# Prince William County Broad Band Ham Network

Status Report and Future Planning
August 2016

# PWCBBHN

- In October 2014 and November 2014, WARC, followed by OVH, passed parallel motions to establish a Broad Band Ham Network (BBHN) in Prince William County (PWC).

- Clarence Meese K4CNM(sk) was named chair of the BBHN committees of both OVH and WARC to pursue the effort and led both committees as a combined joint committee. With Clarence's passing, Terry WA5NTI was named by both clubs to chair the committees.

# OVH and WARC

- Prince William County Virginia Amateur Radio Clubs are joining forces to install an Internet-like communication system for use by area hospitals, fire stations, schools, and key government sites during emergencies.

- Memorandum of Understanding
  - Signed by both club presidents
  - Agreement brings the two clubs together in a meeting of the minds to work together to provide emergency radio communications services within PWC
  - Framework for a joint BBHN Committee to engage parties of interest to access  the high elevation locations required to implement the PWCBBHN

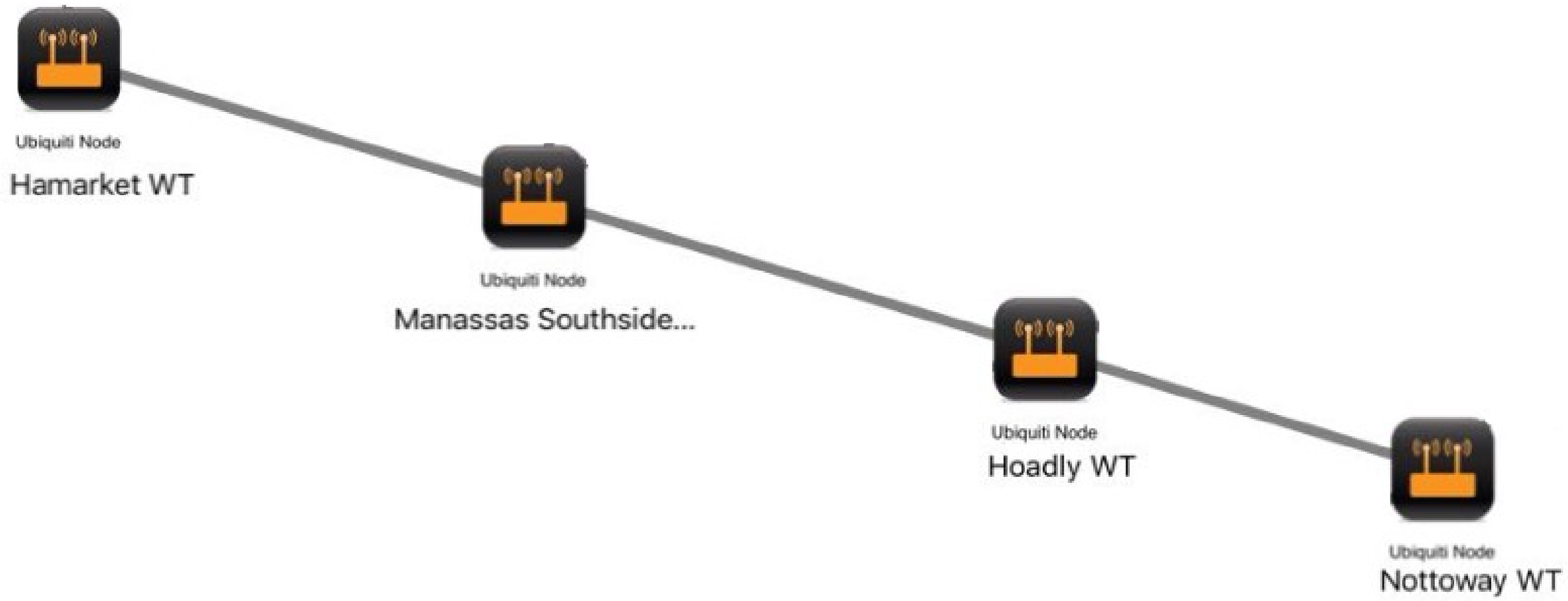
# System Concept

- Utilize a "Data Highway" backbone linking between water towers across the county for connectivity across PWC

- Connect user locations to the cross-county data highway at water tower backbone nodes

- Configuration allows for common equipment design to be utilized at served locations

# Cross-County Data Highway

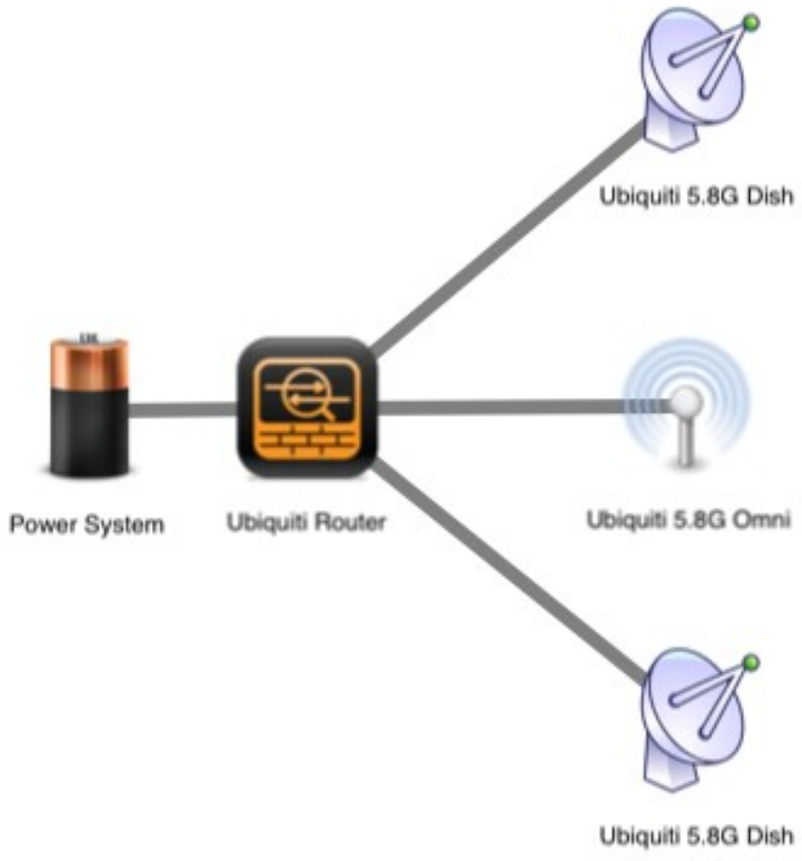


# Common Components

- Backbone Access Point
- Client Node
- Portable Network Communications Kit

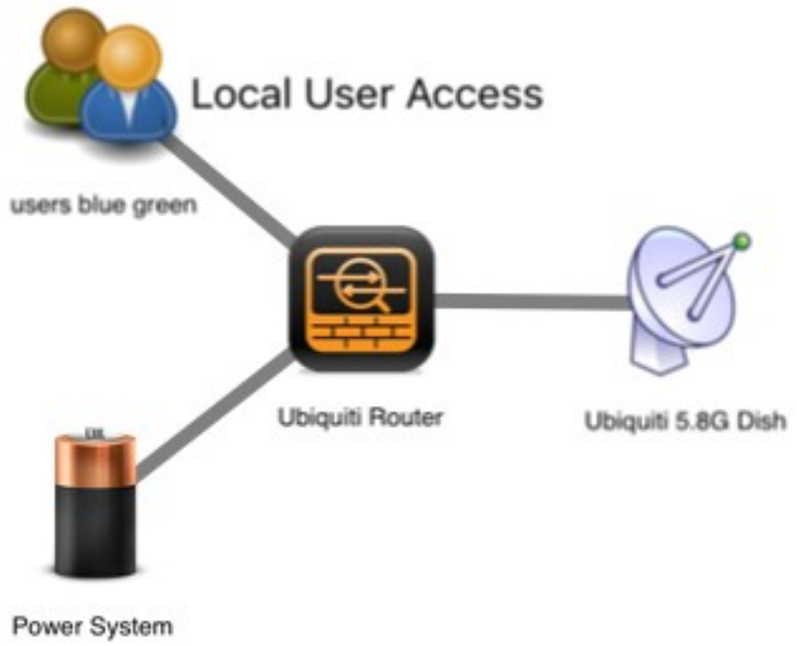
# Backbone Node Access Point

- Installed on water towers.
- Cross-county data highway network and access points provide a data link across the county and provide access to services on the BBHN.
- one, or two, dish antenna/radio sets
- one omnidirectional antenna/radio set
- one network router
- power system and data cabling



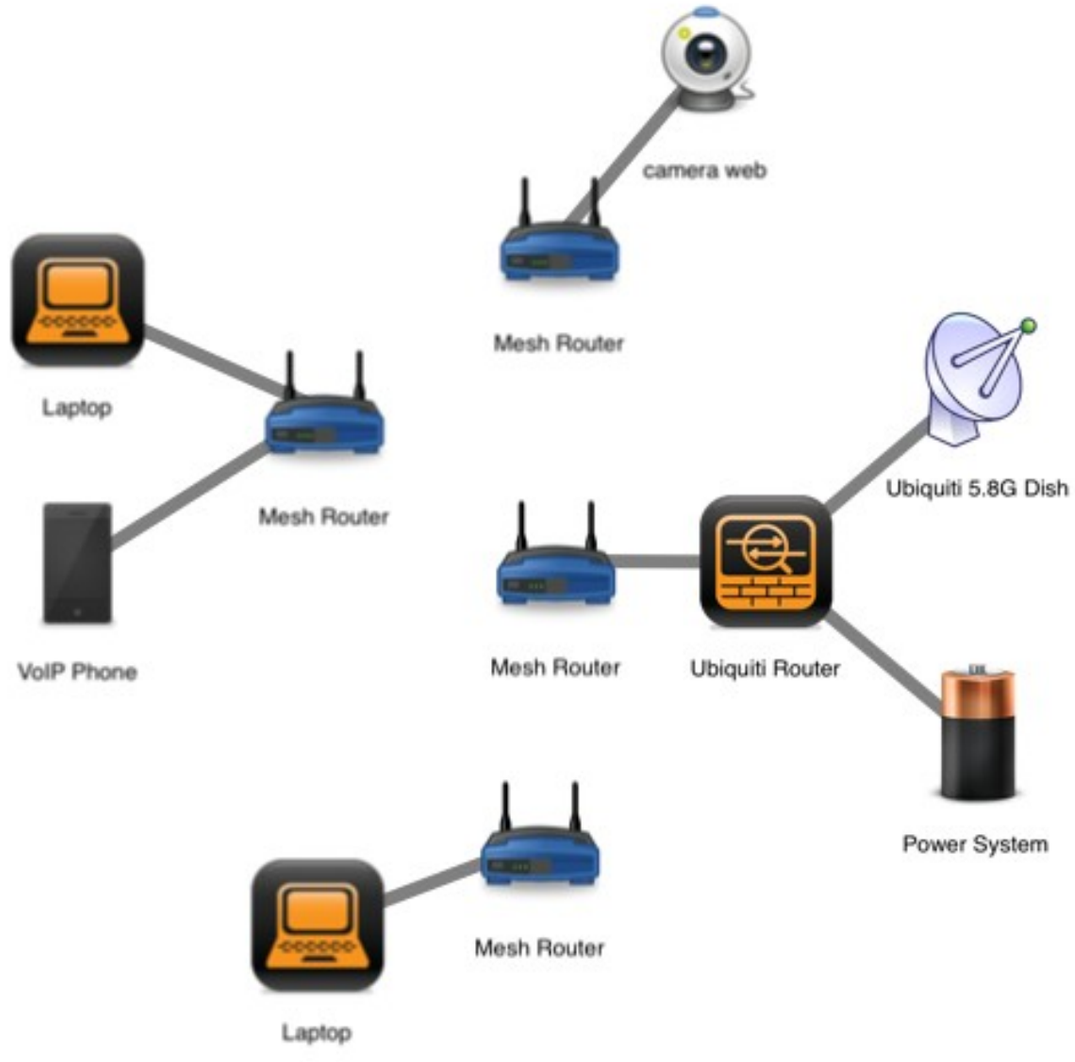
# Client Node

- Installed at fixed user locations (i.e., PWC EOC, repeater sites, hospitals) to provide a data link to the cross-county network and establish linking with services on the BBHN.
- Data link to cross-county network and data connection point.
- one dish antenna/radio set
- one network router
- power system and data cabling



# Portable Network Communications Kit

- Deployed to emergency services locations, as needed, to provide a data link to the cross-county network and establish a local mesh-connected data network linking with services on the BBHN.
- one dish antenna/radio set with telescoping pole mast
- one network router
- power system and data cabling
- multiple mesh routers with batteries
- laptop computer
- VOIP telephones



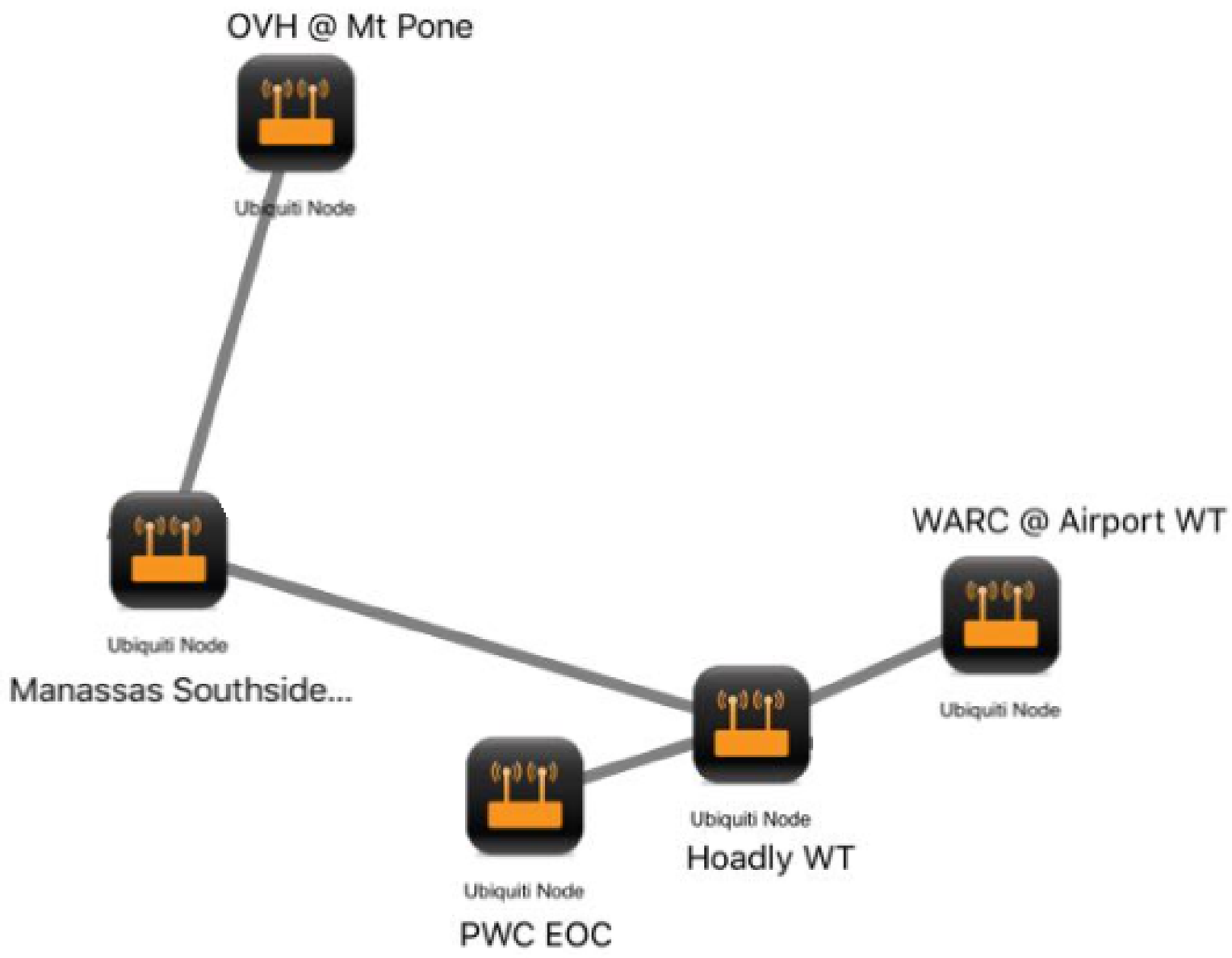
# How Can We Do This?

- Cannot be accomplished in a single step
- Must be broken down into parts that can be digested one at a time
- Phased approach to implement portions in an order that gradually increases capability as we progress

- # Phase 1

  - Backbone Link between Manassas South water tower near the PWC parkway south of intersection with Liberia Ave. and Hoadly water tower near the McCoart complex.
    - Point-to-point dish and omnidirectional access point at top of towers.
    - High point locations provide area link capability AP to most of Manassas, Lake Ridge, and Dale City for client access to access the network.
  - Initial Client Access
    - OVH repeater site at Mt. Pone water tower
    - WARC repeater site at Airport water tower
    - PWC EOC at McCoart complex
    - Deployable Network Communications Kit
      - Many locations in the 1-2 mile radius around each water tower will be capable of linking into the network using a dish antenna mounted on a 30' mast connected to a local mesh network to provide emergency data network communications in the local vicinity (i.e., school or firehouse used a shelter location).
  - Phase 1 configuration will provide the capability for data communication between the repeater complexes, the EOC, and any selected temporary operations location.

# Initial Configuration



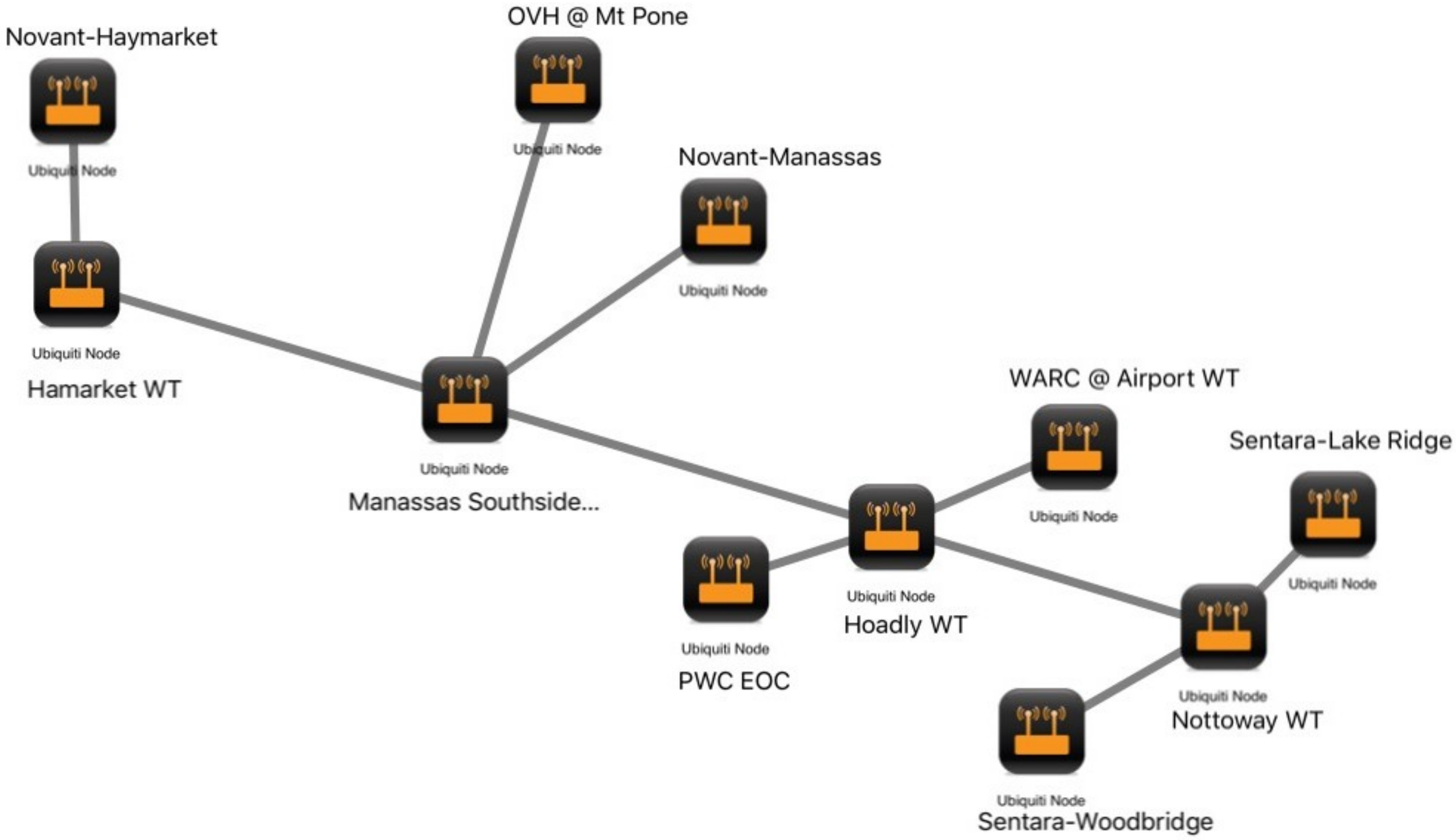
- # Phase 2

  - Deploy and test augmented communications capabilities.
    - VOIP Telephone Server
    - Web-based Realtime Communications Server (chat, file transfer, etc.)
    - Fax and Email Server
    - Remote Observation Cameras and/or Weather Sensors
  - Phase 2 configuration will provide additional services to augment standard voice radio communications messaging employing the essential data communications capabilities of the network.
  - Substantial overlap with Phase 1

- # Phase 3

  - Extend the backbone link to the Haymarket water tower in the West and the Nottoway water tower to the East at Horner Road.
    - Point-to-point dish and omnidirectional access point at top of towers.
    - Additional high point locations provide area link capability AP to most of Haymarket, West part of Manassas, and Woodbridge for client access to access the network.
  - Client Access at Additional Facilities
    - Novant Manassas Medical Center
    - Novant Haymarket Medical Center
    - Sentara Potomac Hospital
    - Sentara Lake Ridge Medical Facility
    - Additional Deployable Network Communications Kit
      - Expand deployment capabilities to provide for an activation of more than one temporary emergency operations location.
  - Phase 3 configuration will provide full communications capabilities across the county between the EOC, the primary medical facilities , and at least two temporary emergency centers (when activated).

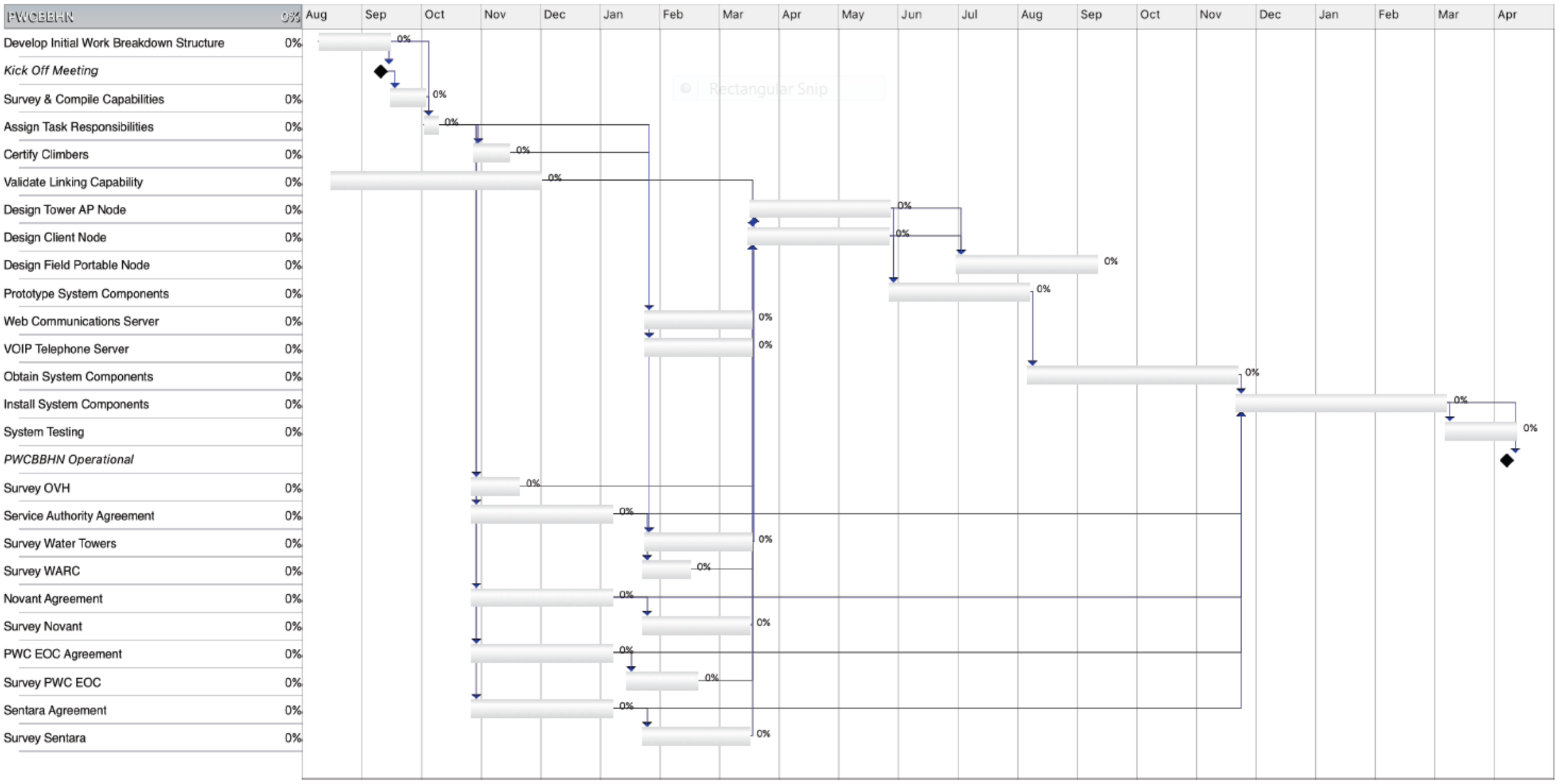
# The End Game


Novant-Haymarket
Ubiquiti Node
Ubiquiti Node
Hamarket WT
OVH @ Mt Pone
Ubiquiti Node
Novant-Manassas
Ubiquiti Node
Ubiquiti Node
Manassas Southside...
WARC @ Airport WT
Ubiquiti Node
Sentara-Lake Ridge
Ubiquiti Node
Ubiquiti Node
Hoadly WT
Ubiquiti Node
PWC EOC
Ubiquiti Node
Nottoway WT
Ubiquiti Node
Sentara-Woodbridge

- # Phase 4

  - Provide for activation of access to network for amateur radio communications testing and experimentation when BBHN is not active for emergency communications (expected 99% availability).
  - Additional Sites May Be Connected into the BBHN at a Later Time
    - Schools/Shelters
    - Red Cross
    - Skywarn
    - Volunteer Fire Stations
    - Other Water Towers
    - MAIPN
      - MAIPN is expected to make long haul interconnectivity with regional and interstate emergency resources possible in the future when the PWCBBHN reaches an operational level where connection with outside networks becomes possible.

# Program Plan

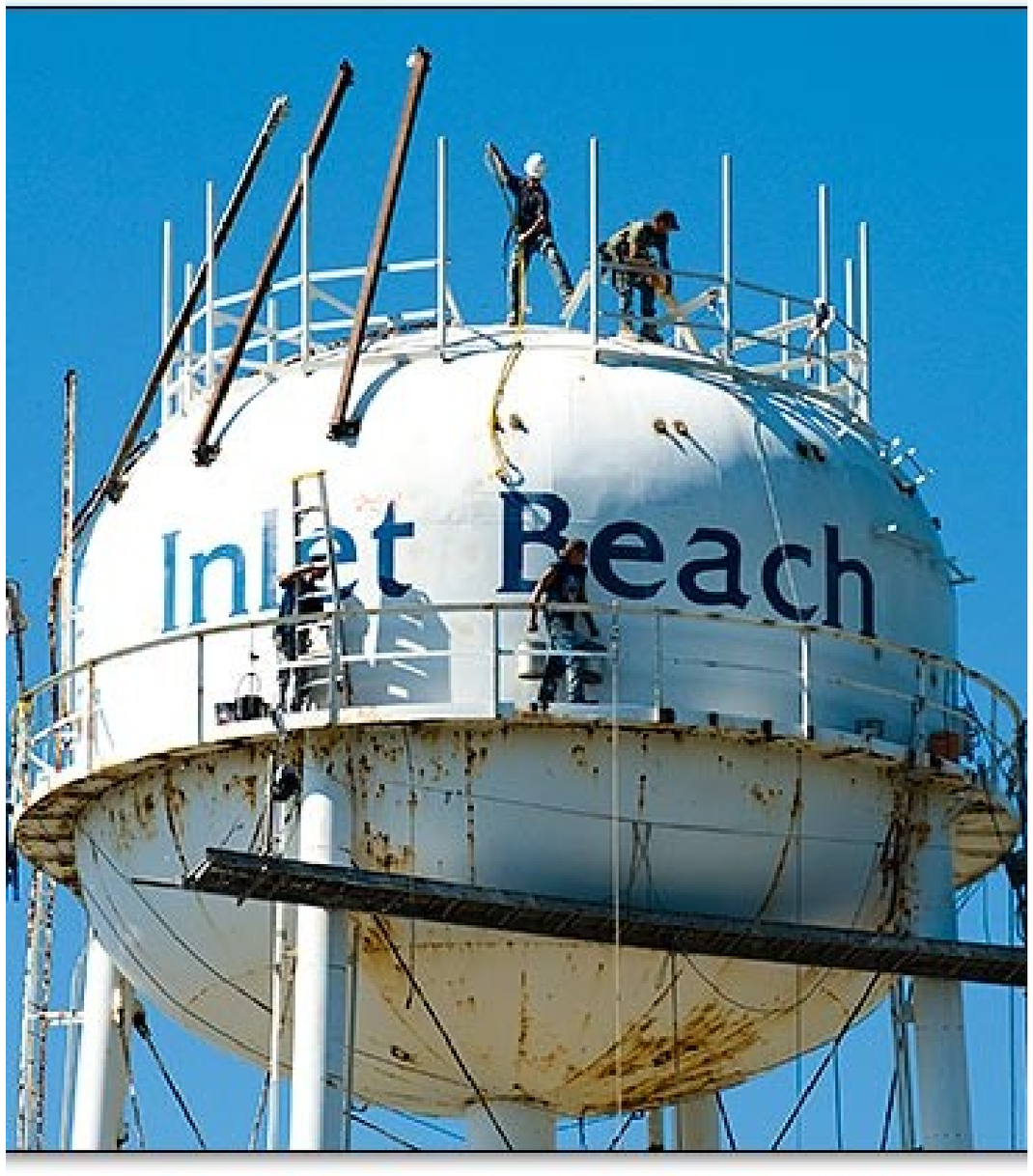


# Resources are Needed

- Project Management Expertise
- Network System Engineering and Programming
- Survey and Planning Expertise
- Component Construction And Fabrication
- Installation Expertise
- Leverage Political Contacts to Facilitate Agreements
- Financial Support

# Certified Climbers

- At least one committed volunteer from each club
- Climbing school and certification can cost $3,000-$5,000 estimated per climber



# $$$$$$$$$$

Budget Estimates

| Item | Low Estimate | High Estimate | Number of Items | Projected Low $ | Projected High $ |
|---|---|---|---|---|---|
| **Initial Costs** | | | | | |
| **Climber Certification** | $3,000.00 | $5,000.00 | 2 | $6,000.00 | $10,000.00 |
| **Development Components** | $1,000.00 | $2,000.00 | 1 | $1,000.00 | $2,000.00 |
| | | | subtotal | $7,000.00 | $12,000.00 |
| **Phase 1 Costs** | | | | | |
| **Water Tower Relay Nodes** | $800.00 | $1,600.00 | 2 | $1,600.00 | $3,200.00 |
| **PWC EOC Node** | $800.00 | $1,600.00 | 1 | $800.00 | $1,600.00 |
| **Club Nodes** | $800.00 | $1,600.00 | 2 | $1,600.00 | $3,200.00 |
| **Network Communications Kit** | $1,000.00 | $2,000.00 | 1 | $1,000.00 | $2,000.00 |
| | | | subtotal | $5,000.00 | $10,000.00 |
| **Phase 2 Costs** | | | | | |
| **VOIP/FAX Telephone Server** | $250.00 | $500.00 | 2 | $500.00 | $1,000.00 |
| **Web Communications Server** | $250.00 | $500.00 | 2 | $500.00 | $1,000.00 |
| **Remote Cameras/Sensors** | $100.00 | $200.00 | 6 | $600.00 | $1,200.00 |
| | | | subtotal | $1,600.00 | $3,200.00 |
| **Phase 3 Costs** | | | | | |
| **Water Tower Relay Nodes** | $800.00 | $1,600.00 | 2 | $1,600.00 | $3,200.00 |
| **Hospital Nodes** | $800.00 | $1,600.00 | 4 | $3,200.00 | $6,400.00 |
| **Network Communications Kit** | $1,000.00 | $2,000.00 | 1 | $1,000.00 | $2,000.00 |
| | | | subtotal | $5,800.00 | $11,600.00 |
| **Phase 4 Costs** | | | | | |
| **Miscellaneous Mesh Nodes** | $250.00 | $500.00 | 4 | $1,000.00 | $2,000.00 |
| **VPN Router** | $100.00 | $200.00 | 4 | $400.00 | $800.00 |
| | | | subtotal | $1,400.00 | $2,800.00 |
| | | | | | |
| **TOTAL COST ESTIMATE (+/-3dB)** | | | | $20,800.00 | $39,600.00 |

In order to bring this system to fruition, the club must make a substantial long-term commitment to achieve the goal of establishing a Broad Band Ham Network in Prince William County.

# Motion

The BBHN Committee moves that the club establish a fund to raise and collect monies to pay for the implementation of the Prince William County Broad Band Ham Network (PWCBBHN), such monies to be dispensed in accordance with expenditures approved by the club in accordance with PWCBBHN system needs presented by the PWCBBHN Committee.

# Motion Amended

The BBHN Committee moves that the club establish a bank account (fund) to raise and collect monies to pay for the implementation, operation, and maintenance of the Prince William County Broad Band Ham Network (PWCBBHN), such monies to be dispensed in accordance with expenditures approved by the club in accordance with PWCBBHN system needs presented by the PWCBBHN Committee.

“The way to get started is to quit talking and begin doing.”

–Walt Disney