Today’s Presentation
Agenda

- Welcome & Introductions
- Opening Remarks
- 2015 Program Plan
- Supplemental Projects
- Review & Wrap up

Opening Remarks

Tiffany Gibby
Program Manager, Grid Modernization
Tennessee Valley Authority
Information and Communication Technology (ICT) Program

The ICT Program conducts research, development and demonstrations that cut across operating domains and the IT and OT departments.

Research Areas:
- Interoperability
- Communications
- Data Management & Analysis
- Systems Integration
- Advanced Metering

EPRI Power Delivery and Utilization

Information, Communication and Technology (ICT) for Transmission: Program 161B

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Questions? Email: ICTHotline@epri.com
161B - Information and Communications Technology for Transmission

- Enables Improved Grid Management through:
  - Real time information
  - Increased use of synchrophasors
  - Standards based health assessment
  - Continued reliance on legacy sensory devices
  - Improved network model management

Project Set Lead: Paul Myrda
pmyrda@epri.com
(708) 479-5543
2015 Schedule

• Planning Webcast
  • Friday January 23, 2015

• Program Advisors Meeting
  • March 2-4, 2015
  • Sheraton Phoenix, AZ

• Mid-Year Update Webcast
  • Monday, May 11, 2015

• Program Advisors Meeting
  • October 5-7, 2015
  • Baltimore Marriott Waterfront Hotel

2015 Program Plan
P161B Project Set Summary

• Objective
  – Enhance the situational awareness and asset management of the transmission system by identifying requirements and industry best practices for a robust communications infrastructure
  – Develop effective approaches for integrating, managing and analyzing internal and external data sources;
  – Create a standards-based approach for integrating sensors.

• Results
  – Help utilities reduce long-term O&M expenditures
  – Improve system reliability and resiliency

P161B Project Set Overview

- P161.022
  • Synchrophasor Communications Infrastructure and Data Management

- P161.030
  • Integration of Internal and External Data Sources to Support Transmission Operations, Planning and Maintenance

- P161.036
  • Standards and Communications for Asset Condition Monitoring
Research Alignment

Focus
Transmission Operations, Planning and Maintenance

Integrated Network Model Manager
Digital Fault Recordings
Synchrophasor Communications Infrastructure and Data Management
Digital Imagery Visible & IR

Focus
Standardized data structures to provide reusable asset condition information

Automation
Transmission Line Impedance Calculation

Integration of Internal and External Data Sources
Standards and Communications for Asset Condition Monitoring

Focus
Capitalizing on all available relevant data for informed decision making

Synchrophasor Communications Infrastructure and Data Management

Project Set Value
- Capture the benefits
  - IP protocol suite
  - associated routing and switching
- Solving practical problems
  - without custom designed hardware or software.
- These solutions are of value
  - extensive engineering and testing
  - standard off-the-shelf products
  - confirmed through multi-vendor demonstrations.
Integration of Internal and External Data Sources to Support Transmission Operations, Planning and Maintenance

Project Set Value

- Leveraging a variety of data sources
  - combining them into useful relationships
  - supporting business functions
- Geospatial centric information uncover location-specific impacts using:
  - related location-specific information
  - other real-time data
- Value oriented business enhancement opportunities such as
  - comprehensive asset condition evaluation
  - crew and supply deployment

Standards and Communications for Asset Condition Monitoring

Project Set Value

- Demonstrated data exchanges using:
  - Common Information Model
  - IEC 61850 Object Models
  - and other relevant standards
- Fundamental to future proofing applications
- Broadens the reusability of software thereby lowering overall costs.
- Expeditious way to intelligently utilize data more efficiently.
Synchrophasor Communications Infrastructure and Data Management

**Issue**
- Synchrophasor network and data operational concerns plague many utilities

**Approach**
- Improve overall PMU operational efficiencies through modeling and testing using the EPRI Smart Grid Substation Lab and other resources.

Increase asset and system reliability
Synchrophasor Communication Infrastructure

- Deliverable – Electric Utility Guidebook on Synchrophasor Communications

- Value To – Technical staff involved in network communications for synchrophasors

The guide book will focus on the quality and other performance issues associated with synchrophasor communications.

Synchrophasor Data Management

- Deliverable – Electric Utility Guidebook on Synchrophasor Data Management

- Value To – Technical staff involved in storing, archiving and using this data

The guide book will focus on the data management issues associated with synchrophasor data.
Integration of Internal and External Data Sources to Support:

Transmission Operations, Planning and Maintenance
Integration of Internal & External Data Sources to Support: Transmission Operations, Planning & Maintenance

**Issue**

• A wide array of transmission related data sources can be integrated to provide measureable performance improvement in planning, operations and maintenance.

**Approach**

• Utilities have demonstrated measurable improvements in field operations from standardized field data integration

Optimize use of existing and future monitoring equipment.

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Integration of Internal and External Data Sources to Support: Transmission Operations, Planning and Maintenance

• Deliverable - Electric Utility Guidebook on Integration of Internal and External Data Sources:

• Value To – Technical staff involved in Transmission Operations, Planning and Maintenance

The guide book will focus on the value and technical concerns associated with integrating internal and external data sources within the utility enterprise

Evaluate Concept Guidebook Demo Concept
2014 2015 2016
## P161.030 Integration of Internal and External Data Sources to Support Transmission Operations, Planning and Maintenance

### 2015 Deliverable

<table>
<thead>
<tr>
<th>Product Title &amp; Description Planned</th>
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### Standards and Communications for Asset Condition Monitoring
Standards and Communications for Asset Condition Monitoring

**Issue**
- A wide array of data sources including internal and external are available but integration is limited

**Approach**
- Review the requirements for asset condition monitoring from the perspective of standards and identify relevant gaps to be addressed by project research

Decrease maintenance and operating costs

Standards and Communications for Asset Condition Monitoring

- Deliverable – Electric Utility Guidebook on Using Standards for Asset Condition Monitoring

- Value To – Asset management personnel employing analytics and IT support staff involved in asset data management

The guide book will focus on the applicability of existing standards in using asset condition data for health monitoring of utility assets.
**161.036 Standards and Communications for Asset Condition Monitoring**

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**ICT for Transmission Success**

Improving
Transmission Network Model Management
Improving Transmission Network Model Management

Industry Issue
- Network models independently maintained in network analysis systems across the utility
- No overarching data management strategy
- Existing approach inefficient and error-prone

Applicable Standard
- Common Information Model (CIM)
  - Maturity
  - Few industry implementations for internal network model management

Consolidated network model management vision

- Network Model Manager (NMM) tool
  - Provides master repository
  - Supports model and case assembly

“EPRI’s Network Model Management concept offers an effective way to ensure model consistency and process efficiency.”
– Durgesh P. Manjuré, Senior Manager, System Modeling at MISO
Improving Transmission Network Model Management

Projects and Products

2015+
- “Transmission Modernization Demo” Supplemental Network Model Management Improvement at AEP
- “CIM Primer Companion Guide for Network Analysis Data Management” (Product ID 3062002587)

2014
- “Network Model Manager Requirements Overview” Supplemental (Product ID 3062000609)

2013
- “Integrated Network Model Management” Supplemental

Making steady progress toward improved network model management across the industry

“Integrated Network Model Management is no longer a ‘nice to have’ idea, but is CRITICAL for utilities who plan to thrive in today’s regulatory and competitive environment!”
- Eric Hatter, EMS Applications Support at AEP

Improving Transmission Network Model Management

“So, what’s next?”

Network Model Management Guidance Team

- Cross-cutting group
  - Utilities, vendors, consultants
  - ICCS, GO&P, Distribution
  - US and Europe
- Develop a shared understanding of “state of the NMM world”
- Define strategies for industry education
- Identify areas for action (research, standards development, etc.)
- Help EPRI target its NMM efforts
- Interested?
  Contact Pat Brown pbrown@epri.com
Supplemental Projects

Application Guides, Software Tools and Migration Strategies for the Implementation of the IEC 61850 Standard

Objectives and Scope

- Address the barriers in planning, implementing, operating and maintaining the IEC 61850 standard and associated technologies by:
  - capturing lessons learned from utility implementations
  - developing education and training material
  - developing guidebook and software tools
  - addressing security challenges

Value

- Reduce costs and minimize risk when deploying the IEC 61850 standard

Details and Contact

- Price: TBD
- Qualifies for TC and SDF
- Project will start in 2014
- Don Von Dollen
  - dvondoll@epri.com (650) 855-2210
  - SPN Number: 105304

Address the barriers in implementing and maintaining IEC 61850
Automated Transmission Line Impedance Calculation Using GIS

Objective - Determine the feasibility of automating the line impedance calculation using existing data sources such as GIS

Phased Approach:
1. Validate Simple Line Impedance Calculation Process: Determine the feasibility of automating the line impedance calculation process
2. Complex Line Impedance Calculation Process: Transmission line which has multiple mutually coupled lines and other complexities.
3. Improved Line Impedance Calculation Process: Impact of refining the calculation process by including terrain variations, conductor sag and other parameters

Assessment of Synchrophasor Network Performance

Issue:
- Utilities have been experiencing performance issues with their PMU data networks
  - Data loss
  - Erratic behavior
  - Poor data transfer rates (latency)

Approach:
- Perform systematic assessments of PMU data networks
- Develop Best Practices recommendations and possibly a PMU Data Network Guidebook
**Integrated Network Model Manager**

**Project Description:**
Deep-dive into existing model management practices and exploration of opportunities for improvement via coordinated model management architecture.

- **Candidates**
  - Transmission owners/operators or ISOs serious about improving internal network model management

- **Participation**
  - $100K (TC/SDF eligible)
  - Active participation required
  - 2 utilities participated in 2013, both are moving ahead with plans to implement model management solutions

- **Benefits**
  - Develop cross-department understanding of feasibility and benefit of coordinated Transmission model management within utilities
  - Explore solid standards-based approach for solution implementation

Still Open in 2015

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**Emerging Technologies and Technology Transfer: 161A**

**Approach:**
- Analysis of emerging standards, technologies and practices for smart grid implementations
  - Smart Grid Standards Tracking, Analysis and Contribution
  - Communications Technology Tracking and Analysis

- Technology transfer support for ALL Integrated Communication and Technology (ICT) R & D projects.

- Email: ICTHotline@epri.com

**Project Set Lead:**
Don Von Dollen  
Email: dvondoll@epri.com  
Phone: (650) 855-2210
Interoperability Standards & Communications Technology Tracking and Analysis

**Issue**
- Rapidly evolving standards and communications technologies can have a major impact on utility deployments
- Tracking development can be overwhelming and costly

**Approach**
- EPRI staff is deeply involved in standards development and industry activities
- EPRI staff reports on developments and activities and provides analysis on the impacts to utilities

Saving utility staff time tracking standards activities, while gaining a better understanding of the impact of standards

ICT Technology Transfer Activities

**Issue**
- To receive value from our research, our member stakeholders must be aware of what we are doing and implement the results

**Approach**
- Communicate research results in a variety of ways:
  - Technical reports
  - Webcasts
  - Newsletters

Receive the results of our work in the format that works best for YOU!
Together…Shaping the Future of Electricity

Questions?
ICTHotline@epri.com