Network Monitoring
grid network performance measurement, simulation & analysis

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Overview

- Wide-Area Network Performance Monitoring and Measurement
- PingER, AMP, Surveyor, RIPE-TT
- NIMI
- Grid Monitoring Architecture (GMA)
- Internet2 End-to-end Initiative
Monitoring Overview (1/2)

• Active
  – put packets on the network
• More Active
  – put lots of packets on the network
• Passive
  – sniff traffic as it goes by
Monitoring Overview (2/2)

- Simple
  - Straight-forward methodology with well-known tools, simple to understand

- Sophisticated
  - Somewhat more advanced methodology, probably still simple to understand

- Advanced
  - Probably not for the nervous
The PingER Project (1/2)

- Ping End-to-end Reporting
- Funded by DoE/MICS
- SLAC and HEPNRC/FNAL
- HENP Community, worldwide coverage
- Simple, low impact, near real-time
- 11x100Byte, 10x1000Byte packets
- 30 mins, 1 packet per second
The PingER Project (2/2)

• Typically a shared box
• Deployment is a volunteer effort
• 32 Monitoring Sites in 14 countries
  – Coming Soon: South Africa, Pakistan
• 430+ Monitored Sites in 72 countries
• 3500+ pairs of connections
• http://www-iepm.slac.stanford.edu
PingER and the GMA

• PingER almost fits into the GMA
  – Producers
  – Consumers

• But not really
  – Directory Services
  – LDAP, SOAP, XML

• It is feasible
The AMP Project

- Active Monitoring Project
- NSF, NLANR
- Widely deployed amongst HPC award sites
- Simple, low impact
- 1 ping, randomly sent (poisson, $\lambda=1\text{min}$)
- Dedicated box, centrally maintained
- [http://watt.nlanr.net](http://watt.nlanr.net)
The Surveyor Project (1/2)

- Advanced Network and Services Inc
- Widely Deployed amongst Internet2 sites
- Sophisticated
- Dedicated box, centrally maintained
- One-way Delay, GPS
- UDP
- Random (poisson, $\lambda=0.5s$)
The Surveyor Project (2/2)

- Almost 25 million measurements from SLAC to CERN in 2000
- http://www.advanced.org/surveyor
Surveyor and the GMA

- Producers, Consumers, Directory Services
- Surveyor has the sensitivity
- And wide deployment
- Not the reliability
- Not the availability
The RIPE-TT Project (1/2)

- RIPE NCC
- Deployed at RIPE Customer sites
- Now a production service
- Sophisticated
- Dedicated box, centrally maintained
- One-Way delay, GPS
- UDP, $\lambda=40s$
The RIPE-TT Project (2/2)

- http://www.ripe.net/ripencc/mem-services/ttm
Other Measurements

• Passive Monitoring (Darpa/XIWT/IPEX)
  – http://www.xiwt.org
• Simulations
  – ns2
• SNMP
  – Access is usually not allowed
  – Looking glass
The NIMI Project (1/3)

• National Internet Measurement Infrastructure
• Darpa, ACIRI/PSC
• Advanced Monitoring Architecture
• Software for configuration and control
• http://ncne.nlanr.net/nimi
The NIMI Project (2/3)

- Typically a dedicated Box
- FreeBSD
- Typically U.S. but not exclusively
  - UK, Sweden, CERN
- Typically Education but not exclusively
  - HP, Sony
The NIMI Project (3/3)

• A platform from which to run tests
  – Any binaries can be wrapped
    • traceroute, ping, pathchar, iperf
  – Other Monitoring Projects such as Surveyor
    one-way delay, passive monitoring, snmp
  – DiffServ and TCP/IP Tuning (web100)
NIMI

• NIMI is loaded by CPOC (Configuration Point of Contact)
• Sets ACL (Access Control List)
- User schedules measurements via the Measurement Client (MC)
  - E.g. traceroute to some other nimi at 3pm today
• User also specifies output to a Data Analysis Client (DAC)
• Could be LDAP
NIMI

- CPOC can configure other NIMIs
- Or local admins can keep control of their own NIMI
NIMI and GMA (1/2)

- NIMI fits into GMA
  - Consumer, Producer
  - Directory Services

- Does it make sense to do it this way?
  - Same feel
  - Accessible
NIMI and GMA (2/2)

- NIMI concerned with scalability too
  - Potentially thousands of hosts
- Security
  - Authentication
  - Encryption
The AIME Proposal

• Use NIMI
• Specifically for ESnet-connected sites and their collaborators
  – Incorporate other effort
• Seems ideal/essential for the grid
• INCITE (Rice University, LANL)
• PPDG
I2 End-to-end Initiative (1/2)

• High capacity, high performance WAN means expectation is up
• Often expectation doesn’t meet reality
• Most of the problems are on the LAN or the host
I2 End-to-end Initiative (1/2)

• Co-ordinate
• Problems and Solutions Database
• Seems Ideal/Essential for Grid
• [http://www.internet2.edu/e2eperf](http://www.internet2.edu/e2eperf)
Summary

• The network is a key component of the Grid
• Network Monitoring is essential
• Pinger/Surveyor/NIMI/AMIE
  – GMA
  – User access is vital
Any Questions?