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# Data Radio Network

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Overview and lessons learned

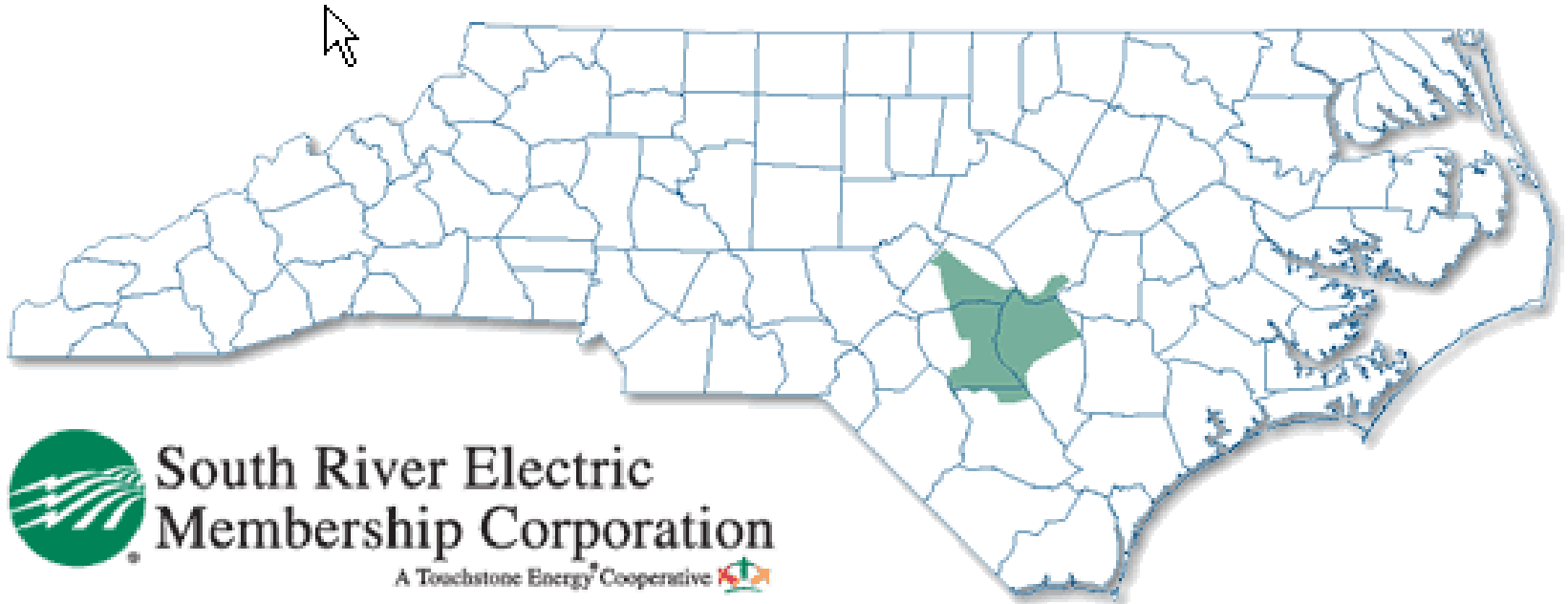
July 14, 2010



**South River Electric  
Membership Corporation**

A Touchstone Energy® Cooperative 

## South River Electric Membership Corporation



**Headquarters**  
17494 U.S. 421 S.  
Dunn, NC 28334

# South River EMC Overview

- 40,000 Consumers
- 2 Offices
- Parts of 5 counties
- 5,144 miles of line
- 30 Sub-stations
- 99 Employees

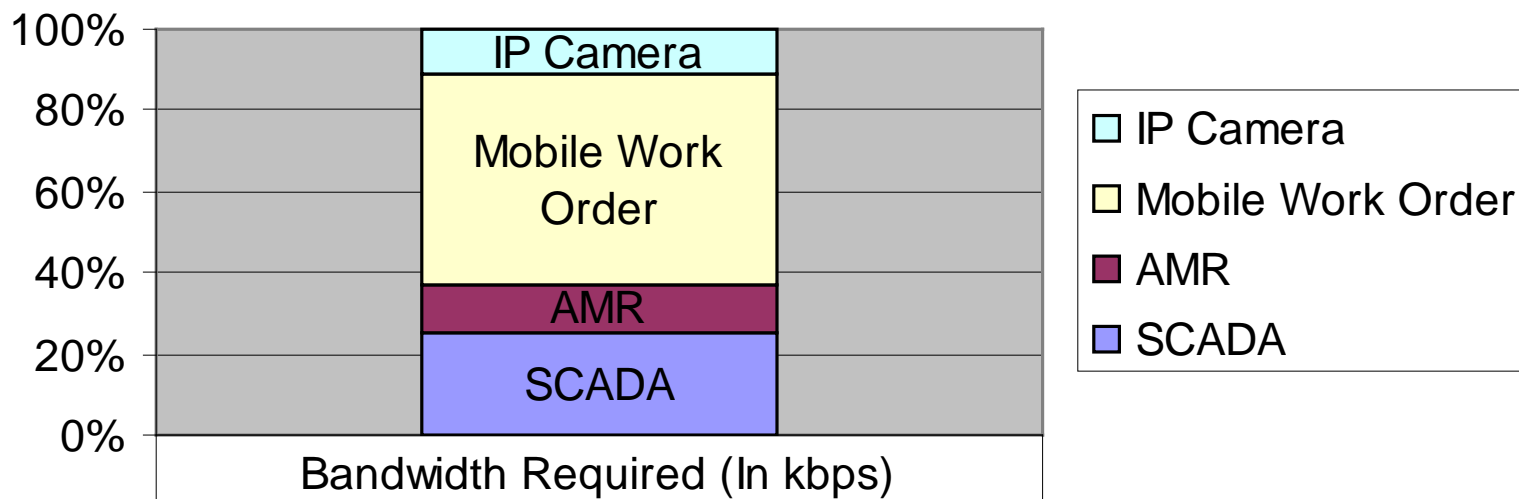
# Business Drivers for Substation Communications Project

- Current communications infrastructure was failing
- Not all substations had communications
- New SCADA system to be installed Q2 2007
- AMR system project in the fact finding stage
- Trucks were recently equipped with wireless PC's

# Requirements & Assumptions

- Must support SCADA and AMR
- Should have room for growth
- Future SCADA equipment providers will make a slow move toward IP based traffic
- Mobile hot spots\* and IP Cameras are likely within the next 5 years
- Communication infrastructure should last 10 to 15 years
- Recurring costs need to be as low as possible
  - \*AVL project currently under way may meet need for mobile hot spot functionality

# Bandwidth Requirements

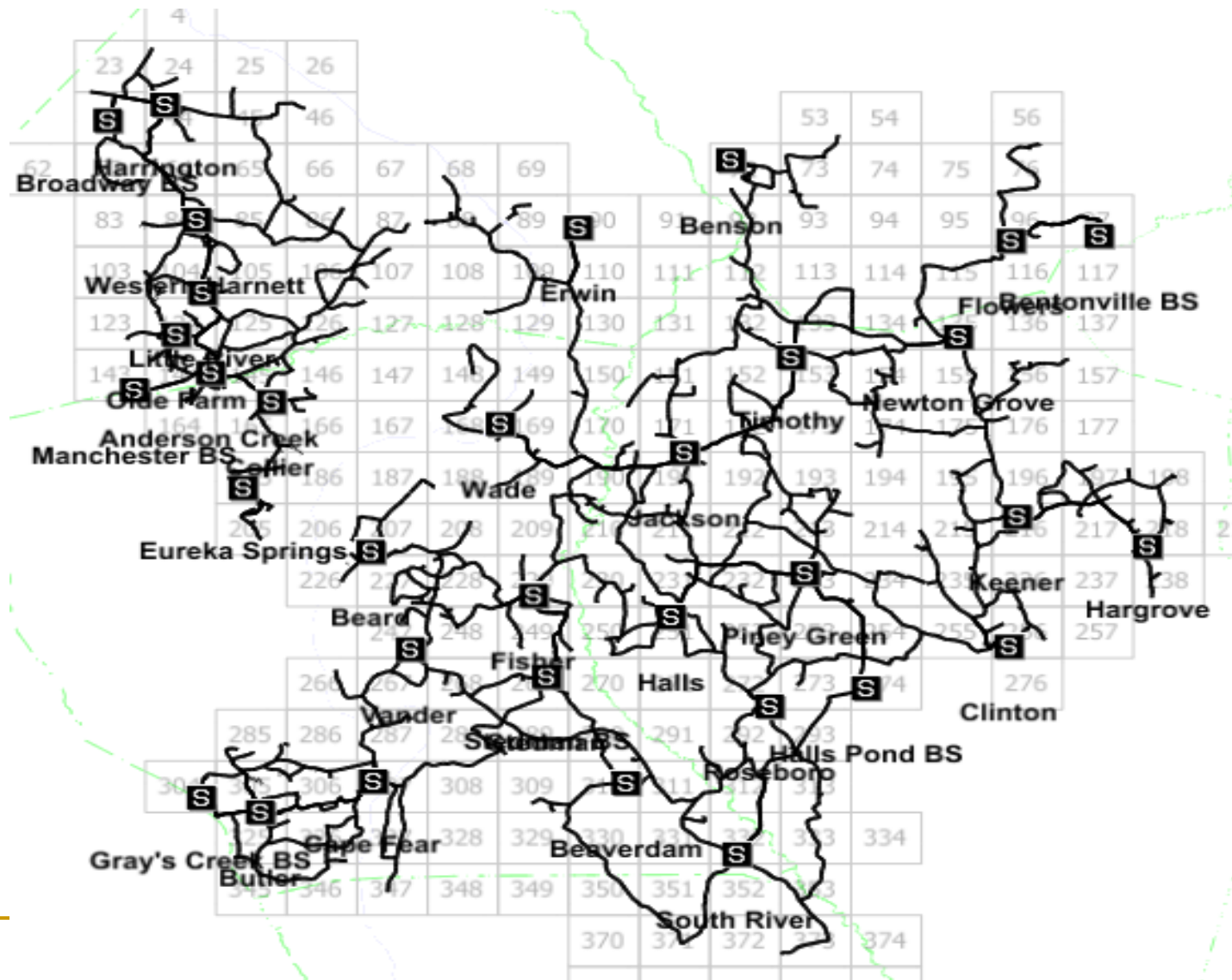


IP Camera	56
Mobile Work Order	256
AMR	56
SCADA	125

# Technologies Considered

- Satellite
- Telco- Frame and point to point
- Fiber to the substation
- 802.11 Pt. to Pt
- 802.16
- Spread Spectrum Unlicensed
- DSL

# Our Model



<b>Technology</b>	<b>Annual Estimated Service Cost or one time Capital Investment</b>
Satellite - \$50.00 per month 512k download, 128k upload	\$18,000.00 (Annually)
Fiber-Optic Network \$10k per mile build out	\$3,600,000.00 (one time capital)
Frame Relay - \$325.00 per month per location	\$117,000.00 (Annually)
802.11 long range	Turned out to be consultants theoretical - No one would quote
802.16 – Metro WiMax	Only viable in a few metropolitan areas
DSL	Available to less than 20% of our locations
<u>Spread Spectrum Unlicensed</u>	<u>\$200,000.00 (one time capital investment)</u>

# The Solution 900 Mhz Spread Spectrum (In theory)

- IP Compatible
- Supports legacy serial
- Speeds 500 kbps through 7.2 Mbps
- Max range ~ 22 miles
- No monthly fees

MDS Mercury 900™



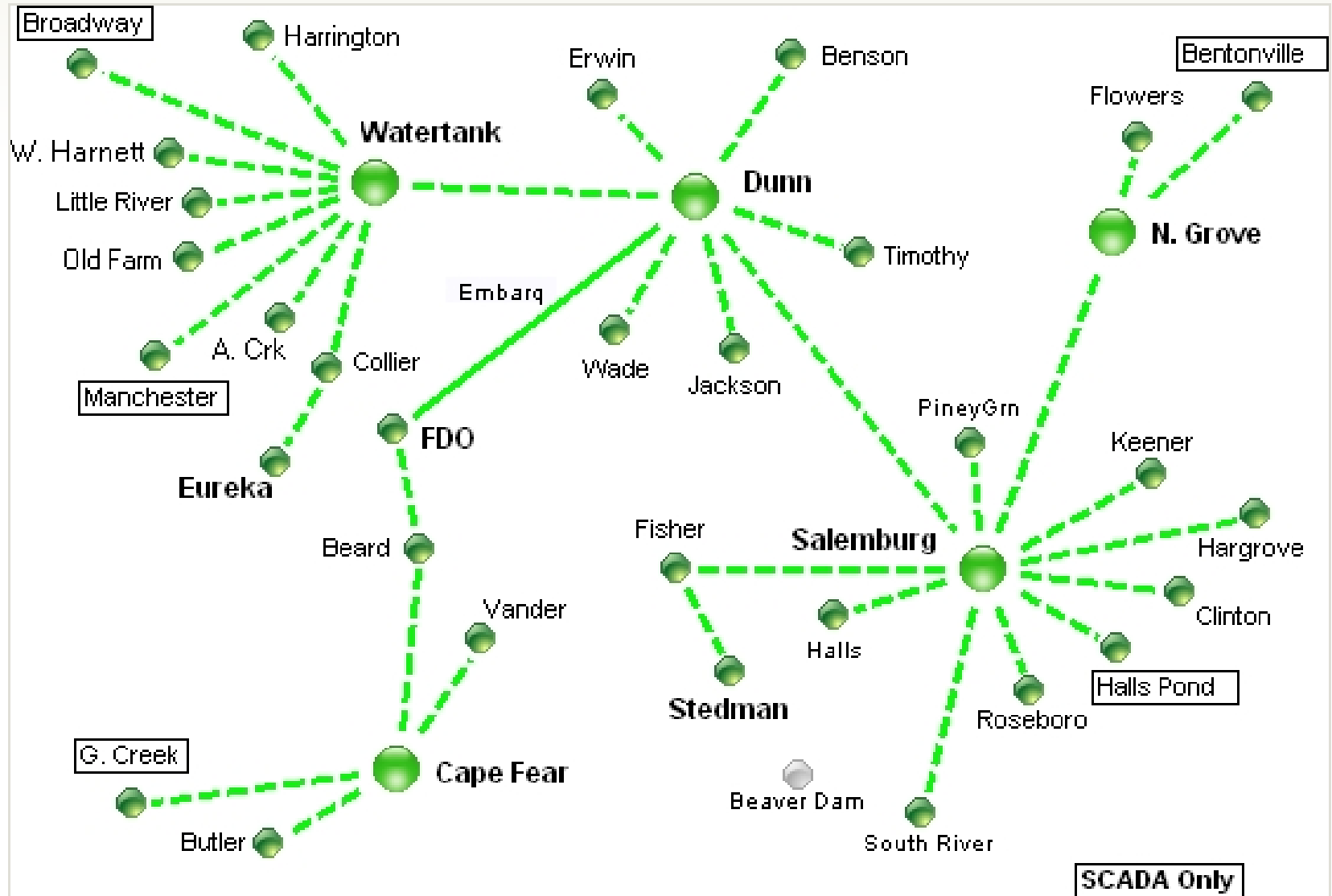
# The Solution 900 Mhz Spread Spectrum (What we found)

- Average range 12 to 15 miles
- Average speed ~ 1.2 mbps
- 2 locations required  
Alternate solutions  
for reliable  
communications

MDS Mercury 900™



# The Solution – As built



# Lessons Learned

- Computer based path studies are a good starting point
- Field testing is mandatory
- It takes trial and error to tweak frequency hopping patterns
- Support from RF professionals
- Hidden costs for replacing poles and extending antenna masts
- A long leaf pine needle is the same length as a radio wavelength in the 900 Mhz spectrum signal
- Flexibility is key, may require a different solution for trouble spots

# Questions?

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