Wide Area Visibility PowerWorld

A pilot for improved wide-area situational awareness

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Transmission & Reliability Organization

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Blackout Report*

- Recommendation 9 - Actions
  - Evaluate and improve the tools and procedures for operator and reliability coordinator communications during emergencies.
  - Evaluate and improve the tools for the timely exchange of outage information among control areas and reliability coordinators.
- Recommendation 10 - Introduction
  - The August 14 blackout was caused by a lack of situational awareness that was in turn the result of inadequate reliability tools and backup capabilities.

  *August 14, 2003 Blackout: NERC Actions to Prevent and Mitigate the Impacts of Future Cascading Blackouts, February 10, 2004

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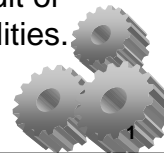
Objective

To develop a tool that provides
a common basis for operators
to be aware of changing bulk
transmission system conditions
across a broad region.

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Approach

- Technical
  - Replicate the TVA hosted EIPP phasor data technology and architecture (hub and spoke)
  - Use PowerWorld as the display layer

- Business
  - Provide a low hurdle for NERC certified entities in SE to participate
    - Current PowerWorld Users
    - Accommodate entities that do not need full-scale PowerWorld
  - PowerWorld maintains case and one-line diagrams as a "service" for utility consumers
  - NDA's are setup among participating utilities
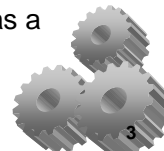
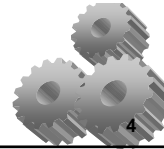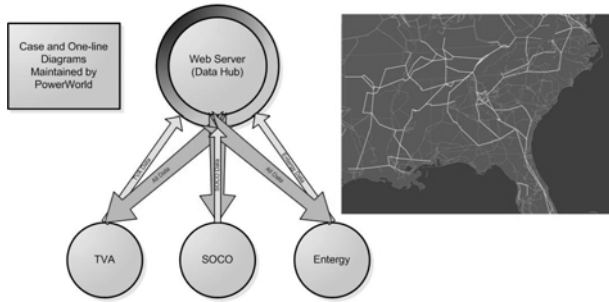JRC 06/15/2006   3
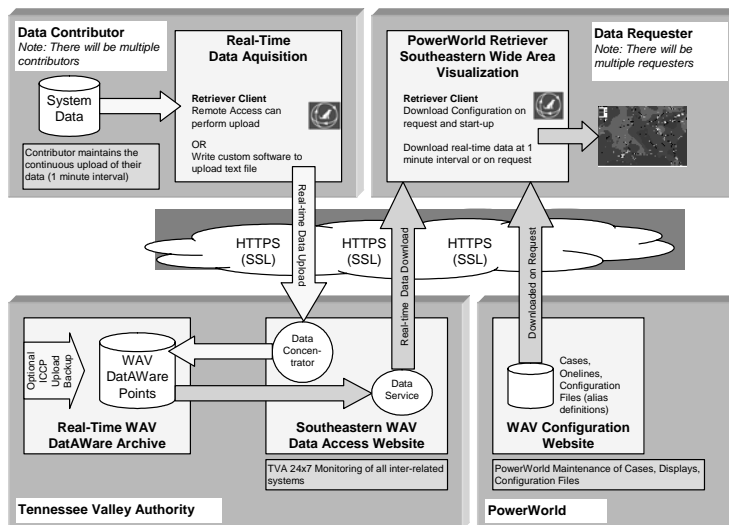
How does it work ?

- Contributors upload data to Data Access Website
- Data concentrated and pushed into DatAWare
- Requestor asks for data from Data Access Website
- Data Access Website has a Data Service that
  - fetches data from DatAWare
  - packages it as a text file
  - pushes text file to requestor
- Requestor is kept up to date on files through WAV Configuration Website

PowerWorld Wide Area Architecture

Case and One-line Diagrams Maintained by PowerWorld

Web Server (Data Hub)

TVA   SOCO   Entergy

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Architecture Detail

Data Contributor
Note: There will be multiple contributors

System Data

Contributor maintains the continuous upload of their data (1 minute interval)

Real-Time Data Aquisition

Retriever Client
Remote Access can perform upload

OR
Write custom software to upload text file

PowerWorld Retriever Southeastern Wide Area Visualization

Retriever Client
Download Configuration on request and start-up

Download real-time data at 1 minute interval or on request

Data Requester
Note: There will be multiple requesters

Real-time Data Upload

HTTPS (SSL)   HTTPS (SSL)   HTTPS (SSL)

Real-time Data Download

Downloaded on Request

Optional ICCP Upload Backup

WAV DatAWare Points

Data Concen-trator

Data Service

Cases, Onelines, Configuration Files (alias definitions)

Real-Time WAV DatAWare Archive

Southeastern WAV Data Access Website

TVA 24x7 Monitoring of all inter-related systems

WAV Configuration Website

PowerWorld Maintenance of Cases, Displays, Configuration Files

Tennessee Valley Authority

PowerWorld

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Data Contributor

- ## Uploads data to the Southeastern WAV data access site

```
*** DATE *** 12/ 2/2005 12:20:34 PM
"TV_Browns F_500_1.KV",518.77,GOOD
"TV_Bull Run_500_1.KV",519.14,GOOD
"TV_Caledoni_500_1.KV",524.17,GOOD
"TV_Caledoni_500_2.KV",524.17,GOOD
"TV_Choctaw_500_1.KV",520.94,GOOD
"TV_Choctaw_500_2.KV",520.94,GOOD
"TV_Cordova_500_1.KV",518.36,GOOD
"TV_Cumberla_500_1.KV",514.68,GOOD
"TV_Davidson_500_1.KV",510.73,GOOD
"TV_E. Point_500_1.KV",525.19,GOOD
"TV_Franklin_500_1.KV",521.66,GOOD
"TV_Freeport_500_1.KV",513.12,GOOD
"TV_French C_500_1.KV",519.13,GOOD
"TV_Gleason_500_1.KV",523.45,GOOD
"TV_Haywood_500_1.KV",519.01,GOOD
"TV_Haywood_500_2.KV",519.01,GOOD
"Browns F_500_1_Limeston_500_1_1.FMV",-68.8,GOOD
"Browns F_500_1_Limeston_500_1_1.FMW",601.2,GOOD
"Browns F_500_1_Limeston_500_1_1.TMV",48.1,GOOD
"Browns F_500_1_Limeston_500_1_1.TMW",-600.2,GOOD
"Bull Run_500_1_Voluntee_500_1_1.FMV",108.3,GOOD
```

Through Retriever or some custom script
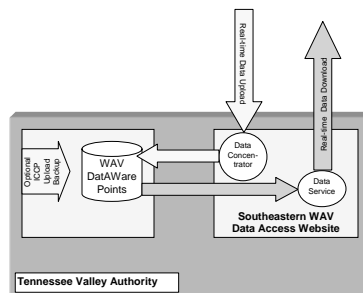
1-minute interval or faster

Data transferred over SSL

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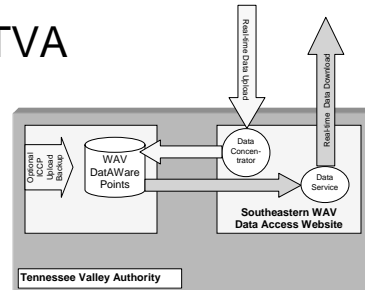JRC 06/15/2006

WAV Data Website

- ## Contributors upload
  - Uploaded data is concentrated and pushed to local archive
- ## Requestors download
  - Data Service receives request
  - Data Service Pulls requested data from local archive
  - Data Service pushes text file containing requested data to requestor over SSL

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WAV Data Archive

- Local data historian concentrates and consolidates uploaded data by timestamp
- Result is published to data access website
- Archive hosted by TVA

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NDA Provisions

- To contribute or receive data, participants must be a NERC certified BA or RC
- Data shall only be used for the purpose of display in "wide-area PowerWorld"
- TVA must provide the same caution and care for this data as it does for its own proprietary data
- TVA will retain one-minute real-time data for a maximum of 24 hours after which the data will be destroyed
- Data recipients must protect and not share data with others
- Neither the data contributors nor TVA provides any warranties for the data

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Why not use ICCP?

- Simple way to meet objective -- Guarantees a common display, with common annotation and coloring in all control rooms
- Significantly Lowers Operating Costs -- All parties do not have to separately maintain:
  - The display
  - The case (model, ratings, and alarm limits)
  - Data-to-model mapping
- Low Cost of Entry -- All NERC certified BA and RC entities in SE can easily add this tool to their control rooms thereby promoting the strongest regional reliability.
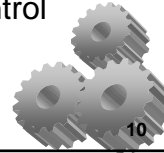
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Example Display

P.U. Volt
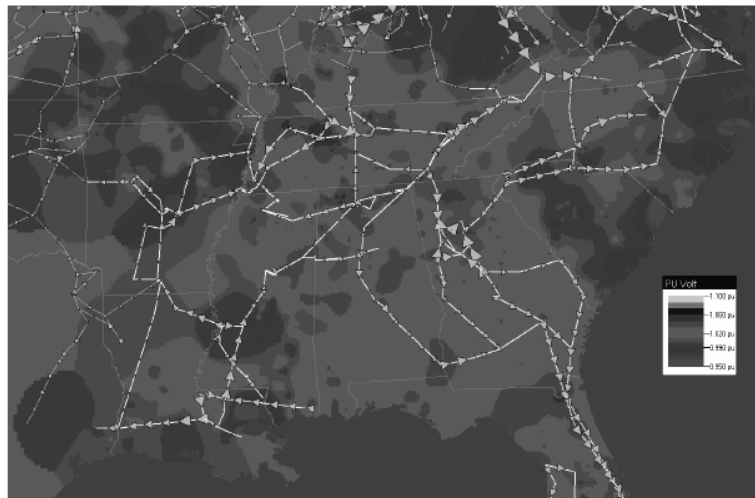
Example colors – browns and blacks are normal, reds low

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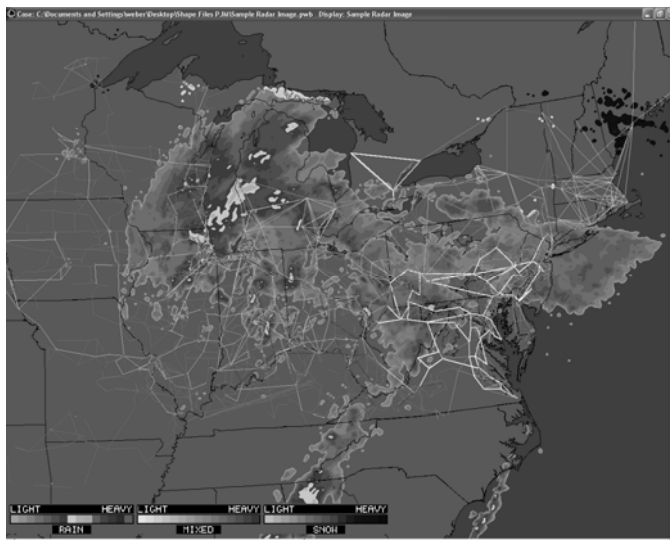
Current Progress...

- Technology has been deployed.
- NDA has been executed for Entergy and TVA. Entergy is working on mapping data from their SCADA system and creating a process to provide the data.
- NDA is final stages for Southern Company and TVA. Southern Company has already tested the system with their SCADA data.

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Overlaying Weather...

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