What is NASPINet, Anyway?

The Global Leader in DDS
Mission-Critical Networks
## Why Use Data Distribution MW?

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Tough cases</th>
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What is NASPInet?

![Diagram of NASPInet Architecture]

**Figure 1** Basic NASPInet Architecture
Network Standards Options

Stovepipe

1. Application
2. Data Model
3. Wire Protocol
4. Transport
5. Physical

Layered

1. Application
2. Data Model
3. Wire Protocol
4. Transport
5. Physical
Stovepipes

• Definition
  – Any layer that is unique to the domain is part of the stovepipe

• Critical Questions
  – Does the Data Model (API) impact on-the-wire bits?
  – Are the layers widely used?
If the Data Model Impacts Bits

• Adding new functionality changes bits
  – Incompatible changes!
  – Slow...requires a new standard
  – Unique...leads to lock in

• Stovepipes stifle evolution
  – Systems struggle to add new functionality & new demands
If the Layers are Widely Used

• Costs go down
• Applications benefit from lessons learned in other industries
  – Especially unforeseen future demands
• Integration technology becomes critical…and good
• Latest innovations are rushed to market
  – Notably: Security!
• Faster, better, and cheaper
Layered

- A “middleware” layer
  - Separates the data model from the protocol
  - Generic data model / interface definition capability
- Allows “services” that can operate on any data model
- Add a new functionality?
  - Add a new model; everything else comes for free
Integration Ease

- DDS integrated
  - C37.118
  - Redundant SEL PMUs
  - SEL’s viewer
  - Excel
  - GPA OpenPDC
  - GPA PMU Connection Tester
  - Multiple platforms

- With
  - Automatic discovery
  - Full redundancy & failover
  - Reliable multicast
  - Security
    - Authentication/access control
    - NAT routers/firewalls

- Total time: ~2 person-months
- All applications run unmodified
  - Only the bits change, not the APIs
  - Routing handles conversions
Why Build Stovepipes?

• Many stovepipes
  – Aegis, JAUS, UAS, STANAG 4586

• Why?
  – Increment easier than rethink
  – Outside comfort zone
  – “Open” implies risk

• Stovepipes can make sense!
DDS in Power Systems

• DDS makes sense in generation stations
  – Wind farms, distributed plants
  – SCADA systems
  – Delivers performance and reliability that other protocols cannot

• 61850 makes sense in substations

• Does DDS make sense in NASPINet?
  – Easily integrate C37.118, 61850 systems
  – Easily integrate new functions
  – 61850 over DDS…a single protocol for all classes
New Functions Example

Security Situational Awareness

DDS topics used to publish normalized sensor data and processed information to consumers

Producers:
- Snort
- Nmap
- OpenPMF
- Nessus
- Ganglia

Consumers:
- Visualization (3D Asset Viewer)
- Visualization (Microsoft Excel)
- Archive (RTI Recorder)
- Network Management

Processors:
- Classified
- Promia Raven 1100
- RTI CEP (Coral8)
- AFRL Custom

 normalized sensor feed inputs
normalized processed outputs

new sensors
COTS UTM
custom CEP
new processors
Why Use Data Distribution MW in Power?

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  – Automatic failover
  – Reliable multicast

• Performance
  – 500k msgs/sec with < .5ms latency
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• Transparency
  – 70+ platforms & langs
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• Tough cases
  – Slow consumers
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  – De-duplication
  – Lossy links

• Security

• Scalability

• Ease of use
  – Discovery
  – Tools

• Integration
  – Databases
  – Web services

• Vibrant Standard
What is NASPINet, Anyway?

- A network to view synchrophasors from multiple generating stations

- An opportunity to network the grid
  - Synchrophasors are only the first killer app

- Someday
  - Control, costing, ...
  - Millions of stations
  - Security situational awareness
  - Many other apps
The Network is the Computer

The Network is the Grid