

# Telecommunications Master Planning (TMP) Process

Building Capacity and  
Sustainability

Spring, 2010

# Justification, Strategy, Tactical Plans

- Justification

- County and Schools free access to inter-building Telecommunications Network is at risk
- Need to reduce and eliminate dependency upon Comcast
- Joint County – Schools Planning Process

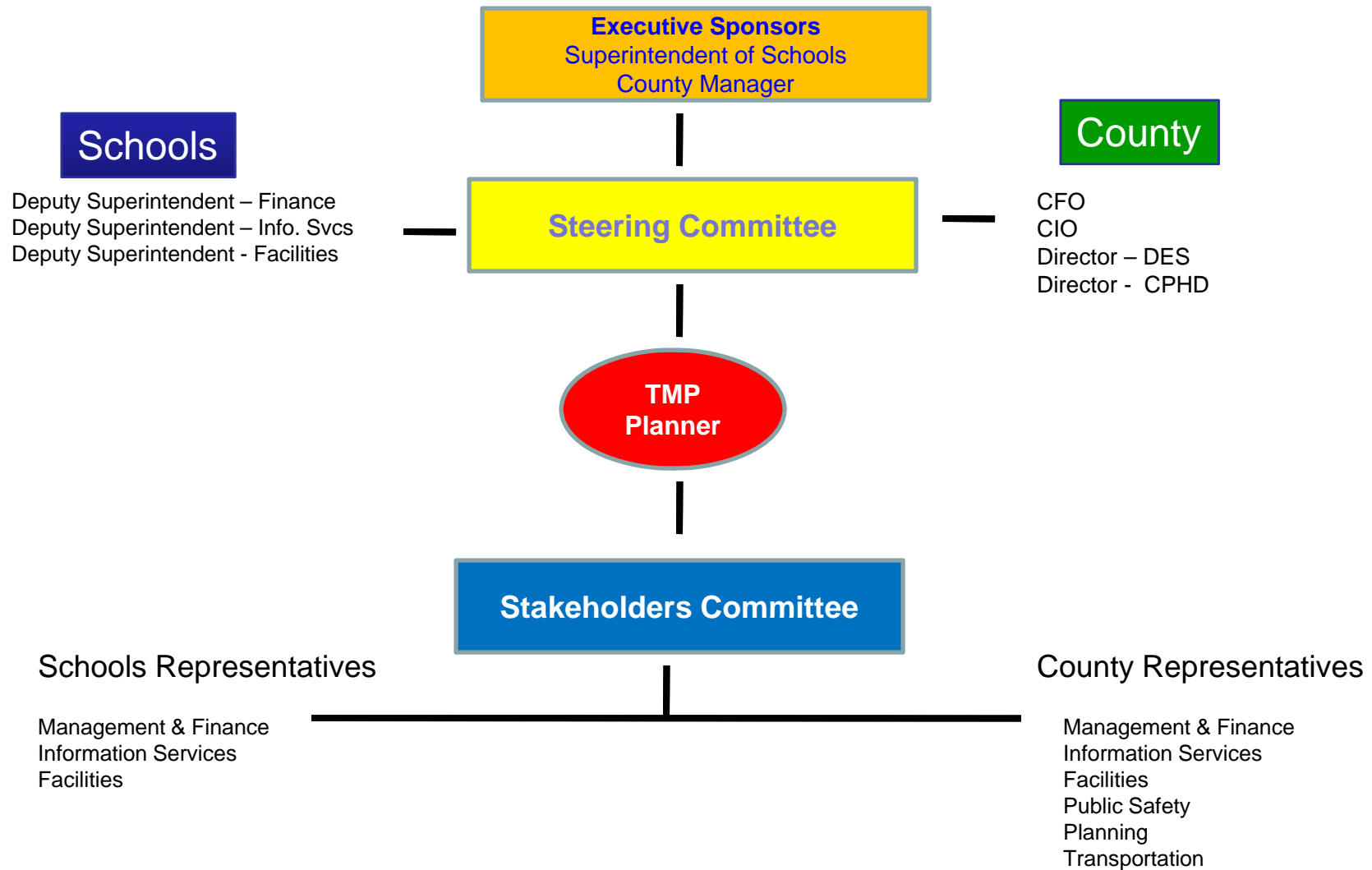
- Strategy

- Deploy *'middle mile'* broadband telecommunications network
- Leverage any and all opportunities to lay dark fiber
  - Dominion Power Grid Extension (*co-location of County – Schools fiber*)
  - Public Safety Radio Network (*Bond funded fiber backhaul for Public Safety radio towers*)
  - Intelligent Transportation System (*Federal funded refreshment of copper connections to traffic signals with fiber*)
  - New Site Development (*e.g. Founders Square, Central Place, Virginia Tech / IBM Research Facility*)
  - County and Schools Projected Capital Investments (*To fund 'last mile' connections to County/APS facilities*)

- Plan

- Phase I (*pre-2013*)
  - Core, most trafficked Sites interconnected (*includes: Ed Center, CHP Campus, Trades Campus / NOC II, Sequoia Campus, Public Health Campus at George Mason, Thomas Jefferson Middle School and additional sites to be identified by TMP Stakeholders Committee*)
- Phase II (*post-2013*)
  - Remaining, sites interconnected

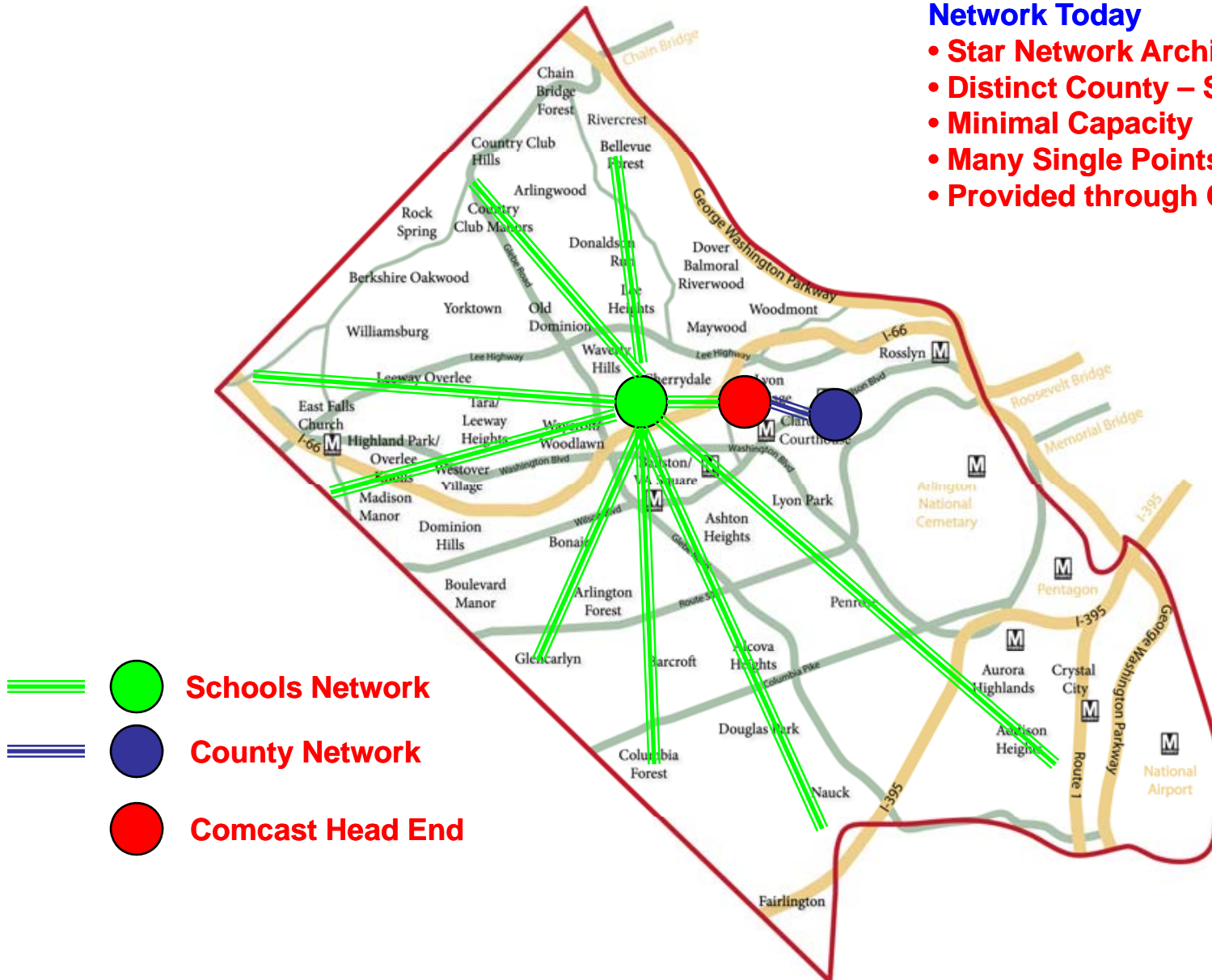
# Governance Model



# Current INET Network Architecture APS

## Network Today

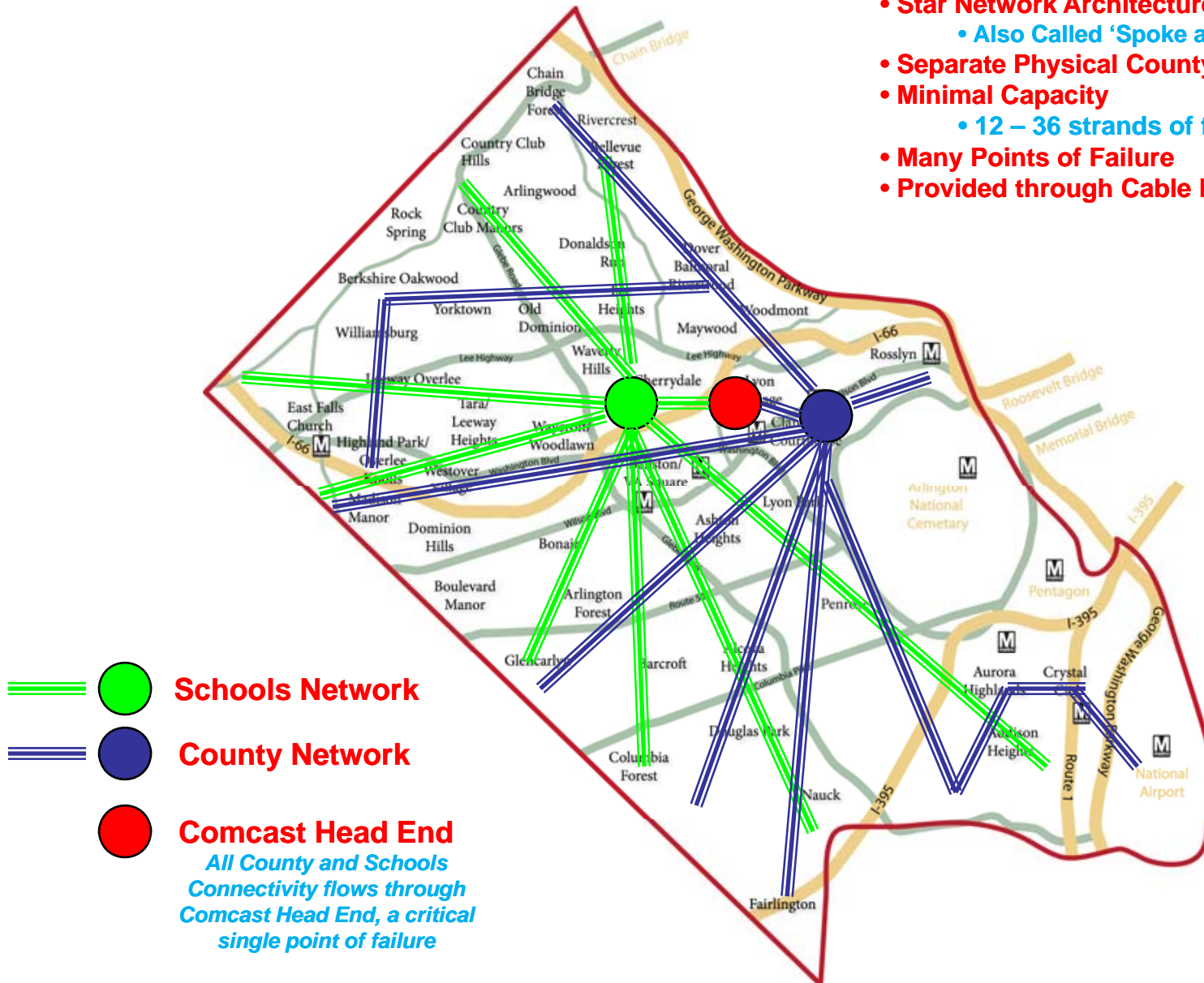
- Star Network Architecture
- Distinct County – Schools Networks
- Minimal Capacity
- Many Single Points of Failure
- Provided through Cable Franchise



# Current INET Network Architecture County Network

## Network Architecture Today

- **Star Network Architecture**
  - Also Called 'Spoke and Hub'
- **Separate Physical County – Schools Networks**
- **Minimal Capacity**
  - 12 – 36 strands of fiber
- **Many Points of Failure**
- **Provided through Cable Franchise**



## Current INET Network Architecture Vulnerabilities and Weakness

Break 'X' in Fiber Path  
Results in loss of services  
past break.

Failure at CHP results in wide  
spread County outage.

Failure at EdCenter results in  
wide spread School's outage.

Failure at Head End results in  
wide spread County and  
School's outage.

### Multiple Points of Failure

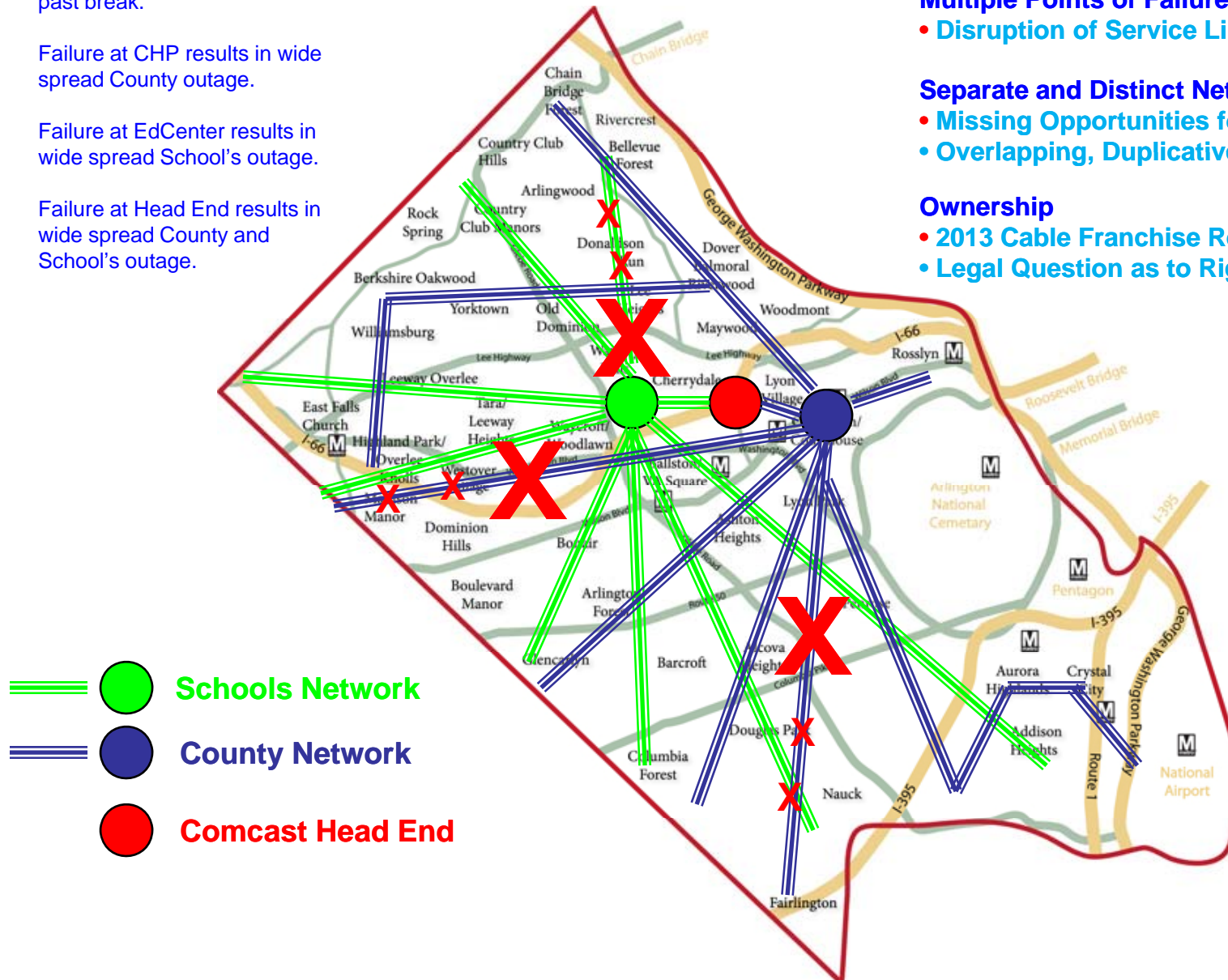
- Disruption of Service Likely




### Separate and Distinct Networks

- Missing Opportunities for Synergy
- Overlapping, Duplicative Coverage

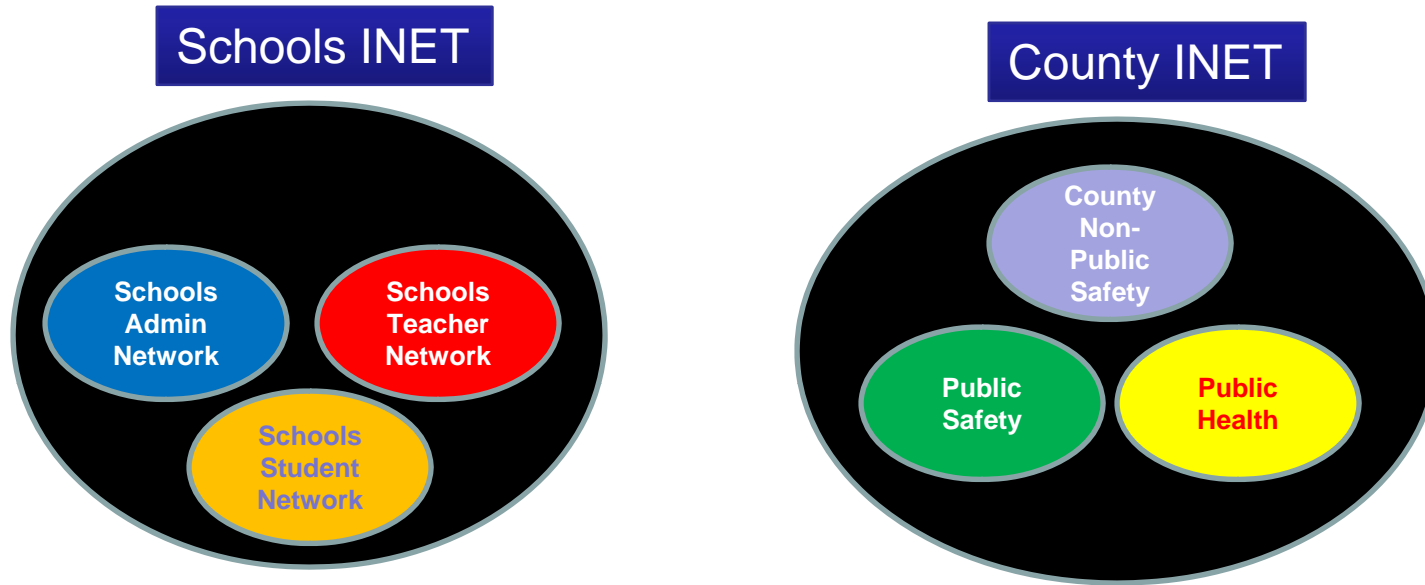
### Ownership

- 2013 Cable Franchise Renegotiation
- Legal Question as to Right to Use



-  Schools Network
-  County Network
-  Comcast Head End

## INET Design Fiber Bundles - Today

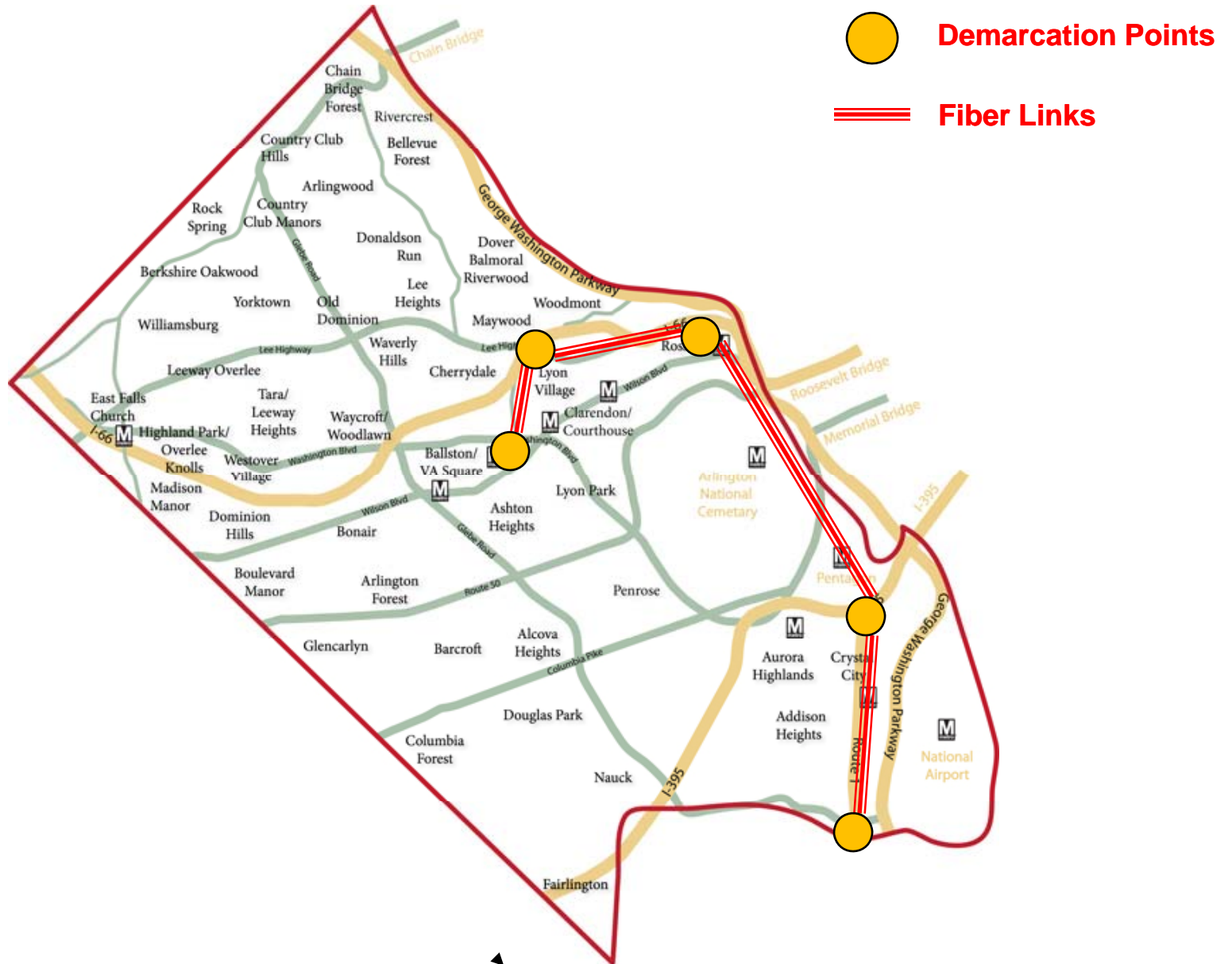


### Attributes

- **Multiple Duplicative Fiber Routes**
- **Separate Schools, County Fiber**
- **Intersection at Comcast Head End**

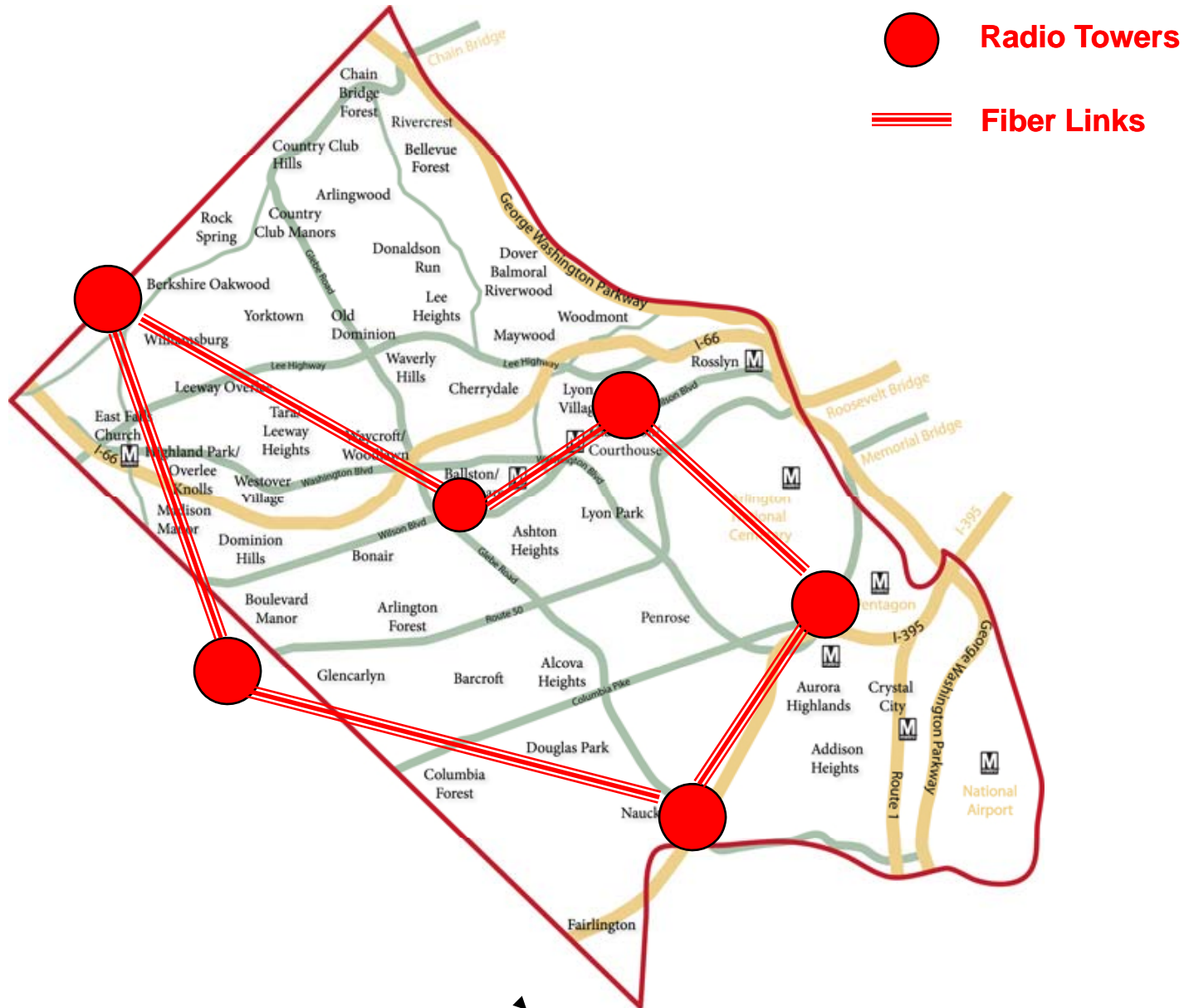


**Dominion Power Grid Upgrade**  
**Electric Company Funded Upgrade of County's Power Grid**  
**County to Co-locate Dark Fiber with Power Company**



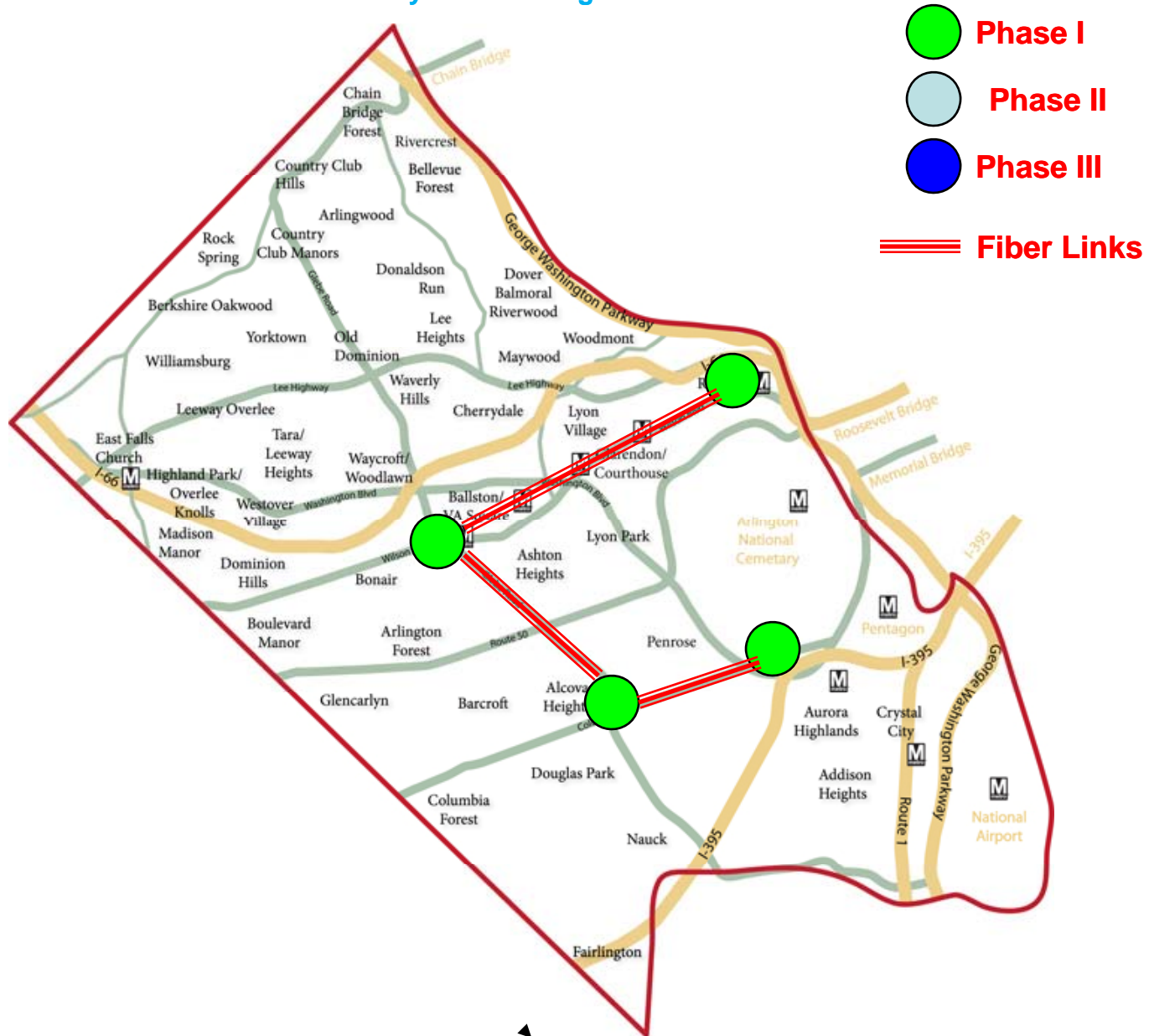


**Public Safety Radio Ring**  
**Six Public Safety 800 MHz Radio Towers**  
**To be Interconnected with Fiber Ring**

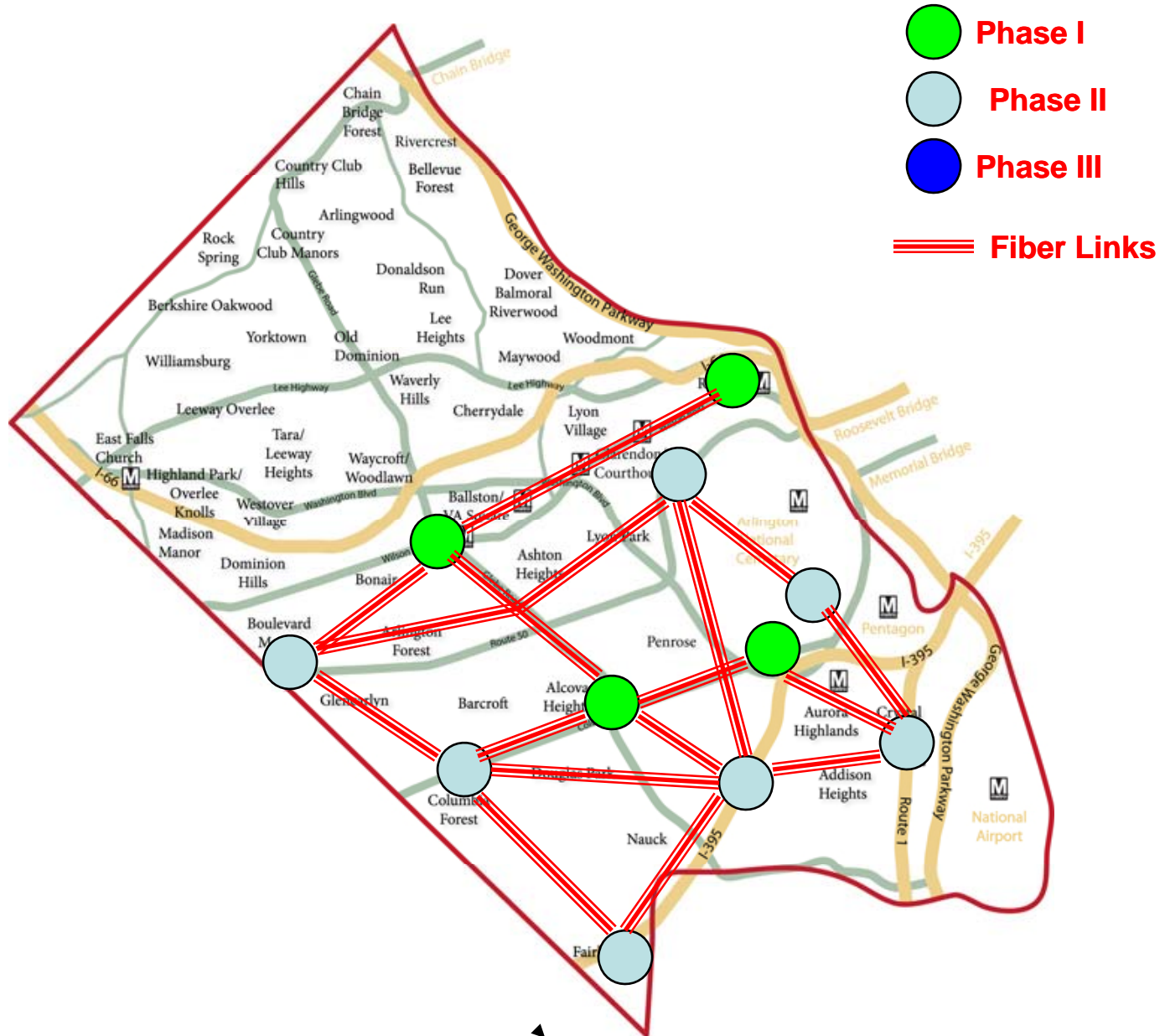


# Integrated Transportation System Phase I

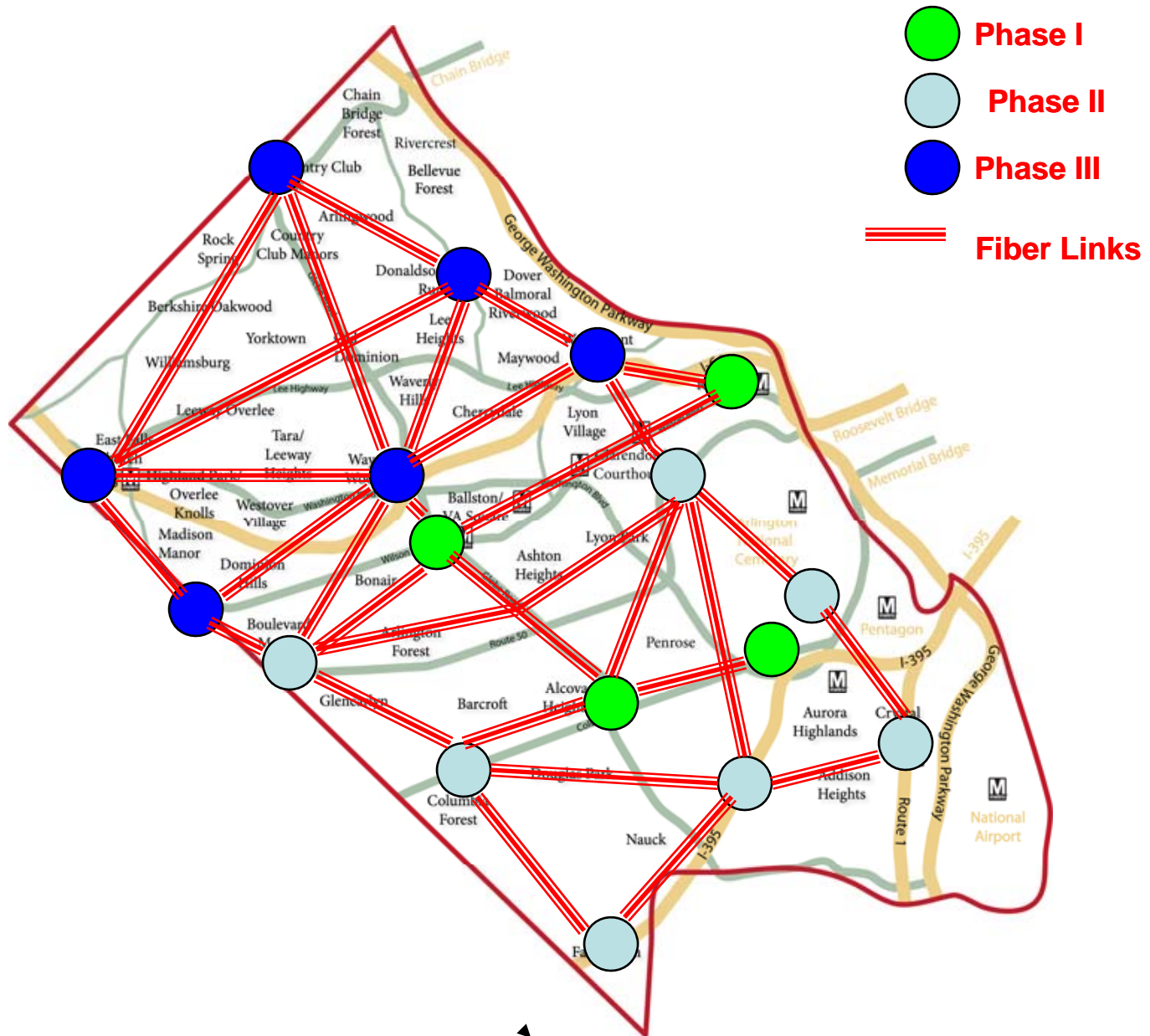
Federally Funded Refreshment  
Of Connectivity to Traffic Signals



# Integrated Transportation System Phase I and II

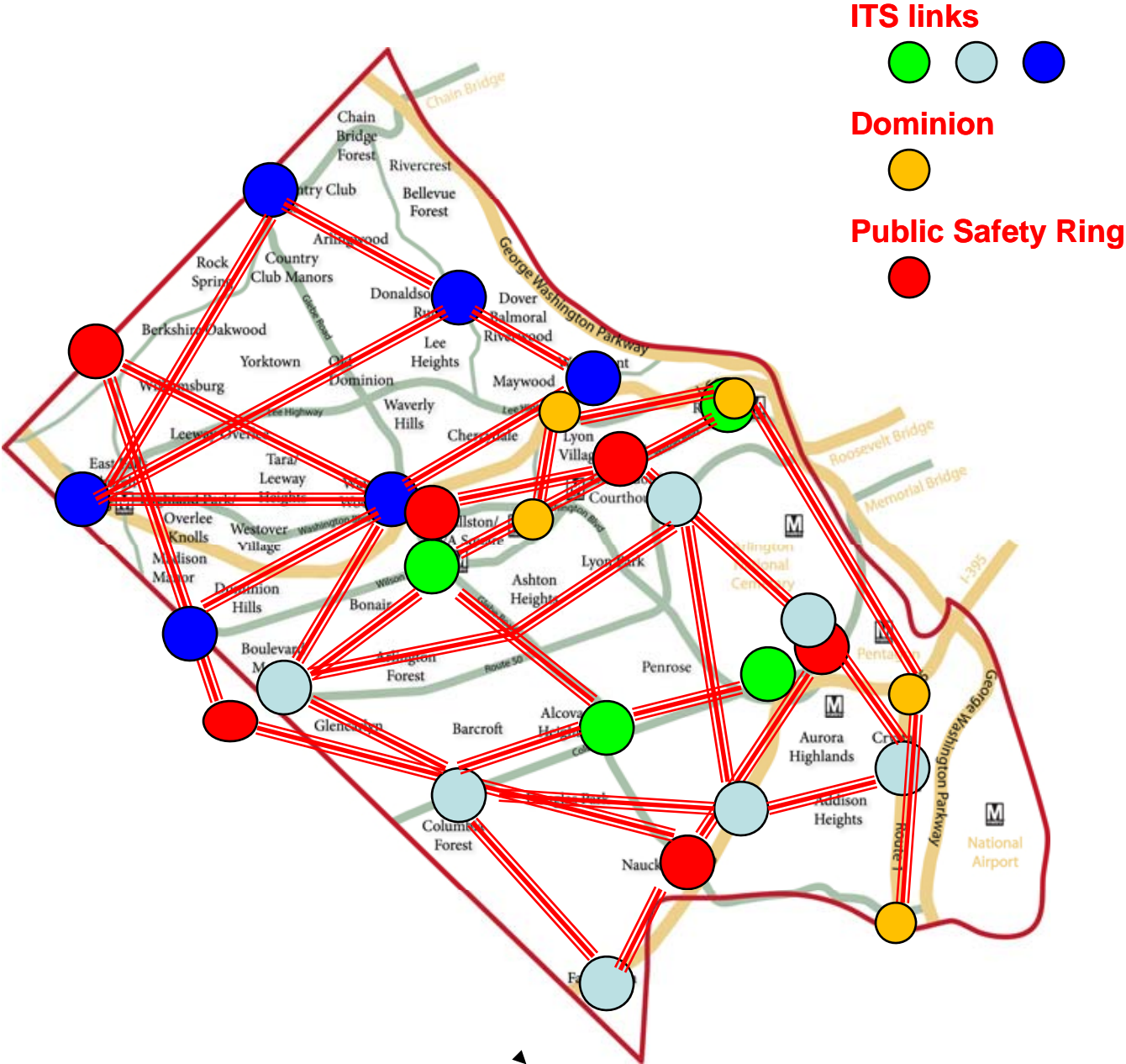


# Intelligent Transportation System Phase I, II and III





# ITS, Dominion And Public Safety Ring Investments



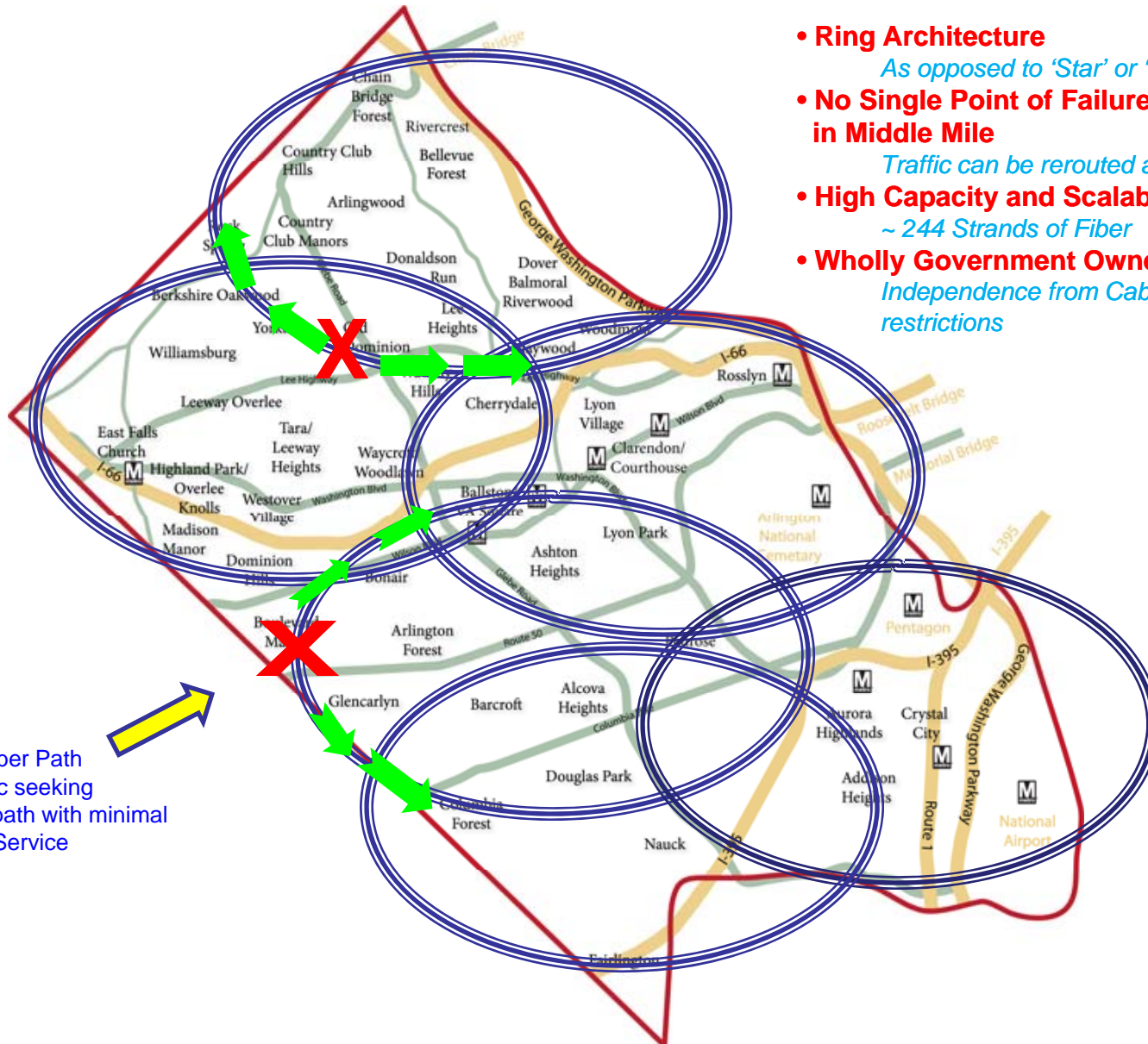




# Proposed CNET Network Topography

## Desired Outcomes:

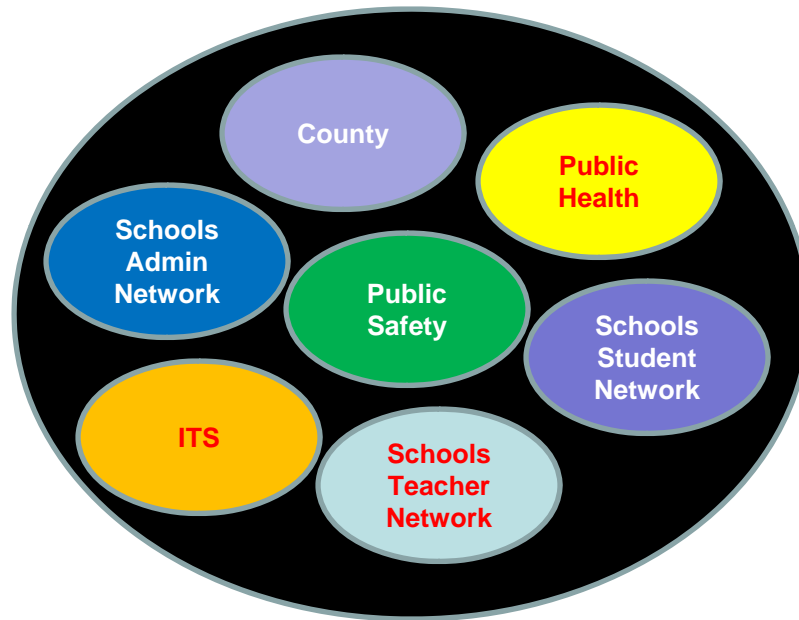
- **Ring Architecture**  
*As opposed to 'Star' or 'Spoke & Hub'*
- **No Single Point of Failure for Fiber in Middle Mile**  
*Traffic can be rerouted as needed*
- **High Capacity and Scalable for Future**  
*~ 244 Strands of Fiber*
- **Wholly Government Owned**  
*Independence from Cable Franchise restrictions*



Break 'X' in Fiber Path  
Results in traffic seeking  
An alternative path with minimal  
Interruption of Service

## **CNET ( Common Network) Design Common Fiber Bundle - Tomorrow**

### County - Schools CNET



### **Desired Outcome**

A shared government and schools owned fiber network infrastructure that provides for distinct, secure lines of business operations while preserving organizational independence, resiliency / recovery routes and creates broadband capacity to satisfy future connectivity demands.

# Performance Measures

- # of conduit or pole miles
  - % of Phase I Core build out
  - % of Phase II Extended build out
- # of miles of dark fiber laid
  - % of Phase I Core build out
  - % of Phase II Extended build out
- # of miles of fiber lighted
  - % of Phase I Core build out
  - % of Phase II Extended build out
- # of County / School Sites Connected
  - % of Phase I Core build out
  - % of Phase II Extended build out