Experiences with perfSONAR MDM on TEIN Network

TEIN4-NOC
Zhiyan Zheng
zhzhy@cernet.edu.cn

perfSONAR MDM
PART OF THE GÉANT SERVICES PORTFOLIO

perfSONAR Deployments

perfSONAR MDM

* Overview
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  - Network Connection
  - perfSONAR MDM Services
  - Participants Status
* Installation
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Measurement Points

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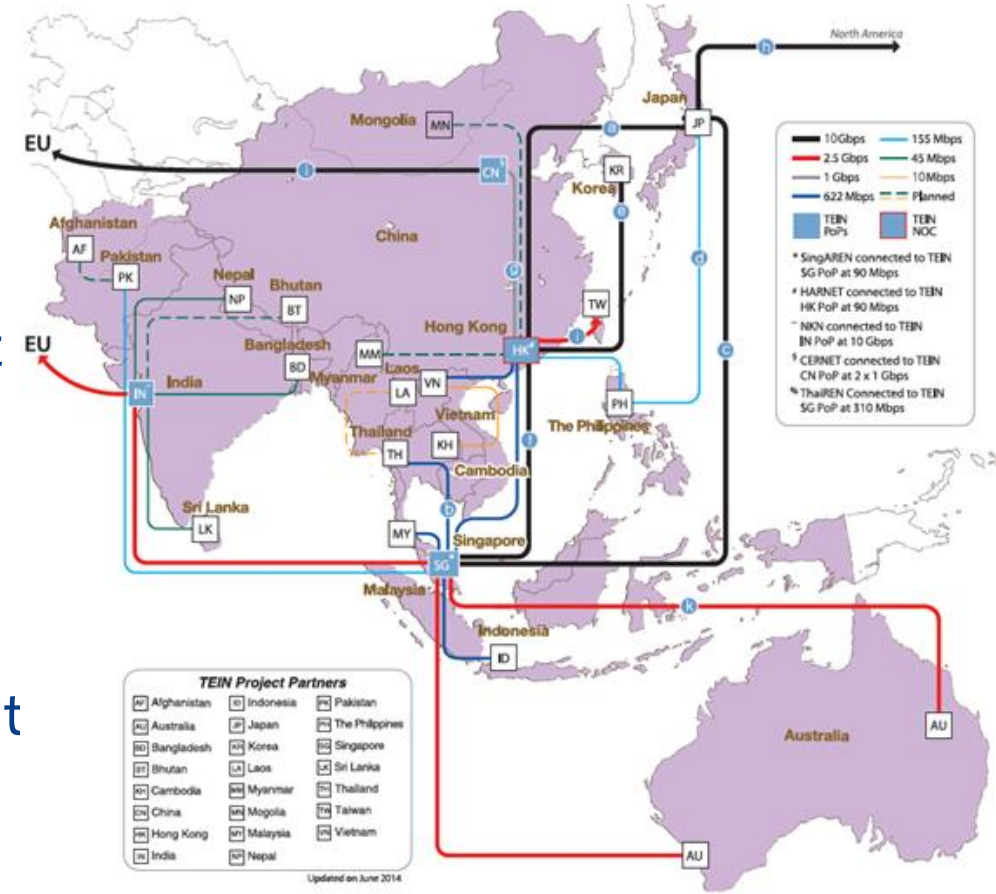
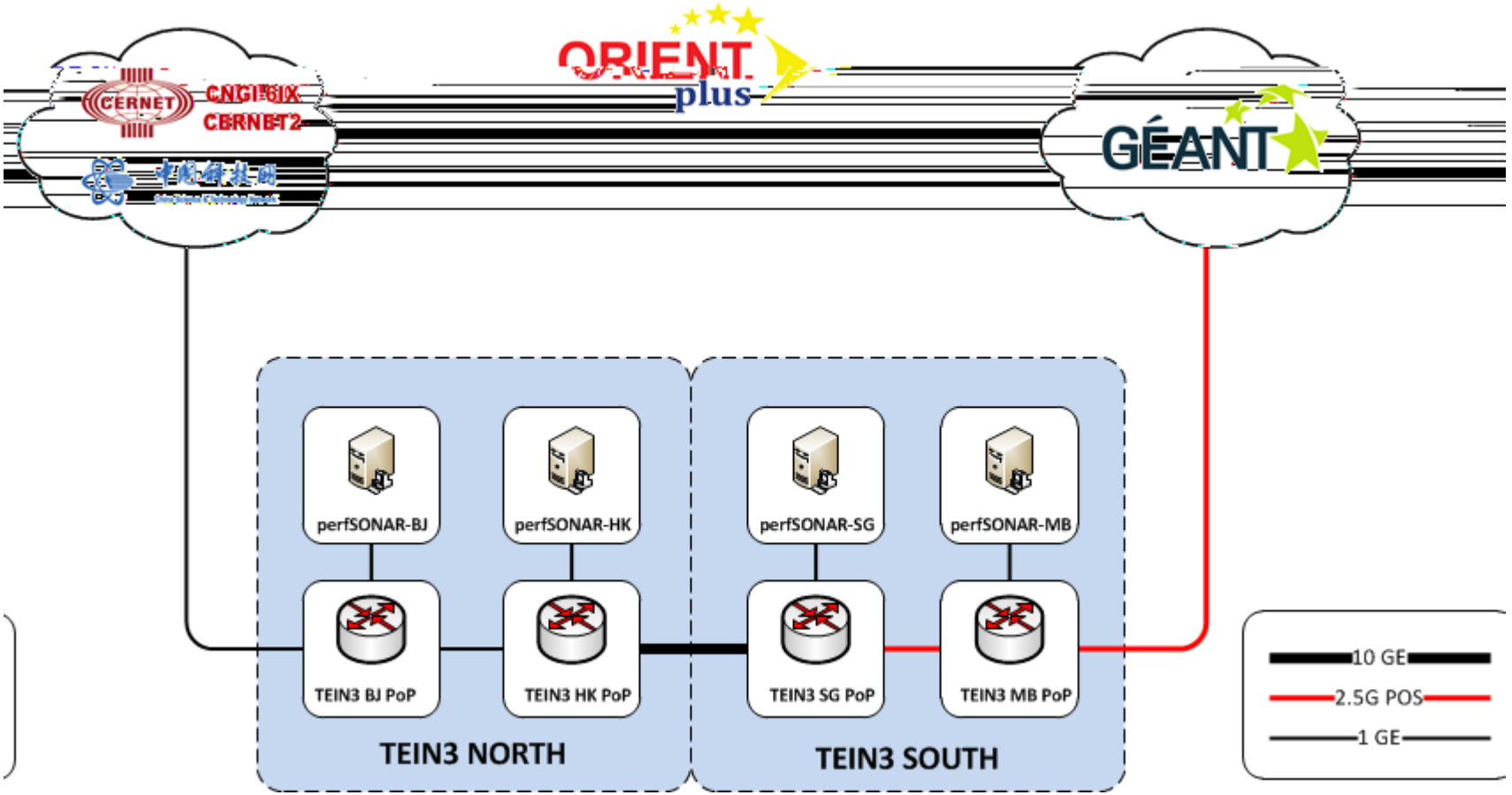
* Beijing PoP
  perfsonar-bj.noc.tein3.net
* Hongkong PoP
  perfsonar-hk.noc.tein3.net
* Singapore PoP
  perfsonar-sg.noc.tein3.net
* Mumbai PoP
  perfsonar-mb.noc.tein3.net



Network Connection



perfSONAR MDM Services

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TEIN4 PoP	Status	MP Address	BWCTL MP	HADES MP	Web-UI	Bandwidth
Beijing	Deployed	202.179.242.9	Yes	Yes	Yes	1G Shared
HongKong	Deployed	202.179.246.18	Yes	Yes	Yes	1G
Singapore	Deployed	202.179.252.18	Yes	Yes	Yes	1G
Mumbai	Deployed	202.179.254.18	Yes	Yes	Yes	1G

Participants Status

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NREN Name	PS Type	Service URL
APAN-JP	PS-PS	http://qgpop-nms1.jp.apan.net:4823 http://nms1.jp.apan.net:4823
ASTI	PS-PS	http://perfsonar.pregi.net:4823
CNGI-6IX/CERNET	PS-PS/MDM	http://210.25.189.58:4823 http://210.25.189.158:8090/services/MP/BWCTL
HARNET	PS-MDM	http://192.245.196.117:8090/services/MP/BWCTL
LEARN	PS-PS	http://perfsonar.learn.ac.lk:3423
PERN	PS-PS	http://www.pms-lhr.pern.edu.pk:4823

Hardware Platform

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TEIN4 PoP	Model	Processor	RAM	HDD	NIC
Beijing	IBM x3550 M3	Xeon E5620	16G 1067MHz	500G Raid1	Intel 82580
HongKong	IBM x3550 M3	Xeon E5645	16G 1333MHz	500G Raid1	Intel 82580
Singapore	IBM x3550 M3	Xeon E5650	16G 1067MHz	500G Raid1	Intel 82580
Mumbai	IBM x3650 M3	Xeon E5649	8G 1333MHz	500G Raid1	Intel 82580

Software Component

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* OS
  - Red Hat Enterprise Linux 5.7 x86_64
* BWCTL MP
  - iperf version 2.0.2 (03 May 2005) pthreads
  - BWCTL version 1.4
  - Perl v5.8.8 built for x86_64-linux-thread-multi
  - perfsonar-oppd-mp-bwctl-0.53-4.noarch.rpm
  - NTPv4
* HADES MP
  - owamp-client-3.3rc1-1.i386.rpm

Configuration and Tuning

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* Time Synchronization
* Firewall Setting
* BWCTL/OWAMP Limits
* Recommended Parameters for Measurement
* TCP/UDP & NIC Tuning

Time Synchronization

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* As BWCTL and OWPing tests rely on accurate time synchronization, it is recommended that you install an ntpd
* It is recommended that 4 to 5 Stratum1 servers be used

Measurement Tools	Clock Accuracy
BWCTL MP with Iperf	10ms
HADES MP	1 ms

Firewall Setting

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* Please amend firewall setting based on the information below

Tools	Protocols	Directions	Ports	Usage
BWCTL MP	TCP	In	8090	Requests to BWCTL MP
BWCTL	TCP	In	4823	BWCTL tool control
BWCTL	TCP	In/Out	56000:56999	BWCTLD peer
Iperf	TCP/UDP	In	6000:6999	Iperf tool test
OWAMP	TCP	In	861	OWAMP tool control
OWAMP	UDP	In/Out	8760-8960	OWAMP tool test
Tomcat	TCP	In	8080	Web-UI

BWCTL/OWAMP Limits

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* BWCTL and OWAMP have configurable dialog that allows the limit on resources consumed
* These allow you to limit the influence that outside users have on your system performance

https://forge.geant.net/forge/download/attachments/491888/bwctld.limits

Recommended Parameters for Measurement

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* TCP bandwidth tests

	Scheduled		On-Demand	
Inter-domain	**TCP window size**	up to 64 MB	**TCP window size**	up to 64 MB
	Duration	30 seconds	**Duration**	min 120 second
	Frequency	every 6 hours	**Frequency**	
Intra-domain	**TCP window size**	up to 64 MB	**TCP window size**	up to 64 MB
	Duration	30 seconds	**Duration**	min 120 second
	Frequency	every 3 hours	**Frequency**	

Recommended Parameters for Measurement (cont.)

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* UDP bandwidth tests

	Scheduled	On-Demand	
Inter-domain	**Negotiated**	**Duration**	10 second
		Bandwidth	max 100Mbps
Intra-domain	**Negotiated**	**Duration**	10 second
		Bandwidth	max 100Mbps

Recommended Parameters for Measurement (cont.)

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* One-way delay, jitter, packet loss tests

	Scheduled		On-Demand	
Inter-domain	**Rate**	9 packets/second	**Max rate**	10 packets/second
	Packet size	41bytes	**Packet size**	41 bytes
	Inter packet gap	20ms	**Max duration**	120 second
	Duration	1 second		
	Frequency	1 minute		
Intra-domain	**Rate**	9 packets/second	**Max rate**	10 packets/second
	Packet size	41bytes	**Packet size**	41 bytes
	Inter packet gap	20ms	**Max duration**	120 second
	Duration	1 second		
	Frequency	1 minute		

TCP/UDP & NIC Tuning

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* Increase TCP buffer
* Congestion control
* TCP Selective Acknowledgments (SACK) Option
* Increase txqueuelen for 10GE NICS
* MTU
* etc.

Please refer to the URL below

http://fasterdata.es.net/host-tuning/linux/
http://www.psc.edu/index.php/networking/641-tcp-tune#Linux

Measuremnet and Problems

* TCP/UDP Bandwidth Test
* One-way Latency & Jitter Test
* Measurement Result
* Test via Web-UI

TCP/UDP Bandwidth Test

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* TCP bandwidth test example (by CLI)

```
bwctl -f m -t 30 -i 1 -x -c –w $SIZE $HOST
bwctl -f m -t 30 -i 1 -x -s –w $SIZE $HOST
```

  - ***-f m***: Formats the output into Mbps, which is easier to read
  - ***-t 30***: Performs a 30 second TCP test, this is sufficient to allow for TCP ramp up
  - ***-i 1***: Outputs results on 1 second intervals. This is useful to see how TCP may rise and fall during the complete length of the TCP
  - ***-x***: Outputs the 'client' and 'server' side of the results. We recommend this because the server and client may report different results in the end (particularly in the result of UDP testing, due to loss of data).
  - ***-w $SIZE***: The size of the TCP window that is being requested
  - ***-c $HOST***: The hostname that will receive the data
  - ***-s $HOST***: The hostname that will send the data

TCP/UDP Bandwidth Test (Cont.)

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* UDP bandwidth test example (by CLI)

```
bwctl -f m -t 20 -i 1 -x -u -b $LIMIT -c $HOST
bwctl -f m -t 20 -i 1 -x -u -b $LIMIT -s $HOST
```

  - ***-t 20***: Performs a 20 second UDP test, this is sufficient to observe UDP behavior in many instances
  - ***-u***: Start a UDP test
  - ***-b $LIMIT***: Sets the limit of bandwidth that will be allowed for the test

One-way Latency & Jitter Test

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* owping test example (by CLI)

```
owping perfsonar-bj.noc.tein3.net
```

Measurement Result

638 Mbits/sec

MTU 8988 bytes

Test via Web-UI

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* TEIN perfSONAR Web-UI
  - http://202.179.242.10:8080/perfsonar-ui/
  - http://202.179.246.18:8080/perfsonar-ui/
  - http://202.179.252.18:8080/perfsonar-ui/
  - http://202.179.254.18:8080/perfsonar-ui/
* perfSONAR Web-UI user guide
  - http://downloads.perfsonar.eu/repositories/documents/perfsonar_UI_user_guide_1.1.pdf

Operation and Problems

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* Local Performance Services disabled
* Denied by firewall
* Restricted by BWCTL/OWAMP limits file
* NTP Synchronization problem

Thanks!

zhzhy@cernet.edu.cn

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