

# NASPInet 2.0 Update Briefing

Mar 22-23, 2017

Jeffrey D. Taft, PhD  
Chief Architect for Electric Grid Transformation  
Pacific Northwest National Laboratory

# Assessment of Existing Synchrophasor Networks

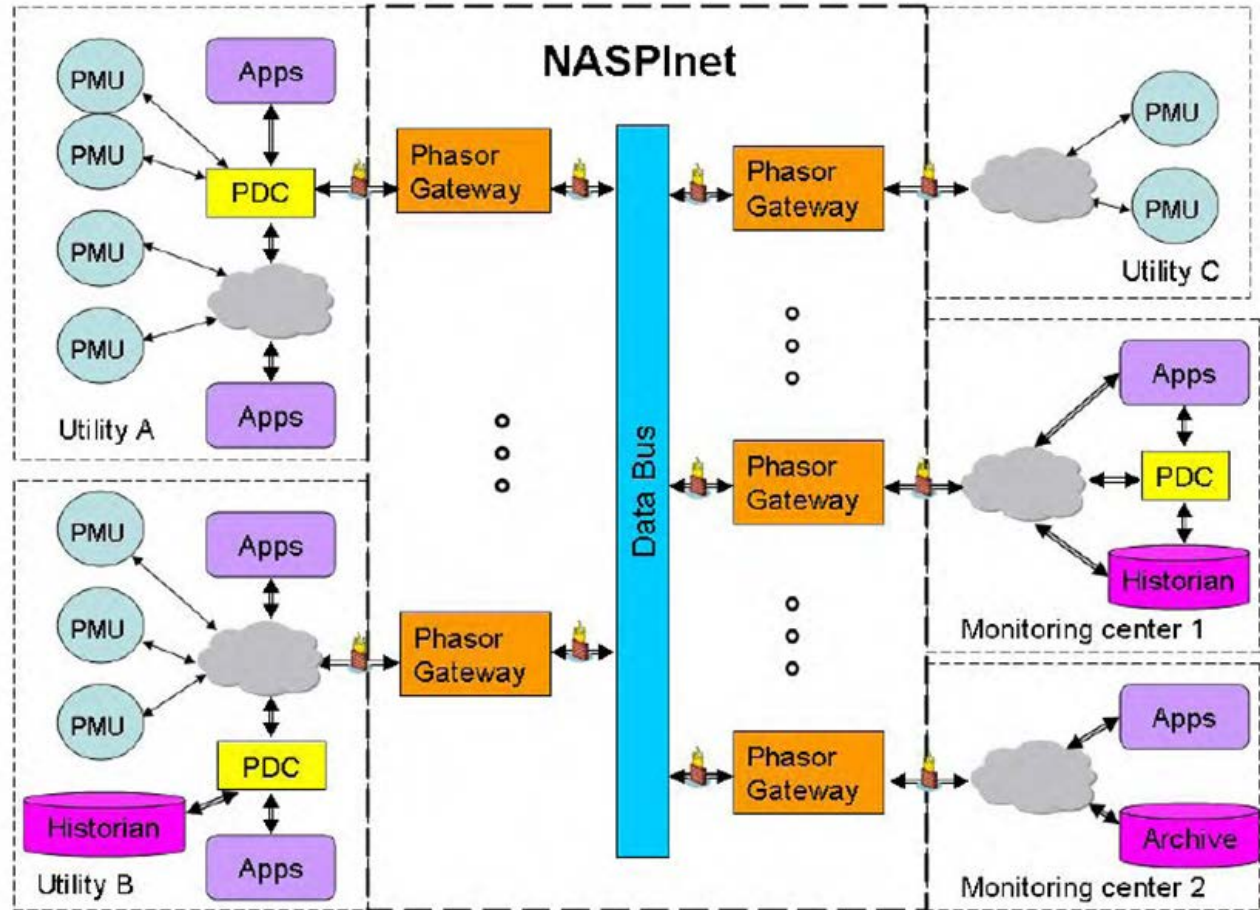
NASPInet 2.0

# Purpose

- Learn from implementation experiences
- Assess possible need for specification revision
  - what was useful; what was not
- Consider:
  - emerging technologies
  - emerging use cases
  - new/revised systemic issues and priorities
- Guidance, not binding specification

# Original Specification Set

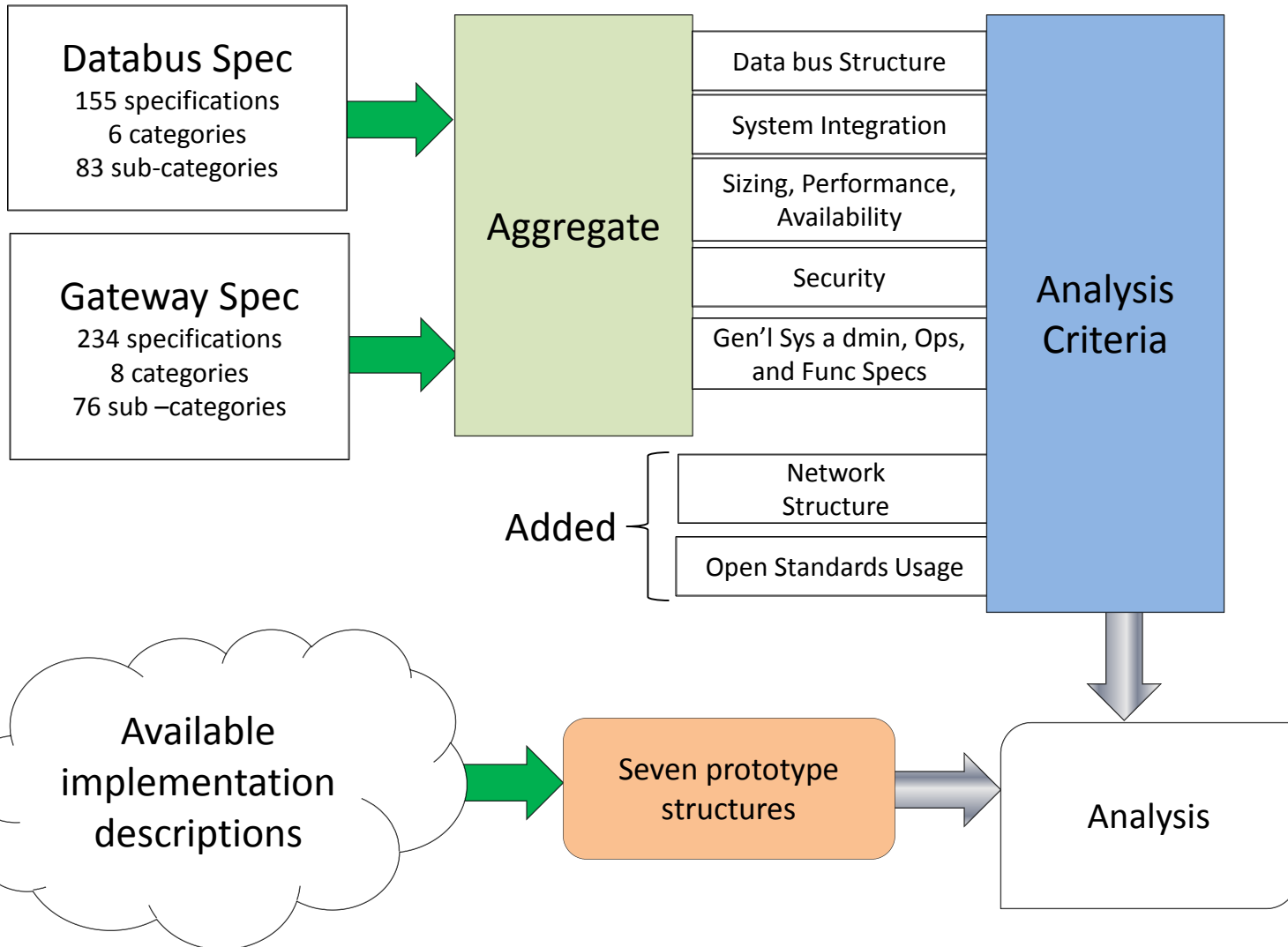
- Data Bus Technical Specifications for North American SynchroPhasor Initiative Network
- Phasor Gateway Technical Specifications for North American SynchroPhasor Initiative Network



# Specification Analysis

- Data bus specification
  - 155 specifications
  - 6 categories
  - 83 sub-categories
- Gateway specification
  - 234 specifications
  - 8 categories
  - 76 sub –categories
- Three additional large categories of general considerations

# Implementation Analysis Process



# Analysis Process Detail

- NASPInet specifications were aggregated into five groups:
  - Data bus Structure and Communications – basic architecture and operational modes
  - System Integration – mechanisms for connecting devices and systems to perform complete functions
  - Sizing, Performance, and Availability - design capacity for handling expected data volumes; ability of the network to carry out data transport well in terms of network available bandwidth, latency, jitter, and packet loss; percentage of up time and reachability of input and output ports in a network
  - Security – ability of the network to protect data integrity, privacy, and confidentiality; ability to control access to the network, ability to maintain device, network, and application integrity; ability to resist intrusion and to detect and mitigate intrusions when they happen
  - General/Sys Admin/Ops and Functional Specification – generic capabilities and best practices in the design, deployment, and operation of networks
- Network core and edge structure added
- Use of advanced open standard protocols added

# Source Materials for Analysis

- NASPI Working Group SGIG Update presentations
- NASPI Work Group presentations
- NASPI Work Group Success Story presentations
- NASPI Reliability Coordinator Data Quality Survey (March 2016)
- NASPI 2014 Survey of Synchrophasor System Networks – Results and Findings (July 2015)
- Various presentations from utilities



# Next Steps for Analysis report

- Review – DNMTT?
- Revisions as needed
- Report release

# New Specification Development

NASPInet 2.0

# NASPInet 2.0 Document

- Will again be guidance and framework
- Update of original specification in light of experience
  - streamlining of the material
- Additional considerations:
  - emerging technologies
  - forward-looking use cases
    - wider area closed loop protection and control
    - adaptive protection
  - new/revised systemic issues and priorities
    - more focus on cyber security

# NASPInet 2.0 ToC Draft

- Background and Purpose
- Scope
- Key Architectural Principles
- Core Requirements
- Problem Domain Reference Model
- Architectural Specifications and Recommendations
- Guidance on Newer/Emerging Technologies
- Appendices (as needed)

# Core Requirement Categories

- scalability
- latency minimization
- reliability/(min packet loss)
- cybersecurity
- performance
- functional flexibility
- data persistence
- open standards usage/conformance
- data sharing
- data rates
- availability
- extensibility
- service classes
- governance

# Problem Domain Reference Model

- Describes the problem environment
- Emerging trends & systemic issues
- Regulatory/public policy issues
- Key constraints & barriers
  - example: geographic constraints
- Entity-relationship (industry structure) model(s)
- Logical/data flow model(s)

# Specification & recommendations

- Function class definitions (capabilities)
- Component class definitions (devices and systems)
- Communication networks
  - structures/topologies (intra-utility, WAN)
  - protocols, operating modes
  - network provisioning/monitoring/management: AAA; ZTD, FCAPS
  - QoS management
  - timing distribution
  - network level cyber security
- Systems- structures and interfaces; system level security
- Standards

# Newer/Emerging Technologies

(compared to original spec time frame)

- Software Defined Networking
- Cloud Services
- Network Virtualization
- Distribution level synchrophasor measurement



# Next Steps

- Inputs from DNMTT and elsewhere
- Draft document
- Review process
- Finalization

# Thank You

Jeffrey D. Taft, PhD  
jeffrey.taft@pnnl.gov