



# **NLANR/MNA Measurement and Network Analysis**

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**<http://moat.nlanr.net/>**

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MEASUREMENT & NETWORK ANALYSIS

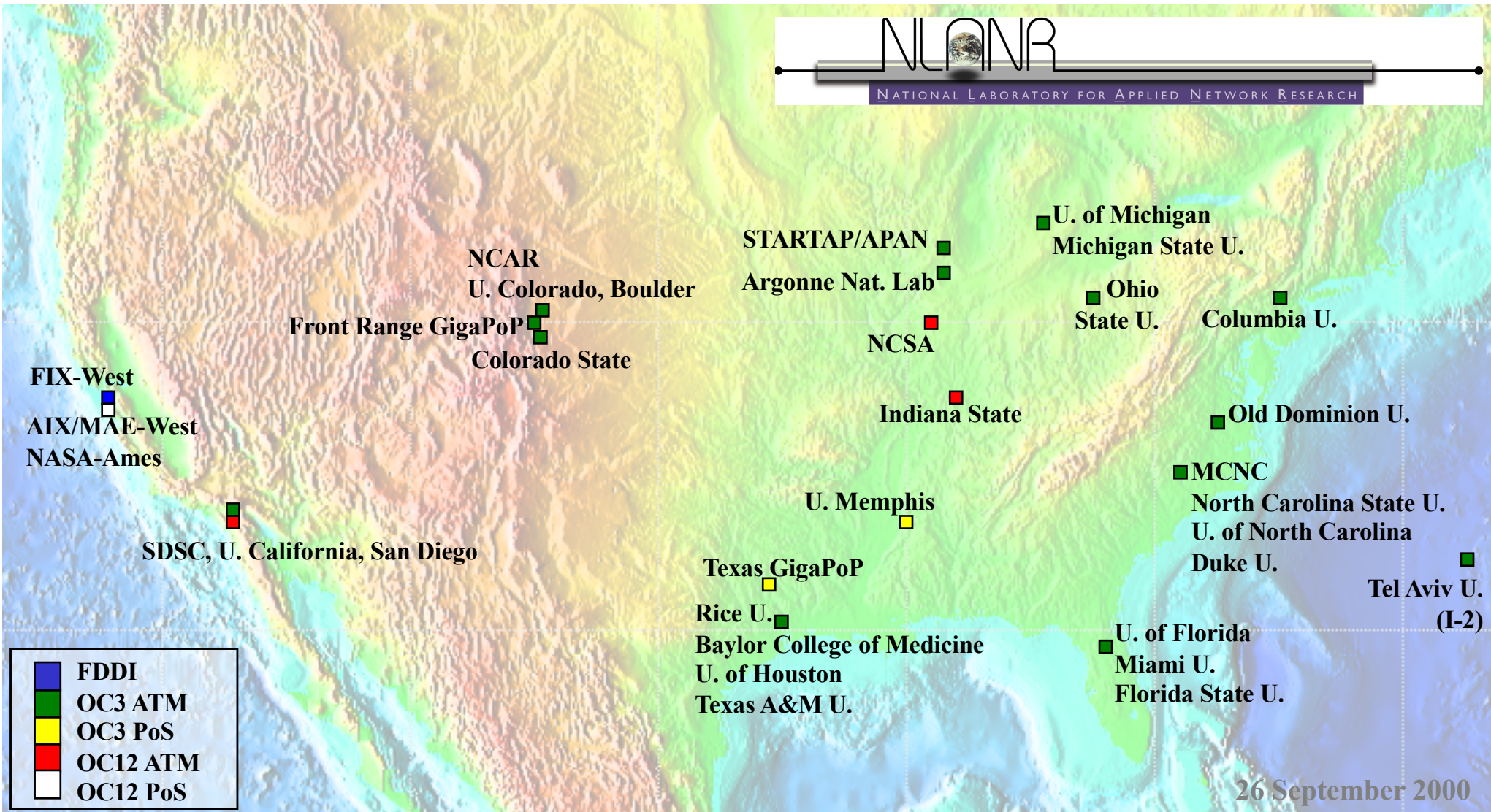
## NLANR/MNA

- The mission of the NLANR Measurement and Network Analysis group is to study the operation of computer networks, measuring the flow of traffic and analyzing performance issues, to better understand the theoretical and practical behavior of the systems.
- Creation of the Network Analysis Infrastructure (NAI) to support measurements and network analysis (within and outside the group)
- The NAI consists of two main components PMA and AMP. PMA packet header traces give tremendous amounts of detail at selected points. There are over 130 AMP machines in a full mesh that measure RTT, path, packet loss, and give long-term big scale trend analysis.

# Passive Measurement and Analysis (PMA) project

Led By Joerg Micheel

- Completely **noninvasive**.
- Aggregated traffic signature at a measurement point.
- OC3/OC12, ATM and POS, OC48 (develop OC192 capability).
- Between June 2000 and Jan 2001 (7 months) 6,000 PMA trace files were downloaded (31 per day) from at least 193 different sites.
- Trace analysis summaries include (total packets, Bytes, top port numbers by volume, top 100 throughput connections, etc.)



26 September 2000

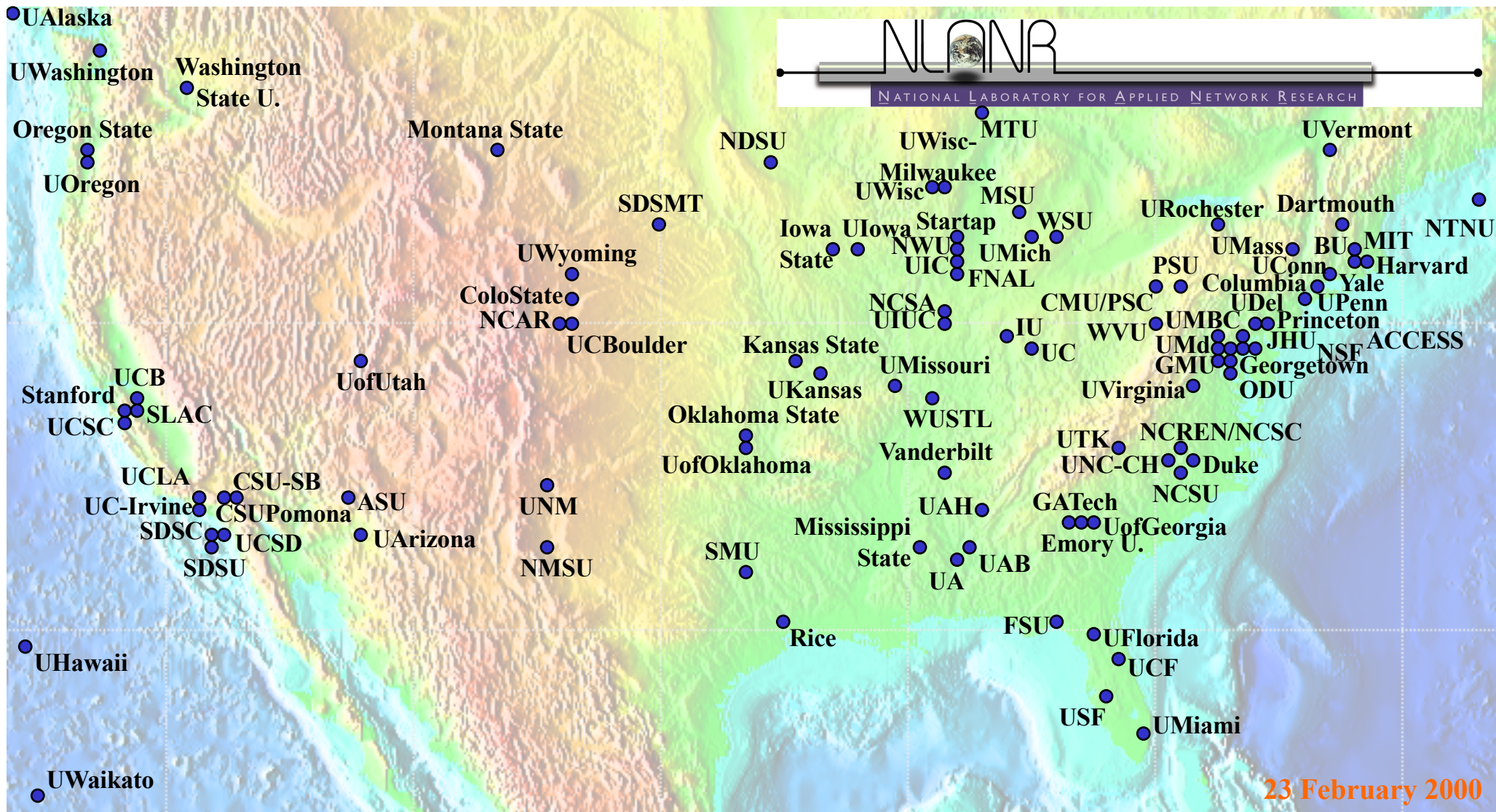
## Passive measurement deployment status

## Active Measurement Project (AMP)

- Led by Tony McGregor
- Focus on site-to-site measurement across high performance networks.
- Attempt to deploy FreeBSD-based AMP machines at all HPC sites.
  - about 130 machines currently deployed and operational.
- RTT, topology, and loss.
- We currently measure RTT to each of the other monitors every minute and the route to each every 10 minutes .

# NLANR

MEASUREMENT & NETWORK ANALYSIS



**Active measurement deployment status**

## Round Trip Times

### amp-aarn HPC results

[\[NLANR\]](#) [\[AMP\]](#) [\[Monitors\]](#) [\[route summary\]](#) [\[summary graph\]](#) [\[site info\]](#)

Site Name - Graph	<u>Min</u> (ms)	<u>Mean</u> (ms)	<u>Max</u> (ms)	<u>Stddev</u> (ms)	<u>Loss</u> (%)	Stats from
<a href="#">Arizona State University</a>	206.00	207.20	231.00	1.71	2.08	2002/10/21
<a href="#">Baylor college of Medicine</a>	214.00	214.53	224.00	0.57	2.92	2002/10/21
<a href="#">Boston University</a>	238.00	251.29	708.00	16.27	2.57	2002/10/21
<a href="#">CSU - San Bernardino</a>	178.00	179.27	453.00	7.90	2.57	2002/10/21
<a href="#">California Institute of Technology</a>	177.00	177.36	182.00	0.53	2.22	2002/10/21
<a href="#">California State University, Pomona</a>	0.00	0.00	0.00	0.00	100.00	2002/10/21
<a href="#">Canarie CA*net3-ARDNOC</a>	233.00	233.07	234.00	0.25	2.08	2002/10/21
<a href="#">Case Western Reserve University</a>	0.00	0.00	0.00	0.00	100.00	2002/10/21
<a href="#">Clemson University</a>	251.00	256.47	661.00	19.49	20.42	2002/10/21
<a href="#">Colorado State University - AMP</a>	177.00	179.44	965.00	21.35	2.15	2002/10/21
<a href="#">Columbia University</a>	241.00	242.49	408.00	8.04	25.14	2002/10/21
<a href="#">Cornell University</a>	230.00	232.13	442.00	9.02	3.06	2002/10/21
<a href="#">Dartmouth College</a>	240.00	252.87	289.00	9.28	2.99	2002/10/21
<a href="#">Duke University</a>	251.00	256.94	294.00	1.20	1.94	2002/10/21
<a href="#">Emory University</a>	225.00	232.04	291.00	7.46	8.33	2002/10/21
<a href="#">Fermi Labs</a>	240.00	243.59	452.00	13.20	2.71	2002/10/21
<a href="#">Florida International University</a>	242.00	244.39	327.00	8.16	2.15	2002/10/21
<a href="#">Florida State University</a>	229.00	230.49	427.00	6.84	2.71	2002/10/21
<a href="#">George Mason University</a>	237.00	276.65	487.00	61.50	2.57	2002/10/21
<a href="#">Georgetown University</a>	230.00	235.34	244.00	0.82	2.43	2002/10/21

# AMP web info (1)

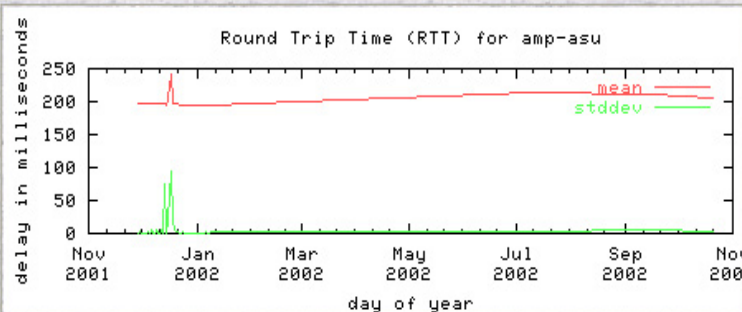
### RTT and Loss Measurements

amp-asu from amp-aarn

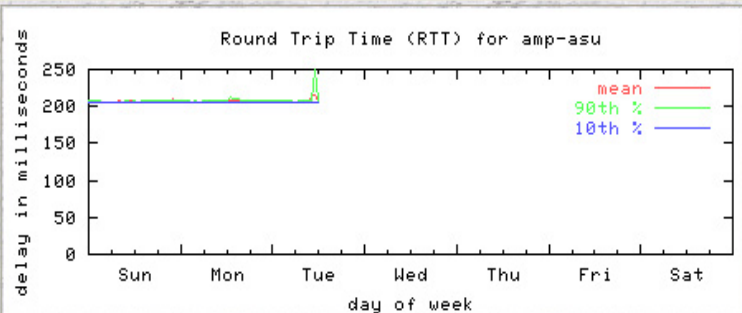
[\[NLANR\]](#) [\[AMP\]](#) [\[monitors\]](#) [\[src info\]](#) [\[dst info\]](#)

## AMP web info (2)

Long Term average per day



Weekly average



min: 205.00 (ms)  
 mean: 206.79 (ms)  
 max: 415.00 (ms)  
 stddev: 7.12

- [22 Oct 2002 \(Tue\)](#) [routes](#)
- [21 Oct 2002 \(Mon\)](#) [routes](#)
- [20 Oct 2002 \(Sun\)](#) [routes](#)



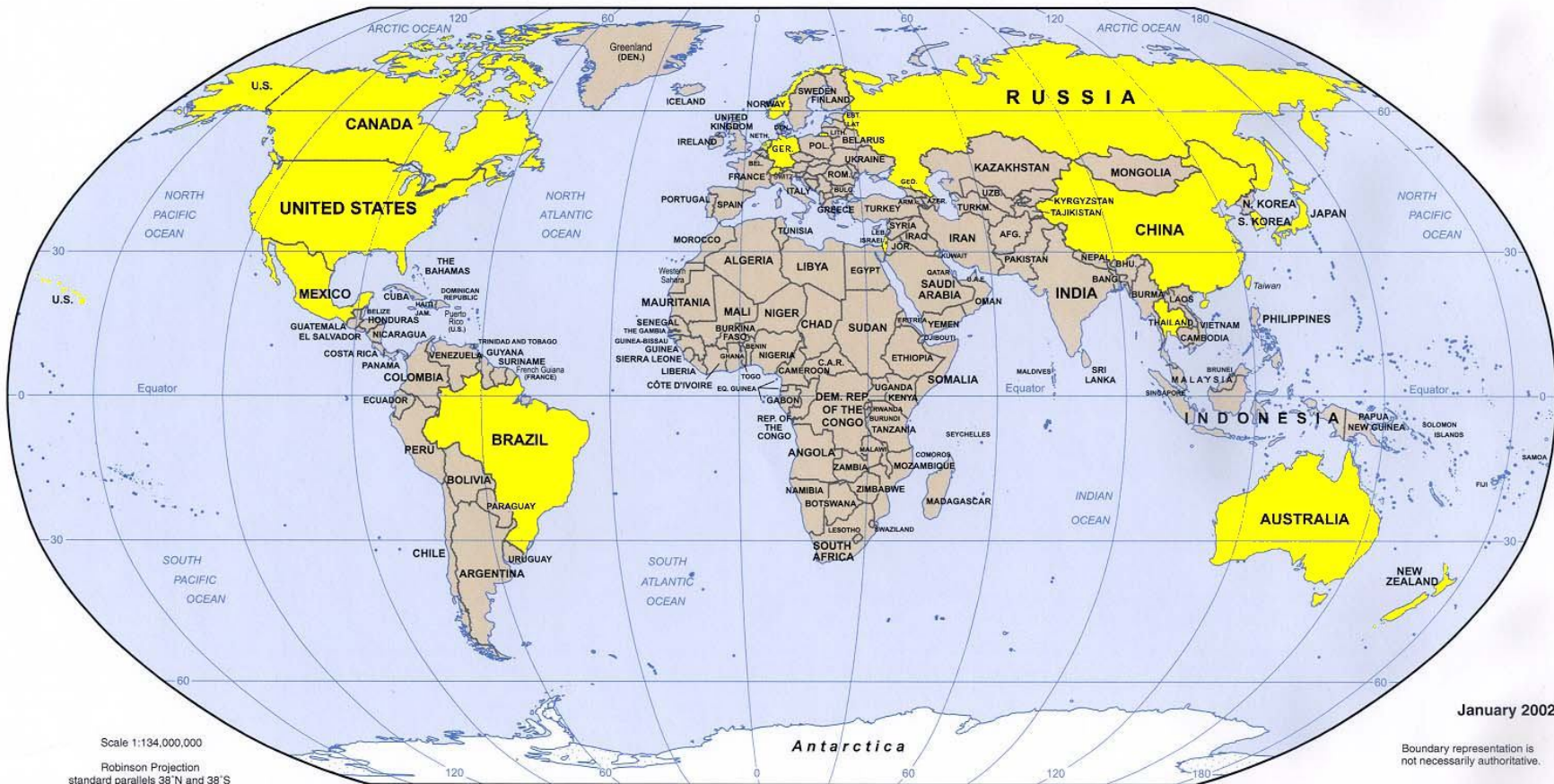
## International Collaborations

- We are in talks with AMPATH regarding the placement of an OC3mon and AMP machine to measure the traffic from AMPATH.
- Discussions with Tom DeFanti have included the monitoring of STAR LIGHT, and early insertion of optical splitters to allow quick installation of PMA machines.
- Ronn Ritke recently attended a meeting in Russia with Greg Cole of NaukaNet (formerly Fastnet) and are discussing several possible measurement activities.

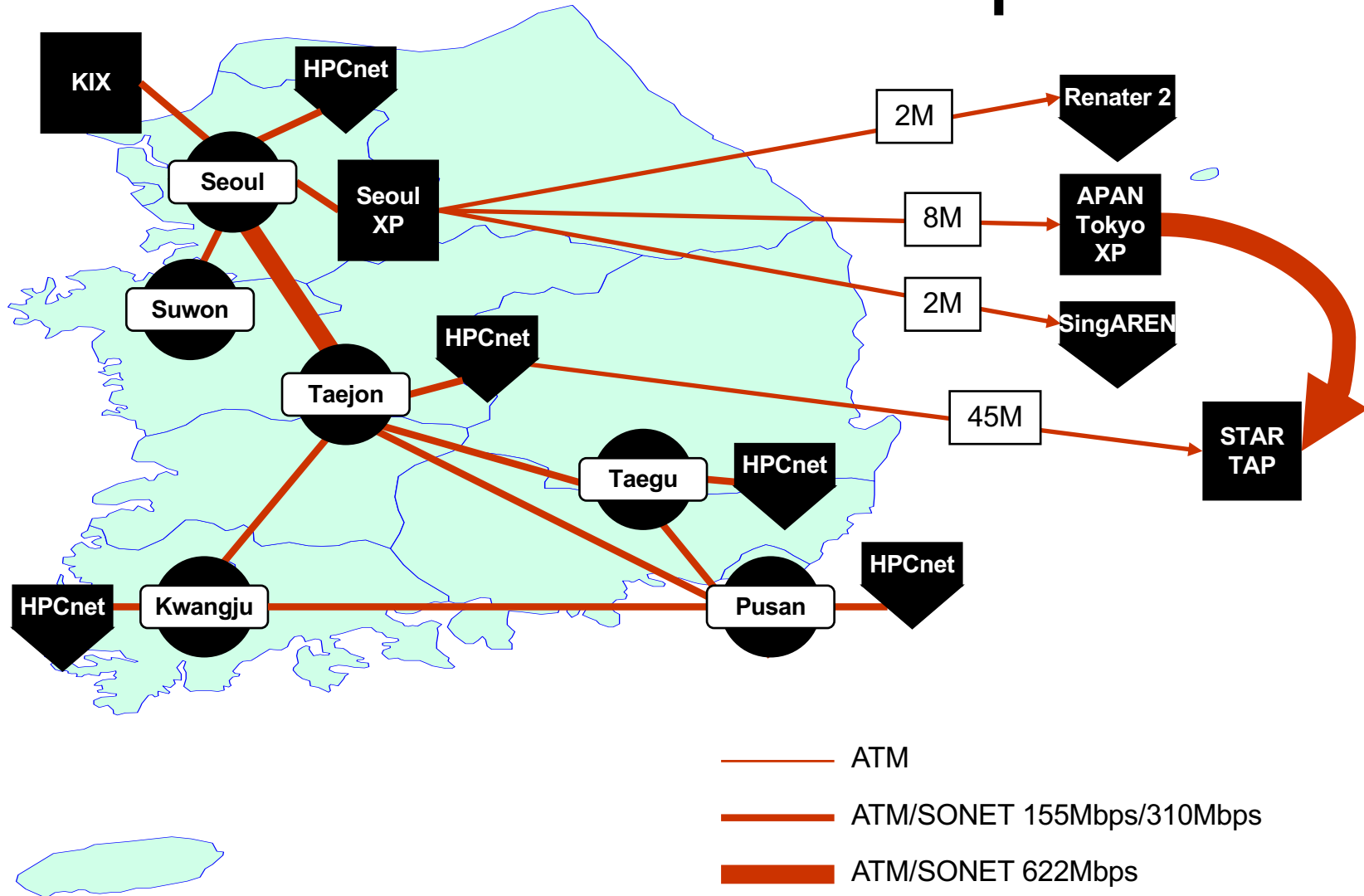
## International Collaborations (Cont'd)

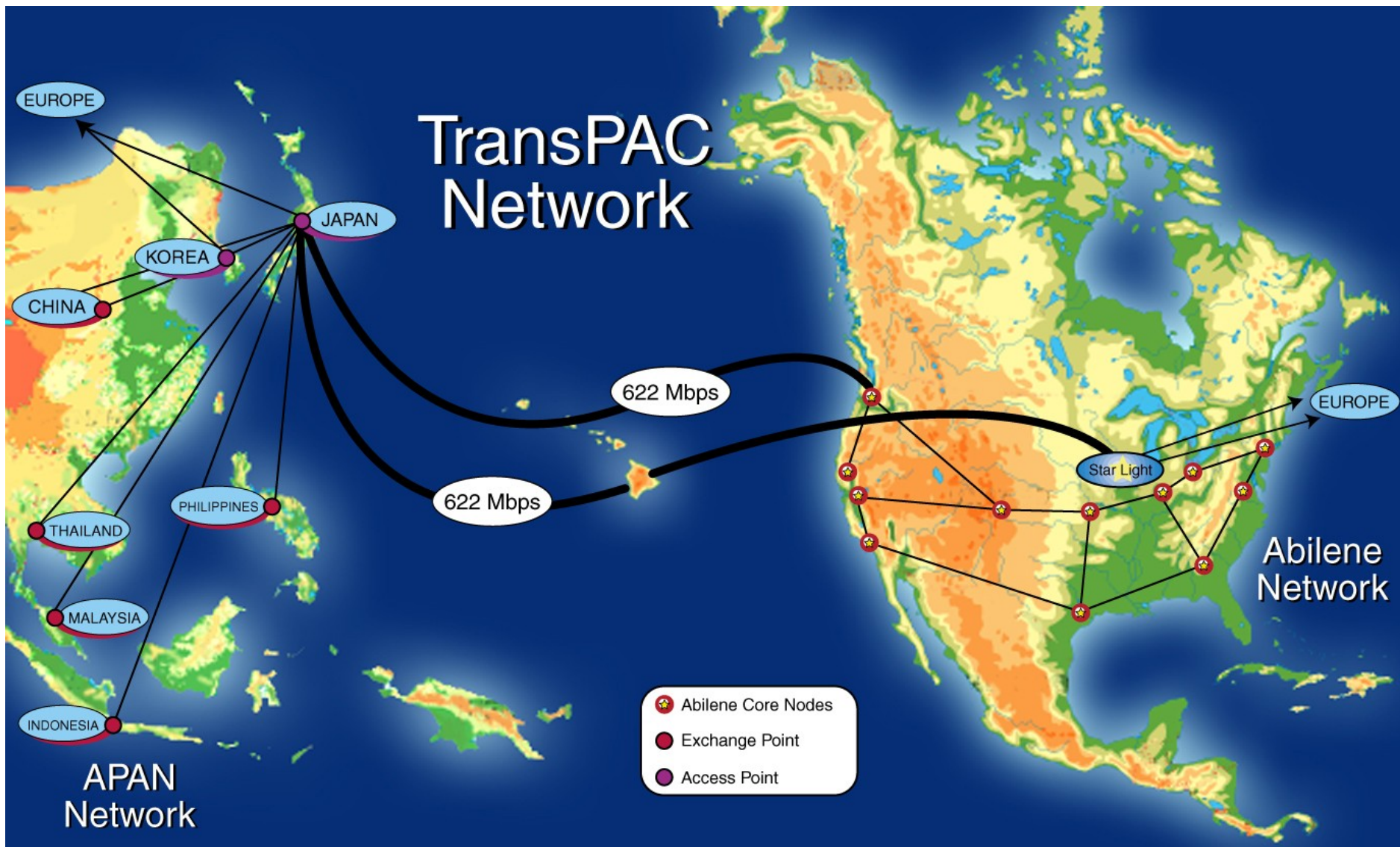
- We have a PMA monitor in Israel (soon in Thailand, Germany and Korea), and AMP machines in Korea, Norway, Canada, Australia, Japan and New Zealand (soon in Thailand, Hungary and Singapore).
- We are working with Korea, and Australia to help them install their own local AMP meshes.
- Interest has also been expressed by other countries (Japan, China, Russia, Brazil, Taiwan, Germany, Norway, Holland, Mexico, Switzerland and Thailand) in both the AMP and PMA projects.
- We are working with the Pacific Rim Applications & Grid Middleware Assembly (PRAGMA) effort at SDSC.

# International Collaborations



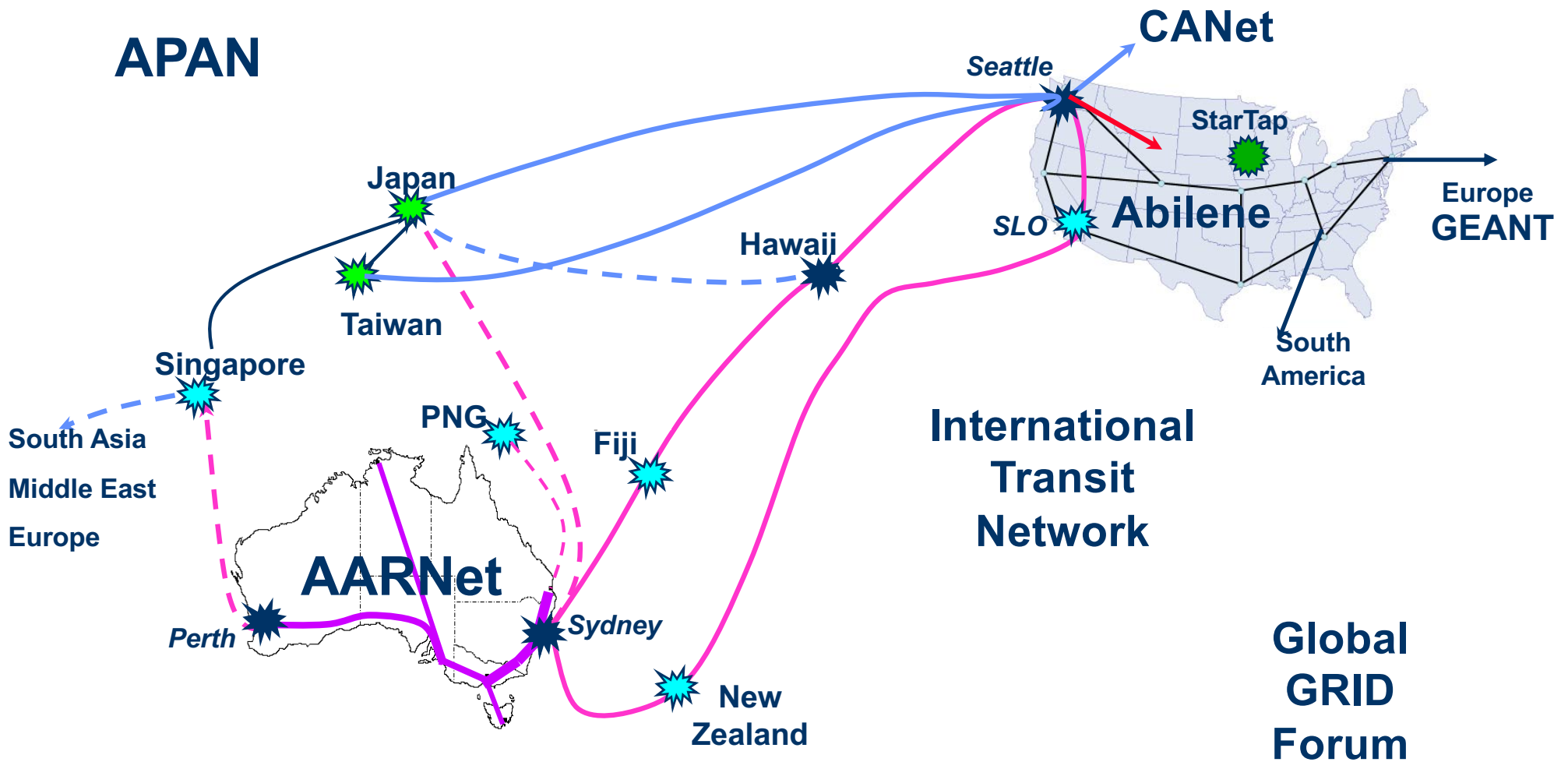
# KOREA Network Map : ~2001





# AARNet's International Connections

## Current and Planned





- A recent NLANR shirt Sighting at the Great Wall