Muni Fiber:
Challenges & Solutions for the Road Ahead

Jason Mittler, FPUAnet Manager, FPUAnet Communications, Fort Pierce Utilities Authority
Mel Poole, Director, Ocala Fiber Network

MUNI FIBER

Challenges & Solutions for the Road Ahead

FPUAnet
COMMUNITY PROUD

OCALA FIBER NETWORK

Overview of Muni Fiber

- Municipal electric utilities began incorporating fiber optics into their grids in the early to mid-1980s, revolutionizing grid operations with ultra-fast, reliable communication and minimal maintenance needs

- Today, many fiber networks in use are 20 to 30 years old, with most installations occurring between the 1990s and early 2000s.

- While fiber cables typically have a lifespan of 25 to 30 years, other system components may require replacement within 15 to 20 years.

- With Grid Modernization over the next few years additional fibers will be required and will become more reliant on the fiber network.

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

CHALLENGES OF MUNICIPAL FIBER

DEPLOYMENT, MANAGEMENT, AND MAINTENANCE

FPUAnet
COMMUNITY PROUD

OCALA FIBER NETWORK

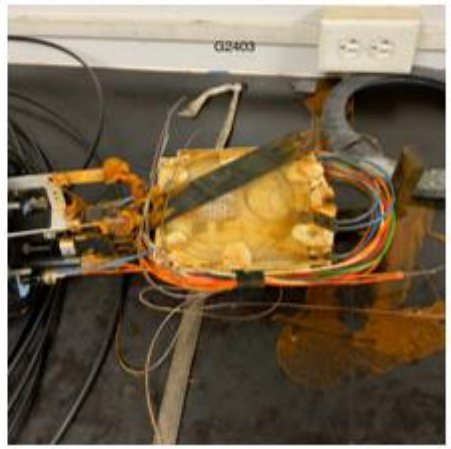
Environmental Challenges

Temperature and Humidity: Extreme temperatures can cause cable materials to expand or contract, potentially leading to fiber fractures or breaks. Maintaining stable environmental conditions is essential for optimal performance.

Weather Conditions: While fiber is less susceptible to weather compared to copper, extreme weather like heavy rain, ice storms, hurricanes, and even wind can physically damage aerial installations or affect buried cables through flooding.

UV Damage: Direct sunlight can damage Splice Enclosure, Overhead cable, Plastic Tie Straps leading to premature failure

Rodent & Pests Damage: Rodents & Pests can chew on and damage fiber optic cables, leading to signal loss and service disruptions.



FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Technical & Operational Issues:

- **Signal Loss and Attenuation:** Factors like excessive bending, poor connections, and subpar splicing techniques can cause signal loss or weakening.
- **Improper Cable & Jumper Routing:** Improper routing of cable and fiber jumpers can create failure points from excessive bending and long term failure points from jumpers not be supported
- **Contamination:** Dust, dirt, or moisture on connectors can degrade signal quality.
- **Splicing Issues:** Improper splicing techniques can lead to signal loss and unreliable connections.
- **Complexity of Network Management:** Managing a growing fiber network with a large number of assets and configurations is complex. Efficiently tracking and monitoring these components requires robust systems.
- **Lack of Skilled Workforce:** Repairing fiber cables requires specialized skills and equipment, and a shortage of trained technicians can impact deployment speed and quality.

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Physical Damage & Infrastructure:

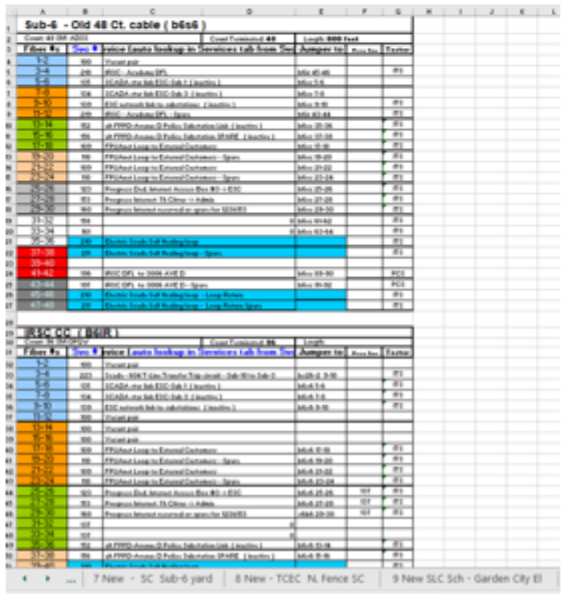
- **Construction Activities:** Accidental cuts or damage to cables during excavation or construction projects are a significant risk.
- **Aging Infrastructure:** Over time, cables and their components can deteriorate, leading to performance issues and the need for upgrades.
- **Managing Expansive Networks:** Maintaining a vast network of fiber cables across varied terrain and potentially remote areas can be challenging, especially during periods of network expansion.

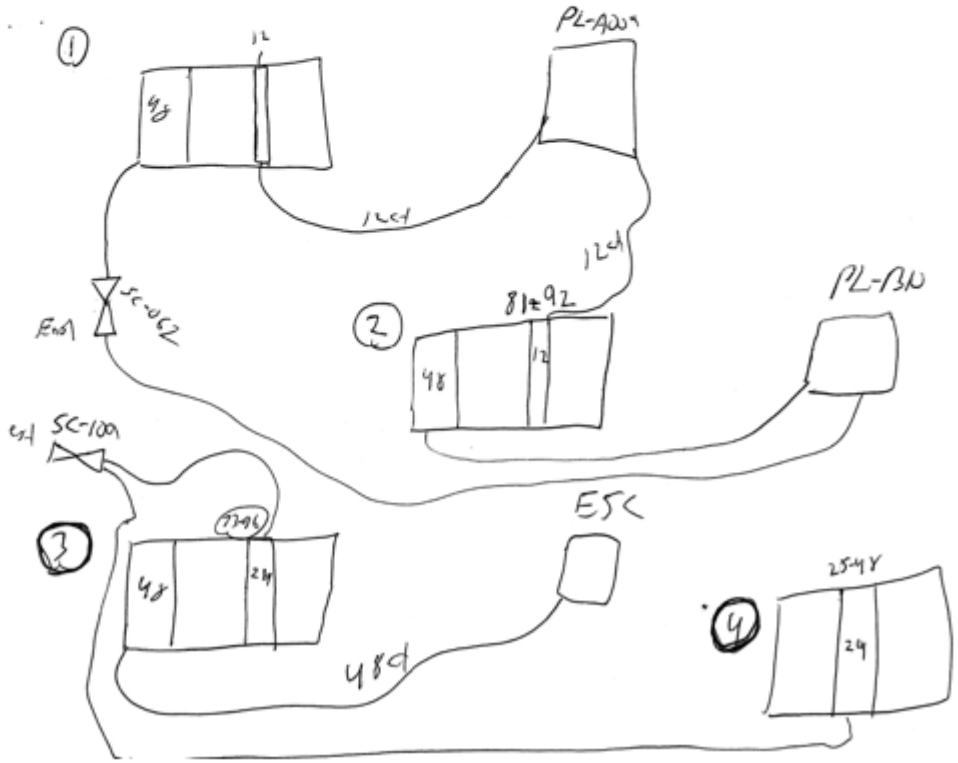
FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

No or outdated documentation

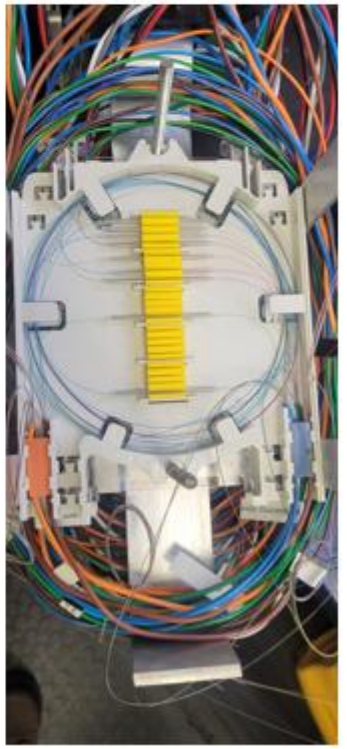
- **Challenging to create new circuits**: Not having updated documentation creates issues when trying to create new circuits thru out the network. Which could lead to long lead times and accidental outages.
- **Challenging to troubleshoot issues:** Documentation is critical for troubleshooting. With out outages times can be long and challenging.





Other Challenges

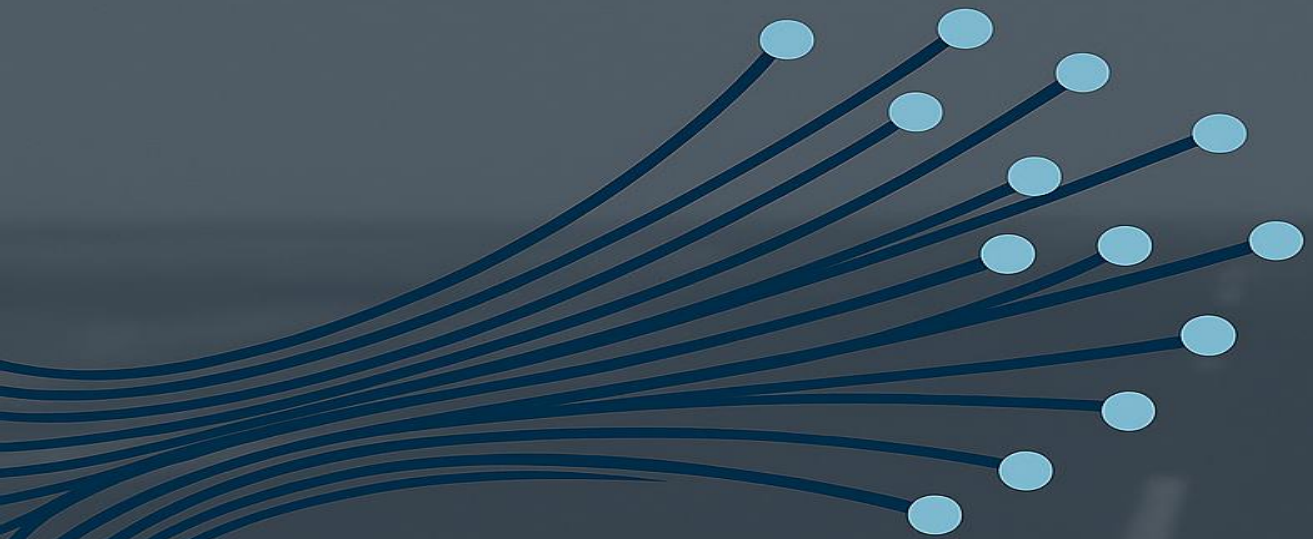
- **Handling of Fragile Fibers:** The delicate nature of fiber optic cables requires careful handling to avoid damaging the fibers.
- **Stocked Materials:** Many materials were 20 to 30 years old and items are not manufactured any longer
- **New & Better Technologies:** Fiber industry has evolved significantly with large leaps within materials, tools and standards
- **High Installation and Maintenance Costs:** Deploying and maintaining fiber networks can be expensive especially if all work is performed by contractor.
- **Single point of failure:** Many circuits traverse the same fiber cable creating a single point of failure.
- **Standards:** Lack of design, construction and maintenance standards has allowed sub par work and materials to be used within the fiber network.



FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

SOLUTIONS FOR MUNICIPAL FIBER DEPLOYMENT, MANAGEMENT, AND MAINTENANCE



FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Replacement & Upgrade Plan

- Abandon OPGW
  - Challenging to troubleshoot issues
  - Limited Access points
  - Replace with ADSS
- Install larger fiber counts
  - Taper Feeders
- Extension of Fiber Plant
  - SMART Grid requirements
  - SMART City Solutions
- Upgrade or replace patch panels
  - SC connectors allow low loss & reflection
  - Cassettes allow for saving space
- Budget for the future

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

In House Staff & Tools

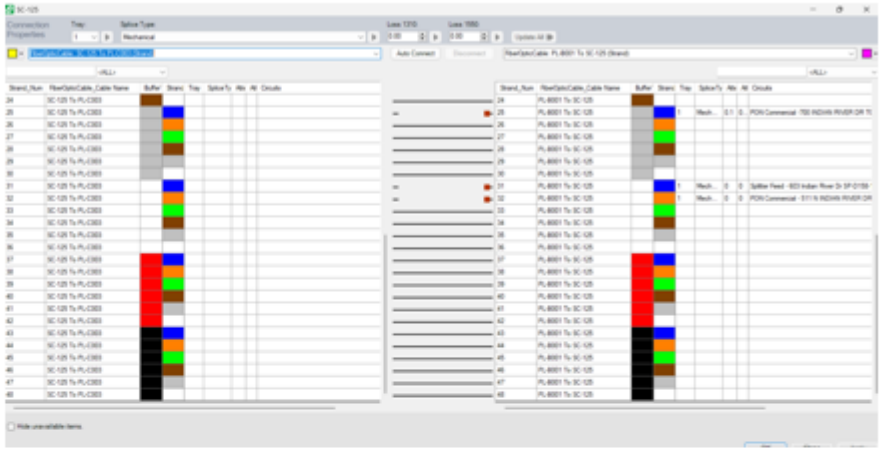
- Reduce outage times
- Proper jumper routing
- Ability to create circuit creation
- Implementing of Standards
- Inspections for contractors
- Finds failure before they happen
- Identifies work that needs to be budgeted
- Reduce cost for installation

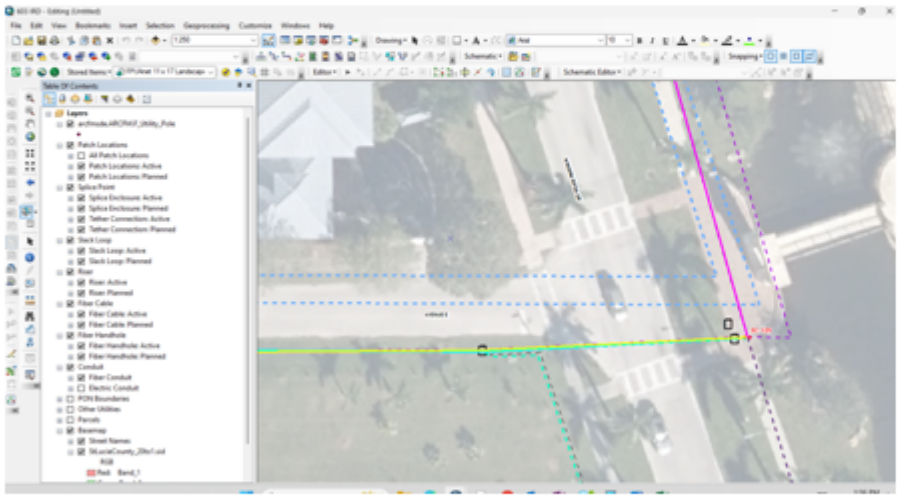
FPUAnet
COMMUNITY PROUD

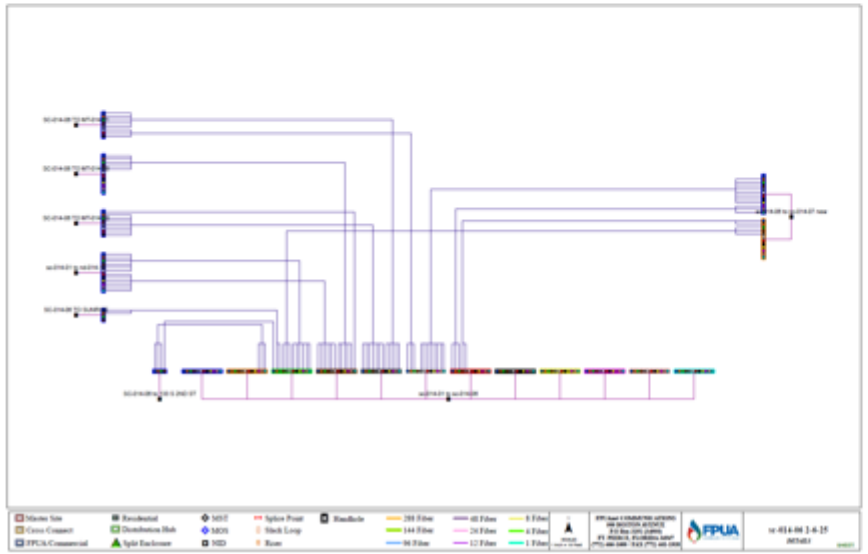
OCALA FIBER NETWORK

Update Fiber Documentation

- Verify and document existing Fiber Network
- Implement a Fiber Management Software
  - Reduces time for new circuit creation
  - Reduces time for troubleshooting & repairing fiber





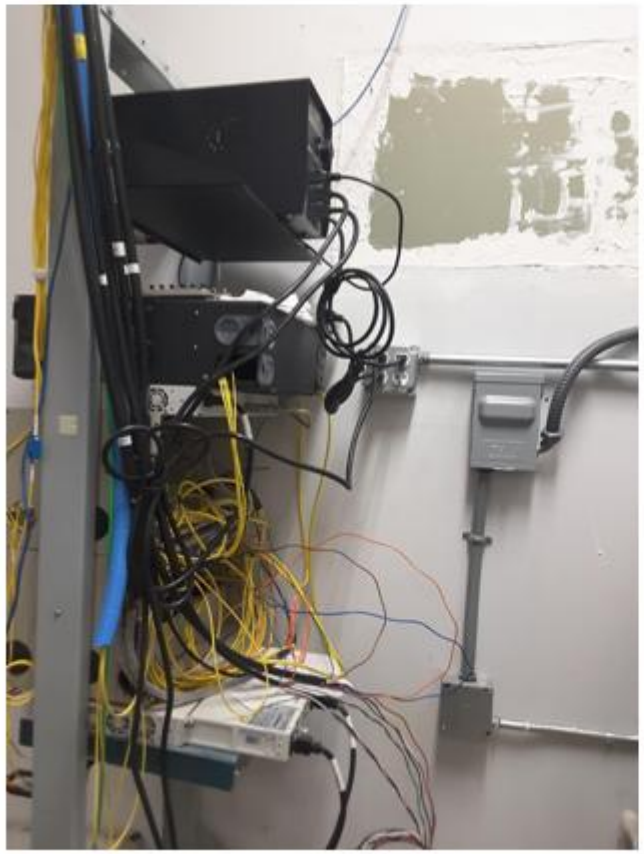


FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Enzine Transformation

Before



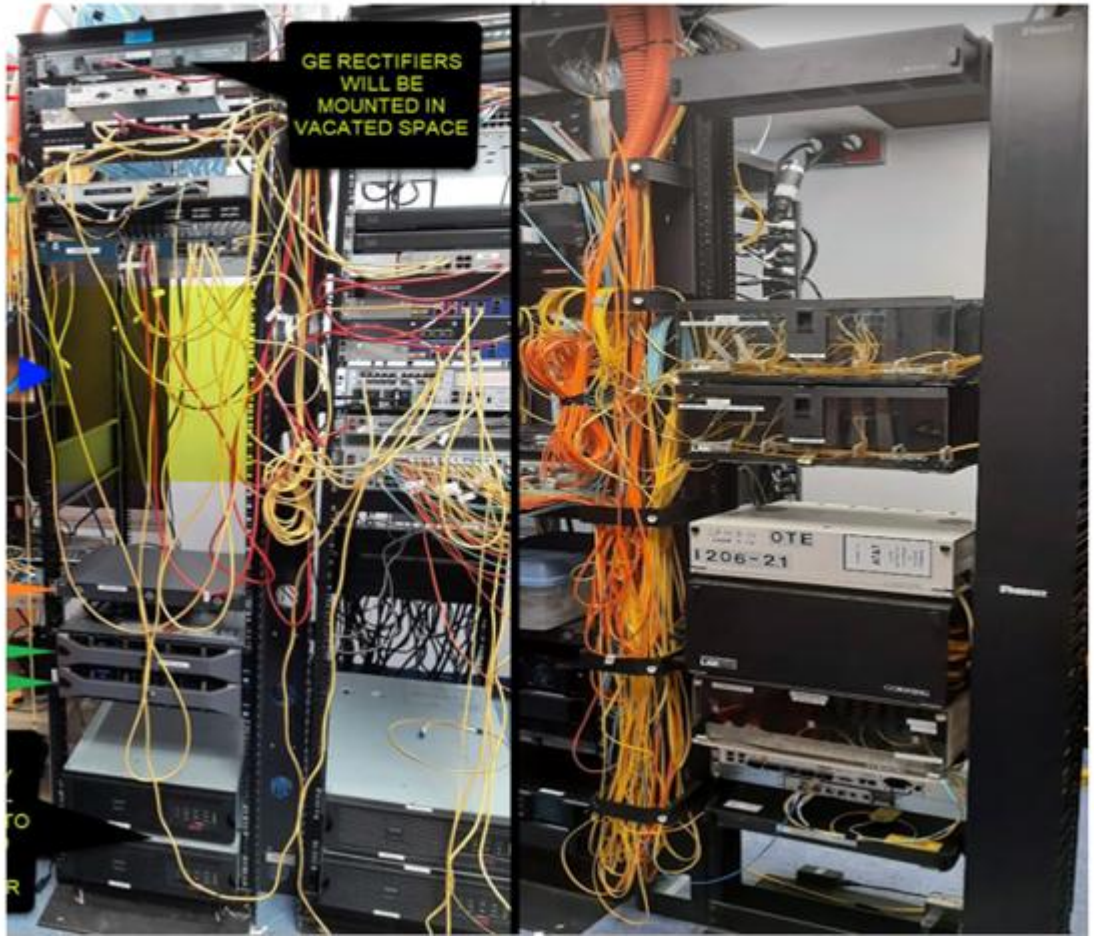
After

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Admin Data Center

Before



After

FPUAnet
COMMUNITY PROUD

OCALA FIBER NETWORK

Clyatt Transformation

Before

After

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Additional Fiber Usages

Generate Revenue or Offset Expenses

Dark Fiber Lease

- Other Municipals
  - 2023Average Pricing $220.60 per fiber pair per mile
- Private Companies
  - 2023 Average Pricing $278.35 per fiber pair per mile

Selling Broadband

- Become an ISP

- Public Private Partnership

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

Additional Fiber Usages

SMART Grid & City Connections (332)

- Gas Scada (12)
- Wastewater Lift Stations (91)
- Electric Reclosers (8)
- Water Wells (58)
- Capacitors (58)
- AMI Gatekeepers (33)
- Cameras (45)
- Park Wi-Fi (23)
- Digital Kiosks (4)

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK

FPUAnet
COMMUNITY PROUD

OCALA FIBER NETWORK

FMBA Florida Municipal Broadband Alliance

- Legislation updates
- Round Tables
- Mutual Aid
- Development of White Papers

Mel Poole
Director of Ocala Fiber Network
Chairman of FMBA
MPoole@ocalafl.gov

Jason Mittler
FPUAnet Manager
Vice Chairman of FMBA
Jmittler@fpua.com

FPUAnet COMMUNITY PROUD

OCALA FIBER NETWORK