



**INTERNATIONAL  
NETWORKS**  
At Indiana University

## International Networks at IU

### perfSONAR use and trainings abroad

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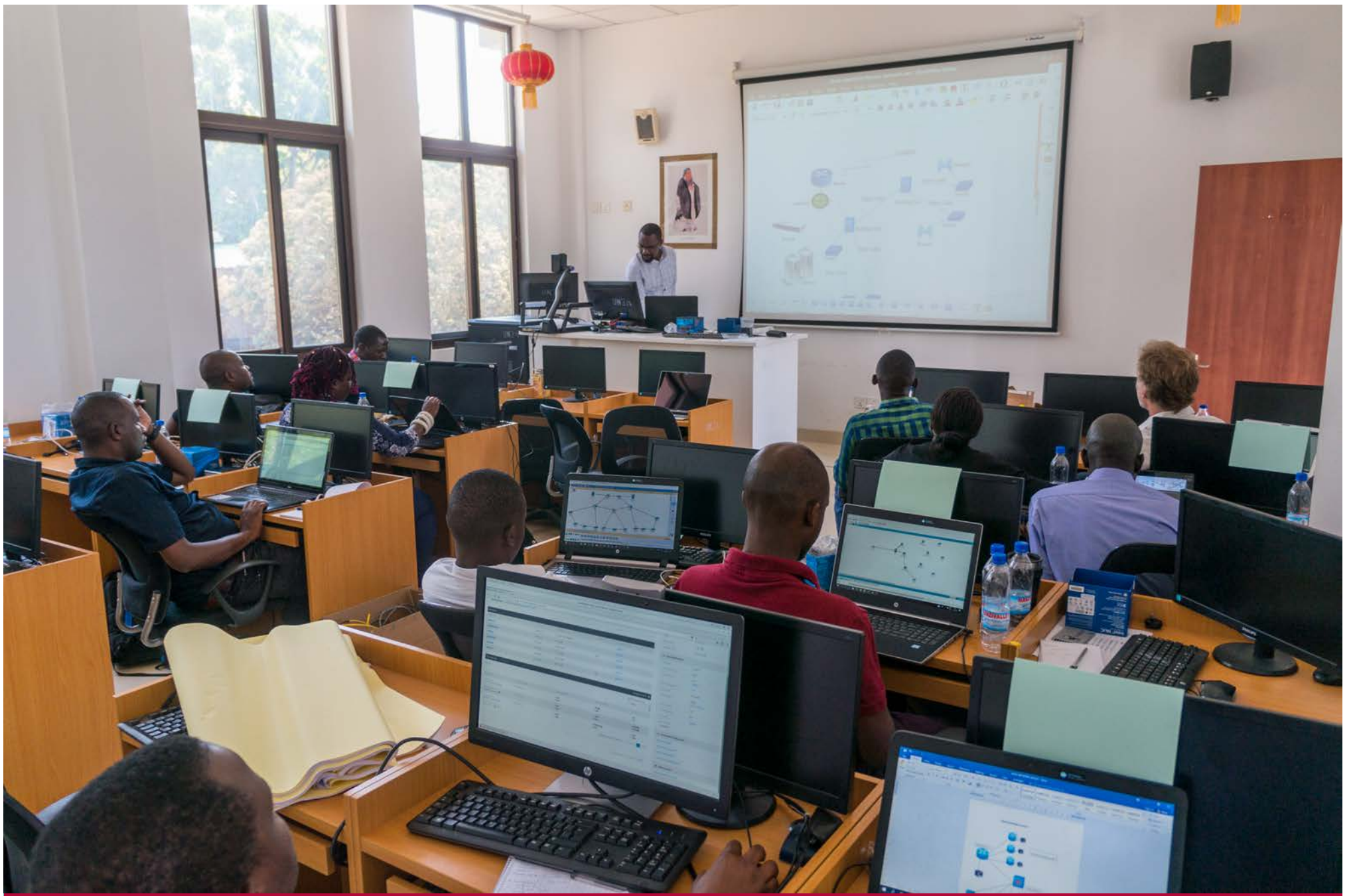
# Overview

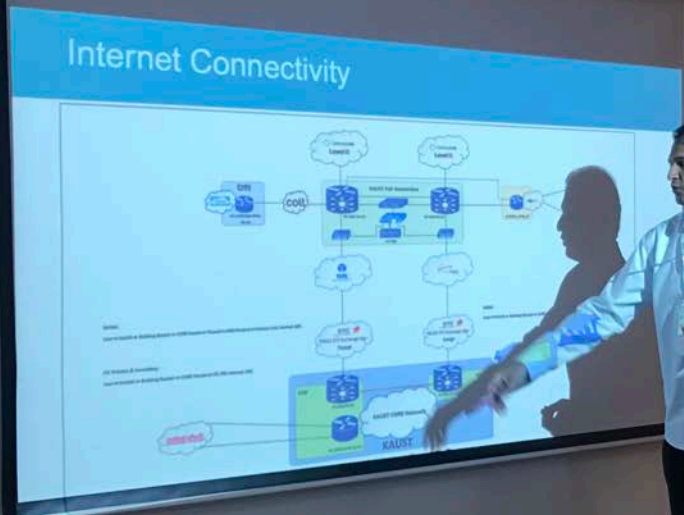
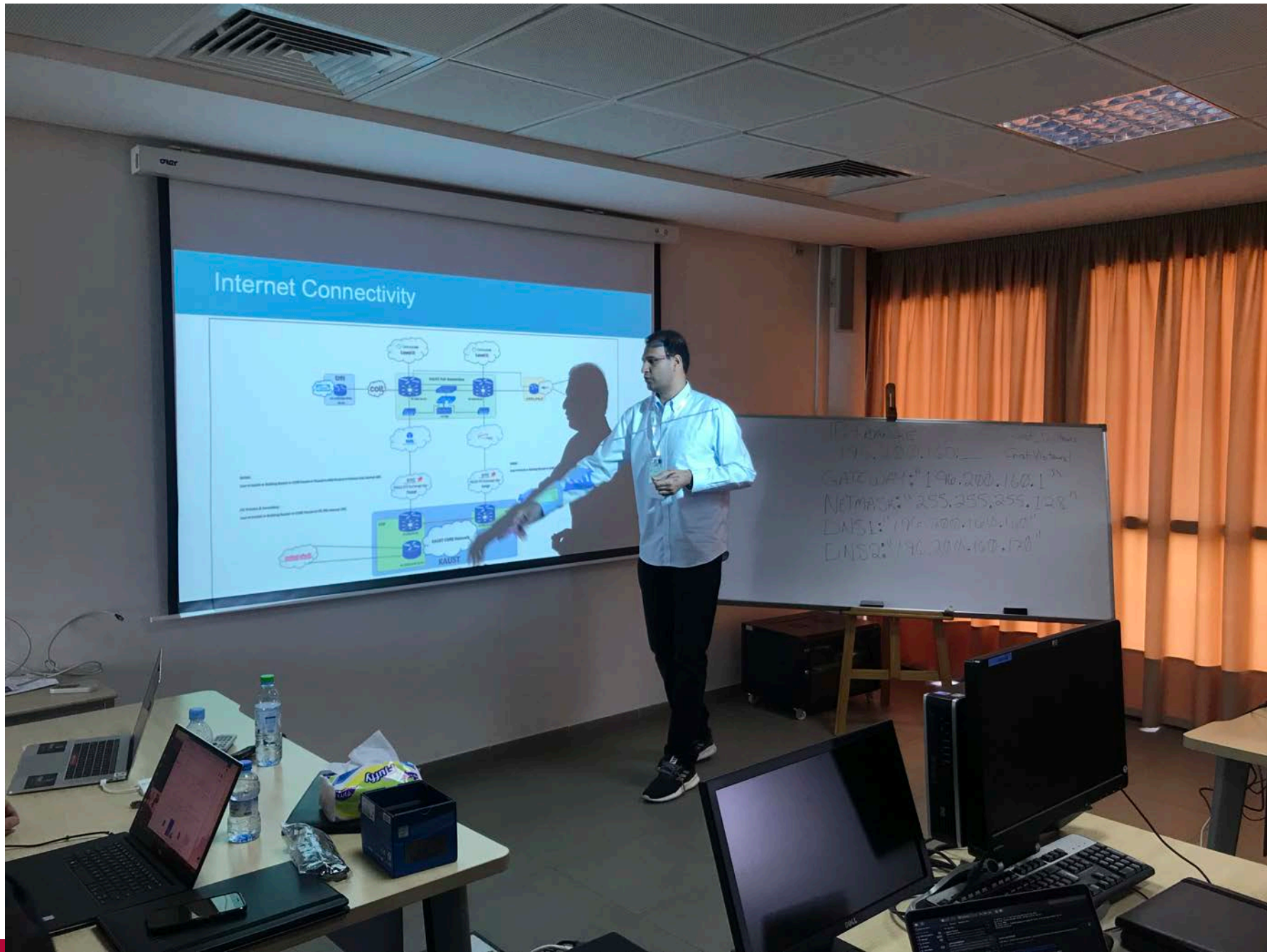
- [NEAAR](#) – collaboration with GÉANT, in a cooperative partnership with the African regional RENs:
  - UbuntuNet Alliance
  - Arab States Research and Education Network (ASREN)
  - West and Central African Research and Education Network (WACREN)
  - the South African National Research Network (SANReN)
  - the Kenya Education Network (KENET)
  - And domestically, in the US, with Internet2 and ESnet
- [TransPAC](#) – a collaboration composed of a cooperative partnership with the Asia Pacific Advanced Network ([APAN](#)), [GEANT](#), and [Internet2](#)
- **Meshbuilder Workshops**
- **perfSONAR small node support**

# What we do?

- **Creating User-friendly Quicksheets/Cookbooks for common tasks and troubleshooting based on user experiences**
- **Meshbuilder Workshops**
  - **MaDDash Quicksheet**
  - **pS configuration Quicksheet**
  - **MaDDash Thresholds Quicksheet**
  - **Etc...**
- **Troubleshooting in Support of deployed partner MaDDashi**
  - **Continued communication and coordination after workshops to assist in deployment and growth**



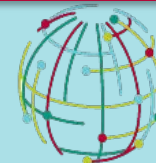




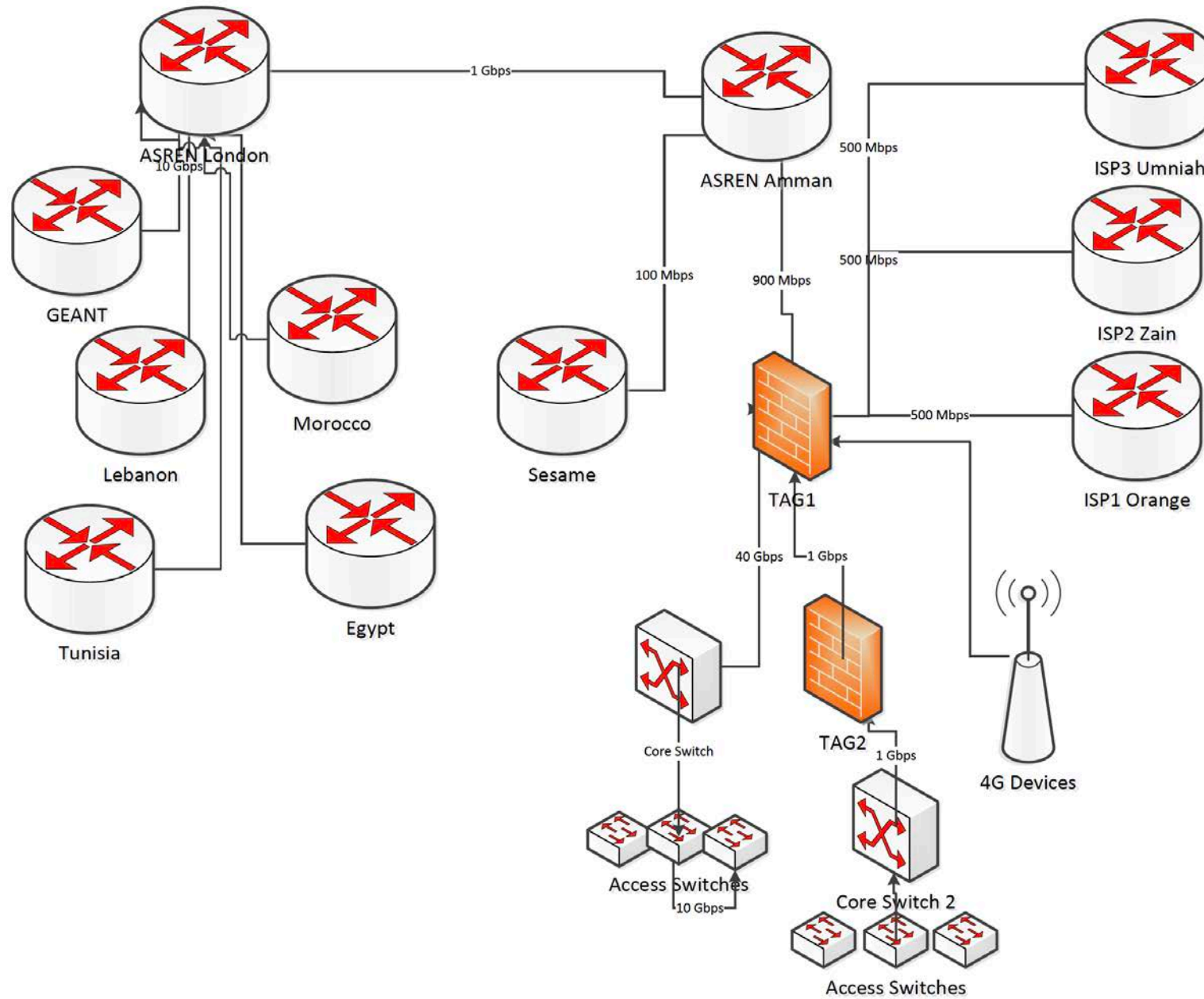
IP: 192.168.1.100  
GATEWAY: 192.168.1.1  
NETMASK: 255.255.255.0  
DNS1: 192.168.1.1  
DNS2: 192.168.1.1



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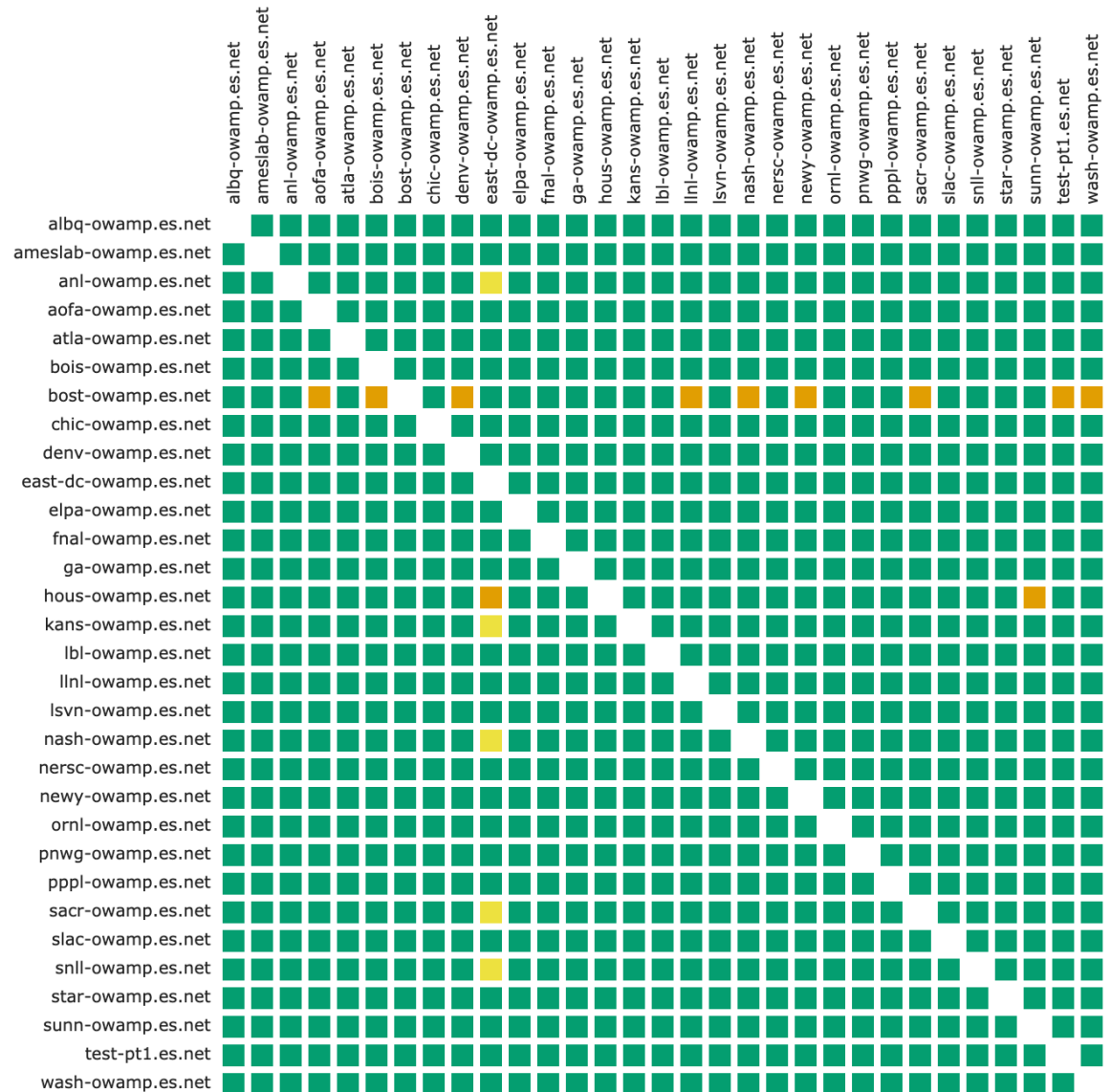




✓ No problems found in grid

## ESnet MaDDash

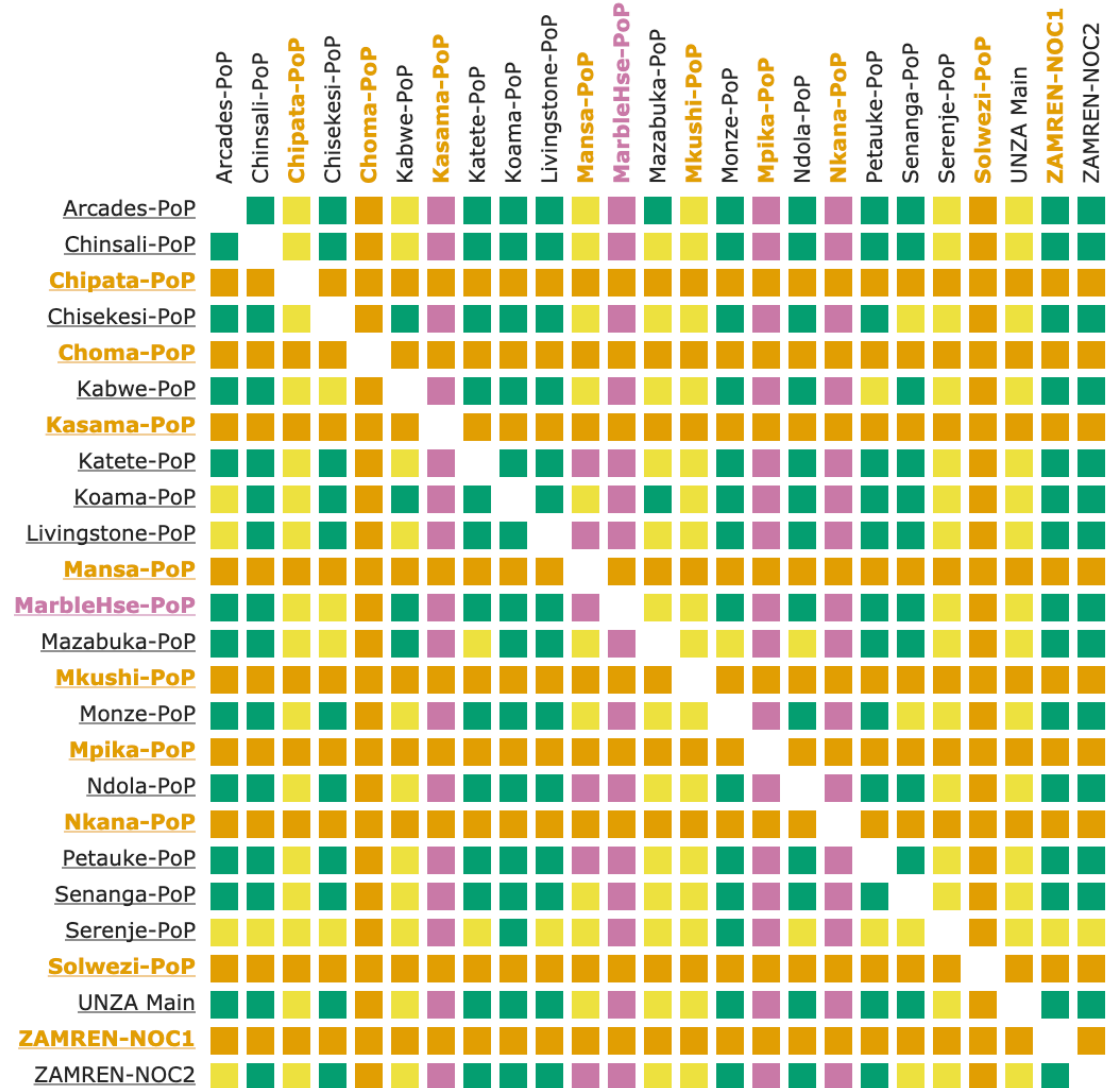
- Beautiful example of a 100GE backbone network
- Extremely fine-tuned
- Serves as a good example of a well maintained MaDDash running on a clean network
- Visual tool for showing issues immediately which will be addressed very quickly through alerting



! Found a total of 10 problems involving 10 hosts in the grid

## ZAMREN MaDDash.

- Setup in the Fall of 2018
- Still being deployed in a couple of places
- Serves as a good example of use commodity/NREN challenges on the African continent
- Less a tool for fine tuning a perfectly deployed and uncluttered western Backbone
- More a tool for expectation management and for holding providers accountable



# Where we've been?



# NEAAR Workshops

- ASREN perfSONAR Workshop - April. 2019 (4-day) – Rabat, Morocco
- TERNET perfSONAR Workshop - Feb. 2019 (4-day) – Dar es Salaam, Tanzania
- ZAMREN perfSONAR Workshop - Sep. 2018 (4-day) - Lusaka, Zambia
- [AfriNIC / AIS 18 Conference - Internet Measurements and Research in Africa Workshop - May 2018 \(1-day\)](#) - Dakar, Senegal
- [WACREN Conference - Oct. 2017](#) (4-day) - Accra, Ghana
- [SANREN OIN Workshop - May 2017](#) (two 1-day) - Cape Town / Pretoria, South Africa
- [KENET Training with NSRC - Sep. 2015](#) (4-day) - Nairobi, Kenya

# TransPAC and Asi@Connect

- ***In Planning*** - [APAN 48 perfSONAR Troubleshooting and Joining the APAN Dashboard – July 2019](#) (1 day) – Putrajaya, Malaysia
- ***In Planning*** - Asi@Connect Workshop - July 2019 (3-day) - New Dehli, India
- Asi@Connect Workshop - Mar. 2019 (3-day) - Loas
- [APAN 46 perfSONAR Workshop - Aug. 2018](#) (1 day) - Auckland, New Zealand
- [APAN 44 perfSONAR Workshop - Aug. 2017](#) (1 day) - Dalian, China
- [International OIN sponsored by PREGINET - Mar. 2017](#) (2-day) - Manilla, Philippines
- [APAN 43 perfSONAR Workshop - Feb. 2017](#) (1 day) - New Dehli, India
- [APAN 42 OIN Workshop - Aug. 2016](#) (2-day) - Hong Kong
- [APAN 41 perfSONAR Workshop - Jan. 2016](#) (half-day) - Manilla, Philippines
- [APAN 40 perfSONAR Workshop - Jan. 2015](#) (1-day) - Kuala Lumpur, Malaysia

**perfSONAR**
**Lookup Service Directory**

**Search**

Filter results by searching for specific terms:

**Browser**

- ▶ pScheduler Server 1925
- ▶ BWCTL Server 922
- ▶ OWAMP Server 2102
- ▶ NDT Server 190
- ▶ NPAD Server 37
- ▶ Ping Responder 319
- ▶ Traceroute Responder 322
- ▶ MA 2010
- ▶ BWCTL MP 663
- ▶ OWAMP MP 663
- ▶ twamp 1068
- ▶ bwctl10g 6

Showing: 10227 of 10227 services on 2164 hosts.

**Communities**

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**Developer**

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**Service Information**

Service Name	Addresses	Geographic Location	Communities	Version	Custom

**Host Information**


Host Name	Hardware	System Info	Toolkit Version	Communities

**Service Map**







 Updates Ready to Install  
Some apps could not be updated automatically.



# Next steps in these areas...

- Continue to improve User-friendly documentation
  - Have an experience you would like better documented? Let us know!
- Continue holding trainings for developing NRENs in Africa and Asia
  - Know of an NREN in these areas that is in need of assistance/has reached out to you? Point them our way!

# perfSONAR – Small, low-cost Nodes “the Flock”



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# Problem Statement



- Typical rack-mounted servers can cost hundreds, even thousands, per device (dollars, yen, myr)
- Some locations have power or size restrictions
- Want to test at least 1G
- Would like the cost under \$250 per testpoint

# Why do we do this?

Report was generated on 2019-06-04 11:37:19.167205

Displaying all values

Lookup data for 2186 hosts (239 duplicates found):

Ls Count (1):

	count	percent
35.237.255.214:8090	2186	100.0 %

Ps Version (51):

	count	percent
4.1.6-1.e17	942	43.09 %
4.0.2.5-1.e16	476	21.77 %
3.5.1.7	79	3.61 %
4.1.5-1.e17	61	2.79 %
3.5.1.3	57	2.61 %
MonIPE	52	2.38 %
4.1.3-1.e17	48	2.2 %
unknown	41	1.88 %
4.0.2.2	38	1.74 %

# Why do we do this?

Bundles (8):

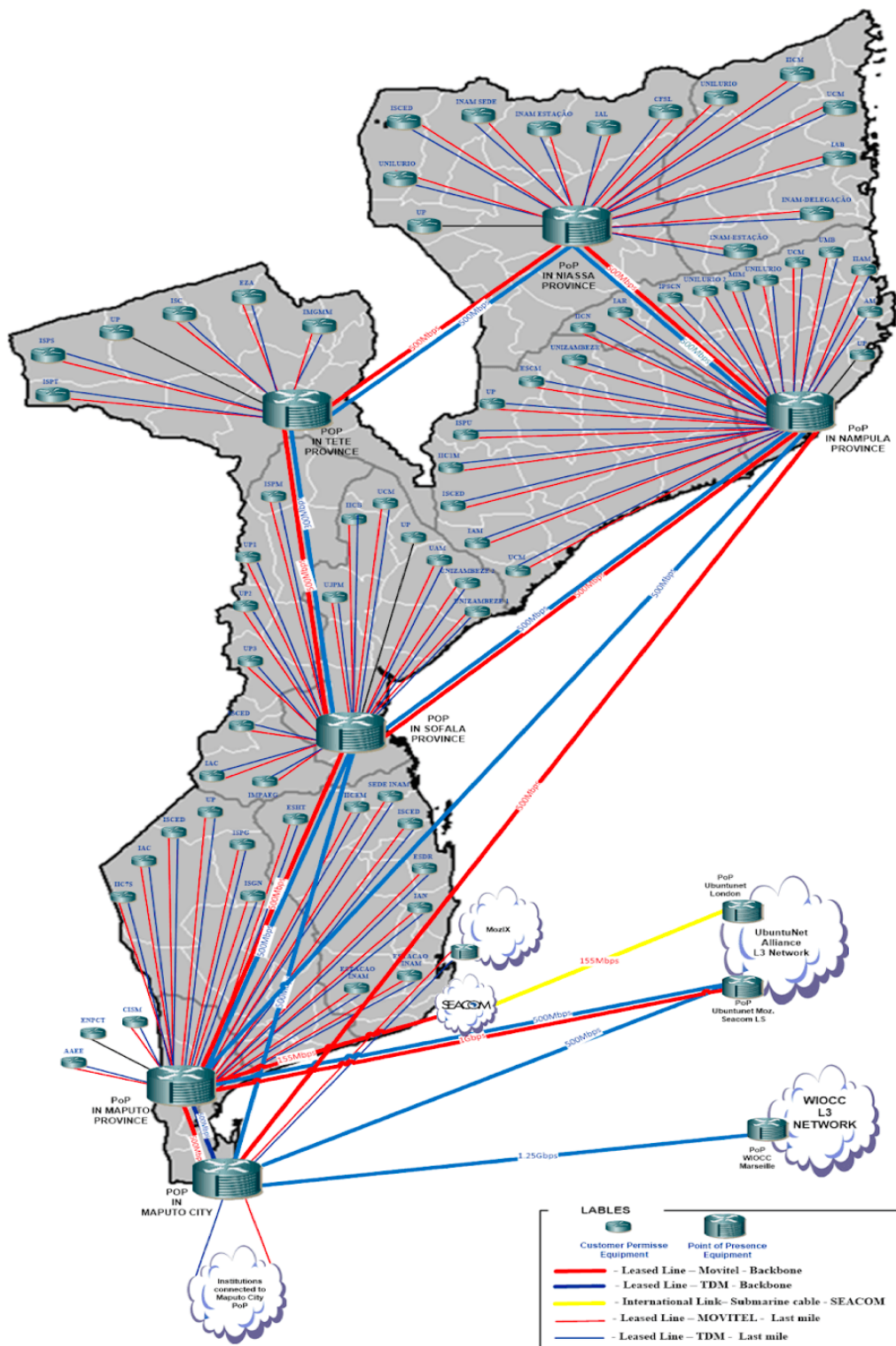
	count	percent
perfsnar-toolkit	1632	74.66 %
perfsnar-testpoint	180	8.23 %
unknown	115	5.26 %
test-point	102	4.67 %
perfsnar-centralmanagement	87	3.98 %
perfsnar-core	60	2.74 %
tools	9	0.41 %
perfsnar-complete	1	0.05 %

# Why do we do this?

Iface Speed (9):

	count	percent
10 Gbps	1158	42.43 %
1 Gbps	1103	40.42 %
unknown	329	12.06 %
100 Mbps	66	2.42 %
40 Gbps	50	1.83 %
20 Gbps	16	0.59 %
2 Gbps	4	0.15 %
undefined	2	0.07 %
10 Mbps	1	0.04 %





## Another Network Map example

- 6 pops around the country
- Each with duplicate connections at 500Mbps
- Exterior connections currently at ~1Gbps via various providers
- Desire to deploy nodes at each member's connection
- Those connections range from 10Mbps-100Mbps



# Small, less costly perfSONAR nodes

- **Problem statements**
  - Limited budgets for perfSONAR deployments
  - Need many boxes for mobile, adhoc test-points
- **One possible solution: Low-cost, Small-form Nodes**
- **Primary Benefits and Use Cases**
  - Low-cost nodes for multiple, meshed testpoints
  - Small-form for easy transport as adhoc testers

# Possible Solutions – Intel NUC

## NUC8i3BEH

- **Price-point: \$200-350** (all pieces)
- **Supported Build: CentOS Toolkit**
- **1GE tested**
- **2/4/8G memory**
- **Recommend 32G SSD** (Requires mSATA)
- **Requires memory, drive, and power cord purchase separately** (price at top includes)



# Small Node Results – 1GE

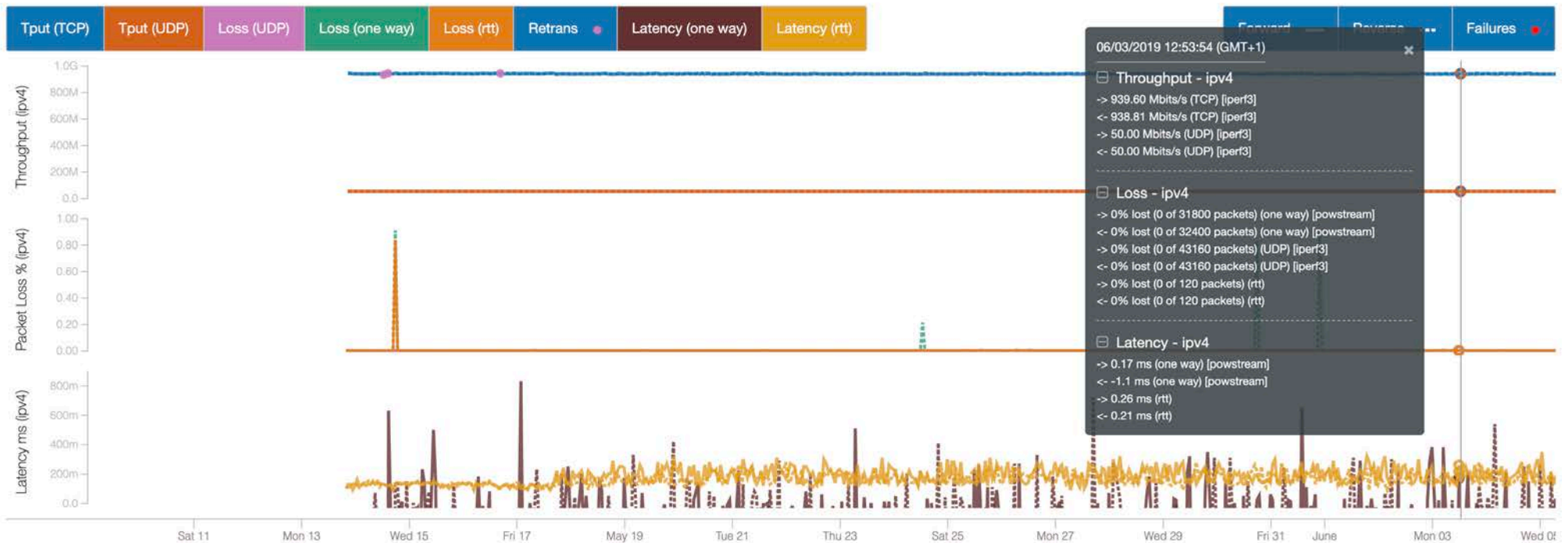
perfSONAR test results - [documentation](#)

[Share/open in new window](#)

**Source**  
ps-lab-1ge-07.in.iu.edu  
149.165.239.247  
[Host info](#)

**Destination**  
ps-lab-1ge-06.in.iu.edu  
149.165.239.246  
[Host info](#)

**Report range**  
← 1 month →  
Sun 05/05/2019 to Wed 06/05/2019  
12:52:55 (GMT+1) to 12:52:55 (GMT+1)

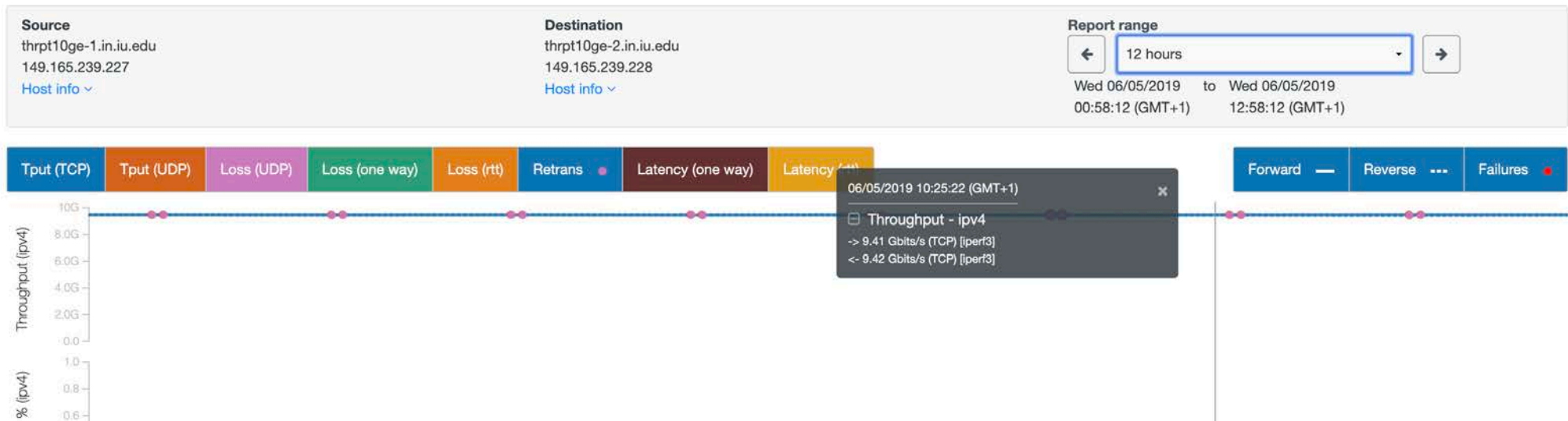


# Possible Solutions – SuperMicro by Servers Direct

- **Price-point: \$900-1200** (all pieces)
- **Supported Build: CentOS Toolkit**
- **Rack-mounted**
- **1GE/10GE tested**
- **Customizable builds**

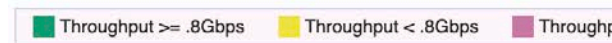


# “Small” Node Results – 10GE

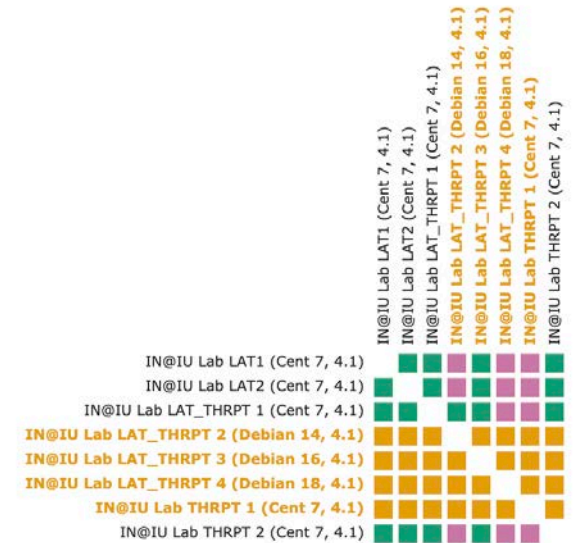
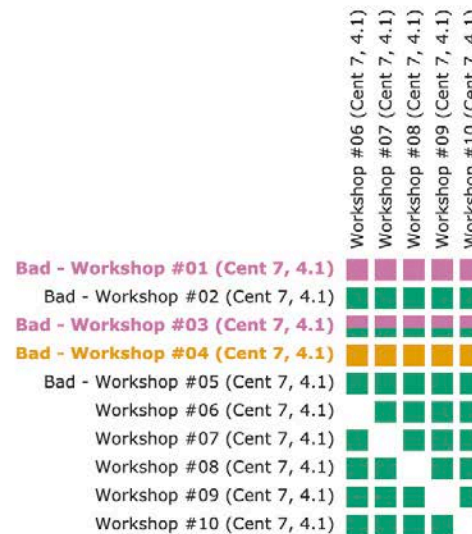


## IN@IU TestLab MaDDash

- Setup initially in 2015 as a learning tool for myself
- Continually being rebuilt to showcase issues for workshop purposes
- Learning example.
- Looking to better utilize built-in options to explain to users what they are seeing for the various builds



! Found a total of 4 problems involving 3 hosts in the grid



# Small Nodes Next Steps

- **Continued investigation and testing of new technology/options as they become available**
- **The new next best small node is out there already**
  - **the next next best small node is right behind it...**



# Acknowledgements

- **IN@IU is funded by**
  - **US NSF award #1450904 for TransPAC**
  - **US NSF award #1638863 for NEAAR**
- **NEAAR / ANA 100Gbps links**
- **The TransPAC PacificWave 100gb/s network fabric is provided by Pacific Northwest GigaPop**
- **Our partners and collaborators in Europe and elsewhere**

# Questions? Comments?

**IN@IU**

- <https://in.iu.edu>

**perfSONAR Training Documents**

- <https://drive.google.com/drive/folders/1OHn9X4WWPA54X6f8N9VaGUe4Ae5K4pDm?usp=sharing>

