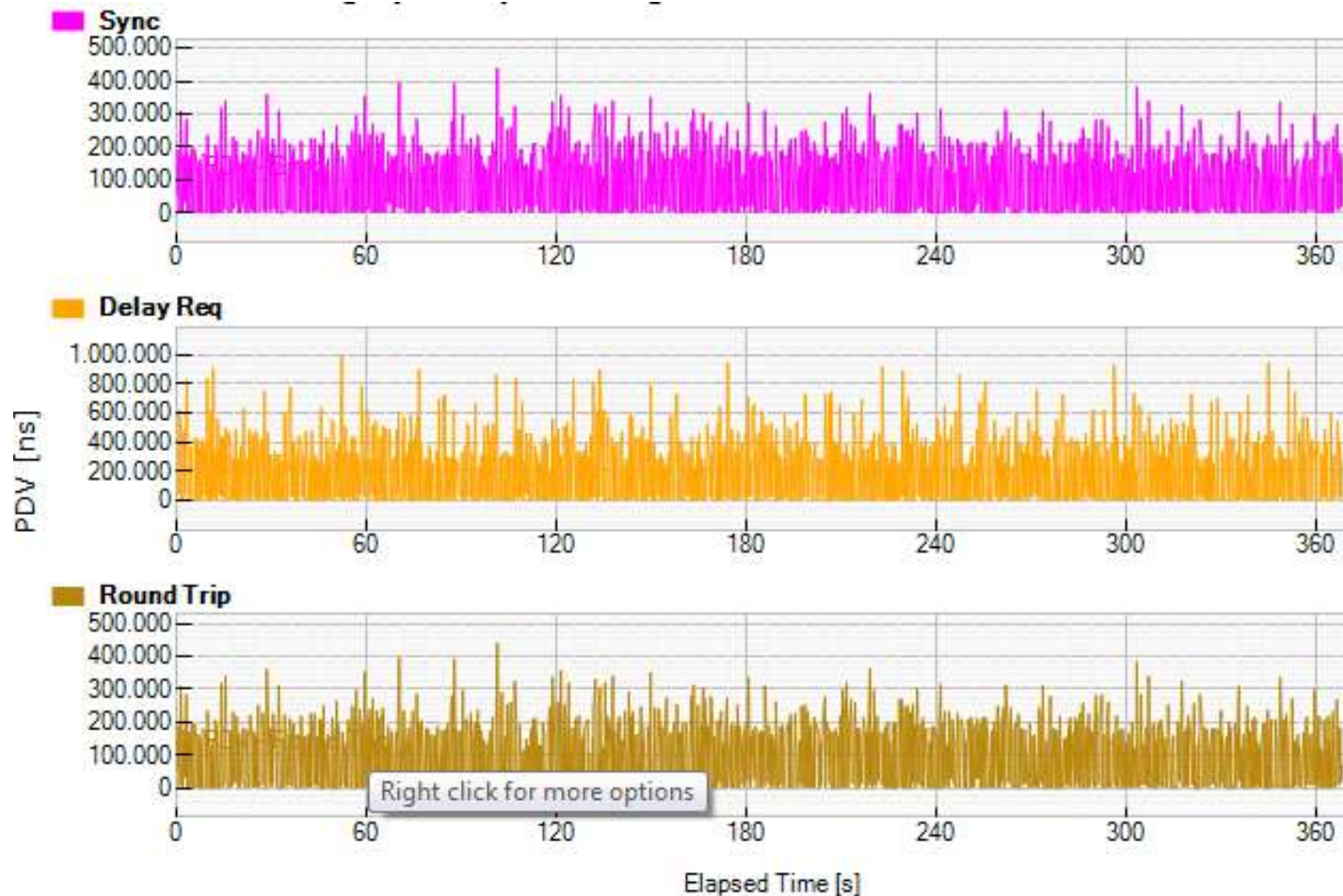
TC SFP Communication and Traffic in the same priority class

Figure 2: Overload ; PDV with Correction Field



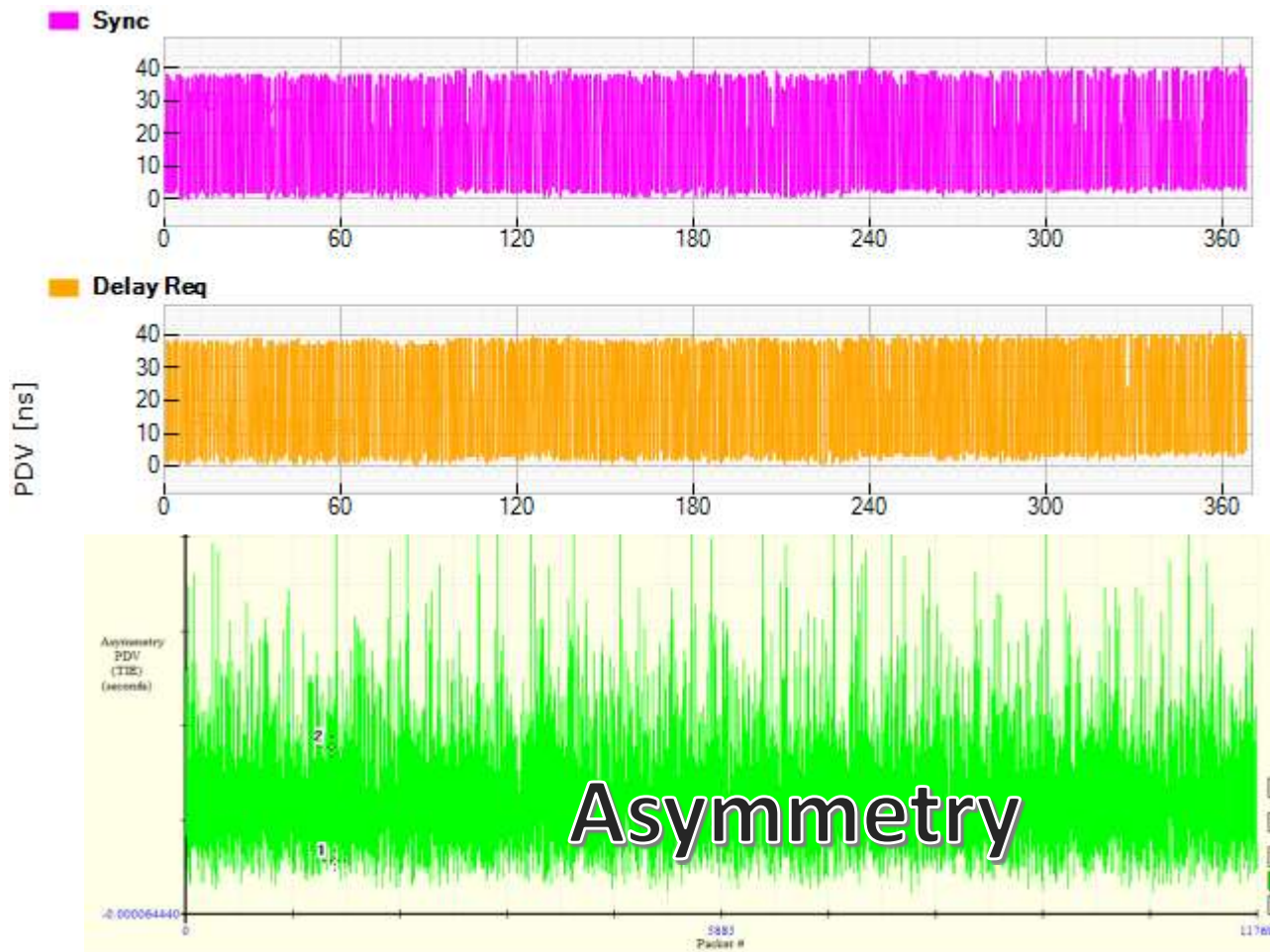
Synchronisation destroyed caused by dropped packets in P 4
TC SFP Communication and Traffic in the same priority class

Figure 3: PDV without CF



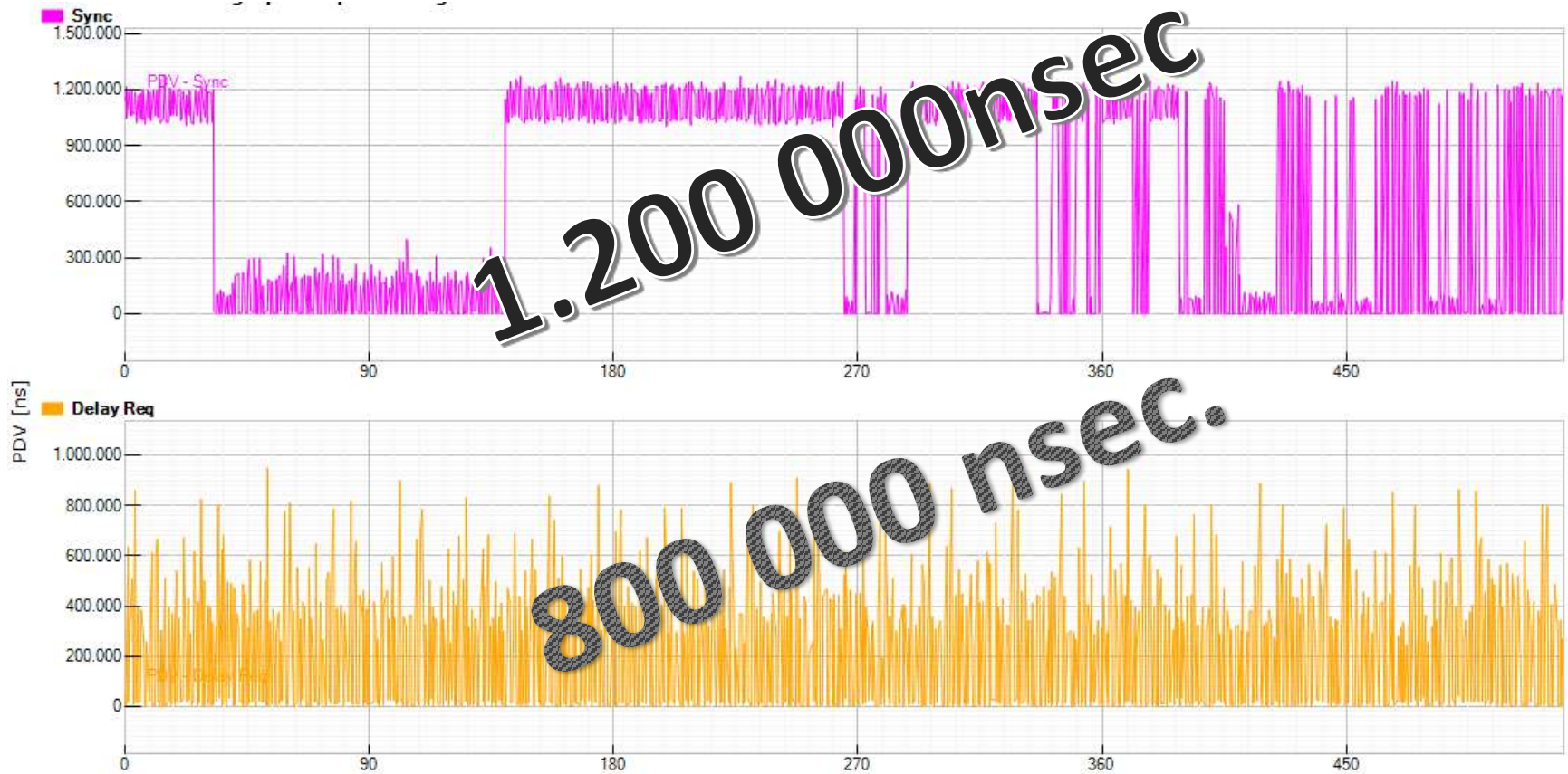
TC SFP Communication and Traffic in different priority classes

Figure 3: PDV with CF



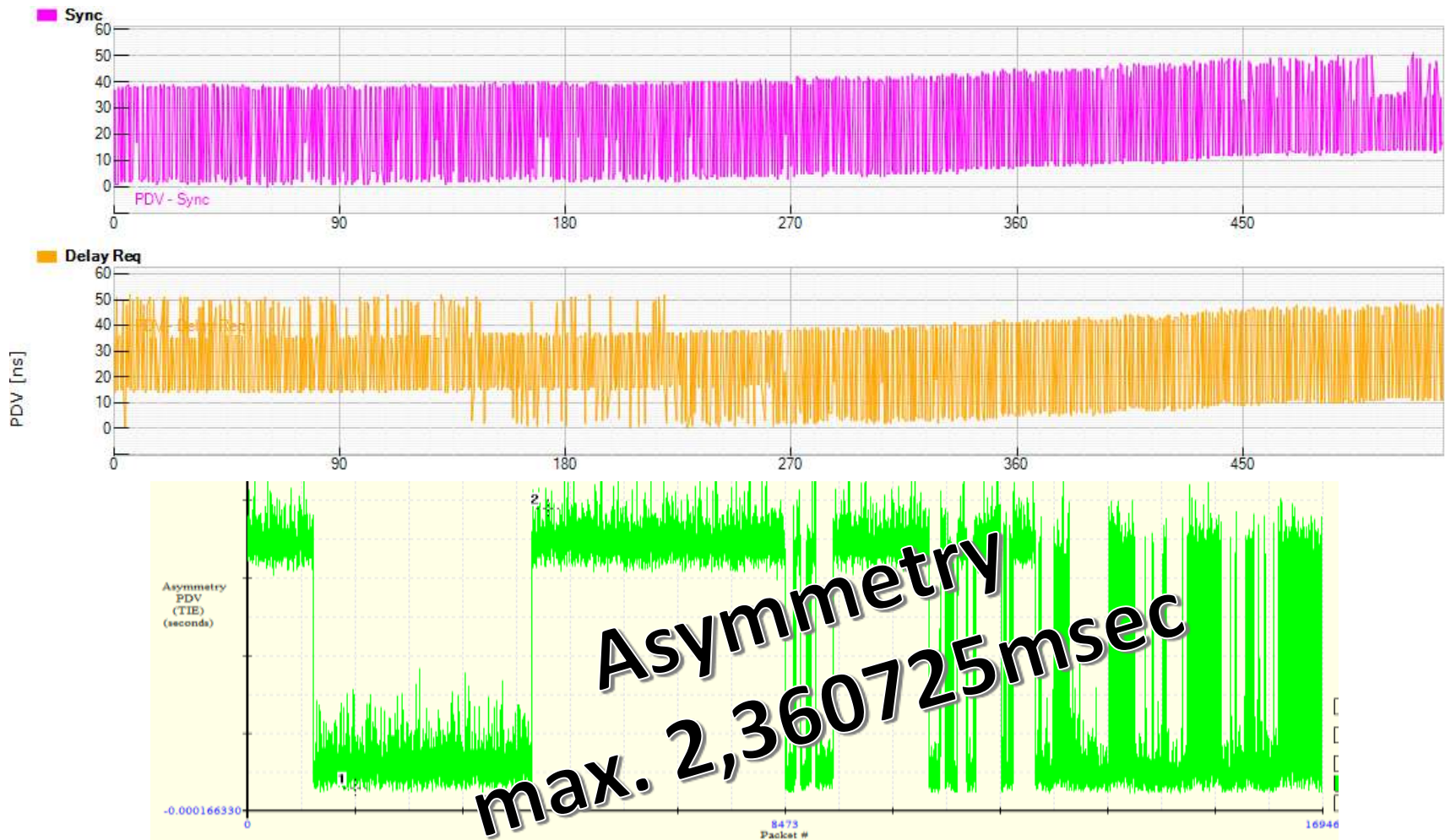
TC SFP Communication and Traffic in different priority classes

Figure 4: PDV without CF; Overload 80–40Mbit in Priority 4



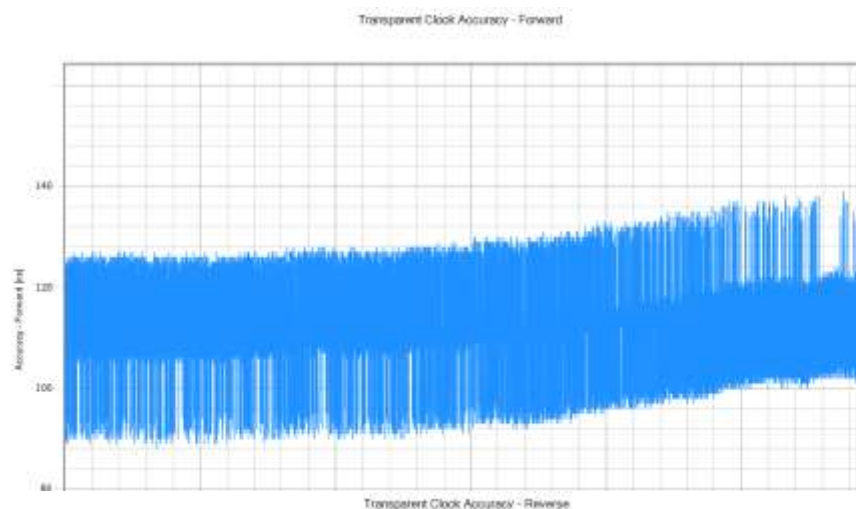
TC SFP Communication and Traffic in different priority classes.

Figure 4: PDV with CF Overload 80–140Mbit with P 4



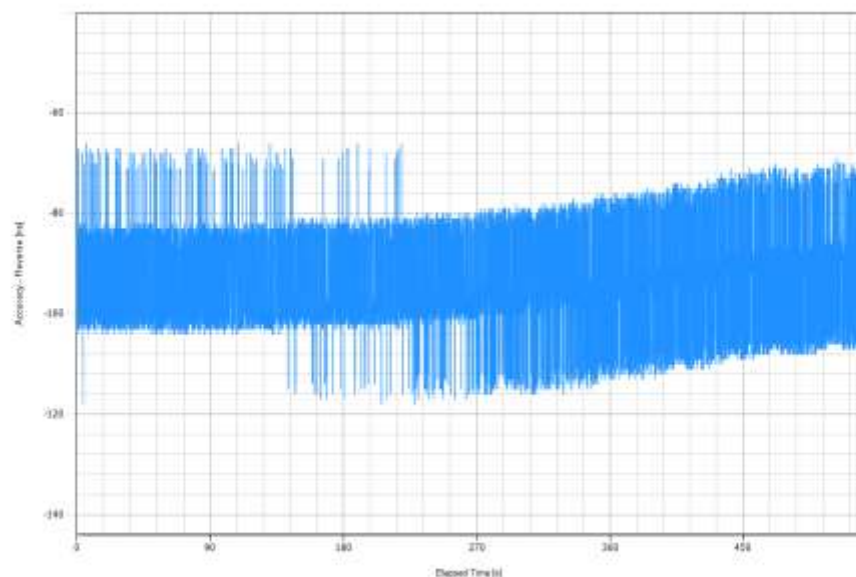
TC SFP Communication and Traffic in different priority classes.

Figure:4 Forward and Reverse Correction field Accuracy



Messages 16.947
Info Tact

Messages	16.947
Min [ns]	88
Max [ns]	139
Max-Min [ns]	51
Mean [ns]	112,193
Message rate	32/second



Messages	16.947
Min [ns]	-118
Max [ns]	-66
Max-Min [ns]	52
Mean [ns]	-92,873
Message rate	32/second

TC SFP Results

- ✓ Synchronisation is robust between the TC SFP's.
if corresponding Vlan TC SFP' are in a most significant priority class (6)
- ✓ Overload in priority class 4 does not destroy the synchronisation between the SFP's
- ✓ Transparent clock accuracy OK
- ✓ Compensation of asymmetry OK



TC SFP: open Tasks:

Influence of:

- QAM modulation changes
 - input wander tolerance
 - jitter tolerance,
 - short term phase transient
 - long term phase transient
-
- additional power in TC SFP

**The TC SFP is an interesting and
useful development**

Thanks

Questions?

Atzwanger Joachim

joachim.atzwanger@a1telekom.at