

GO Committee #2
October 22, 2015

Worksession

MEMORANDUM

October 20, 2015

TO: Government Operations and Fiscal Policy Committee
FROM: Dr. Costis Toregas, Council IT Adviser *CTM*
SUBJECT: Update – FiberNet Network Operations Center

The following are expected to attend:

Sonny Segal, Chief Information Officer, Department of Technology Services
Dieter Klinger, Chief Operating Officer, Department of Technology Services
John Castner, FiberNet Project Manager, Department of Technology Services
Representative(s), Office of Management and Budget
ITPCC Agency Chief Information Officers may be in attendance

Summary of Staff Recommendations:

1. Voice support for the accelerated implementation of the fully configured NOC as detailed in the NOC status briefing on ©1-13.
2. Encourage DTS to complete the project plan before the end of 2015 rather than March 2016 as currently scheduled (see ©12). It is a vital planning document that should be available quickly to guide all decisions for MCG and its partners.
3. Clarify plans for the actual location/co-location of the NOC.
4. Continue to support the ITPCC's strong role in the planning, funding, and deployment of FiberNet and other broadband technologies that can provide stronger linkages to residents, visitors, and businesses of the County.

Background

FiberNet represents the County's major investment in high speed, high capacity fiber links between governmental locations and other vital points. Since 1996, more than \$61 million has been invested in this network that currently connects over 300 schools, public safety facilities, and traffic lights throughout the County.

To manage this complex program and ensure strong performance, the FY16 budget has appropriated significant new resources from the Cable Plan to develop and implement a Network Operating Center (NOC). Even in a difficult financial environment, the Executive has found a way to fund a strong NOC while including not only a call-taking capability but a future, forward-seeking capacity to investigate the network for faults and balance the capacity and performance of the network. The update report on ©1-13 details this accelerated implementation of the NOC.

Organizationally, FiberNet and the new NOC are guided by the ITPCC's CIO subcommittee, which represents all major agencies of the County. These CIOs are vital to the success of the network, and their vision ensures that the system will serve all agencies. They make explicit both their strong support for FiberNet and the accelerated implementation of the NOC (see ©14-18). Their input should continue to be considered that of vital stakeholders and partners in the process, and sought early in the implementation cycle.

The location of the NOC is an important element that needs additional clarity. The original plans called for co-location with the Traffic Management Center (TMC) (which controls traffic throughout the County), one of the many vital functions FiberNet is called upon to support. This action, endorsed by the Committee, was later replaced by a call center location where the County's own Help Desk is located, something that does not have the geographic focus of the TMC. It will be important for the Committee to understand the final decisions around the NOC location early.

Once the NOC is completed, FiberNet itself can begin to offer reliable services to its partners (with a quality of service for which they articulate a need) through designated and approved service level agreements (SLAs), and engage other potential users (federal agencies and other research institutions with a need for the quality and speed possessed by FiberNet).



FiberNet NOC Status Briefing

GO Committee

October 22, 2015



Agenda

- Scope & Status
- NOC Operations & Resource Allocations
- Budget Projections
- High Level Timeline
- Next Steps

October 22, 2015

2

2

2



FiberNet Network Operations Center (NOC) & Network Management System (NMS) Scope & Status (1)

- MCG is standing up a full-function (FCPS-compliant) NOC (FCPS is Fault, Configuration, Performance, Security)
 - ISO standards identify FCPS guidelines but no service level metrics
 - Organizations must adapt to FCPS guidelines dependent on business case
- NMS is the critical tool to enable the NOC
 - NMS required to facilitate a proactive NOC by providing visibility into the real-time status of strategic network components
 - Configuration of the NMS is underway; expected completion in early FY17
- NOC staffing is critical to 24/7 operation
 - Eight (8) FTEs have been added since inception, including a NOC Supervisor; total sixteen (16) staff (8 NOC, 8 FiberNet)
- DTS's Network Services Team is ideally positioned and suited to support Network Operations and Network Management Services
 - NOC/NMS is the foundation required to grow business functions (e.g., ultraMontgomery)
 - NOC/NMS supports operational function, and will evolve to support higher level business functions
- Initial NOC/NMS phases conducive to leveraging organizational synergies
- Functions are phased in to evolve, e.g., network load balancing, predictive maintenance



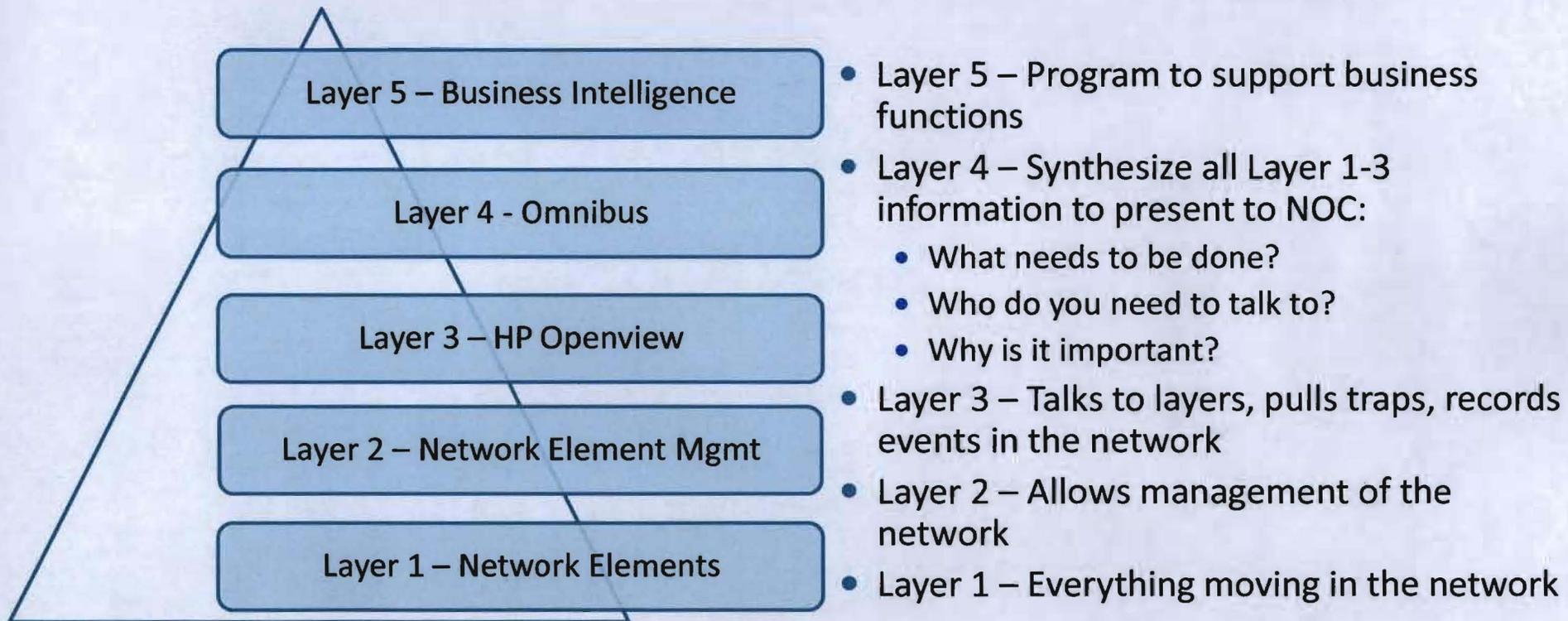
FiberNet Network Operations Center (NOC)

Scope & Status (2)

FAULT (F)	Configuration (C)	Performance (P)	Security (S)
Service Call Intake ✓	Network Provisioning ✓	Performance Data Collection	Security Audit (enforce security protocols)
Fault Detection ✓	Change Management	Performance Data Analysis	
Fault Isolation	Remote Configuration	Capacity Planning	Security in FiberNet Core
Alarm Handling ✓	Configuration Management	Utilization & Error Rates	
Alarm Correlation		Maintaining & Examining Historical Logs (FiberNet I, EISO)	
Alarm Filtering ✓		Performance Data & Exception Reporting (Ad Hoc)	
Alarm Clearing ✓			
Impact Analysis		Root Cause Analysis	
Event Enrichment		Troubleshooting	
Escalations ✓			
Diagnostic Tests ✓	Blue Check Marks – Service in place as of October 1, 2015 Blue – Part of NOC/NMS Implementation with FT NOC Supervisor Yellow – Currently handled by DTS Network Services; to be transitioned to NOC/NMS as NOC evolves Dotted – Future implementation		
Problem Analysis ✓			
Manager of Managers			



FiberNet NOC Operations & Resource Allocations (1)





FiberNet NOC Operations & Resource Allocations (2)

Layer 5 – Business Intelligence: *Future Functionality*

Layer 4 (**NOC Supervisor**) – Manages NOC staff, ensuring staffing and emergency responses; SME for NOC Operators; has knowledge of NOC Operators and holistic view of NOC Engineers

Layer 3 (**NOC Engineers**) – Supports NOC Operators; has detailed understanding of all NOC software

Layer 2 (**NOC IT Analysts**) – Supports NOC Engineers, Operators, and Business Customers; has detailed understanding of application configuration, optimization, interfaces, and supports device mgt. and integration

Layer 1 (**NOC Operators**) – Provides 24 x 7 coverage; has intimate knowledge of monitored devices, interaction of IT and PD systems, diagnostics, troubleshooting and service call intake



FiberNet NOC Operations & Resource Allocations (3)

Layer 5 – Business Intelligence: *Future Functionality*

Layer 4 NOC Supervisor – **1 Contractor** in place (*Work Plan in Review*)

Layer 3 NOC Eng – **3 DTS Staff** (*also supporting FiberNet buildout and MCG PS, Network Design, WiFi*)

Layer 2 NOC IT Analysis – **5 DTS Staff** (*also supporting FiberNet buildout and MCG WiFi*)

Layer 1 NOC Operators – **4 Contractors & 3 DTS Staff** (*additional training on knowledge of network, labor contract issues enabling shift work scheduling; and 2 network field techs to be added in FY17, pending budget and development of work plan by NOC Supervisor*)



Recent NOC Progress

- Implemented 24/7 fault management functions on schedule on October 1, 2015
- Extended services of an expert NOC Supervisor
- Drafted a Concept of Operations to justify the creation of a FiberNet NOC
- Established a high-level and then a mid-level detail milestone schedule plan for NOC establishment and Initial Operation Capability (IOC) execution.
- Outlined and recommended individual government actions necessary to support a fulltime NOC operation.
- Added eight (8) FTEs to NOC
- Initiated actions to establish NOC support systems to organize and maintain FiberNet
 - NMS requirements analysis and definition
 - NOC location creation
 - SharePoint creation for logging and configuration management
- Provided and conducted NOC Watch Officer training plan
- Provided initial draft Standard Operating Procedures (SOPs) to be used by the NOC

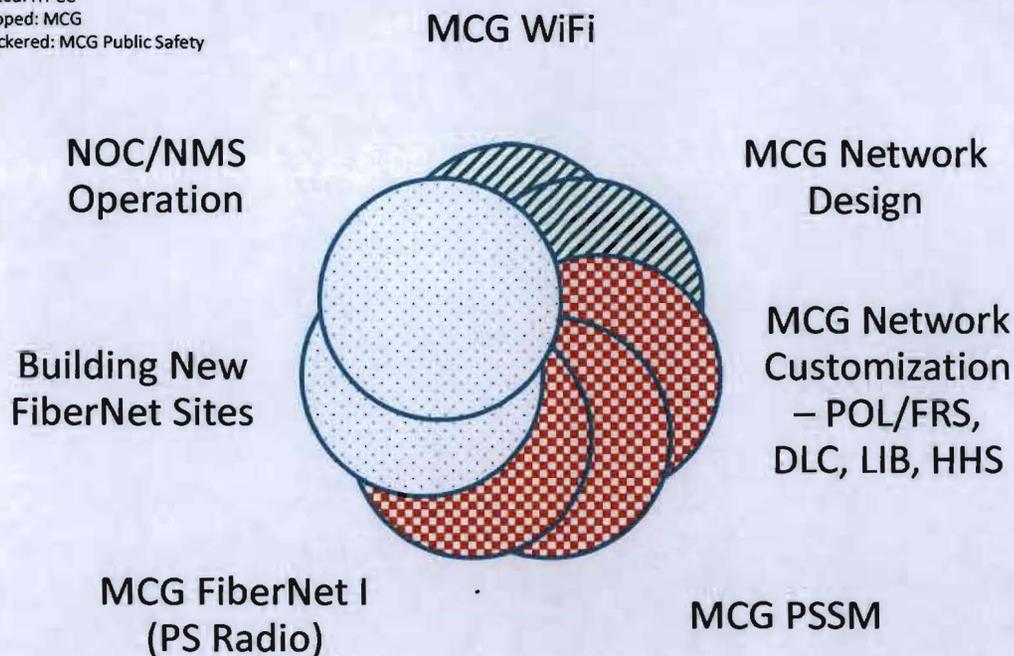
October 22, 2015





DTS FiberNet Staffing Allocation

Dotted: ITPCC
Stripped: MCG
Checked: MCG Public Safety



- 8 DTS FiberNet staff supporting NOC/NMS are also supporting:
 - ITPCC New FiberNet Sites
 - MCG WiFi
 - MCG Network Design
 - MCG Network Customization
 - MCG PS
 - POL/FRS Network Customization
 - PSSM Implementation
 - FiberNet I (PS Radio)
- Adding Technical Project Managers will balance the workload & allow efficient evolution of the NOC/NMS



NOC Budget Projections

- October 1, 2015
 - Appropriation \$728,900
 - Encumbered \$457,560
- November 1, 2015 (Projected)
 - Appropriation \$728,900
 - Encumbered \$700,000
- July 1, 2016 (Requested)
 - Appropriation \$910,000



High-level Timeline

- Continue on plan reported to GO Committee on October 1, 2015
 - SLAs negotiated - October 31, 2015
 - Phase 3 - Full 24x7, SLA-based (fault, configuration/change management) operation - March 1, 2016
 - NMS Configured and Operational - July 1, 2016
 - Integration with other NOCs accomplished - December 1, 2016



Next Steps (1)

- Review NOC progress and plans with ITPCC agencies
 - Explore synergies and in-kind participation
 - Accelerate NMS configuration
 - Share responsibilities across agency NOCs
- Accelerate NMS configuration
- Train NOC staff
- Continue to develop cohesive Level 1 and Level 2 team between the NOC staff and the network engineering staff
 - Allow the NOC to handle all future Authorized Service Interruptions (ASIs)
 - Ensure NOC involvement in releasing field engineers from installation and outage responses before they are allowed to depart the affected sites
- Establish a milestone/project plan to achieve Final Operating Capability by March 2016



Next Steps (2)

- Develop and implement configuration management plan now that the NOC has achieved IOC
- Establish a Configuration Control Board to approve all future major network configuration management changes
- Future and current FiberNet documentation must be better populated and managed using the NOC as the center piece in maintaining the network configurations
 - Modify and approve existing draft SOPs for NOC operations to follow
- Establish network performance measures
 - Include number of critical business functions supported; including Federal/intergovernmental contracts
- Develop an internal network security plan
- Integrate new MRV DWDM system into NOC operations
 - Initially read-only capability to allow NOC visibility into this network

October 19, 2015

ITPCC Agency perspectives on FiberNet and its Network Operating Center (NOC)

Submitted by each Agency's Chief Information Officer (CIO)

MC- Carl Whitman

Montgomery College continues to support the creation and maintenance of a fully functional Network Operations Center (NOC), implemented in accordance with industry standards and recognized best practices. The need for a NOC extends well beyond today's daily operational considerations. Our commitment to a NOC supports the longer term strategic aspirations that were contemplated in the original charge of the Interagency Technology Policy and Coordination Committee (ITPCC) and its FiberNet Governance Group, and leads directly to the current interest in County Executive Leggett's promotion of ultraMontgomery, a technology-based, multi-year, economic development initiative.

Collectively, the ITPCC has agreed to build a team and program that supports FiberNet. This effort is meant to include additional engineering, supervisory, and project support positions. The NOC is just one part of a strategy to help regain trust in the network and lay the foundation for future expansion into additional services (and potentially, "customers"). Unfortunately, it seems that the emphasis on the term "NOC" has become a distraction to achieving FiberNet's greater potential. The vision is to create the foundation for an organization that will encourage the six ITPCC members to leverage the network's capability to support individual or shared applications that are not dependent on costly commercial vendors.

Looking beyond the ITPCC agencies, the County has not begun to realize the full value of FiberNet, and it will not, without making a full commitment to the management of the network and creatively investing in the next stage of its development. As one example of the possibilities, our neighbors in Washington D.C. have used their version of FiberNet to create the DC Community Access Network, which brings affordable broadband services to over 250 health, educational, public safety and other community anchor institutions with a focus on underserved areas of the city.

As I've said on other occasions, FiberNet must be considered a County priority, and recognized as a strategic resource that is of far more significance than being just one aspect of the County's daily operations.

MCPS- Sherwin Collette

Several years ago, Montgomery County Public Schools made a commitment to partner with other member agencies of the Interagency Technology Policy and Coordination Committee (ITPCC) to extend and jointly govern the county's still fledging fiber optic network. We did so despite the fact that there were other private options, that even then, offered suitable price and performance options with which we could grow. Despite operational challenges we all agreed to stay the course and the heads of the ITPCC agencies confirmed this commitment in signing a governance charter.

Over the recent past the FiberNet network has undergone dramatic growth—with over 600 miles of fiber connecting nearly 400 ITPCC member agency sites, and just over 1000 traffic or public safety cameras to the fiber network. At the same time, we have had fewer designated county staff to support the core network. Moreover, given the expansion of the network's endpoints these dedicated staff is stretched well beyond any reasonable expectation for them to provide the level of service and supervision that each agency requires. It should be noted that member agencies must still manage and maintain their own wide area network. We are not simply consumers of the FiberNet network.

The establishment of a Network Operations Center (NOC)—consistent with industry standards and effective practices, is both operationally and strategically essential at this time. The reality is that we have a county fiber network in which over \$72 million dollars from federal grants, and county Operating and Capital Budget dollars have been invested. The network has no operational center that would ensure greater utilization and set the foundation for attracting any potential paid private customers. The network also is estimated to have helped the county avoid over \$54 million in carrier cost. The current stalemate over fully operationalizing the NOC as funded, undercuts the strategic interests shared by ITPCC member agencies to realize the vision for a digital Montgomery County.

This vision is about the full realization of the value and potential of the FiberNet network. Over four years ago, the ITPCC began work to envision leveraging the FiberNet network as a centerpiece in building a digital county. Making this a reality would mean that together we would expand county residents' access to data and information to improve services and empower communities; strengthen the County's digital infrastructure to support more wireless and broadband access, across the county and particularly in more economically disadvantaged areas; and work to develop sustainable funding strategies for investing in new technologies to attract private and other paying customers. The unnecessary contention over the NOC undermines this

broader shared vision and aspirations for the network and creates misgivings about continued participation in it.

Our shared vision and thinking about the FiberNet network extends well beyond the mere technical aspects. This is about constituent services in a digital county. To do so requires a vibrant and appropriately supported network. The NOC is but one of critical contributors to the future viability of FiberNet. It also must be underscored that much more work remains beyond operationalizing a fully functional NOC. For all county agencies, MCPS included, this robust infrastructure is critical to serving the county's residents in a digital age. All the agencies of the Interagency Technology Policy and Coordinating Committee continue to renew our energies to ensuring this jewel of a county asset is operated, managed, and leveraged fully.

WSSC- Mujib Lodhi

Performance Metrics

The value of basic availability metrics such as latency and loss are evident. However, performance related metrics are just as important for an advanced service model that goes beyond 'best effort'. Availability in and of itself has little business value if the service is effectively unusable because of degraded performance. Service degradation does not necessarily have to be severe: voice and video services in particular are sensitive to end-to-end performance characteristics such as jitter (latency variance) and error rates. Modern converged networks typical of the FiberNet customer base that carry voice, video, and other enterprise data must be able to measure and profile availability and performance metrics to assure service levels are consistent with business needs. Suggested metrics that would add value for customers include:

- § Latency (delay) – milliseconds
- § Jitter (absolute latency variation) – milliseconds
- § Availability – percentage (per period)
- § Packet loss – percentage
 - § Error rate – per million packets

Service Classes

Virtually all Service Providers offer service classes that offer specific service levels tailored to business needs. Service classes begin from 'best effort' up, with more stringent SLAs and associated metrics. The FiberNet SLA document appears to define some high-level

classes/subclasses (e.g. Public Safety Sites, Critical Systems, Non-critical systems, Non Public Safety Sites, 24x7 Sites). Expanding these definitions and developing them into specific service classes (together with eligibility requirements) would add value to FiberNet customers by offering clearly defined service levels and helping the customer to communicate and coordinate with FiberNet to acquire services. Service classes could benefit both FiberNet managers and customers.

'Authorized Service Interruptions'

The SLA defines 'Authorized Service Interruptions (ASI)' but does not specify when these occur (e.g. a standing maintenance window) nor how long they can be. This may create confusion and perhaps unrealistic expectations (on the part of customers) of the services offered by FiberNet in situations where the stated availability of 99.999 (five nines) was not met because of the effect of planned/scheduled outages rather than just unplanned/unscheduled outages. A potential problem with ASIs not counting as 'downtime' is that should the network experience topology/convergence events stemming from many ASIs then the service provider can still claim 100% uptime as long as customers were notified at least 14 days beforehand. From the customer's perspective, downtime is downtime regardless of whether it is planned or unplanned. The possibility of an undefined number of ASIs of unknown duration directly affects availability metrics and may erode customer confidence. Defining limits on ASIs and duration of ASIs will help to create robust SLAs and reduce the likelihood of unpleasant surprises, and unreasonable expectations on the part of customers.

M-NCPPC- Henry Mobayeni

MNCPPC is in full support of the creation of a Provider-level NOC for Fibernet operations for numerous reasons. Network uptime is not a luxury in Montgomery County; it is a requirement. Citizens expect to reach us and our services any time from any place.

Public safety in the Parks is dependent upon FiberNet for connectivity from cruisers to headquarters and local and federal law enforcement databases/services.

In Planning, citizens and developers depend upon our regulatory land-use systems and GIS on a daily basis. Our website is heavily utilized and rich with content that the public demands.

FiberNet is critical to our enterprise operations such as tennis, ice skating, nature centers, camping, and boat rentals.

Recently, we migrated to the FiberNet as our local loop for our entire VOIP voice network, supporting 800+ telephones.

Finally, Since the operation of FiberNet is mission critical to M-NCPPC and other agencies, the FiberNet support should be elevated to provider-level support beyond government constraints due to lack of a NOC. We at MNCPPC believe that it is time for the FiberNet to be elevated to a carrier-level service which requires a NOC at the same level not less.