Data & Network Management Task Team Report Out

October 18, 2012
Atlanta, GA
DNMTT breakout agenda

- Dan Lutter, Allied Partners LLC and Dick Wilson
  - Review operational requirement for Smart Grid real time operational network
- Dave Bakken WSU and Bob Braden USC
  - Cloud Computing
  - GridStat+DETER
- John Hoag Ohio University
  - End-to-End Latency in Synchrophasor Communications
Platform for SG projects

- Lessons learned in Broadcast Television Industry
  - A lot of the same issues confronting SGIG implementers
  - Net Insight use of Nimbra MSR appliances
    - Transport agnostic
    - Improved QoS over any IP network
    - Protection mechanisms
    - Secure and reliable multicasting
    - Provide for separate service for Time Transfer
GridStat – Cloud Computing

- GridStat overview/update
- Focus on Cloud Computing advantages
  - Reduced cost of operation / Ability to setup services quickly
  - Better utilization of equipment
  - Scalable quickly or “on demand” – Tertiary Monitoring Centers
  - Could deploy massive parallel computation on large data stores
    - Different fault diagnosis algorithms could be run in parallel
DETER – DEFT Consortium

- Bob Braden updated topics that were explored at earlier DNMTT meetings.
- DETER is an emulation testbed designed for testing different networking topologies, OS’s, protocol stack, applications and tools.
- DEFT Consortium (PNNL, UIUC/TCIPG, ISI)
  - Objective: Modeling of cyber / physical systems.
  - Emulate C37.118 frames between PNNL and Illinois University flowing across WAN to “control center” at ISI.
  - PNNL and Illinois built their own sites.
  - PMUs were simulated and real.
GridStat has also been used DETER to demonstrate some of its work.

Emulated GridStat Components

- Publish Subscribe paradigm
- Redundant forwarding
- Multicasting (at middleware level)
- Down sampling for “rate based” traffic (i.e. constant rate packet streaming)

Demonstrated a complete model of GridStat over emulated networks using BPA transmission system data.
End-to-End Latency in Synchrophasor Communications

How to get necessary telecom capabilities (interconnection, interoperability, performance)

- Many factors contribute to latency,
- Deterministic Components: TDM propagation and transmission delays, Processing at PMU/PDC, route / switch; overhead including Crypto
- John accurately determined latency for ISO project
End-to-End Latency in Synchrophasor Communications

Root Causes for Latency

- No acceptance test before going into production iperf, trace
- Lack of bandwidth to support muxing several sources
- Misconfigured route/switch
  - Duplex; lack of policing; lack of RAM; too much RAM
- Security appliances [FW, IDS/IPS] saturated (DDOS?)
- Unwanted topology change – to some longer path
- Endpoint Lacking RAM – OS page thrashing

- Check logs
Thank you for participating!