



Ohio Middle Mile Consortium (OMMC)

Executive Summary

a) Opportunity Proposed System Seeks to Address

A Comprehensive Statewide Plan for Ohio: The “Ohio Middle Mile Consortium” (OMMC) is a public-private partnership facilitated by the Ohio Academic Resources Network (OARnet), the technology operations arm of the University System of Ohio. OMMC was created to integrate three Broadband Technology Opportunities Program-Comprehensive Community Initiatives (BTOP-CCI) middle mile stimulus projects to forge a coordinated and collaborative approach for meeting the needs of Ohio.

Pre-ARRA Funding

Middle Mile Points of Presence with Network Inter-Connectivity

(for detail, see Attachment A)

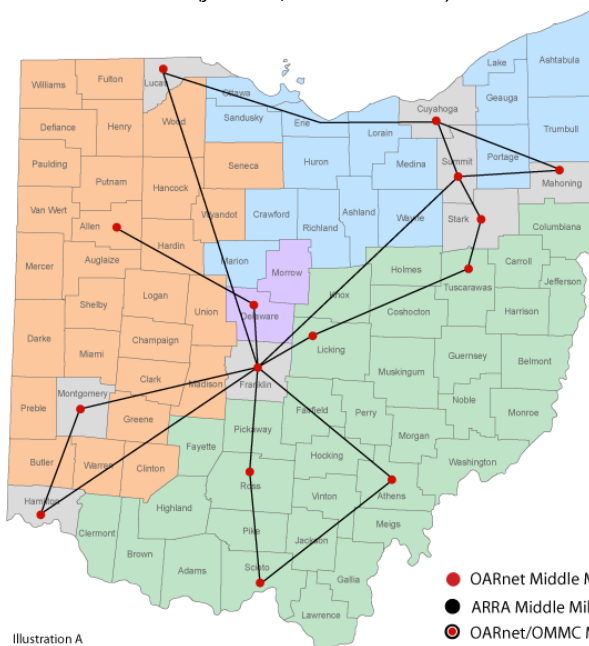


Illustration A

Post-ARRA Funding

Middle Mile Points of Presence with Network Inter-Connectivity

(for detail, see Attachment B)

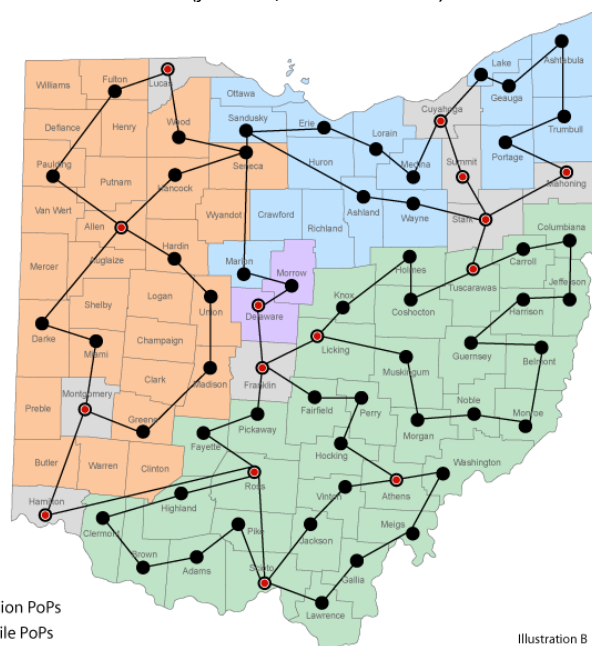


Illustration B



The OMMC related projects include:

- Connecting Appalachian Ohio Middle Mile Consortium (CAOMMC) in southeastern Ohio (green)
- GigEPAC Ohio Middle Mile Consortium (GigEPAC OMMC) in western Ohio (orange)
- Transforming NE Ohio from Rust Belt to Tech Powerhouse-An Ohio Middle Mile Consortium Project (TNEO-OMMC) in northeastern Ohio (blue)

Together, the three projects and OARnet’s statewide network create a comprehensive community infrastructure. OARnet is positioned as a sub-recipient in all three integrated applications.

Ohio represents one of the areas of the country most significantly impacted by the economic downturn, due to its strong ties to manufacturing and a heavy concentration of automotive plants. As a result, Ohio represents a “best fit” for objectives established in the American Recovery and Reinvestment Act (ARRA) programs. Broadband has become even more essential to transition Ohio from its traditional industrial economy to a global technology and advanced manufacturing economy, and to support retraining and development of a new workforce required to meet Ohio’s future needs. Recent Ohio ARRA program awards supporting renewable energy, ambulatory surgical care facilities, affordable housing initiatives, green jobs, and a host of other initiatives depend on affordable and accessible broadband services to realize their goals.

Recognizing OARnet’s 23 years of experience as a national leader in broadband networking, Ohio Board of Regents’ Chancellor Eric Fingerhut requested that OARnet integrate three BTOP Comprehensive Community Infrastructure (CCI) proposals into an overall middle mile plan for Ohio. OARnet initiated a “Gathering of State Stakeholders,” which included key national and state leaders and major applicants, to assess “lessons learned” from the first round of applications.

As a result of the meeting, the Ohio Middle Mile Consortium (OMMC) was founded. The OMMC participants have adopted a cooperative and comprehensive “Round Two” approach, as opposed to the overlapping and fragmented approach in “Round One.”

b) A general description of the proposed funded service areas (location, number of communities, etc.)

The impact of the BTOP funding on the service area is clearly shown in the pre-funded middle mile access in the service area (Illustration A) and the post-funded middle mile access in the service area (Illustration B) in middle mile access maps above (Page 1).

The proposed funded service areas include the following distribution of counties:

- CAOMMC: 34 southeastern counties of Ohio
- GigEPAC-OMMC: 28 western counties of Ohio
- TNEO-OMMC: 20 northeastern counties of Ohio

The counties noted above total 82 of Ohio’s 88 counties. Of the remaining 6 counties, 2 were covered by the Round One BTOP award to Consolidated Electric and 4 large urban counties currently are served by OARnet. The OMMC proposals will increase the middle mile connection points (Points of Presence, or “POPs”) from the current 14 to 68 counties. Each partner’s application provides details on their respective service areas.

c) Number of Households and businesses passed

Collectively, the OMMC-related projects pass 3,606,510 households and 534,363 businesses throughout Ohio.

d) Number of community anchor institutions passed and/or involved with the project (e.g. health care, education, libraries, etc.)

The OMMC applications collectively pass and/or involve community anchor institutions across all 88 Ohio counties. The following is a breakdown by category:

- Higher Education
 - Universities & Colleges-public and private - 59
 - Community Colleges - 34
- K-12 and Career Training Centers - 1342
- Health care facilities - 691
- State and local government offices - 1348
- Public safety operations - 773
- Libraries - 381
- Industrial parks - 144

e) Proposed services and applications for the proposed funded service areas and users

The OMMC collaborators will be expanding the middle mile access for the local and statewide networks, resulting in a broader range of affordable broadband services to their clients. This will in turn provide enhanced and extended broadband Internet, video and voice services to businesses and households in unserved and underserved areas of the state.

OARnet will provide 10 Gbps wave service, as capital indefeasible rights to use (IRUs), to its OMMC partners, while the partners will provide OARnet with dark fiber IRUs. This will allow OMMC to extend its geographic reach to economically distressed, and unserved and underserved areas of the state. This will increase the much-needed capacity to provide advanced applications and services at an affordable cost.

f) Approach to addressing the nondiscrimination and interconnection obligations

The OMMC collaborators have developed an open network model to address non-discrimination and interconnection. The fact that the three integrated applicants and OARnet are current middle mile providers ensures continued open access to the network. The OMMC collaborators have agreed to the required nondiscrimination and interconnection obligations and to post them on their respective websites.

g) Type of broadband system that will be deployed (network type and technology standard)

The OMMC today is comprised of over 3,500 miles of optical fiber using state-of-the-art switches, routers and Ethernet switches, providing Ohio with an advanced, statewide telecommunications network dedicated to research, education and economic competitiveness. The three OMMC-related applications to BTOP-CCI collectively request funding to add over 1,500 fiber miles. The OMCC will support an advanced packet-based architecture using Internet protocol (IP) to create one of the most flexible, scalable and cost-effective infrastructures in the country. This new infrastructure will be equipped for both middle mile and statewide capacity to support new initiatives with a focus on serving the economically disadvantaged and Ohio areas unserved and underserved with broadband.

h) Qualifications of the Applicant that demonstrate the ability to implement and operate a broadband infrastructure, and/or be a sustainable broadband service provider

OARnet will provide the administrative support for the Ohio Middle Mile Consortium organization. OARnet was established in 1987 by the Ohio Board of Regents to provide university researchers with broadband connectivity to the Ohio Supercomputer Center. The OARnet network serves 89 state higher education sites, 30 K-12 hub sites servicing over 6000 school buildings, 9 public broadcasting stations, 75 government sites and 10 health care sites.

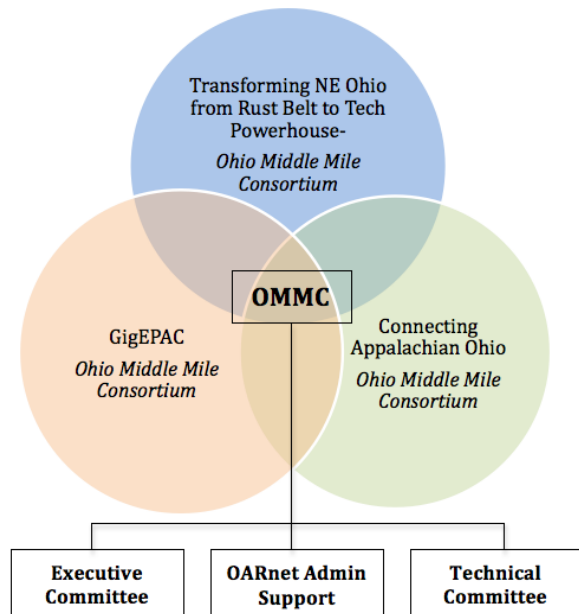
OARnet is Ohio’s gateway to Internet2, Oak Ridge National Laboratory (ORNL), Merit Network, Inc., PennREN (Pittsburgh Supercomputing Center (PSC) and MAGPI), I-Light and a number of other strategic networks and “Round One” awardees.

The OARnet-facilitated OMMC Project Model (Illustration C) establishes an Executive Committee with representation from each of the three lead applicants, and a Technical Committee to focus on sustaining collaboration. This structure will foster cooperation, growth and sustainability, further enhancing services within Ohio.

The OMMC collaborators have a wealth of telecommunications and advanced Internet services experience, based on the partners’ history as Local Exchange Carriers and OARnet’s experience in the public sector. Each of their proposals includes documentation regarding their respective experience and commitment to this endeavor.

OMMC Project Model

Illustration C



i) Overall infrastructure cost of the broadband system

Although each of the three proposals can stand on its own merits, together they fit “hand in glove” to provide a seamless middle mile solution for the state. Collectively, the federal funds applied for in the three proposals total less than the \$150M threshold for the BTOP-CCI category, further reinforcing the integrated design. The overall cost of the OMMC infrastructure is:

Project	Total Funding	Federal Funding	Funding Match		Total Match %
			Cash	In Kind	
CAOMMC	\$94,963,209	\$66,474,246	\$28,488,963	\$0	30.0%
GigEPAC	\$42,904,268	\$30,031,849	\$10,420,316	\$2,452,103	30.0%
TNEO-OMMC	\$71,858,678	\$45,909,377	\$21,916,470	\$4,032,831	36.1%
OMMC Totals	\$209,726,155	\$142,415,472	\$60,825,749	\$6,484,934	32.1%

j) Overall expected subscriber projections for the project

The collective projects associated with the OMMC will serve or pass 5,958 anchor institutions.

- CAOMMC = 2,123
- GigEPAC-OMMC = 1,835
- TNEO-OMMC = 2,000

k) Number of jobs expected to be made or saved during this project

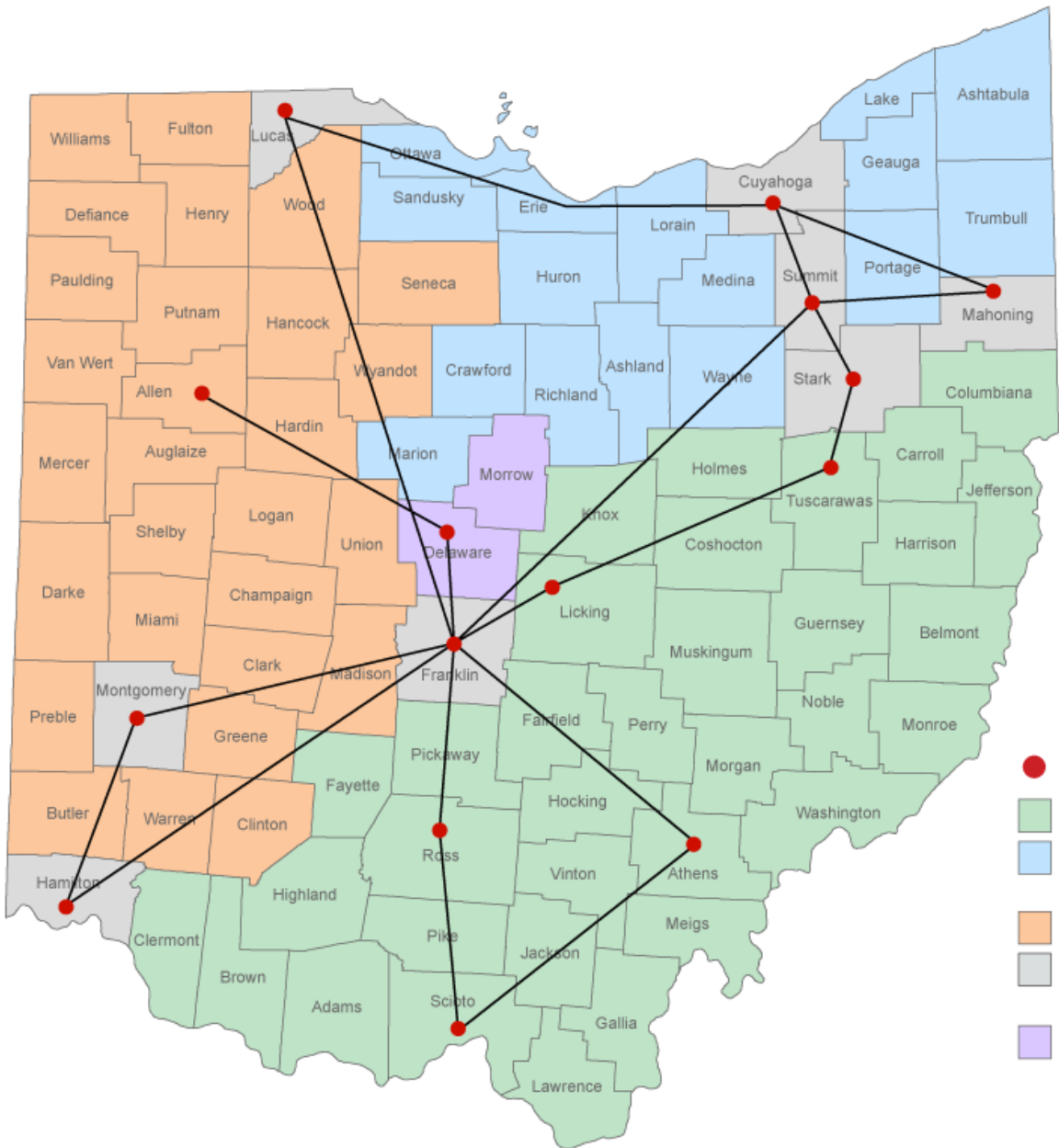
The OMMC Collaborators have projected the following job generation related to their projects:

- Direct: 529
- Indirect: 464
- Induced: 559

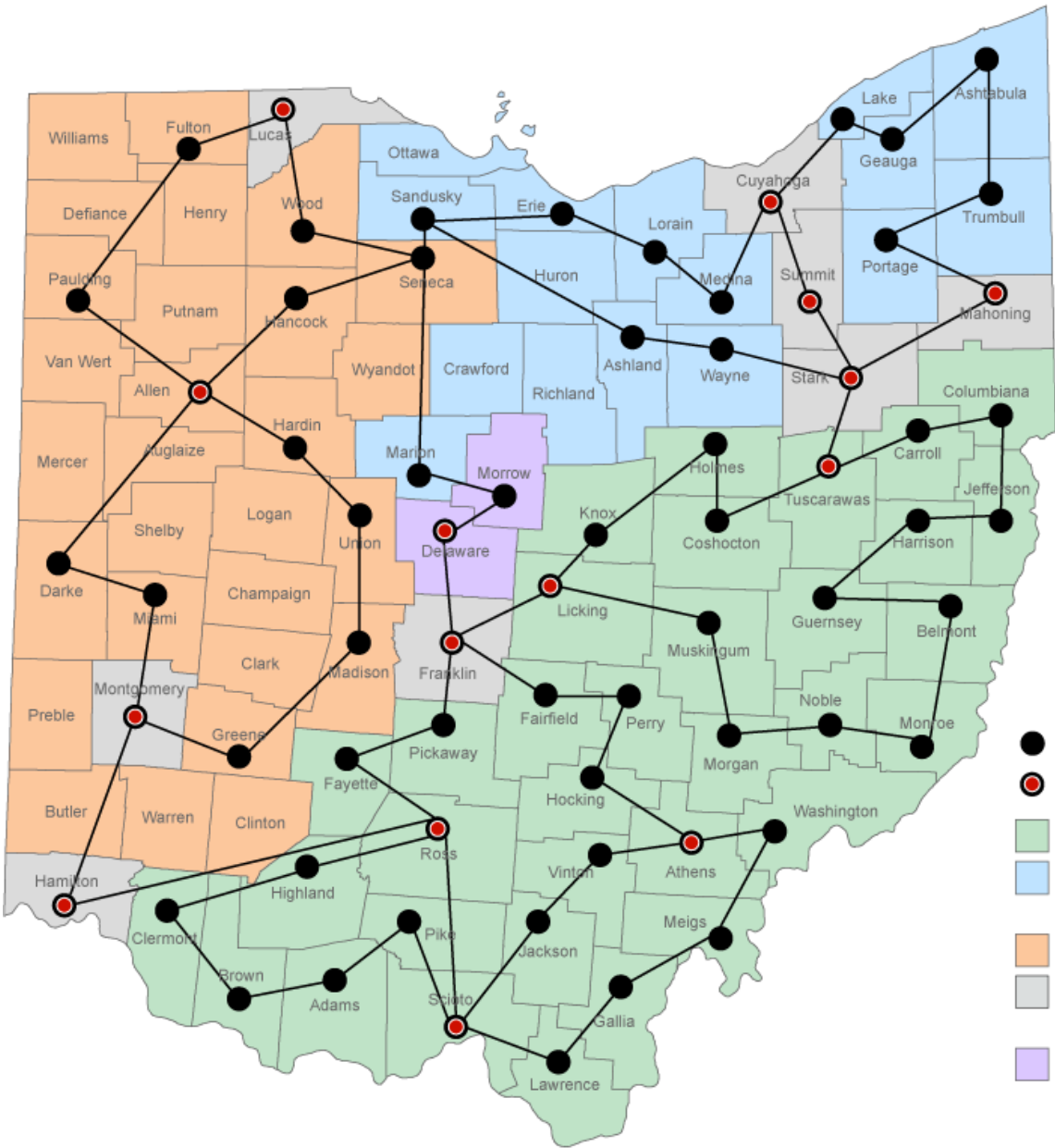
Conclusion

Through the dynamics of this unique public-private partnership, the OMMC can help transform the state from a declining industrial economy to a modern and growing advanced-manufacturing and global-technology economy. This will be achieved by expanding broadband opportunities to unserved and underserved communities throughout the state.

Pre-ARRA Funding Middle Mile Points of Presence (PoPs) with Network Inter-Connectivity



- OARnet Middle Mile PoPs
- Connecting Appalachian Ohio
- Transforming NE Ohio from Rust Belt to Tech Powerhouse
- GigEPAC
- Interconnection Counties (Large Urban Areas)
- Consolidated Electric Area Round 1 Awardee



Post ARRA Funding Middle Mile Points of Presence (PoPs) with Network Inter-Connectivity

- ARRA Middle Mile Expansion PoPs
- OARnet/OMMC Middle Mile PoPs
- Connecting Appalachian Ohio
- Transforming NE Ohio from Rust Belt to Tech Powerhouse
- GigEPAC
- Interconnection Counties (Large Urban Areas)
- Consolidated Electric Area Round 1 Awardee



COMNET INC.

GigE Plus Availability Coalition System Design

Broadband Technology Opportunities Program
National Telecommunications & Information
Administration





Connecting Appalachia Ohio Middle Mile Consortium System Design



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Existing ComNet Network

The ComNet network is primarily focused in the far Northwest corner of Ohio spanning from the Ohio-Michigan Border on the north to US33 on the south, and from the Ohio-Indiana border on the west to the I-75 corridor on the east. The network was first constructed through the leasing of existing fiber facilities from ComNet's Last Mile Broadband Service Providers (BSPs) and then building bridging segments to fill in the gaps. This fiber facility, referred to as the legacy network, can be seen in Figure 7 colored in light blue. Two networks have been equipped across these ringed fiber facilities, a SONET OC48 network and a 10 Gigabit Ethernet Network. A map of the BSP's service area can be seen in Figure 1.



Figure 1 - Current Service Area





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Statement of Work

The legacy network lacks the fiber and bandwidth needed to allow BSPs to provide metro grade bandwidth and networking features for business and “Triple Play” services to residential customers. The GigEPAC middle mile solution is designed to provide the bandwidth needed for the BSPs to offer these services in the 28-county area shown in orange (Figure 2).



Figure 2 - Coverage Area

The design will use DWDM and Ethernet equipment for interconnection and a high bandwidth transport between the Points of Presence (POP). Each POP will use Metro Ethernet and MPLS capable equipment to provide a variety of protocols for customer interconnections. Anchor Institutions will gain access to the ComNet backbone through the BSPs last mile service offerings.

Service Offerings

BSPs will connect customers to the GigEPAC through their aggregation network or directly to the DWDM network for wave level services. The last mile connections for customers connected to the aggregation network may be on fiber or copper connections depending on the BSP’s service offerings. Once connected to the BSP’s aggregation network, the traffic can be aggregated into the BSPs Internet connectivity or placed on a Ethernet Virtual Circuit (EVC). EVCs will be routed through the GigEPAC to one or more BSP locations (Figure 3), or to an exchange carrier such as Zayo and OARnet (Figure 4). Customers with DWDM circuits will be connected to the





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BSPs POP through dedicated fiber, and their wave circuit can be carried to any POP on the network to an Inter Exchange point to be handed off to another carrier. EVCs can range from 3Mbit/s to 10Gbit/s in bandwidth in increments specified in the attached rate sheet, and DWDM connections can be 1Gbit/s or 10Gbit/s.

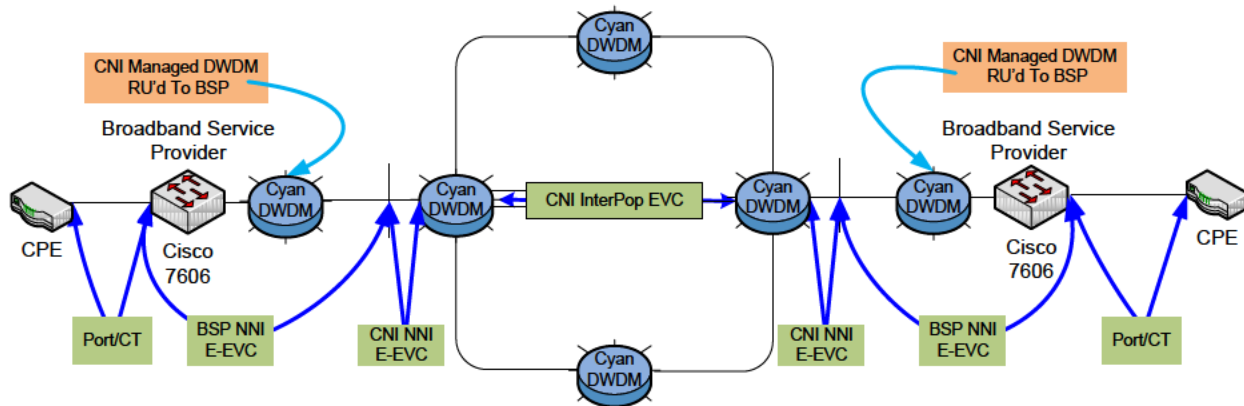


Figure 3 - Point to Point Connection within the GigEPAC through the BSP's aggregation facilities

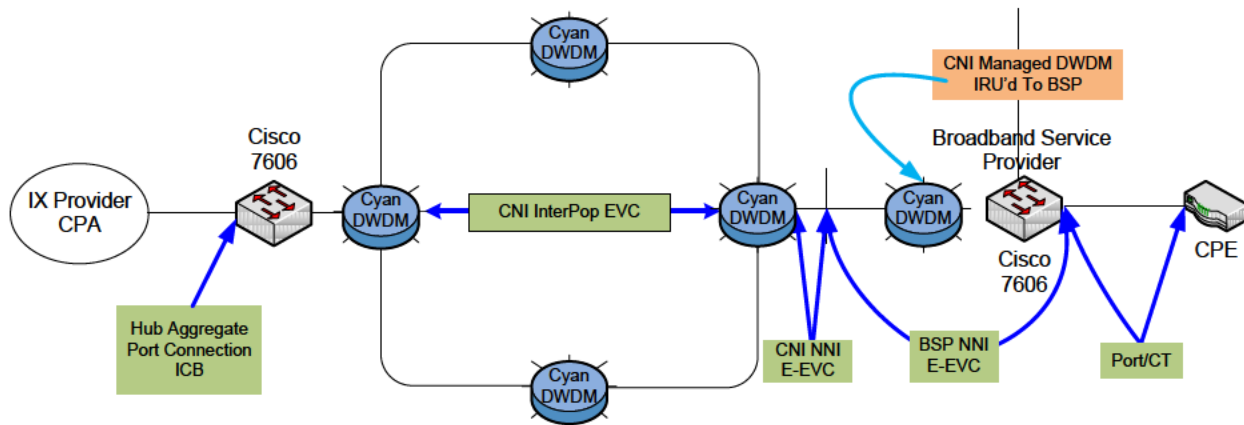


Figure 4 - Connection to Carrier partner through the GigEPAC through the BSP's aggregation facilities

For example, the configuration of a direct link between two health care facilities adds a system component in each DWDM customer's on-site equipment providing for the configuration of a separate logical channel on the same physical network between the two locations. The segregated data replication links are acting as dedicated point-to-point connections between the primary and back-up sites.

ComNet Partners

As part of the Ohio Middle Mile Consortium (OMMC) set of proposals, OARnet and Zayo Bandwidth will participate in the GigEPAC grant request. Each is requesting dark fiber, DWDM transport equipment, and routing equipment to extend their existing networks.





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OARnet intends to leverage the proposed network to create a connection to Hillsdale MI to improve services to MERIT. Conversely, OARnet is offering a Gigabit service to Equinix in Chicago for ComNet.

Zayo will be committing funds to IRU fibers from ComNet on the routes show in green in Figure 5. These routes will be used to extend Zayo's current network into this new coverage area. This will allow Zayo to provide services to its current customers directly or through the ComNet BSPs.



Figure 5 - Zayo Fiber Routes

Fiber Network

The cable to be installed will contain 96 fiber strands, and, where feasible, will be buried to reduce maintenance. If the fiber install is outside of corporate limits, it will be referred to as rural, and will have a splice point every mile. If the fiber is installed inside corporate limits, but not a heavily industrialized area then the install is classified as urban. Urban installations will





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require directional boring, and will have a splice point every 2500 feet due to a more dense population. If the install is in a very dense population and in an industrialized area, then the install will be classified as metro. In this instance, large buildings with concrete bases create an obstacle to an underground install. The install will still be buried or utilize existing conduits where possible in Metro areas. Aerial links will be used when needed.

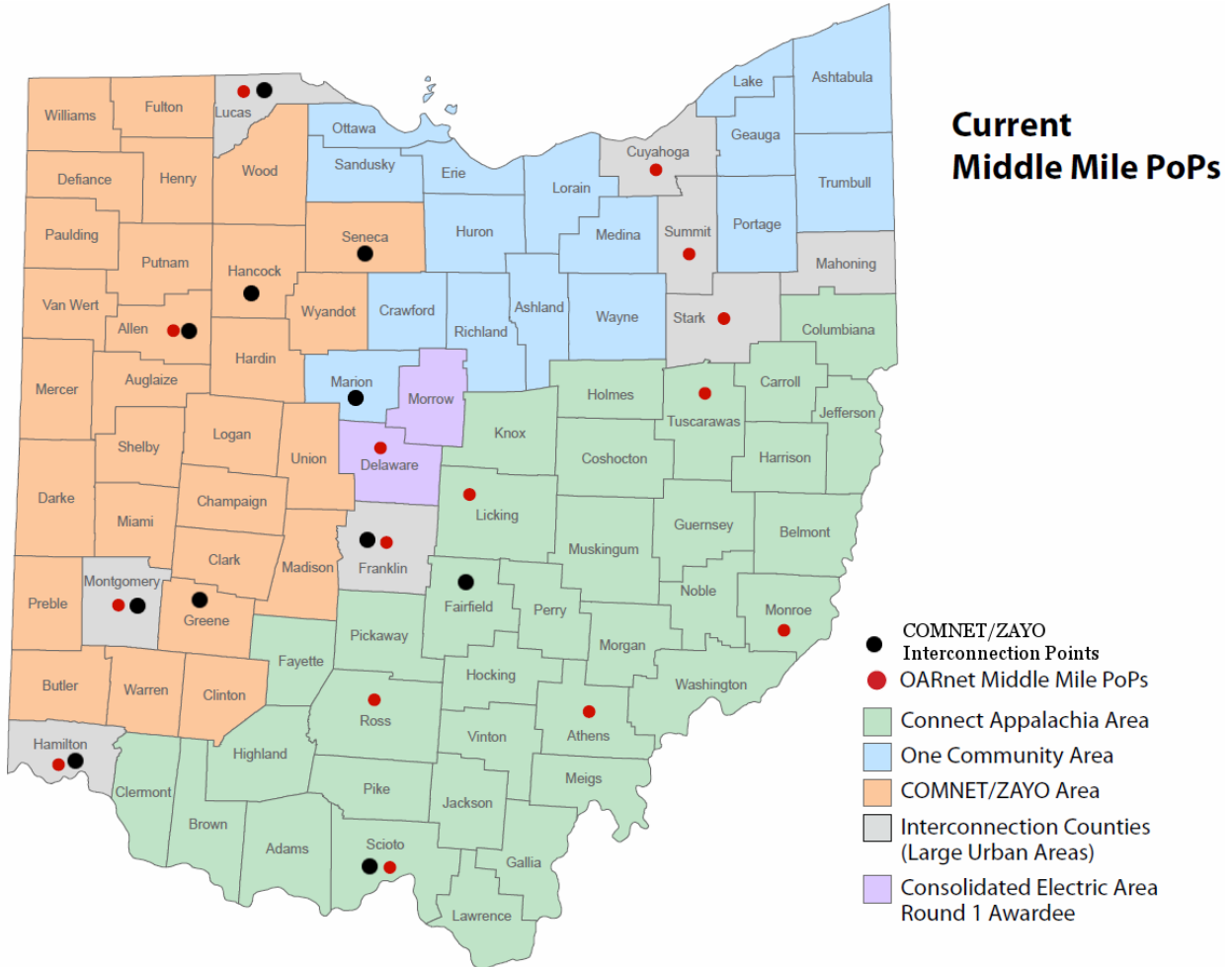


Figure 6 - Network Interconnection Points





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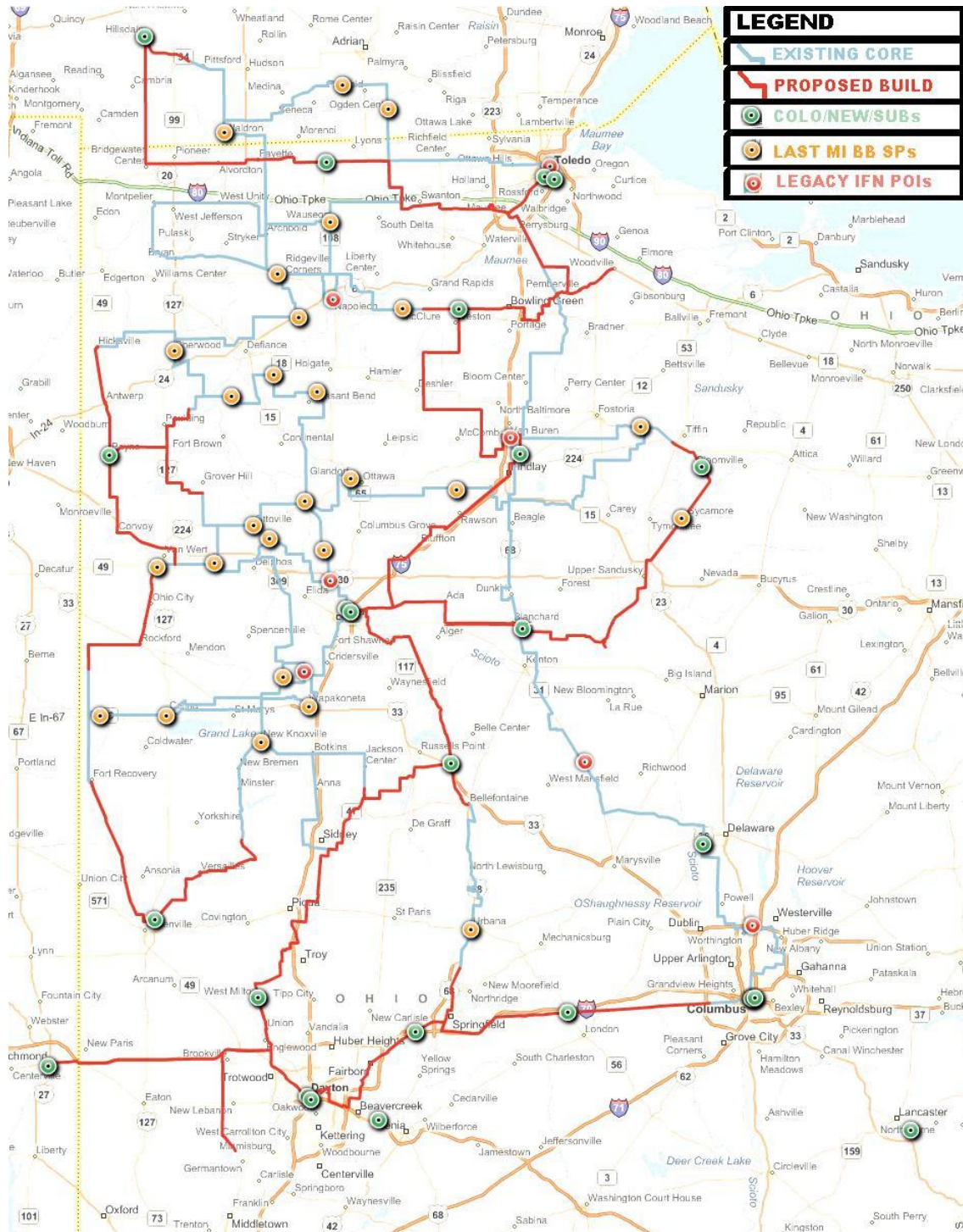


Figure 7 - Fiber Routes with Points of Interest





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Name	Address	City
SO7	32 Manning St.	Hillsdale
NC1	Greenfield TBD	Oakshade
SO6	6 City Park Ave	Toledo
NC3	Greenfield TBD	N. Weston
NC6	Greenfield TBD	N. Findlay
NC8	GreenField TBD	Bellefontaine
SO1	4249 SR48	West Milton
SO4	1620 N. Sugar St	Lima
SO5	6746 Township Rd 155	Kenton
NC5	Greenfield TBD	Melmore (S. Tiffin)
SO2-Zayo Owned	iLITE TBD	Richmond
SO3-Zayo Carrier Neutral Colo	103 W. 2nd Street	Dayton
NC9	Greenfield TBD	Springfield
NC10	GreenField TBD	Summerford
SO9	180 E. Broad St.	Columbus
NC2	Greenfield TBD	Greenville
NC4	Greenfield TBD	Payne
IFN Toledo POI	1946 N. 13th St. Suite 180	Toledo
IFN Napoleon POI	720 N. Perry St.	Napoleon
IFN Findlay POI	11941 Twp. Rd. 108	Findlay
IFN Lima POI	5707 N. West St.	Lima
IFN Leased Rack Space(Head End)	19507 St Rt 501	Wapakoneta
IFN Byhalia Regen Only	19950 Turner Road	Richwood
IFN Worthington POI	535 Scherers Court	Columbus
IFN Columbus POI	180 E. Broad St.	Columbus
Arthur Mutual Telephone Company	21980 St. Rt. 637	Defiance
Ayersville Telephone Company	27932 Watson Rd.	Defiance
Bascom Mutual Telephone Company	5990 W. Tiffin St.	Bascom
Benton Ridge Telephone Company	140 E Main St.	Benton Ridge
Buckland Telephone Company	105 S Main St.	Buckland
Champaign Telephone Company	126 Scioto St.	Urbana
Farmers Mutual Telephone Company	N012 County Road 17D	Okolona
Ft. Jennings Telephone Company	65 W. Third St.	Ft. Jennings
Glandorf Telephone Company	135 S. Main St.	Glandorf
Kalida Telephone Company	121 E. Main St.	Kalida
Middle Point Home Telephone Company	106 1/2 E. Jackson St.	Middle Point
McClure Telephone Company	311 S. East St	McClure
Benton Ridge Telephone Company	911 Walnut St.	New Bavaria
New Knoxville Telephone Company	301 West South Street	New Knoxville
NorthwestNet Van Wert	1250 S. Washington Street	Van Wert
Ogden Telephone Company	4726 East Weston Road	Blissfield
Ottoville Mutual Telephone Company	245 W. Third St.	Ottoville
Ridgeville Telephone Company	S732 County Rd. 20B Box A	Ridgeville Corners
Sand Creek Telephone Company	6525 Sand Creek Highway	Sand Creek
Sherwood Mutual Telephone Association	105 W. Vine St.	Sherwood
Sycamore Telephone Company	104 East 7th Street	Sycamore
Telephone Service Company	2 Willipie Street	Wapakoneta
Vaughnsville Telephone Company	187 N. Water St	Vaughnsville
Wabash Communications	118 E. Market St	Celina
Wabash Mutual Telephone Company	6670 Wabash Rd	Celina
Waldron Telephone Company	115 South Main Street	Waldron
RTEC Express	725 S. Shoop Ave.	Wauseon

Table 1 - List of POPs





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This location and routing data was given to Sigma Technologies. Sigma's role is to provide the engineering services involved in designing, building, and implementation of the project. Myers Construction has agreed to be the lead contractor on the fiber construction. Together this partners are to provide and maintain a turnkey fiber network for the GigEPAC.

Sigma's approach uses proven processes, work control plans, and performance metrics. The application of advanced quality planning and project management body of knowledge methodically drives coordination of key deliverable and process details with associated assurance metrics.

Myers Construction is a proven company that has been installing telecommunication lines for 23 years from small companies to companies as large as AT&T. A detail of Sigma Technologies and Myers Construction backgrounds and Letters of Contract are attached in the auxiliary section of the Application.

A graph of the fiber network to be deploy by Sigma Technologies and Myers Construction can be seen in Figure 8.





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Figure 8 - Fiber Layout all 96 strand count with two strands light for each applicant

Optronics and Electronics

ComNet

Vendor Selection

ComNet considered Cisco, BTI, and Cyan for a DWDM Vender. The requirements were:





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- Robust mesh network
- Reasonable support costs.
- Capable of supporting 40 10G waves
- Integrated Metro Ethernet system for a switched 1G packet service.
- Central Management system.

Cyan Optics provides a DWDM system that matches these requirements, and was selected based upon its successful use by industry peers. Cyan networks are in active use at iRis networks, US Carrier, Great Plains Communications, and Great Lakes Com Net. The Cyan CyMS management system for controlling this multi-layer platform is an excellent way to optimize and manage the network.

Cisco will be used for the routing platform as an extension of the existing network.

DWDM and Ethernet Distribution Networks

40 channel DWDM will be placed at the distribution nodes with options of 1 Gbps to 10 Gbps connections. At the access nodes, a multitude of interfaces will be allowed to keep the network openness and availability.

DWDM allows for growth over time as the initial system is a 6 10G lambda with the ability to upgrade to 40 lambdas. DWDM equipment will be placed at every POP. The POP placements, distances, and requirements were given to Cyan. Cyan used that information to provide a network diagram. The Cyan Z33 card is used at most POPs, however when the slot count increased the Cyan Z77 is used to ensure the integrity of the network while accommodating demand.

DWDM Requirements

- Must support the capability to economically scale from 1 to 40 DWDM Channels
- Must be capable of WSS/ROADM functionality
- Must support a Line Amplifier
- Must support "un-keyed" SFPs and XFPs
- System must have automated amplifier balancing to facilitate graceful capacity upgrades

TDM Requirements

- Must support OTU and OTN transport
- Must support STS grooming
- Must support multiple OC48, OC12, OC3, GbE interfaces

Ethernet Requirements

- ITU/MEF EPL, EVPL and E-LAN services with local bridging between UNI-N and NNI port
- VLANs (802.1Q)
 - 4,094 VLANs w/independent VLAN learning
 - 16K VLAN translation (Ingress + Egress)





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- 4K Unique I-SIDs (service identifiers)
- Q-in-Q (802.1ad)
- MAC bridging (802.1D)
- 32K MAC Addresses
- PBB (Provider Backbone Bridging 802.1ah)
- PBB-TE (Provider Backbone Bridging - Traffic Engineering 802.1Qay) for COE
- 2K TESIs (traffic engineering service instances)
- Path level protection
 - 802.1Qay 1:1 protection w/ ITU-T 8031 APS messaging
 - Switch times < 50ms w/min of 256 protected ESPs
 - Spanning tree (802.1D), multiple spanning tree (802.1s), and Rapid Spanning Tree (802.1w) support
- Ethernet OAM (802.1ag)
- 512 MEPs (maintenance association end points)
- Link Aggregation (802.3ad)
- Metering granularity from 1 Mbps to 10 Gbps
 - 64 Kbps increments
- P-bit priority QoS (802.1p)
- 8 class of service queues per port
- Synchronous Ethernet based on the system synchronization

Software and Service Requirements

- Warranty must be for 5 years
- 48 Hour RMA is required for the length of the Warranty
- Must support a software licensing policy that is cost effective and include all system and EMS software
- Vendor EMS software should not have a high cost/complexity hardware component





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Figure 9 - DWDM Network layout





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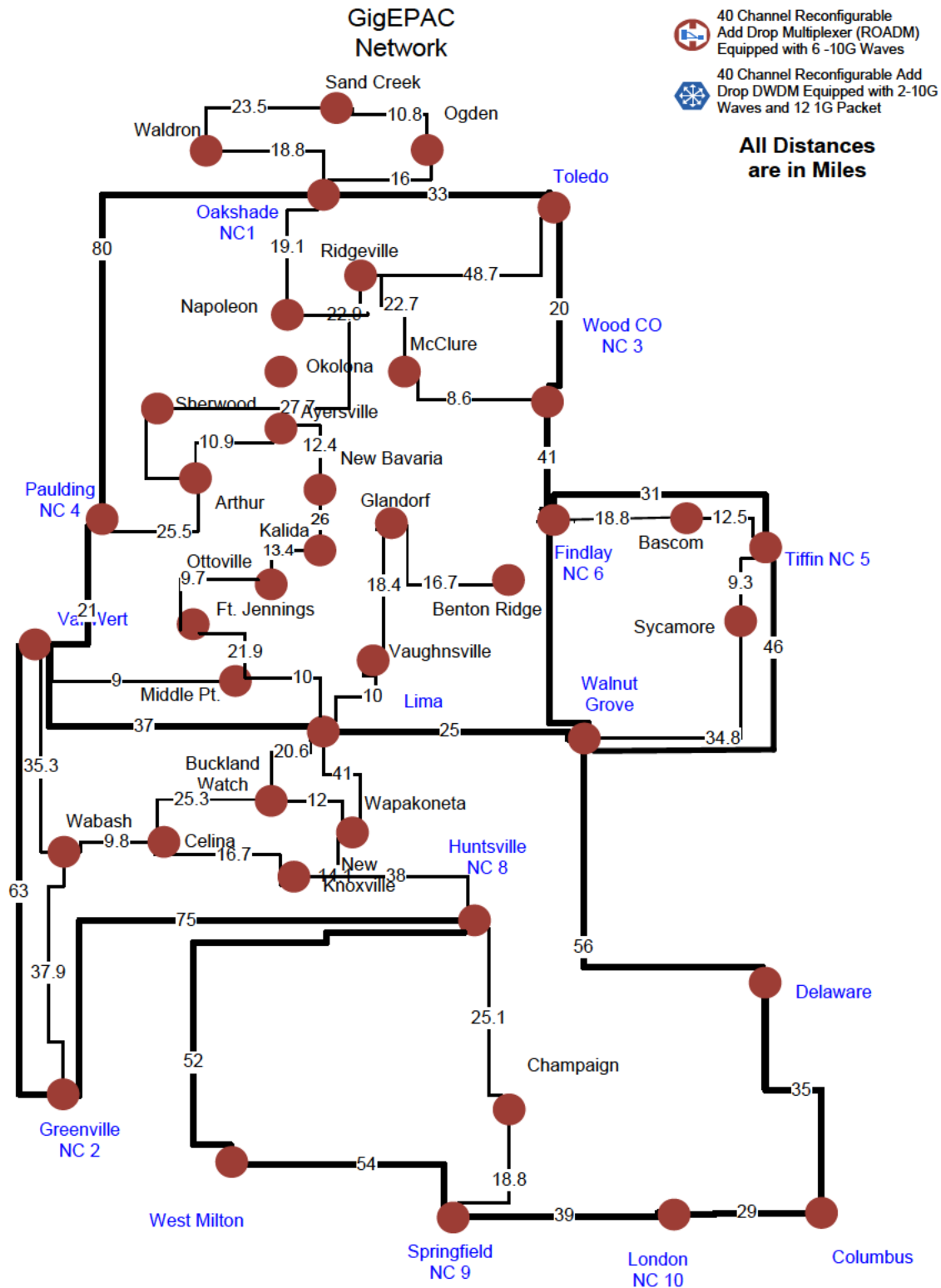


Figure 10 - Network Diagram with Distances





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Network Core

The core nodes are equipped with Cisco 7606 routers which will be used as Label Switch Routers (LSRs) in the MPLS cloud. These devices along with the Metro Ethernet systems integrated into the DWDM gear, provides an array of interconnection methodologies which can accommodate the variety of customers and service providers and their needs.

Each core router has a series of MPLS Virtual Router Forwarders (VRF) assigned on a customer-by-customer basis. The VRF contains the routing information unique to each specific customer, and is not accessible by any other VRF or core router function. The core MPLS is built on a multi-protocol BGP for tag exchange. The network will use VRF-specific OSPF, EIGRP, and static routing protocols to gain access to the border, access, and other core nodes.





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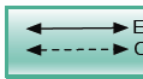


Figure 11 - ComNet IP network Core

Oarnet

OARnet requires Cisco 15454 DWDM equipment consistent with existing infrastructure and provides an upgrade path as articulated by the vendor. Upgrades to the MX480 Juniper routers in the core to supply services to the OMMC and is consistent with current architecture. All other requirements will use Cisco 3400M switch/routers to support middle mile connectivity.

Zayo

To extend its network Zayo Bandwidth requires Fujitsu 7420 8 Channel DWDM equipment in distributed between their facilities in Dayton, Columbus, Toledo, Hillsdale, Lima, and Richland, as well as four regeneration sites.





Connecting Appalachia Ohio Middle Mile Consortium System Design



Project Totals

The following list of equipment and services are needed to complete the network elements for the project partners.

	Total
Sigma Route Engineering-Staking-As Builts	\$
Fiber Route Construction Labor+Materials	\$
Construction Period Staffing-Shared	\$
Legal - Construction	\$
RR Permits (Private + Road ROW)	\$
Michigan DEQ	\$
Ohio State-City-County-Township-village Permits	\$
Pole Attachment Application Fees	\$
Pole Attachment Make Ready	\$
2 Fiber IRU Sugar Street to NOACSC	\$
CNI-BSP Ethernet NNI PRUs	\$
Capitalized Com Net Pre-Award Expenses	\$
Construction Period Staffing-NonShared	\$
Columbus CISCO 7606	\$
Watch Tower CISCO 7609	\$
Lima CISCO 7606	\$
Worthington CISCO 7606	\$
Billing System Database	\$
Plant Eng & Op Records iVUE	\$
Network Management System	\$
IFN Legacy Hut	\$
Land	\$
Hut-Generator-HVAC-Infrastructure	\$
In-Kind Match Wiltel IRU Fiber Unused Wave Capacity	\$
In-Kind Match BNG Fiber Routes	\$
In-Kind Match BNG Legacy Hut Occupancy	\$
Com Net New Route PoP Equipment	
DWDM Cyan Optics	\$
CISCO 7606 Switch/Route	\$
DWDM Cyan Optics - Lab Equipment	\$
Com Net Legacy PoP Equipment	
DWDM Cyan Optics	\$





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CISCO 10G Switch Newly Equipped PoPs	\$	
CISCO 10G Switch Upgrades	\$	
Sub-Recipient PoP Equipment		
Electronics/Optronics	\$	
Colo/Other	\$	
Light Dark Fiber: Lima to Hillsdale	\$	
Light Dark Fiber: Lima to Findlay	\$	
Backbone Upgrade: Wave Service	\$	
Backbone Upgrade: Wave Service	\$	
Backbone Upgrade: Wave Service	\$	
Backbone Upgrade: Wave Service	\$	
Mesh Upgrade: Phase II	\$	
Sub-Recipient In-Kind Match		
OARnet Mesh Upgrade: Phase I	\$	
Lima to Columbus Wave	\$	
Pre-Award Expenses		
Capitalized Oarnet Pre-Award Sub-Recipient Pass Through Exp	\$	
Totals for Proposal	\$ 42,904,268.00	

Table 2 - Total Project Costs

Implementation Timeline

This design has been declared feasible by Meyers Construction and Sigma Networking Group. They have attached letters of approval for the design, and will lead in the implementation of the project. The timeline charts are attached in the “CCI Build-Out Timeline.doc” attached file. The corrective action chart is listed below.

Corrective Action Planning	
This project will present many challenges that could cause delays, some expected challenges and our corrective action plan is:	
Challenge	Corrective Action
Material delays	aggressive preordering, suppliers obligated to ship dates
Weather	have available labor and equipment necessary to increase production to cover bad weather production decreases





Connecting Appalachia Ohio Middle Mile Consortium System Design



Permitting delays	define major issues in beginning of project and have all parties updated weekly as to progress, some progress must be made every week
Resource and time management	with 50 years of outside plant construction experience we feel we can manage this project

Table 3 - Correct Action Table



Napoleon	[REDACTED]								
Sand Creek	[REDACTED]								
Ogden	[REDACTED]								
Waldron	[REDACTED]								
Champaign	[REDACTED]								
West Milton	[REDACTED]								
Glandorf	[REDACTED]								
Spares	[REDACTED]								
Routing					\$0			\$0	
					\$0			\$0	
					\$0			\$0	
Transport					\$0			\$0	
					\$0			\$0	
					\$0			\$0	
Access					\$0			\$0	
					\$0			\$0	
					\$0			\$0	
Other					\$0			\$0	
					\$0			\$0	
OUTSIDE PLANT	[REDACTED]								
	[REDACTED]								
	[REDACTED]								
Fiber/Conduit/Materials - Myers Construction	[REDACTED]								
Ducts	[REDACTED]								
					\$0			\$0	
Poles					\$0			\$0	
					\$0			\$0	
					\$0			\$0	
Towers					\$0			\$0	
					\$0			\$0	
					\$0			\$0	
Repeaters	[REDACTED]								
Other	[REDACTED]								
Capitalized Pre-Award Costs	[REDACTED]								

Light Dark Fiber: Lima to Hillsdale
 Light Dark Fiber: Lima to Findlay
 Backbone Upgrade: Wave Service
 Backbone Upgrade: Wave Service
 Backbone Upgrade: Wave Service
 Backbone Upgrade: Wave Service
 Mesh Upgrade: Phase II
 OARnet Mesh Upgrade: Phase I
 Lima to Columbus Wave
 Capitalized Pre-Award Cost



				\$0					
								\$0	
				\$0				\$0	

SF-424C Cross-check Totals	
1. Admin and Legal	\$0
2. Land, structures	\$0
3. Architectural and engr.	\$0
5. Other archit. And engr.	\$0
6. Inspection fees	\$0
7. Site work	\$0
8. Demolition/removal	\$0
9. Construction	\$0
10. Equipment	\$0
11. Misc.	\$0

Matching Contribution Cross-check Totals	
Federal Funding Request	\$0
Cash Match contribution	\$0
In-kind Match Contribution	\$0

**BTOP Proposal Budget Summary
GigEPAC-OMMC
Grant Request vs. OARnet Match**

	Grant Request		OARnet Match		Description
	%	Amount	%	Amount	
Equipment Purchases					
Light Dark Fiber: Lima to Hillsdale	70%	\$	30%	\$	Capital Budget Cash Match
Light Dark Fiber: Lima to Findlay	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Serv	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Serv	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Serv	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Serv	70%	\$	30%	\$	Capital Budget Cash Match
Mesh Upgrade: Phase I	70%	\$	30%	\$	Capital Budget Cash Match
Capital Risk Wave Services					
Lima to Columbus	70%	\$	30%	\$	Program Income - Cash Match
Pre Award Expenses	70%	\$	30%	\$	Program Income - Cash Match
total for Proposal	70%	\$	50%	\$	
In Kind					
In Kind Match					
Mesh Upgrade: Phase I	0%	\$	100%	\$	In-Kind Match: Equipment Recently Purchased
total In Kind	0.0%	\$	100.0%	\$	
total ARRAYS OP OARnet Participate	47.0%	\$	52.0%	\$	

92255	0.7	3	578.5	0.3	1	7676.5	x		
25	625	0.7	178237.5	0.3	76387.5	x			
193167	0.7	135216.9	0.3	57950.1	x				
39	0	0.7	30758	0.3	13182	x			
39	0	0.7	30758	0.3	13182	x			
1679	7	0.7	117562.9	0.3	5038.1	x			
1206	9	0.7	8	5	5.8	0.3	3619	8.2	x

THIS HAS TO BE OFFSET BY CN1
RUID WAVE Lima-to-Hillsdale (Adjust #
of Years to create a wash



**BTOP Proposal Budget Summary
GigEPAC-OMMC**

Request

			Grant Request		Match		Description
			%	Amount	%	Amount	
Sigma Route Engineering-Staking-As Builts	9	\$	76%	\$	24%	\$	Capital Budget Cash Match
Fiber Route Construction Labor+Materials	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
Construction Period Staffing-Shared	7	\$	76%	\$	24%	\$	Capital Budget Cash Match
Legal - Construction	7	\$	76%	\$	24%	\$	Capital Budget Cash Match
RR Permits (Private + Road ROW)	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
Michigan DEQ	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
Ohio State-City-County-Township-village Permits	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
Pole Attachment Application Fees	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
Pole Attachment Make Ready	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
2 Fiber IRU Sugar Street to NOACSC	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
CNI-BSP Ethernet NNI PRUs	2	\$	76%	\$	24%	\$	Capital Budget Cash Match
Capitalized Com Net Pre-Award Expenses	7	\$	70%	\$	30%	\$	Program Income - Cash Match
Construction Period Staffing-NonShared	7	\$	76%	\$	24%	\$	Capital Budget Cash Match
Columbus CISCO 7606	1	\$	0%	\$	100%	\$	In-Kind Match
Watch Tower CISCO 7609	1	\$	0%	\$	100%	\$	In-Kind Match
Lima CISCO 7606	1	\$	0%	\$	100%	\$	In-Kind Match
Worthington CISCO 7606	1	\$	0%	\$	100%	\$	In-Kind Match
Billing System Database	5	\$	0%	\$	100%	\$	In-Kind Match
Plant Eng & Op Records IVUE	5	\$	70%	\$	30%	\$	Capital Budget Cash Match
Network Management System	5	\$	70%	\$	30%	\$	Capital Budget Cash Match
FN Legacy Hut	2	\$	0%	\$	100%	\$	In-Kind Match
Land	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Hut-Generator-HVAC-Infrastructure	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
In-Kind Match Witel IRU Fiber Unused Wave Capacity	2	\$	0%	\$	100%	\$	In-Kind Match
In-Kind Match BNG Fiber Routes	2	\$	0%	\$	100%	\$	In-Kind Match
In-Kind Match BNG Legacy Hut Occupancy	2	\$	0%	\$	100%	\$	In-Kind Match
Com Net New Route PoP Equipment							
DWDM Cyan Optics	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
CISCO 7606 Switch/Route	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
DWDM Cyan Optics - Lab Equipment	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
Com Net Legacy PoP Equipment							
DWDM Cyan Optics	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
CISCO 10G Switch Newly Equipped PoPs	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
CISCO 10G Switch Upgrades	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
Sub-Recipient PoP Equipment							
Electronics/Optronics	1	\$	70%	\$	30%	\$	Capital Budget Cash Match
Colo/Other	3	\$	70%	\$	30%	\$	Capital Budget Cash Match
Light Dark Fiber: Lima to Hillsdale	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Light Dark Fiber: Lima to Findlay	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Service	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Service	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Service	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Backbone Upgrade: Wave Service	2	\$	70%	\$	30%	\$	Capital Budget Cash Match
Mesh Upgrade: Phase II	1	\$	52%	\$	30%	\$	Capital Budget Cash Match
Sub-Recipient In-Kind Match							
OARnet Mesh Upgrade: Phase I	1	\$	0%	\$	100%	\$	In-Kind Match: Equipment Recently Purchased

Lima to Columbus Wave		\$	[REDACTED]	70%	\$	[REDACTED]	30%	\$	[REDACTED]	In-Kind Match
Pre-Award Expenses										
Capitalized Earned Pre-Award Sub-Recipient Pass Through		\$	[REDACTED]	70%	\$	[REDACTED]	30%	\$	[REDACTED]	Program Income - Cash Match
Totals for Proposal		\$	[REDACTED]	70%	\$	[REDACTED]	30.00%	\$	[REDACTED]	\$

Service Element	Service Element
5 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	5 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
10 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	10 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
20 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	20 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
50 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	50 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
100 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	100 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
250 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	250 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
500 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
100 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	100 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
250 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	250 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
500 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-SubF 2-way NNI based on BSP long term fiber lease, long time Managed Wave and/or	
1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-SubF 2-way NNI based on BSP long term fiber lease, long time Managed Wave and/or	
1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-SubF 2-way NNI and meet in revenue neutral location with each party pickir	
500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60	
1 Gig Middle Mile Ethernet Aggregation Port-Hub Connection 60-M	
500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60	

500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 M

1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 M

1Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 M

1 Gig Sub-Recipient/3rd Party Provider Network-to-Net

100 Meg Middle-Mile Ethernet InterPoP
Transport Service - 60 Month Term

100 Meg Middle-Mile Ethernet Aggregation
Port-Hub Connection 60 Month Term (Com
M - PCP)

500 Meg Sub-Recipient/3rd Party Provider Network-to-Net

100 Meg Middle-Mile Ethernet InterPoP
Transport Service - 60 Month Term

100 Meg Middle-Mile Ethernet Aggregation
Port-Hub Connection 60 Month Term (Com
M - PCP)

Served by 3rd Party GigEPAC Broadband Service Provide

Service Element	Customer Type	Year 0	Cumulative/ Net Add	YEA	
				Q1	Q2
5 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
10 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
20 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
50 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	5
			Net Add	0	5
250 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
500 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation	Commercial-Industrial Parks	0	Cumulative	0	0
			Net Add	0	0
250 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation	Commercial-Industrial Parks	0	Cumulative	0	0
			Net Add	0	0
500 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation	Commercial-Industrial Parks	0	Cumulative	0	0
			Net Add	0	0
Recip-100% Discount based on agreement to use as a long term Managed Ethernet Terminal)	Last Mile Interstate Network	0	Cumulative	1	1
			Net Add	1	0
Recip-100% Discount based on agreement to use as a long term Managed Ethernet Terminal)	Last Mile GigEPAC Broadband Service	0	Cumulative	1	1
			Net Add	1	0
Recip-100% Discount based on agreement to use as a long term Managed Ethernet Terminal)	Anchor Institution - Higher Ed (OARnet)	0	Cumulative	1	1
			Net Add	1	0
Month Term (Com Net-AI)	Anchor Institution - K-12 (ITCs)	0	Cumulative	0	0
			Net Add	0	0
Month Term (Com Net-AI)	Anchor Institution - K-12 (ITCs)	0	Cumulative	0	0
			Net Add	0	0
Month Term (Com Net-AI)	Anchor Institution -	0	Cumulative	1	1

Month Term (Com Net-AI)	Public Safety (PSAP M-BSG)	0	Net Add	1	0
Month Term (Com Net-AI)	Anchor Institution- Health Care	0	Cumulative	1	1
			Net Add	1	0
Month Term (Com Net-AI)	Anchor Institution- Government	0	Cumulative	1	1
			Net Add	1	0
Work Interface	New BSP Last Mile Providers & Virtual Aggregation	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation	New BSP Last Mile Providers & Virtual Aggregation	0	Cumulative	0	0
			Net Add	0	0
Network Interface	Carrier-to-Carrier	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation	Carrier-to-Carrier	0	Cumulative	0	0
			Net Add	0	0
Users Participants	Indirect Residential/	62272	Cumulative	62283	62444
			Net Add	11	161
	Indirect Businesses	13674	Cumulative	13845	14016
			Net Add	171	171
	Indirect Industrial Parks	3	Cumulative	3	3
			Net Add	0	0
	Indirect CAls	135	Cumulative	135	137
			Net Add	0	2

0	0		0	0	0	0	0	0
1	1	1	1	1	1	2	2	2
0	0		0	0	0	1	0	0
1	1	1	1	1	1	2	2	2
0	0		0	0	0	1	0	0
0	1	1	1	1	1	2	2	2
0	1		0	0	0	1	0	0
2	2	2	4	4	6	6	8	8
2	0		2	0	2	0	2	0
0	0	0	0	0	0	0	0	0
0	0		0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0		0	0	0	0	0	0
62906	63517		64131	64851	65745	66693	67827	69061
462	611		614	720	894	948	1134	1234
14187	14358		14681	15004	15327	15650	16119	16589
171	171	14681	323	323	323	323	469	470
4	4		5	5	6	7	8	9
1	1		1	0	1	1	1	1
150	166		200	287	374	461	549	637
13	16		34	87	87	87	88	88

0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0
2	3	3	3	3	3	3	3	3
0	1	0	0	0	0	0	0	0
11	11	14	14	18	18	20	20	21
3	0	3	0	4	0	2	0	1
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
70444	72028	73679	75430	77280	79231	81408	83877	86354
1383	1584	1651	1751	1850	1951	2177	2469	2477
17059	17528	18229	18930	19632	20333	21248	22163	23078
470	469	701	701	702	701	915	915	915
11	12	13	15	16	17	18	19	21
2	1	1	2	1	1	1	1	2
725	810	880	940	1000	1055	1090	30	1115
88	85	70	60	60	55	35	30	25

0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0
3	3	3	3	3	3	3	3	3
0	0	0	0	0	0	0	0	0
21	24	24	24	25	28	28	29	29
0	3	0	0	1	3	0	1	0
0	1	1	1	1	3	3	3	3
0	1	0	0	0	2	0	0	0
0	1	1	2	2	4	4	6	6
0	1	0	1	0	2	0	2	0
88779	90814	92689	94363	95838	97176	98413	99551	100588
2425	2035	1875	1674	1475	1338	1237	1138	1037
23993	24952	25911	26920	27832	28667	29502	30337	31172
915	959	959	1009	912	835	835	835	835
22	23	25	26	27	28	28	29	30
1	1	2	1	1	1	0	1	1
1137	1161	1189	1223	1261	1305	1356	1411	1473
22	24	28	34	38	44	51	55	62

YEAR 8			
Q1	Q2	Q3	Q4
49	49	51	50
3	0	2	-1
1	1	1	2
0	0	0	1
18	18	18	18
6	0	0	0
1	1	1	1
0	0	0	0
58	58	58	56
-1	0	0	-2
8	8	8	10
1	0	0	2
2	2	2	2
1	0	0	0
21	21	21	20
0	0	0	-1
6	6	6	7
2	0	0	1
0	0	0	0
0	0	0	0
3	3	3	3
0	0	0	0
3	3	3	3
0	0	0	0
3	3	3	3
0	0	0	0
0	0	0	0
0	0	0	0
2	2	2	2
0	0	0	0
1	1	1	1

0	0	0	0
2	2	2	2
0	0	0	0
2	2	2	2
0	0	0	0
3	3	3	3
0	0	0	0
33	33	33	34
4	0	0	1
6	6	6	6
3	0	0	0
9	9	12	12
3	0	3	0
101496	102204	102712	103020
908	708	508	308
31639	32106	32574	33042
467	467	468	468
30	31	32	32
0	1	1	0
1530	1582	1633	1686
57	52	51	53

Service Element	Service Element
5 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	5 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
10 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	10 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
20 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	20 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
50 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	50 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
100 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	100 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
250 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	250 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
500 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
100 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	100 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
250 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	250 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
500 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)

1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-SubF

2-way NNI based on BSP long term fiber lease, long time Managed Wave and/or

1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-SubF
2-way NNI based on BSP long term fiber lease, long time Managed Wave and/or

1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-SubF
2-way NNI and meet in revenue neutral location with each party pickir

500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60

1 Gig Middle Mile Ethernet Aggregation Port-Hub Connection 60-M

500 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60

1 Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 M

1Gig Middle-Mile Ethernet Aggregation Port-Hub Connection 60 M

1 Gig Sub-Recipient/3rd Party Provider Network-to-Net

100 Meg Middle-Mile Ethernet InterPoP
Transport Service - 60 Month Term

100 Meg Middle-Mile Ethernet Aggregation
Port-Hub Connection 60 Month Term (Com
Net-BSP)

500 Meg Sub-Recipient/3rd Party Provider Network-to-Net

100 Meg Sub-recipient/3rd Party Provider Network-10-14

100 Meg Middle-Mile Ethernet InterPoP Transport Service - 60 Month Term	100 Meg Middle-Mile Ethernet Aggregation Port-Hub Connection 60 Month Term (Com Net-BSP)
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Served by 3rd Party GigEPAC Broadband Service Provide

Service Element	Customer Type	Year 0	Cumulative/ Net Add	YEA	
				Q1	Q2
5 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
10 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
20 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
50 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	5
			Net Add	0	5
250 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
500 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Anchor Institutions	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Commercial-Industrial Parks (Economic Development)	0	Cumulative	0	0
			Net Add	0	0
250 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Commercial-Industrial Parks (Economic Development)	0	Cumulative	0	0
			Net Add	0	0
500 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Commercial-Industrial Parks (Economic Development)	0	Cumulative	0	0
			Net Add	0	0
recip-100% Discount based on agreement to use as	Last Mile Interstate Network	0	Cumulative	1	1
			Net Add	1	1

long term Managed Ethernet Terminal)	Operator Sub-Recipient Service Provider Partners	0	Net Add	1	0
Recipient-100% Discount based on agreement to use as long term Managed Ethernet Terminal)	Last Mile GigEPAC Broadband Service Provider Partners	0	Cumulative	1	1
			Net Add	1	0
Recipient-100% Discount based on agreement to use as long up fair share cost to meet)	Anchor Institution - Higher Ed (OARnet - Sub-Recipient)	0	Cumulative	1	1
			Net Add	1	0
Month Term (Com Net-AI)	Anchor Institution - K-12 (ITCs)	0	Cumulative	0	0
			Net Add	0	0
Month Term (Com Net-AI)	Anchor Institution - K-12 (ITCs)	0	Cumulative	0	0
			Net Add	0	0
Month Term (Com Net-AI)	Anchor Institution - Public Safety (PSAP - MARCS)	0	Cumulative	1	1
			Net Add	1	0
Month Term (Com Net-AI)	Anchor Institution - Health Care	0	Cumulative	1	1
			Net Add	1	0
Month Term (Com Net-AI)	Anchor Institution - Government	0	Cumulative	1	1
			Net Add	1	0
Work Interface	New BSP Last Mile Providers & Wireless Carriers	0	Cumulative	0	0
			Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	New BSP Last Mile Providers & Wireless Carriers	0	Cumulative	0	0
			Net Add	0	0
Network Interface	Carrier-to-Carrier	0	Cumulative	0	0

NETWORK INTERFACE	CARRIER-TO-CARRIER	0	Net Add	0	0
100 Meg Last Mile Broadband Service Provider Mid-Mile Virtual Ethernet Virtual Aggregation Connection, Ethernet Port and Last Mile Fiber	Carrier-to-Carrier	0	Cumulative	0	0
			Net Add	0	0
ers Participants	Indirect Residential/ Individual	62272	Cumulative	62283	62444
			Net Add	11	161
	Indirect Businesses	13674	Cumulative	13845	14016
			Net Add	171	171
	Indirect Industrial Parks	3	Cumulative	3	3
			Net Add	0	0
	Indirect CAls	135	Cumulative	135	137
			Net Add	0	2

R 1			YEAR 2				YEA	
Q3	Q4		Q1	Q2	Q3	Q4	Q1	Q2
3	5	5	5	10	10	14	14	22
3	2	0	0	5	0	4	0	8
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	1	1	1	1	1	1	1	1
0	1	0	0	0	0	0	0	0
8	11	11	15	17	24	26	30	30
3	3	0	4	2	7	2	4	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
2	3	3	5	5	8	8	10	10
2	1	0	2	0	3	0	2	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
1	1	1	2	2	2	2	3	3

0	0		0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0		0	0	0	0	0	0
62906	63517		64131	64851	65745	66693	67827	69061
462	611		614	720	894	948	1134	1234
14187	14358		14681	15004	15327	15650	16119	16589
171	171	14681	323	323	323	323	469	470
4	4		5	5	6	7	8	9
1	1		1	0	1	1	1	1
150	166		200	287	374	461	549	637
13	16		34	87	87	87	88	88

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
70444	72028	73679	75430	77280	79231	81408	83877	86354
1383	1584	1651	1751	1850	1951	2177	2469	2477
17059	17528	18229	18930	19632	20333	21248	22163	23078
470	469	701	701	702	701	915	915	915
11	12	13	15	16	17	18	19	21
2	1	1	2	1	1	1	1	2
725	810	880	940	1000	1055	1090	30	1115
88	85	70	60	60	55	35	30	25

0	0	0	0	0	0	0	0	0	0
3	3	3	3	3	3	3	3	3	3
0	0	0	0	0	0	0	0	0	0
3	3	3	3	3	3	3	3	3	3
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	0	0
0	0	0	0	0	0	0	0	-1	0
1	1	1	1	1	1	1	1	2	2
0	0	0	0	0	0	0	0	1	0
1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0	0
3	3	3	3	3	3	3	3	3	3
0	0	0	0	0	0	0	0	0	0
21	24	24	24	25	28	28	29	29	29
0	3	0	0	1	3	0	1	0	0
0	1	1	1	1	3	3	3	3	3

0	1	0	0	0	2	0	0	0
0	1	1	2	2	4	4	6	6
0	1	0	1	0	2	0	2	0
88779	90814	92689	94363	95838	97176	98413	99551	100588
2425	2035	1875	1674	1475	1338	1237	1138	1037
23993	24952	25911	26920	27832	28667	29502	30337	31172
915	959	959	1009	912	835	835	835	835
22	23	25	26	27	28	28	29	30
1	1	2	1	1	1	0	1	1
1137	1161	1189	1223	1261	1305	1356	1411	1473
22	24	28	34	38	44	51	55	62

YEAR 8			
Q1	Q2	Q3	Q4
49	49	51	50
3	0	2	-1
1	1	1	2
0	0	0	1
18	18	18	18
6	0	0	0
1	1	1	1
0	0	0	0
58	58	58	56
-1	0	0	-2
8	8	8	10
1	0	0	2
2	2	2	2
1	0	0	0
21	21	21	20
0	0	0	-1
6	6	6	7
2	0	0	1
0	0	0	0
0	0	0	0
3	3	3	3

0	0	0	0
3	3	3	3
0	0	0	0
3	3	3	3
0	0	0	0
0	0	0	0
0	0	0	0
2	2	2	2
0	0	0	0
1	1	1	1
0	0	0	0
2	2	2	2
0	0	0	0
2	2	2	2
0	0	0	0
3	3	3	3
0	0	0	0
33	33	33	34
4	0	0	1
6	6	6	6

3	0	0	0
9	9	12	12
3	0	3	0
101496	102204	102712	103020
908	708	508	308
31639	32106	32574	33042
467	467	468	468
30	31	32	32
0	1	1	0
1530	1582	1633	1686
57	52	51	53