



# Chesapeake Connect

The Chesapeake Next Generation Network (C-NGN)

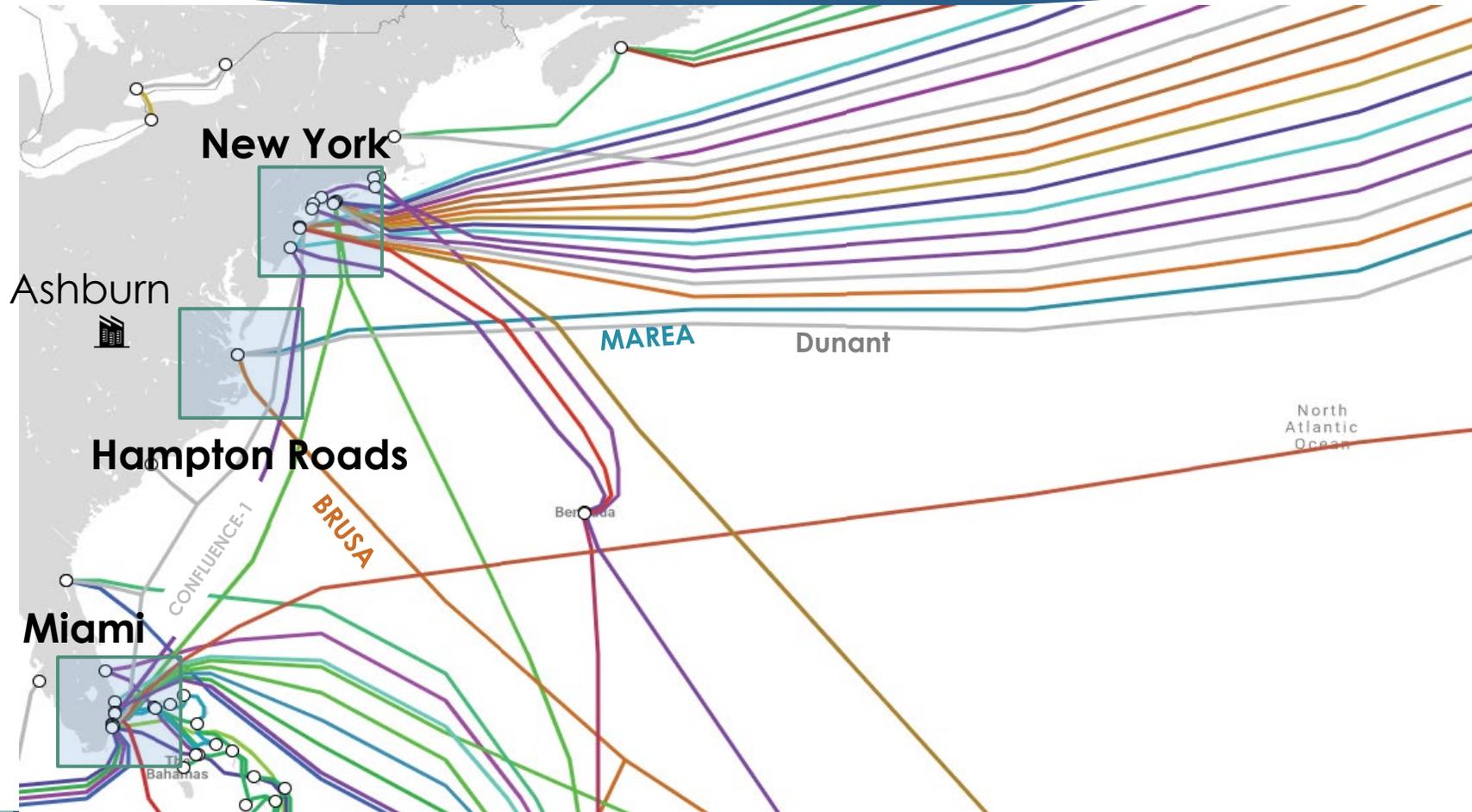
**MASTER PLAN**

September 2020

# How we got here... the problem

- ▶ Relative high cost of Internet services
- ▶ Limited number of data services providers
- ▶ Unserved and underserved areas (Digital Deserts)
- ▶ Resulting Negative Impact on
  - Quality of Life
  - Education
  - Healthcare
  - Community and Economic Development
  - **City, School and Library Operations and Costs to deliver network services**

# Subsea Fiber Optic Cables



# The Interstate Highway System and Digital Broadband Superhighways



# Master Plan RFP Objectives

- ▶ Affordable, broadband services to all City, School and Library facilities
- ▶ Leverage the Subsea Cables and Regional Connectivity Ring (SNA-RCR)
- ▶ Ensure network financial and operational sustainability and resiliency
- ▶ Make Chesapeake an exceptional place to live, work, learn, farm, and play by
  - Better serving citizens, businesses and visitors
  - Creating a catalyst for private investment in broadband services to all citizens and businesses city-wide (more competition)
  - Creating a catalyst for community and economic development

# Magellan Advisor's Tasks

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- ▶ Clearly define the gap that exists between where we are and where we want to be
- ▶ Identify the best ways to meet our stated objectives from a
  - **Technical Perspective** by developing an optimal technical architecture and high-level design
  - **Business Perspective** by evaluation implementation and business model options and helping the City select the best approach
- ▶ Develop a detailed business case, including financials
- ▶ Develop a roadmap for execution

# What we are not doing

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## ▶ The C-NGN is NOT

- Fiber to the home (FTTH)
- Residential or business Internet



## ▶ The C-NGN IS

- A **catalyst for private sector investment** in last mile services by reducing the barriers to entry for new telecom companies; and
- A **catalyst for community and economic development**

# Recommendation

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We are proposing that the City adopt an  
**Infrastructure-only Government Service Provider**  
business model

- ▶ City finances, builds, owns and operates the C-NGN, and
- ▶ Leases excess capacity to drive community and economic development

# The Ask

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## ► We are seeking

- Concurrence with this approach
- Support for funding the project in the upcoming CIP so staff may proceed
- Support for future policy changes needed to enhance implementation

# Strategic Anchors

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- ▶ **Makes Chesapeake a more attractive place to live, work, learn, farm and play by**
  - Enhancing the City's ability to provide services
  - Providing a catalyst for private investment by network service providers in residential and business class services, increasing competition
  - Providing a catalyst for tech-based economic development and cloud native entrepreneurs
  - Laying a foundation for new, high-impact Smart City applications to enhance services
- ▶ **Provides Outstanding Service**
- ▶ **Fiscally Responsible and Sustainable Approach**

# Agenda

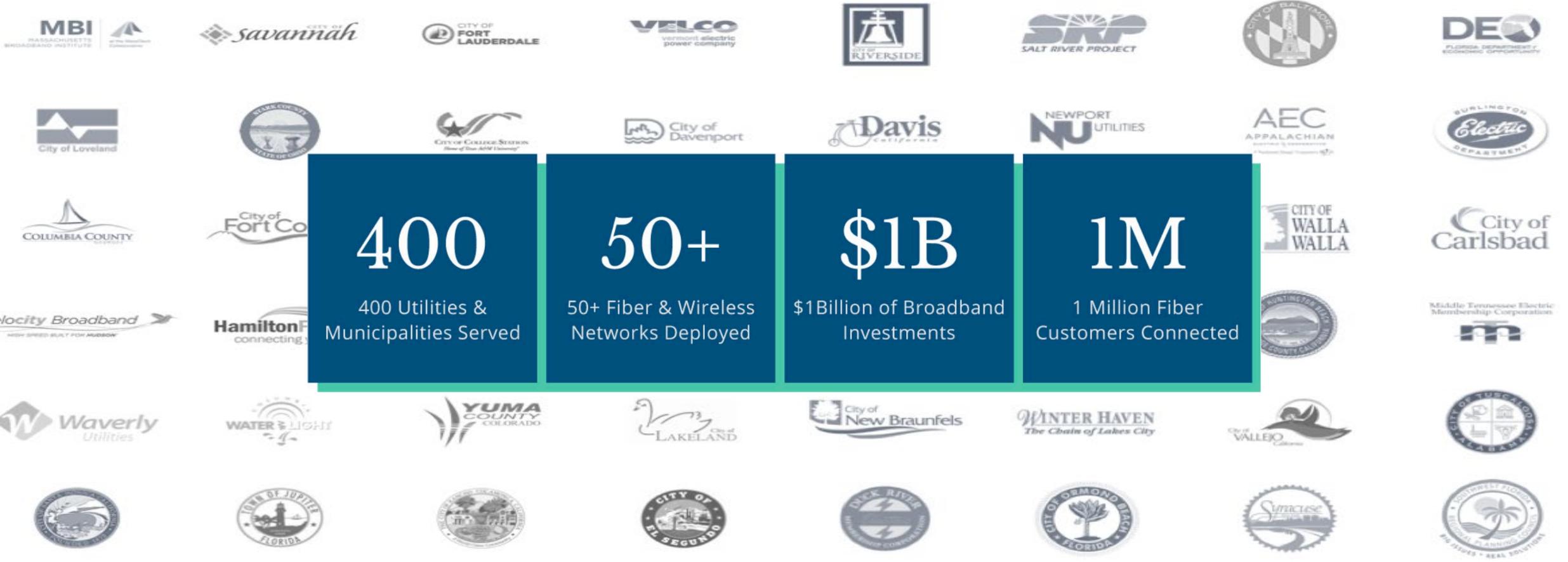
**Magellan Advisors**

**Courtney Violette**, Chief Operating Officer

**Mark Lane**, Sr. Broadband Consultant

1. **INTRODUCTION**
2. **GAP ANALYSIS**
3. **NETWORK DESIGN**
  - a. **Fiber Backbone**
  - b. **Wireless Overlay**
4. **NETWORK DESIGN COSTS**
5. **BUSINESS MODEL  
OPTIONS AND  
RECOMMENDATION**
6. **BUSINESS CASE**
7. **ROADMAP AND NEXT  
STEPS**

# Magellan Advisor's Introduction

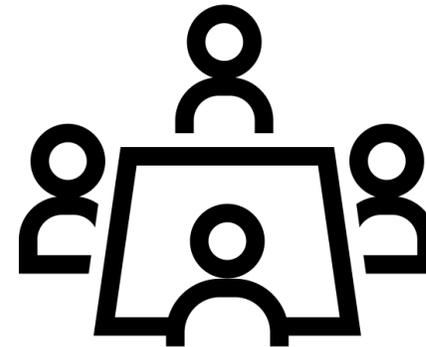


<p><b>400</b></p> <p>400 Utilities &amp; Municipalities Served</p>	<p><b>50+</b></p> <p>50+ Fiber &amp; Wireless Networks Deployed</p>	<p><b>\$1B</b></p> <p>\$1 Billion of Broadband Investments</p>	<p><b>1M</b></p> <p>1 Million Fiber Customers Connected</p>
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# Community Input

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- ▶ Extensive data-gathering of the current state of Broadband Services in Chesapeake and the region
- ▶ Conducted 20+ work sessions with City, Library, School personnel and external stakeholder groups involving more than 240 people
  - Small Business
  - Major Employers
  - Agriculture
  - Tourism
  - Regional development
  - Telecommunications Industry Providers



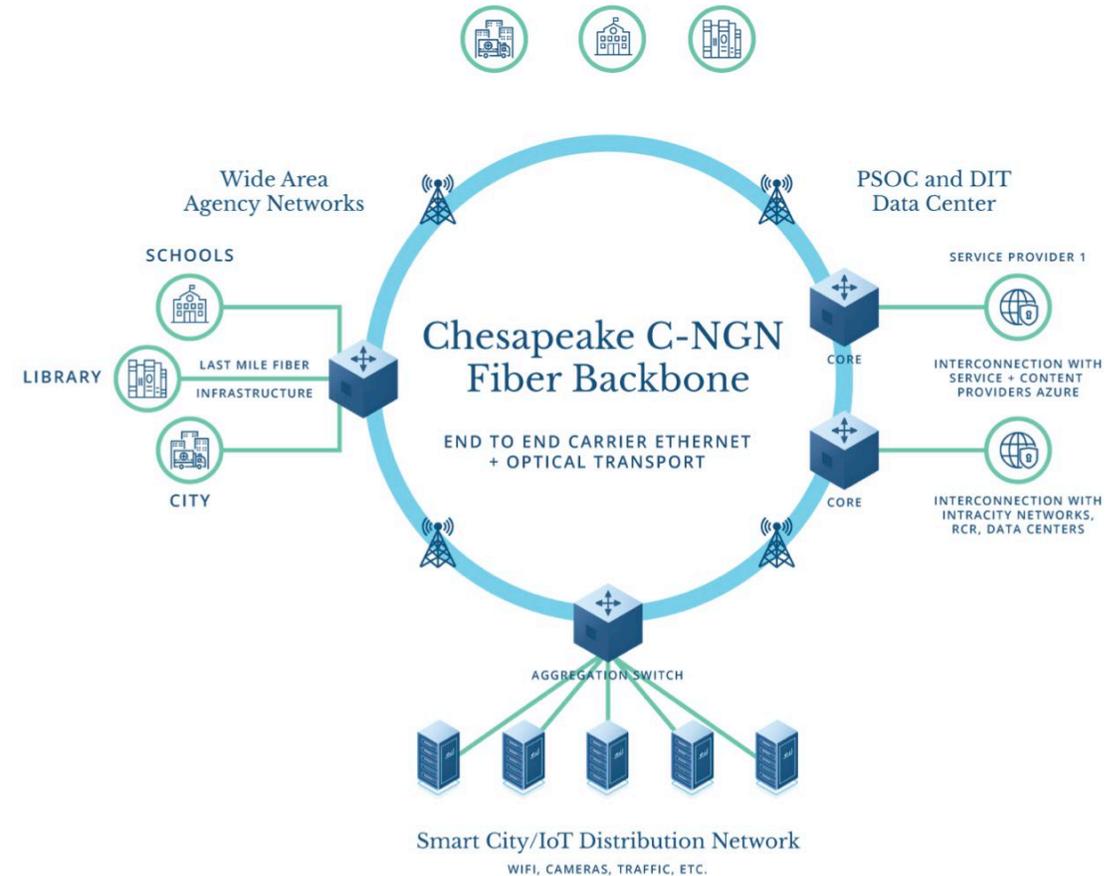
# Network Design – Objectives / Assumptions

- Carrier-class design, performance and reliability
  - Increased bandwidth overall
  - **Control long-term costs**
  - Support current and future Smart City needs
  - **Network to replace 5 separate COX provided WANs**
  - Maintain secure separation of City, School and Library Networks
  - **Connect sites not currently connected because of cost**
- City owned and DIT operated
  - Enable connectivity city-wide
  - **Provide a catalyst for ISP expansion and competition**
  - Support community and economic development
  - Be flexible enough to expand to meet future needs and opportunities
  - **Generate long-term revenue**
- High-speed optical transport ring interconnecting four primary core sites
  - **Sub-second service failover on fiber cuts**
  - Aggregation of 207+ sites and 70,000+ wireless endpoints with redundant connections to key (P2) sites
  - **Interconnection with SNA-RCR**
  - Shared IP and Cloud service edge with diverse connectivity to the Internet

# Network Design – Fiber

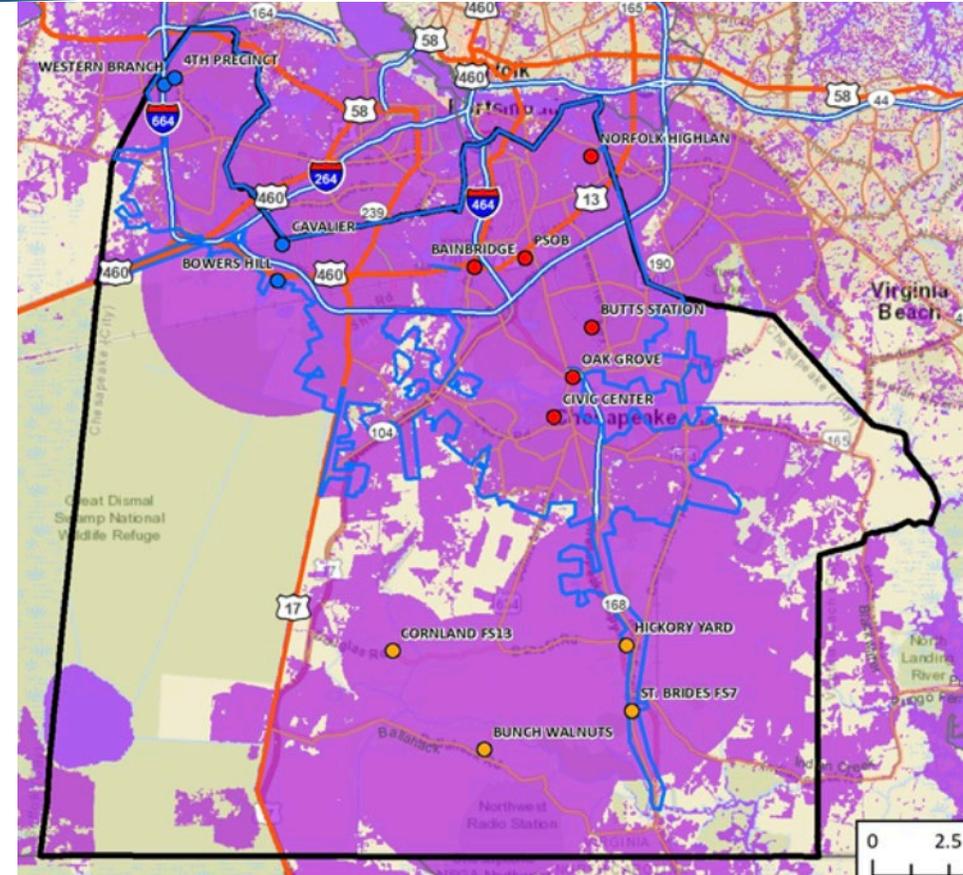
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- ▶ 172 miles of underground construction
- ▶ Self-healing ring with sub-second service failover on fiber cuts
- ▶ New redundancy and resiliency to key sites and facilities
- ▶ Interconnections to the future SNA-RCR, adjacent city networks and private data center assets
- ▶ Deployed in three phases



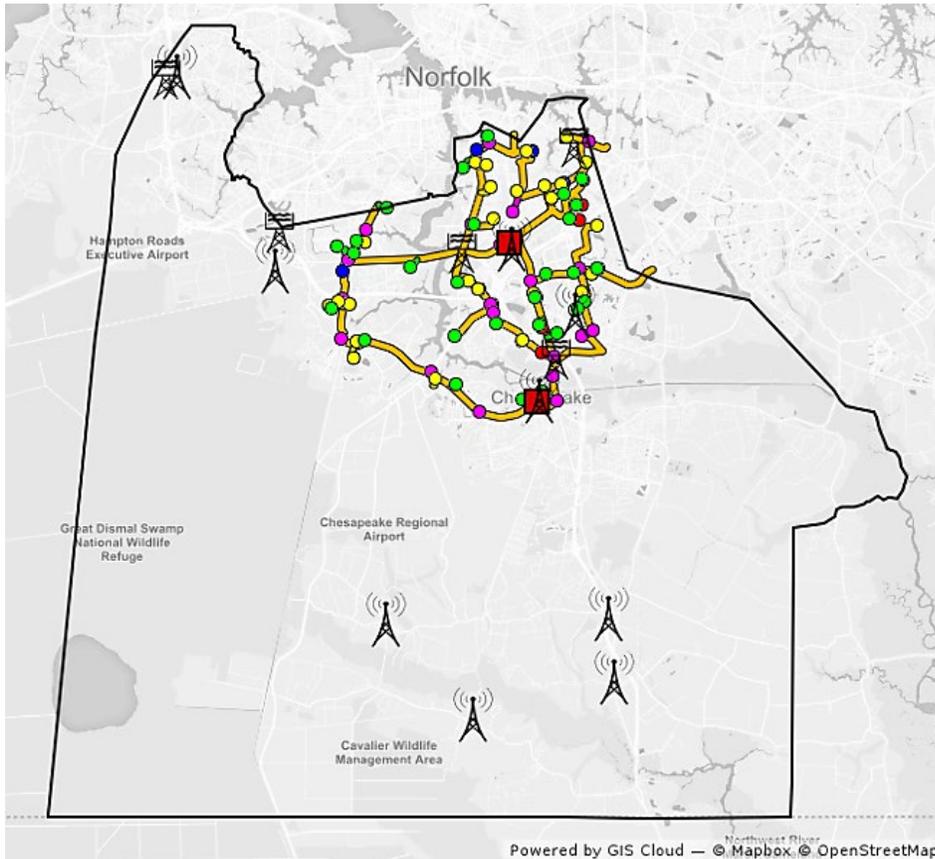
# Network Design – Wireless Overlay

- ▶ 16 sites with 32 Wireless Antennae Gateways connected to the Fiber backbone
- ▶ 70,000+ water meters via LoRa WAN
- ▶ 260+ Utility assets (SCADA) via 700 MHz
- ▶ 15 Safety/Traffic cameras and signs via 4.9 GHz
- ▶ Deployed by phase with fiber
- ▶ Future Smart City Uses
- ▶ Investigating early deployments to support COVID-19 response and online learning



# Network Design – Phase 1

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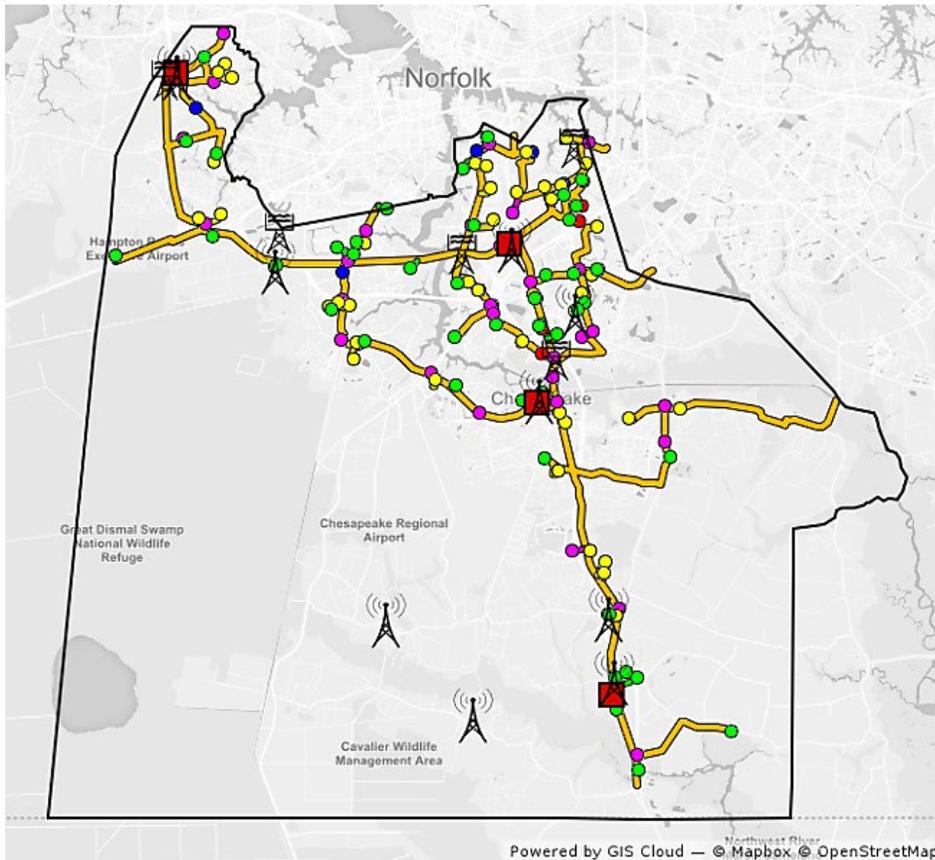
**79 miles – 133 sites**

**(8 wireless sites)**

- Fiber network backbone
- Fiber network lateral/spur
- Network hub
- City facilities
- Schools
- Libraries
- CIBH sites
- ⊠ Radio tower
- T Traffic Cabinet
- Public Utilities

# Network Design – Phase 2

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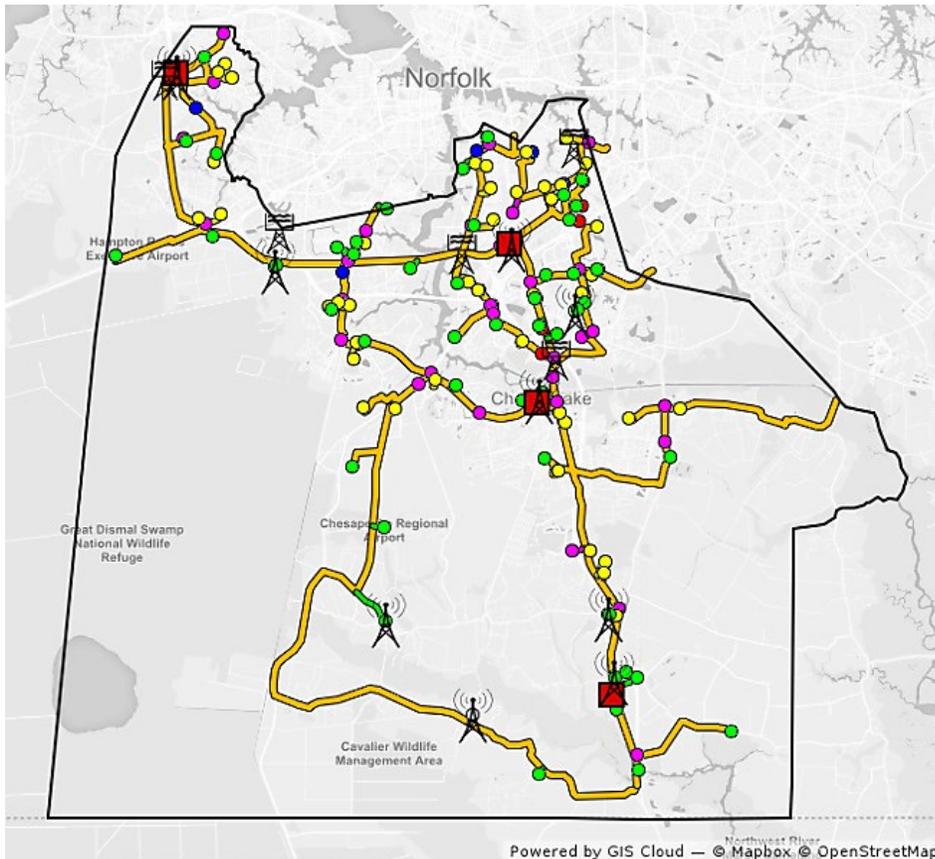


**64 miles – 65 sites**

**(5 wireless sites)**

- Fiber network backbone
- Fiber network lateral/spur
- Network hub
- City facilities
- Schools
- Libraries
- CIBH sites
- ⊙ Radio tower
- T Traffic Cabinet
- Public Utilities

# Network Design – Phase 3



**31 miles – 9 sites**  
**(3 wireless sites)**

- Fiber network backbone
- Fiber network lateral/spur
- Network hub
- City facilities
- Schools
- Libraries
- CIBH sites
- ⊙ Radio tower
- T Traffic Cabinet
- Public Utilities

# Network Design – Cost Estimates

## Capital Expenses

- ▶ **\$32.58 million to design, construct, deploy the C-NGN, and migrate sites to it**
  - \$26.84 million to design, and construct fiber backbone and lateral routes
    - Cost may be reduced by co-building, route optimization, value engineering, and other means
  - \$2.75 million in network and data center equipment, including wireless overlay
  - \$2.63 million for construction/project management, facilities, and tools
  - Includes 10% construction contingency budget

## Operating Expenses

- ▶ **Decrease the Chesapeake's contracted network service costs from \$1.38 million to \$243,454 by Year 5**
- ▶ **New operating costs totaling \$1.52 million in Year 5**
  - Staffing
  - Hardware and Software Maintenance
  - Data Center Collocation & Edge Services

# Business Model Options

## Managed WAN Upgrade (as designed requirements using existing contract rates)

- Contracted services from incumbent provider
- No wireless overlay
- City costs are going to increase significantly next year to meet the City's goals

## City Financed, Owned and Operated

- Fiber and wireless network and services as designed

## Managed WAN Services/PPP

- Fiber network and services as designed - Leased Services
- Possible Public-Private Partnership (PPP) opportunities
- No wireless overlay
- Excess capacity under vendor's control

## Recommended Business Model:

# *Infrastructure-only Government Service Provider*

Magellan is recommending that the City build, own and operate the C-NGN as a City Enterprise or Internal Service funded Infrastructure-only/Government Service Provider serving City departments, schools, libraries, and other local public agencies.

Attribute	Managed WAN Upgrade	Recommended	
		City Financed, Owned and Operated	Managed WAN Services/PPP
Capital Investment Required	No	Yes	Depends on Provider's Model
Annual Operating Cost	High	Medium to High	High
Operational Impact	Minimal	Minimal	Minimal
Bandwidth Deployed	1 to 10 Gbps	1 to 10 Gbps	1 to 10 Gbps
Control of Assets	None	Full	Controlled by Vendor
Support for Other Initiatives	Constrained by Provider Costs and Service Offerings	Constrained by Capital	Depends on Provider's Model
30-Year TCO (Projected)	\$137.9 Million	\$82.4 Million (\$27M cash on hand over 30 years)	\$172.5 Million (bid pricing extrapolated over 207 sites and 251 services)
Debt Payoff	N/A	20 Years (possibly earlier)	Unknown

# Why not a PPP Solicitation?

- ▶ Will be more expensive than building it ourselves
  - May save on upfront capital expenses, but
  - Will have higher long-term operating expenses and less revenue opportunities
- ▶ Simply trading one vendor for another, when we want more vendors and greater competition
- ▶ Will extend procurement, construction and implementation timeline
- ▶ No guarantee of a suitable deal
- ▶ Limited control over the asset, its expansion, and uses
- ▶ Become dependent on 3<sup>rd</sup> party for economic development
- ▶ Unless the partner is local, city payments flow outside the city economy

# Business Case – Financial Perspective

## Fiscally Responsible and Sustainable Approach

- City invests in critical infrastructure and resources vs a long-term “rental” arrangement
- 22% reduction in 1 Gbps circuit costs
- 33% reduction in 10 Gbps Circuit costs
- Future rate reductions

## New Revenue Opportunities

- Excess Capacity
  - Dark Fiber Leases
  - Conduit Leases
- Tower Attachment Leases
- Wireless Overlay Leases

## Opportunities to Reduce Deployment Costs

- Value-Engineering
- Co-build with private telecom providers
- Internal “One-Dig” coordinator with planned transportation and Public Utilities CIPs and the SNA-RCR
- External “One-Dig” coordination with planned Franchise construction

*Pro forma Financial details are in the Master Plan*

# Business Case – Operations/Services Perspective

- ▶ Expands the footprint and speed of the City's network
  - 15 new sites connected
  - 40x increase in bandwidth
- ▶ Futureproofs the network
  - Allows the City to serve more sites over time
  - Provides cost savings and a hedge against cost increases over time
  - Creates a long-term infrastructure asset
- ▶ Protects the network with route diversity and network resiliency
- ▶ Interconnects with
  - The future regional ring and adjacent cities
  - Major private data centers for IP and other services as significant savings
- ▶ Supports City's Strategic Anchors

# Policy Considerations and Framework

- ▶ Magellan reviewed existing City policy and has recommended revisions and provided draft documents for consideration:
  - Fiber and conduit design standards and guidelines
  - “Dig Once” and joint trenching (Internal & External)
  - Further consideration for:
    - Small cell design standards and guidelines
    - Expanded Master Licensing Agreements (MLA) to include City poles and other structures
    - Adjustments to franchise agreements and easements

*Revisions to these policies can support the City's immediate initiatives, while incentivizing new investments by the private sector*

# Roadmap

Task	2020		2021				2022				2023				2024			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Fiber OSP Design/Permitting	■	■																
Wireless Network Design							■											
Construction RFP Finalization/Solicitation			■															
Construction RFP Interviews/Selection/Contract			■	■														
<b>PHASE 1</b>																		
Construction					■	■	■	■										
Equip Procure/Install/Site Prep/Migration							■	■										
Wireless Deployment									■	■								
<b>PHASE 2</b>																		
Construction									■	■	■	■						
Equip Procure/Install/Site Prep/Migration										■	■							
Wireless Deployment												■	■					
<b>PHASE 3</b>																		
Construction													■	■	■	■		
Equip Procure/Install/Site Prep/Migration														■	■			
Wireless Deployment																■	■	
Construction Contract Closeout/Project Completion																	■	■

- ▶ Dependent on permitting
- ▶ Realistic 36-month construction period
- ▶ There may be opportunities to accelerate construction dependent on
  - Funding
  - Contractor Availability
- ▶ Construction RFP will determine additional costs to accelerate

# Next Steps

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- ▶ **Build the C-NGN**
  - Low-level design and value engineering
  - Bid construction through competitive solicitation
  - Construction management and procurement of remaining C-NGN components (equipment, services, etc.)
- ▶ **Plan operations**
  - Network engineering and management, including contractors
  - Contract administration
  - Marketing
- ▶ **Begin staffing**
- ▶ **Bring C-NGN network services online**

# Questions?

# Thank You

# Business Model Options – Financial Analysis

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	C-NGN Annual Cost Estimates		
	Managed WAN Upgrade	City Build, Own, Operate	Managed WAN Services/PPP
City	\$2,632,800	\$2,013,600	\$3,261,384
School	\$446,040	\$350,400	\$603,768
Library	\$125,400	\$96,000	\$149,832
CIBH	\$195,000	\$150,000	\$235,920
<b>Total</b>	<b>\$3,399,240</b>	<b>\$2,610,000</b>	<b>\$4,250,904</b>

*Total cost estimates shown are after E-Rate subsidies*