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perfSONAR in X-WiN
usage @ DFN-NOC
- Current State -

European perfSONAR Workshop, June 5-6th 2019 – London

Robert Stoy

Agenda

- Physical: Topology , perfSONAR MP Installations
- Usage Priorities
- Measurements implemented (currently)
- Add-Ons (Alarming, Analysis)
- Further work...

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Physical



X-WiN

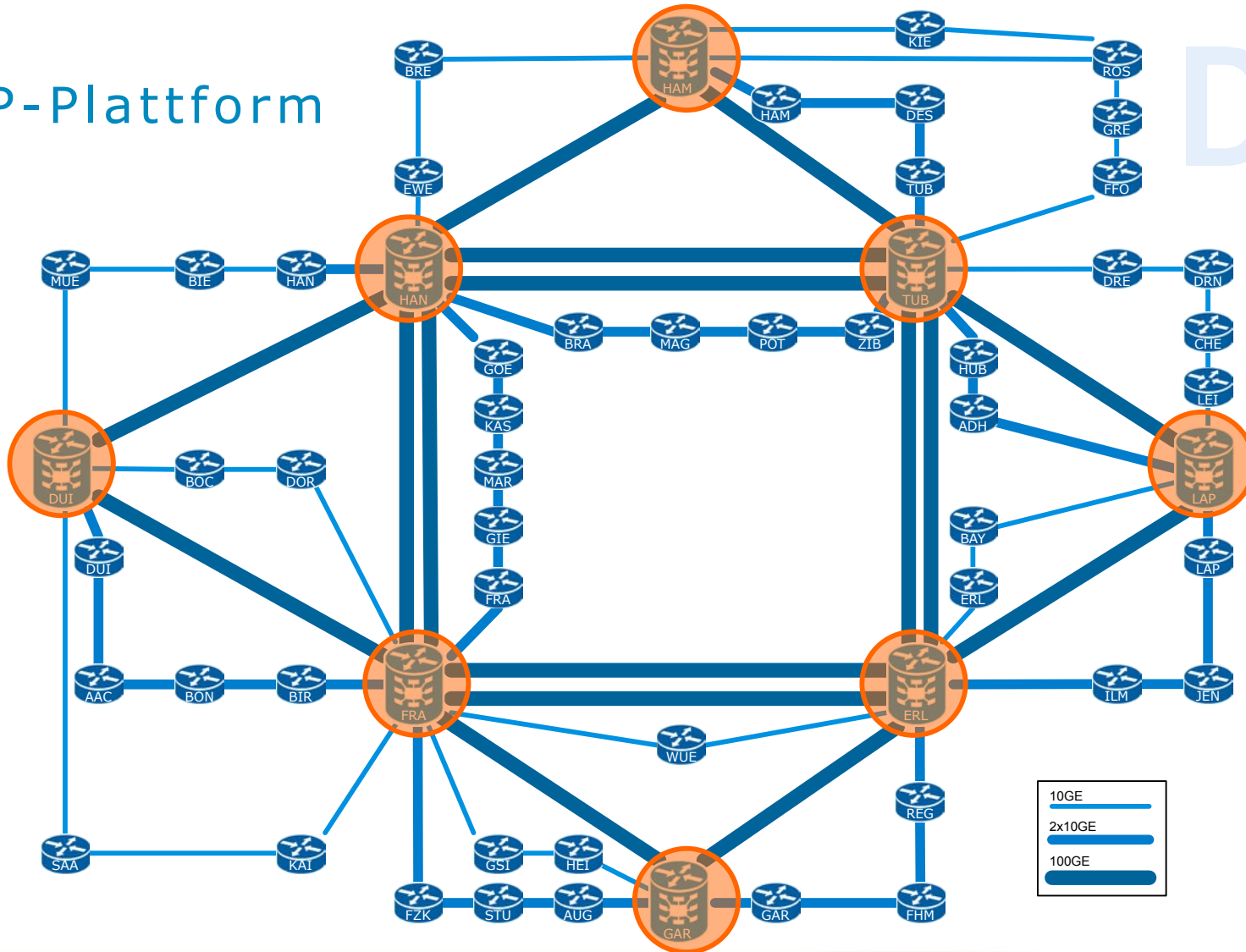
- L2/(L3) Access Nodes
- Core Router Nodes
- perfSONAR MPs connected



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X-WiN IP-Plattform

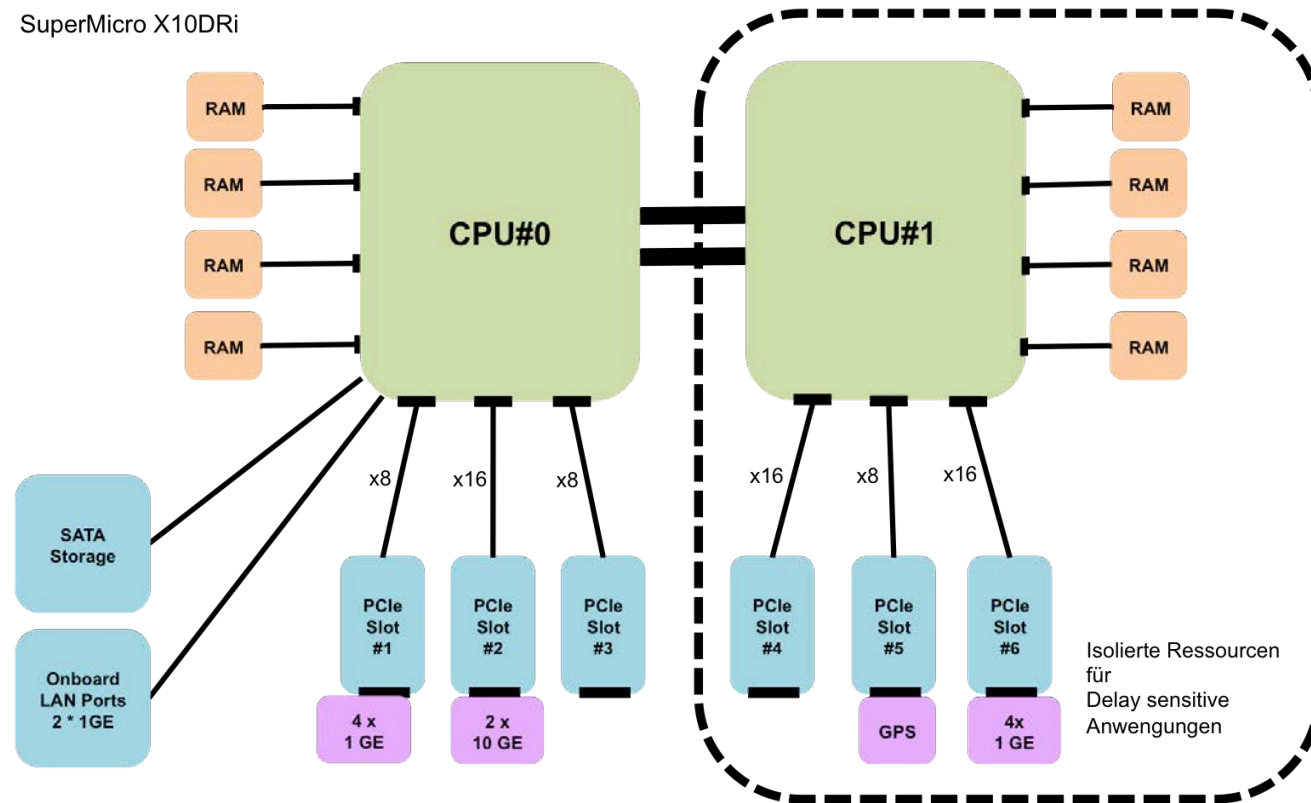
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Measurement Station Architecture

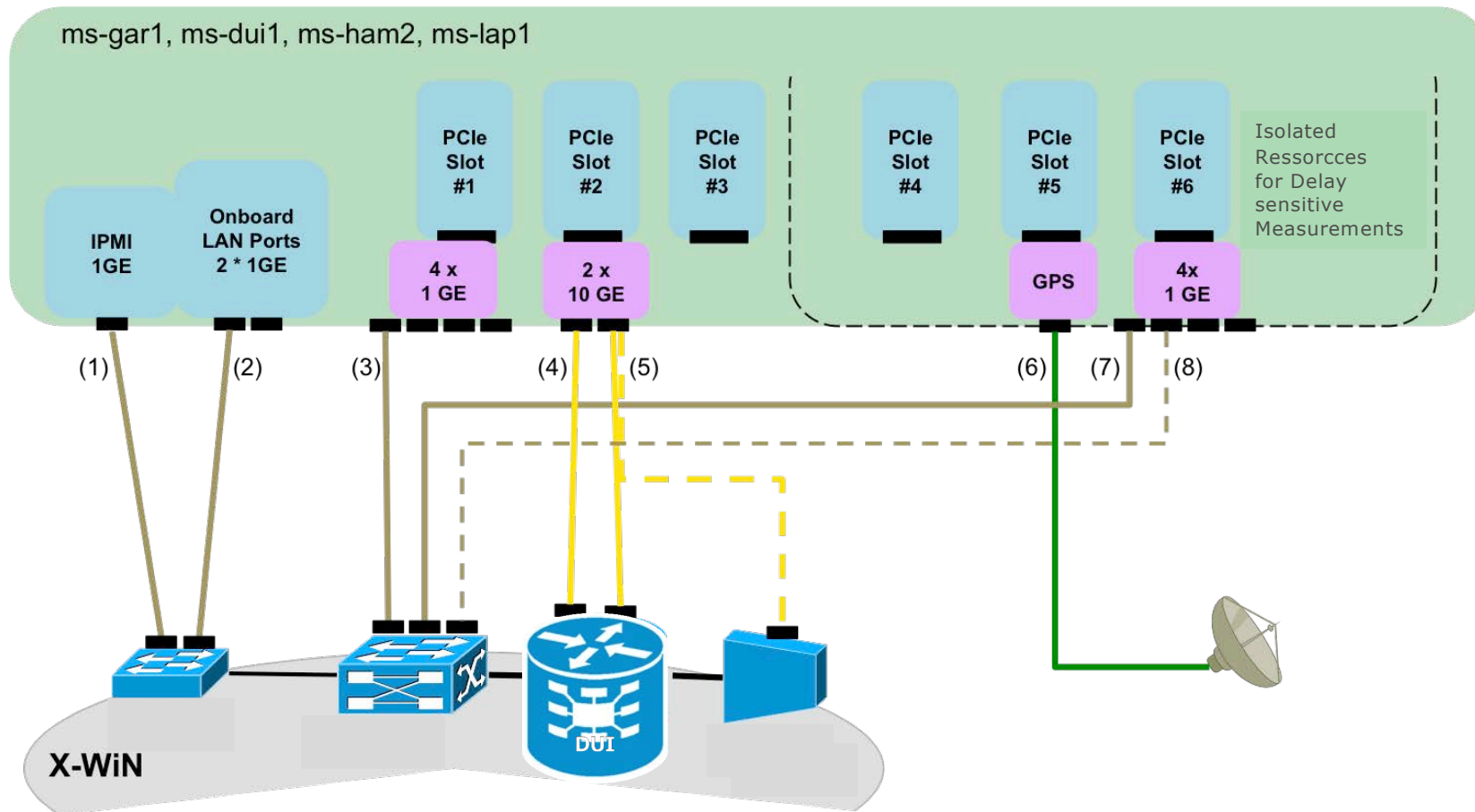
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SuperMicro X10DRi



Measurement Station connections

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System Operations

- Operating System (OS): Debian
 - OS and Hardware Maintenance : Server Team
 - perfSONAR Maintenance and Operation : PMV Team
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Goals, Usage

perfSONAR Usage Goals

1) Support on Permanent Backbone Performance & Healthiness Verification

- ▶ 8 Measurement Stations (MS) - currently
- ▶ Full mesh of measurement paths
- ▶ IP Layer
 - ▶ Permanent flow of low packet rate measurement traffic (background measurements)
 - ▶ Detection of routing anomalies <- One-Way-Delay measurement, high accuracy using GPS synchronisation on each MS
 - ▶ Detection of short path interrupts on milliseconds scale (50ms granularity) <- Loss measurement: Packet rates 20 pkts/s
 - ▶ Support analysis on used IP Paths : Traceroute measurements
- ▶ TCP Layer
 - ▶ regular TCP throughput Measurements between 10GE connected MS interfaces
 - current setup: Duration 20 seconds, Interval: 6 hours -> Detect hidden problems visible only at high data rates.
- ▶ Providing means of On-Demand-Measurements (pscheduler tasks) on each MS and a Central Measurement Control Station

perfSONAR Usage Goals

2) Support on X-WiN backbone access topology

- ▶ Performance Verification
- ▶ Performance Troubleshooting on Demand

3) Support of end-to-End Performance Troubleshooting in case X-WiN connected user is involved

4) Support of networked projects Performance Troubleshooting if applicable

Goal 1) reached: X-WiN Supercore Dashboard

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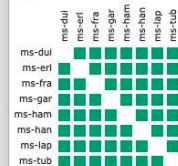
X-WiN Dashboard

Last page refresh time: Juni 04, 2019 10:40:30 nachm. Mitteleuropäische Sommerzeit

X-WiN - Core - Latency

One-way Delay is <= 10ms One-way Delay is > 10ms One-way Delay is >= 15ms Unable to find test data Check has not run yet

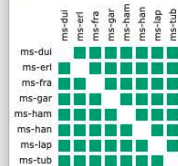
✔ No problems found in grid



X-WiN - Core - Loss

Loss rate is <= 0.001% Loss rate is > 0.001% Loss rate is >= 0.01% Unable to find test data Check has not run yet

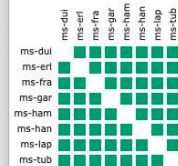
✔ No problems found in grid



X-WiN - Core - Throughput

Throughput >= 0.9Gbps Throughput < 0.9Gbps Throughput <= 0.5Gbps Unable to find test data Check has not run yet

✔ No problems found in grid



More information on MaDDash available [here](#)

- Dashboard (maddash)
- OWD Measurement Results
- Packet Loss
- TCP Throughput

Usage of MA API: -> Integration of perfSONAR into DFN-NOC Error detec

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```
stoy@pscs2:~$ /home/dfn-noc/perfsonarAlarmSystem/bin/getpsdata.pl -s
188.1.222.26 -d 188.1.222.10 -t 1

==== 188.1.222.26 -> 188.1.222.10 : Base Data (Histogramm after 1min)
Time: 2019-06-05T06:10:16
  8.84ms: 2
  8.85ms: 4
  8.86ms: 8
  8.87ms: 9
  8.88ms: 12
  8.89ms: 67
  8.90ms: 175
  8.91ms: 234
  8.92ms: 77
  8.93ms: 6
  8.94ms: 2
  8.95ms: 2
  9.01ms: 1
  9.03ms: 1

===== 188.1.222.26 -> 188.1.222.10 : Histogramm Statistics
=====
2019-06-05T06:10:16 : 8.84 : 8.90 : 9.03 : 0.00022
```

- Integration of perfSONAR measurements into DFN-NOC failure handling procedures using the perfSONAR MA API
- Own Grown simple reading tool
- Example: Output on on measurement path on the last 1 minute
src = HAM , dst = GAR

Add-Ons : Alarming on Metrics -> Ticketing System

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Artikelübersicht - 4 Beitrag/Beiträge

NR.	TYP	VON	BETREFF	ERSTELLT
1	Kunde - E-Mail extern	dfn-noc@pscsc2.in.dfn.de	psAlarm#201906040003 New...	04.06.2019 08:24
2	Kunde - E-Mail extern	dfn-noc@pscsc2.in.dfn.de	psAlarm#201906040003 Upd...	04.06.2019 08:25
3	Kunde - E-Mail extern	dfn-noc@pscsc2.in.dfn.de	psAlarm#201906040003 Upd...	04.06.2019 09:42
4	Kunde - E-Mail extern	dfn-noc@pscsc2.in.dfn.de	psAlarm#201906040003 Clea...	04.06.2019 09:43

Artikel #2 - psAlarm#201906040003 Updated OWD Events, 8 Messstrecken
Erstellt: 04.06.2019 08:25

Unformatierte Ansicht | Drucken | Teilen | Umleiten | Weiterleiten | -Antworten-

Von: dfn-noc@pscsc2.in.dfn.de (DFN-NOC Systemuser)
An: personar-alarm@noc.dfn.de
Betreff: psAlarm#201906040003 Updated OWD Events, 8 Messstrecken

Alarmer auf 8 Messstrecken:

```
NEW DUI->LAP OK-Korridor=[ 6.10 : 6.70 ];0 Messung=[ 6.33 : 6.97 ];1
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.30&url=ht[...]
NEW ERL->DUI OK-Korridor=[ 3.90 : 4.50 ];0 Messung=[ 4.12 : 6.75 ];1
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.18&url=ht[...]
NEW DUI->FRA OK-Korridor=[ 2.10 : 2.70 ];0 Messung=[ 2.40 : 5.05 ];1
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.30&url=ht[...]
NEW FRA->DUI OK-Korridor=[ 2.10 : 2.70 ];0 Messung=[ 2.36 : 5.02 ];1
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.2&url=htt[...]
UPDATE DUI->ERL OK-Korridor=[ 3.90 : 4.50 ];0 Messung=[ 4.14 : 6.78 ];2
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.30&url=ht[...]
UPDATE LAP->DUI OK-Korridor=[ 6.10 : 6.70 ];0 Messung=[ 6.38 : 7.01 ];2
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.34&url=ht[...]
UPDATE GAR->DUI OK-Korridor=[ 6.30 : 6.90 ];0 Messung=[ 6.65 : 9.32 ];2
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.26&url=ht[...]
UPDATE DUI->GAR OK-Korridor=[ 6.30 : 6.90 ];0 Messung=[ 6.64 : 9.30 ];2
Graph: https://personar.x-win.dfn.de/personar-graphs/?source=188.1.222.30&url=ht[...]
```

Legende:
Signal
Von->Nach
OK-Korridor=[minWert : maxWert];Anzahl_nicht_OK
Messung=[minWert : maxWert];Anzahl_nicht_OK

<https://otrs.sgs.dfn.de/otrs/index.pl?Action=AgentTicketZoom;TicketID=728600#>

- Own Grown Alarming System feeding Ticketing System (OTRS)
- Definition of expected OWD values on each Measurement Path:
OK-Corridor: [OWDmin , OWDmax]
- Event (for instance link break) leads to lots of Alarmed measurement Pathes
- Automated aggregation into One OTRS Ticket based on Start and End Time
- Only changed States on a Path generate new Ticket entry.
- Implementation on Loss Metric under construction.

Under construction...

- Measurement Metric extensions: IPv6,
- Extension on Dashboards
 - Weathermap on measurement paths
on metric OWD, Loss, Throughput
- Extensions on Alarming System
- Goal: Extend PMV Support to Access network up to connected users
 - Work on Concept on Performance Verification and Troubleshooting Platform

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Examples

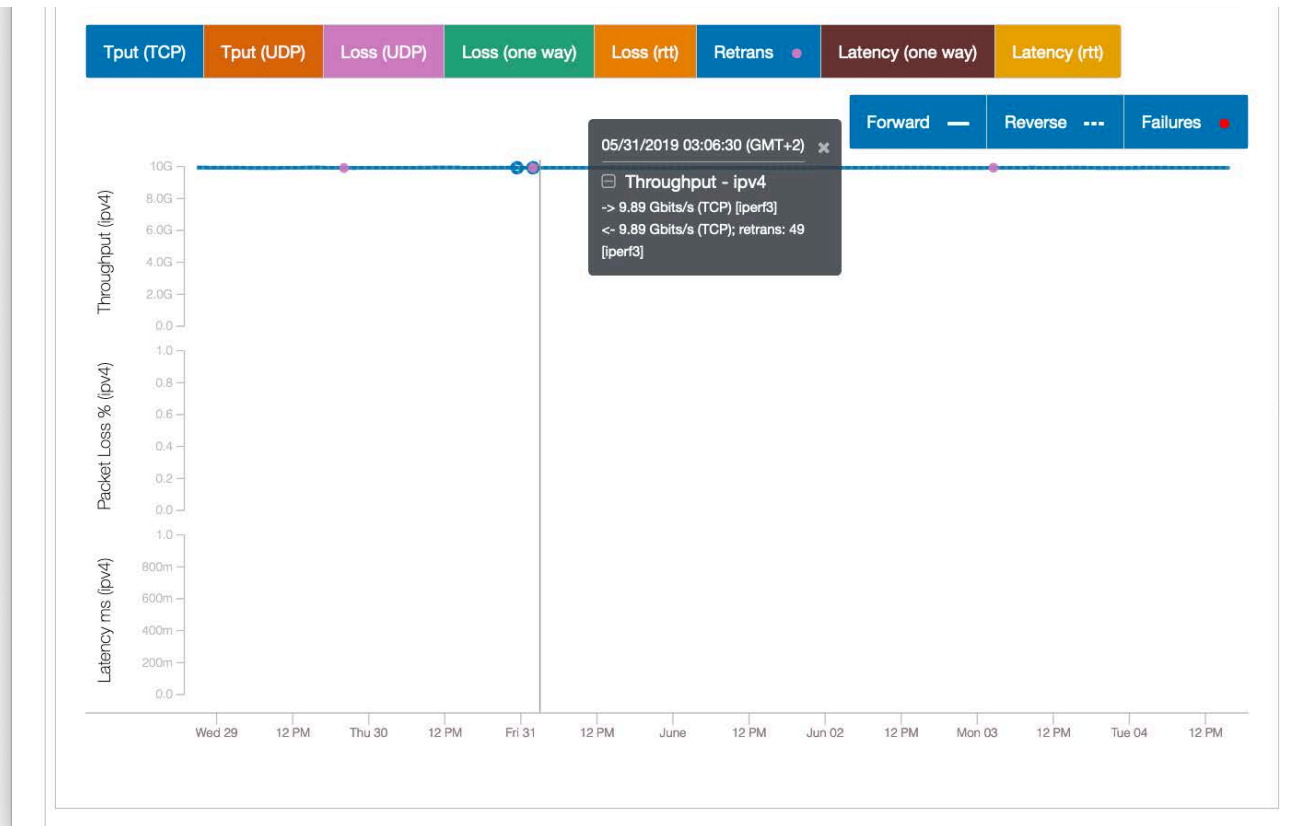
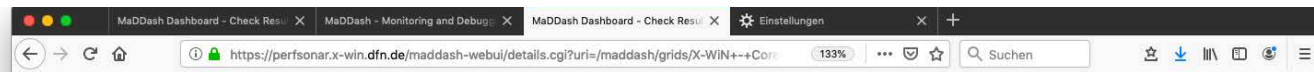
Example: Short Link Interrupt, typical measurement pattern

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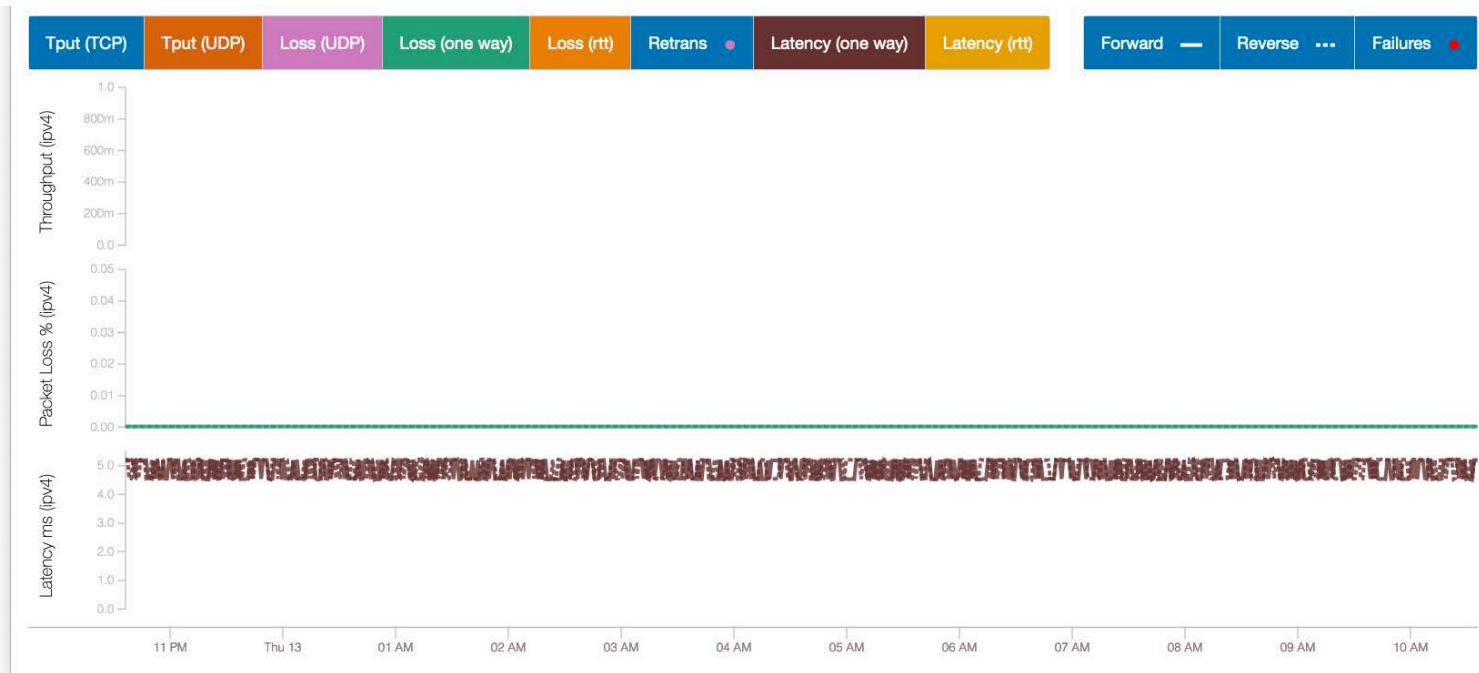
- 3 pkts lost
- Measurement stream 20 pkts/s
- -> $3 \times 50\text{ms}$ path interrupt time = 150 ms

Example: TCP throughput Small amount of retransmissions

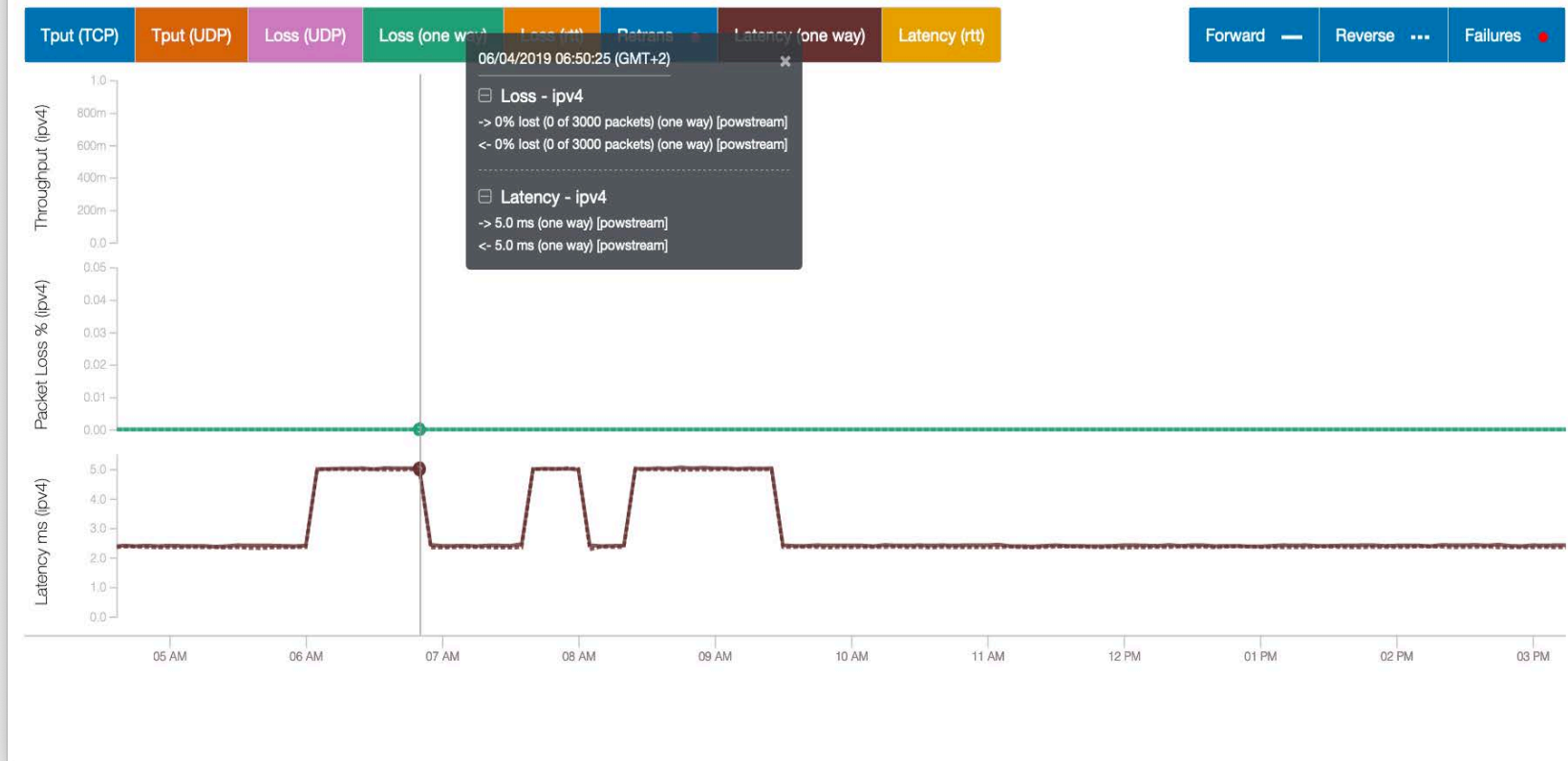


Example: Routing Anomaly

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Example: Maintenance with planned Backbone Link Downtime (well prepared -> no packet loss)



Questions ?

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