

Technology Infrastructure Services

LOB #302:

TECHNOLOGY INFRASTRUCTURE

Purpose



The Technology Infrastructure LOB in the Department of Information Technology (DIT) is responsible for providing and maintaining the core, underlying technology infrastructure environment supporting all Fairfax County agencies and programs for IT (applications and data), and communications capabilities. This LOBs mission is to lead the response to changing technology in order to deliver an enterprise infrastructure that is agile, scalable, dependable and compliant, while enhancing Fairfax County government cost effectiveness and efficiency.

The enterprise platform technologies infrastructure defines and provisions the technical components including servers, technology platforms, devices, middleware integration software, operating systems, data storage, and interfaces, other software tools and equipment used to maintain technical operations and applications installed in the County's Enterprise Data Center and at other data galleries. The County established a strategic approach to building agile enterprise infrastructure architecture by consolidating and standardizing IT resources, implementing scalable and elastic infrastructure components, moving toward service-based technologies, and automating processes while ensuring visibility, security, and accountability. The mission includes enabling continuous improvements - the evaluation, design and implementation of emerging infrastructure technologies and concepts seamlessly, enhancing functionality at the most efficient cost.

This LOB charges general fund agencies for services provided related to maintaining and operating the County's enterprise network and Data Center. It is the sister LOB to the Technology Infrastructure LOB #141 in the DIT general fund.

Description

The Technology Infrastructure LOB is a single program, however funded out of both the Technology Infrastructure Fund and the DIT General Fund. It provides the electronic host and pathway to County IT resources for both the Citizens and employees. While supported out of the two funds, DIT considers this a single line of business because all components are required for the technology infrastructure to perform.

This narrative address the assets and operations performed from the Technology Infrastructure portion of the line of business, referred to in DIT as Network Communications and Enterprise Operations Center (aka Data Center) with these specific discrete activities:

- Enterprise Network – Wide Area and Local Area
- Institutional Network (private fiber network supported by the Cable Fund)
- Data Center

The operational goals for the Network and Data Center activities in "*keeping the lights on*" are to provide a high degree of performance, security, data integrity and resilience, and at the same time, reduce operational costs and improve utilization of IT assets.

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Strategic goals include keeping pace with technology evolution that is responsive to County business requirements for all programs in a rationalized approach with emerging infrastructure technologies/concepts:

- Integrated broadband wireless and fiber network infrastructures
- Cloud computing data center environment
- Resiliency
- 'Green' data center
- Lights out operation

The Fairfax County Enterprise Network is one of the largest most complex local government networks in existence. The network provides transport between and inside County sites for access to enterprise and agency specific applications which are hosted in the Data Center, and personal/shared network storage drives with work related files and data. The network also incorporates Internet pipes for incoming and outbound access from the network to the WEB, and the public's access to the County's WEBSITE for secure transactions and access to information.

The enterprise network supports communications to 305 County Government sites serving 17,000 user devices including the Government Center and Massey Public Safety Campus and 1,800 Public Safety mobile devices. Other sites served by the enterprise network are eight Police/BOS sites, 40 Fire Stations, the Public Safety and Transportation Operations Center (PSTOC), Pine Ridge (backup 911 site), 22 Libraries and 233 remote sites serving all other County functions.

The backbone of the enterprise network - I-Net - is made up of 4,000 Kilometers (KM) of single mode fiber designed in a hub and spoke design consisting of seven hub sites spread throughout the County government owned facilities. The I-Net also serves 230 Fairfax County Public School sites providing high speed fiber. The I-Net hub sites are connected via a fiber optic ring providing a secure and redundant self-healing backbone. The County deployed two different technologies on the backbone to provide technological redundancy. The first technology employed is Dense Wave Division Multiplexing which allows for a single pair of fiber to be carved into 32 unique network paths. The second technology is Metropolitan Ethernet which employs standard Ethernet to be utilized at 10 gigabit speeds. Of the 305 FCG sites approximately 200 are served by the I-Net, with the remaining locations being served by commercial services from Verizon, COX Communications, and Comcast.

The County's I-Net is interconnected with the 23 local governments in the National Capital Area (NCR), funded through Department of Homeland Security Urban Area Security Initiative (UASI) grant interoperability projects. Fairfax DIT provides the engineering, operational oversight and program management.

To ensure continuous delivery of quality services in a cost-effective and resource-efficient manner, Fairfax County's network infrastructure was designed with resiliency and scalability, is responsive to the County's evolving technology and business requirements, and can support new trends such as expanding use of images and video systems.

The network requires highly-skilled resources with specific, deep technical expertise in network engineering and security. The DIT network staff consists of both County employees and staff augmentation with industry firms staffing for senior engineering positions.

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The Data Center in Technology Infrastructure division was established as a core part of the Department of Information Technology at its inception. It is a three shift operation, running 24x7, 365 days/year. There is 3rd party remote monitoring service for the FOCUS environment. In the past, the Data Center was a mainframe centric environment mostly supporting legacy corporate applications (financial/procurement/budget, payroll and e-mail systems), and some agency based business systems applications in Human Resources, Police and Fire records systems, Tax systems, and Land Development systems, and related data. Today the Data Center is host to virtualized server environment and internal 'cloud' hosting over 700 applications and 500 databases supporting all County agencies, the County Web farm, Fairfax County Public Schools (see Technology Infrastructure LOB #141 in the DIT General Fund), and some equipment for some neighboring localities and the National Capital Region. There are over 4 petabytes of data in the County Data Center.

The Fairfax County Data Center is being mirrored and connected to the County's commercial off-site hosting/co-location facility for high-availability/disaster recovery (see Disaster Recovery LOB #303).

Benefits

The County's centralized Technology Infrastructure service has delivered significant important benefits enabling consolidated, shared use IT resources based on standards for optimum performance and reduced overall cost in County IT. The most significant benefits have been in sustained high performance, excellent capacity, redundant design, and validated exceptionally low cost.

The County's centralized, enterprise-wide technology infrastructure model has been recognized multiple times as best practice, and emulated by other governments. It is an example of providing superior customer service and reflecting sound management of County resources and assets, operating with virtually no downtime, at 99.999 percent performance.

Mandates

While not mandated, this central core service is essential, supporting County mandated services and programs.

Trends and Challenges

Trends in data center operations include 'cloud' infrastructure services, however, so far, this is not a wholesale option for Fairfax County. In local governments, the trend is to partner, establishing private, governmental clouds leveraging existing modern data center environments. Fairfax County is ripe for becoming a hybrid, government host, which could also produce revenue to help cover operations. There are continuing trends in 'greening' the data center through better use of cooling, and reduced energy consumption.

Trends affecting the network include industrial systems such as modern building automation systems to support HVAC, lighting controls, access controls, and IP based surveillance camera systems which continue to grow rapidly in both new construction and remodels as the County strives for energy efficiency, and these systems are connected to the enterprise network. This increases cyber risk and increases DIT's operational footprint.

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Other challenges for the network include:

- Being able to sustain 24 x 7 uninterrupted operations without having a dedicated 2nd and 3rd shift
- Adequate funding stream for required equipment refresh
- Funding to sustain the NCR interconnectivity when grants end
- Being able to attract and retain skilled engineers
- Evolution of wireless
- Integration of Public Safety Broadband and Next Gen 9-1-1
- Ongoing and fast evolving cyber security considerations
- Staff capacity to support major emergency events

Resources

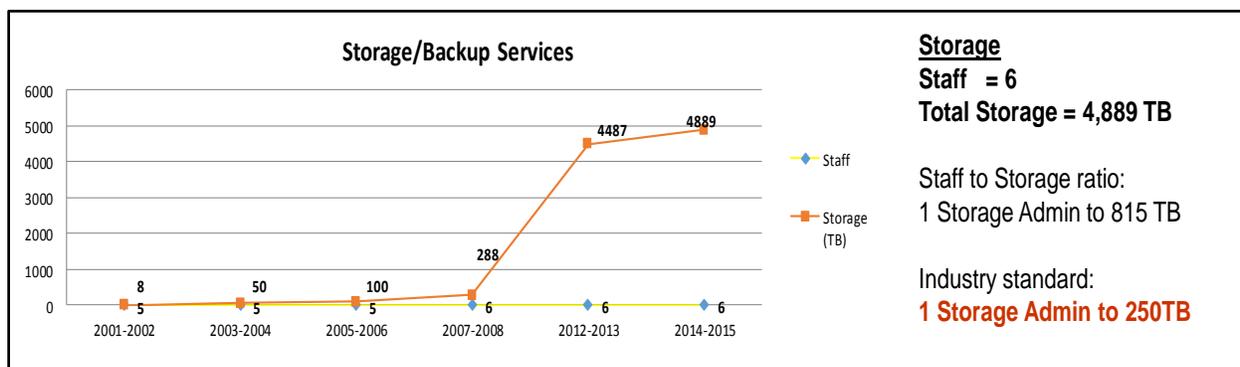
Category	FY 2014 Actual	FY 2015 Actual	FY 2016 Adopted
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FUNDING			
<u>Expenditures:</u>			
Compensation	\$3,763,150	\$3,583,088	\$4,174,525
Benefits	1,277,816	1,223,736	1,410,542
Operating Expenses	15,776,407	17,766,305	15,891,229
Capital Projects	4,769,195	4,778,355	4,007,322
Total Expenditures	\$25,586,568	\$27,351,484	\$25,483,618
Total Revenue	\$22,503,367	\$22,626,828	\$22,800,172
<u>Transfers In:</u>			
Transfers In from Other Funds	\$4,475,253	\$5,870,771	\$4,621,425
Total Transfers In	\$4,475,253	\$5,870,771	\$4,621,425
POSITIONS			
Authorized Positions/Full-Time Equivalents (FTEs)			
<u>Positions:</u>			
Regular	51 / 51	51 / 51	51 / 51
Total Positions	51 / 51	51 / 51	51 / 51

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Metrics

Metric Indicator	FY 2013 Actual	FY 2014 Actual	FY 2015 Actual	FY 2016 Estimate	FY 2017 Estimate
Terabytes (TB) of Storage across County IT Enterprise	2,946	4,487	4,889	5,250	6,825
Fiber Network performance (uptime)	99.99%	99.99%	99.99%	99.99%	99.99%
Cost performance vs commercial	22.70%	23.00%	23.00%	23.00%	23.00%

Electronic data storage size has increased and will continue to increase based on retention schedule requirements associated with various legal requirements for various agencies' business processes; and the deployment of new technologies such as video data. Storage strategy is for both on premise and cloud based, with cost savings realized in both due to volumes and negotiations. Cloud storage must be Criminal Justice Information Service (CJIS) compliant for public safety systems. From FY 2013 to FY 2015, the agency has experienced growth of nearly 66 percent.



Percentage Uptime performance for the County Fiber Network is 99.999 percent. The County's private fiber network - supporting the County and FCPS, has been exceptionally stable and resilient since it went live in 2007.

The County's private fiber network - supporting the County and FCPS, is cost effective, and has provided optimum capacity at a lower cost than commercial offerings (\$2.1 million with the I-Net compared to \$9.2 million commercial; 4.3 times the cost for a 77 percent annual savings.)

Cost per user for the I-net is \$131.25 versus \$575.00.