



U.S. Department of Energy
Office of Electricity Delivery & Energy Reliability

Electric Distribution



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Enhanced Distribution System Monitor

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Purpose

- Provide cost-effective, reliable communications backbone for distribution assets
- Creates a means of monitoring and control for the distribution grid of the future
- Increased visibility of the power distribution system

Applications

- Circuit Monitoring
- Fault Detection
- Outage Management System
- Automatic Meter Reading
- Demand Side Management
- Distribution Automation
- Self Healing Grid

Solution

- Self contained weatherproof radio module
- Attaches to distribution pole
- Many of these devices make up an EDSM network

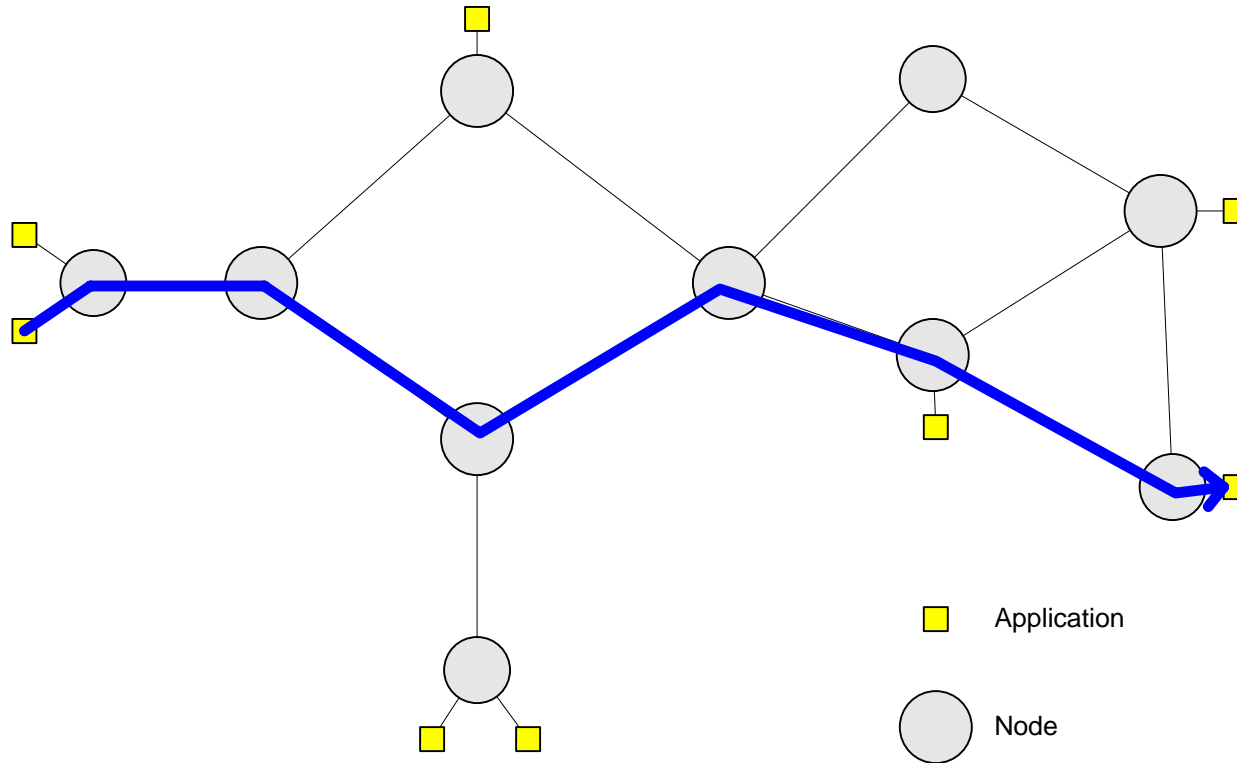
Theory of operation

- 900 MHz spread spectrum interference resistant radios
- Mesh network
 - Scalable, redundant, and easy to install
 - Self healing, dynamic routing, and long range
 - Device to device communication and data concentration ability
- Multiple layers of encryption provide security

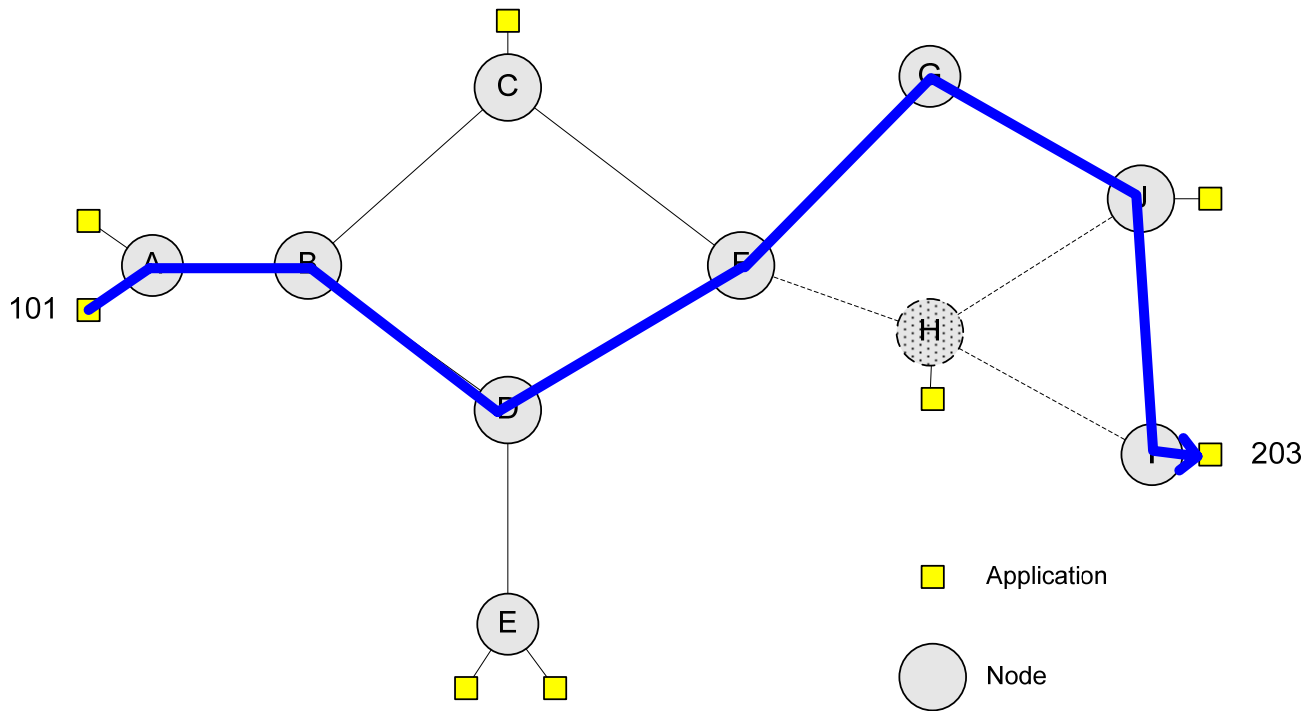
A Mesh Solution

- True homogeneous point to point mesh
- No configuration required, auto-routing (just mount the device to the pole and the network figures everything out)
- Multiple applications can be served by single node
- Communication links can be healed with redundant radios

Mesh Example

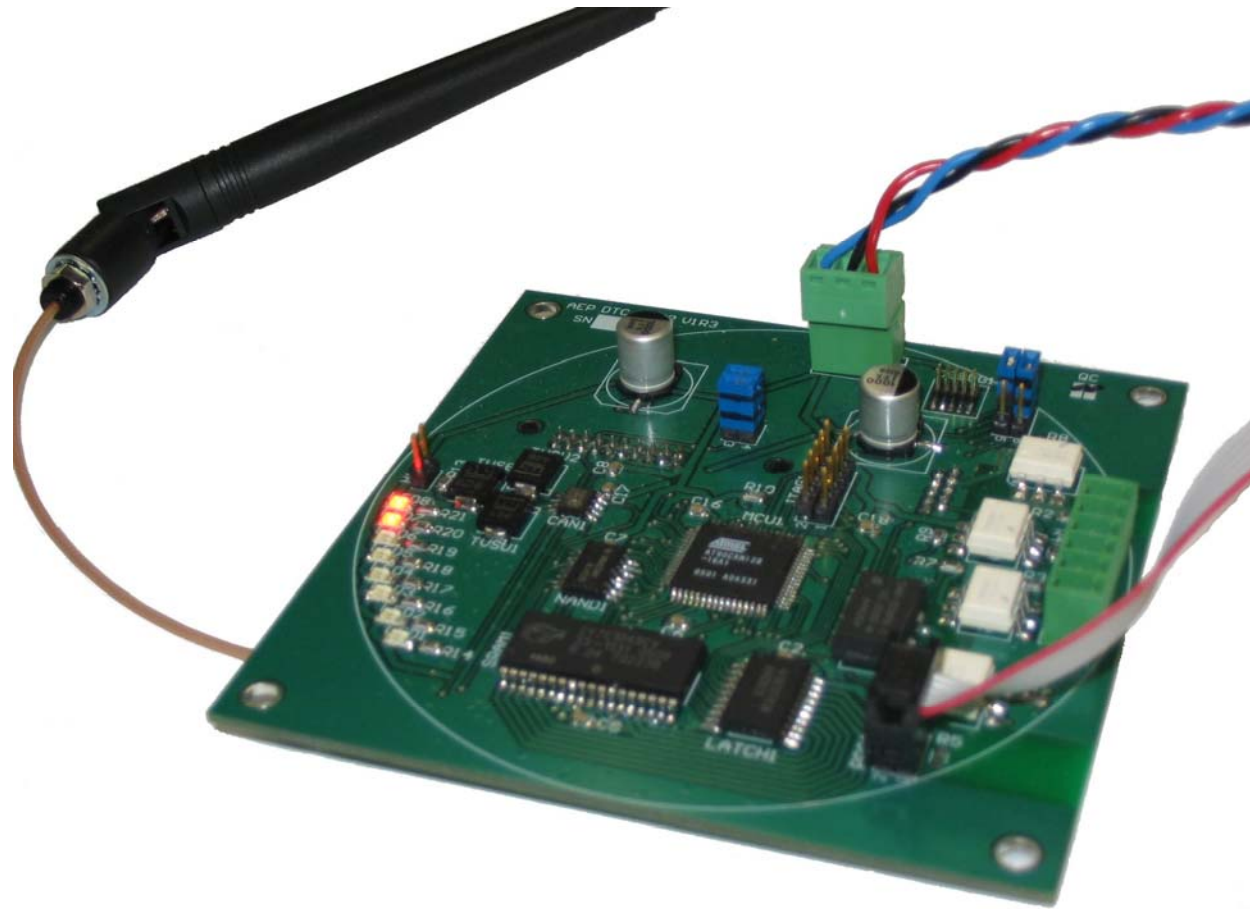


Mesh Example



If node H fails, path re-routes through G

Node Hardware



Differences From Other Meshes

- No central network organizer
 - Each node is an equal peer
- Does not use source routing
- Multiple applications can be connected to a single node (each with separate addresses)

Current Progress

- Mesh algorithms written
- Network node hardware completed and tested

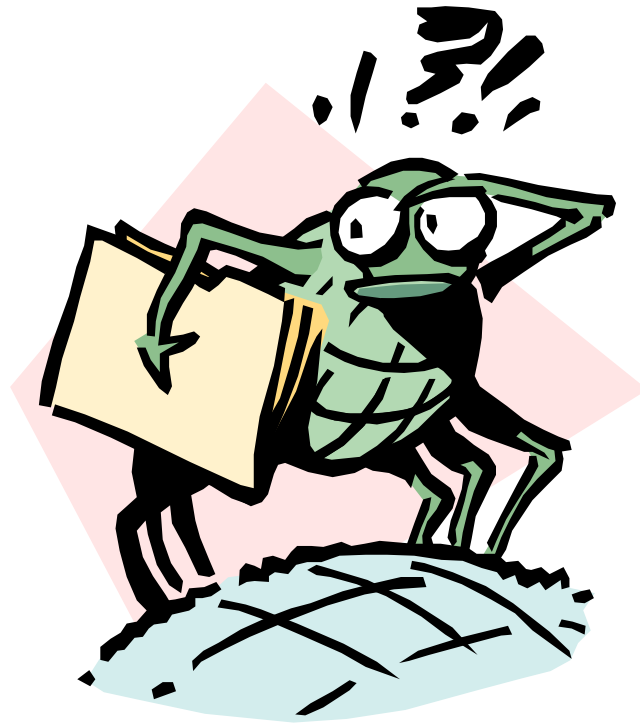
2006 Remaining Goals

- Finalize power supply and packaging
- Create voltage monitoring application
- Create outage identification application
- Install 10 pilot nodes
- Study network behavior

2007 Goals

- Finalize complete design
- Construct and install 100 nodes
- Create server and gateway infrastructure
- Develop administrative applications

Questions?



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