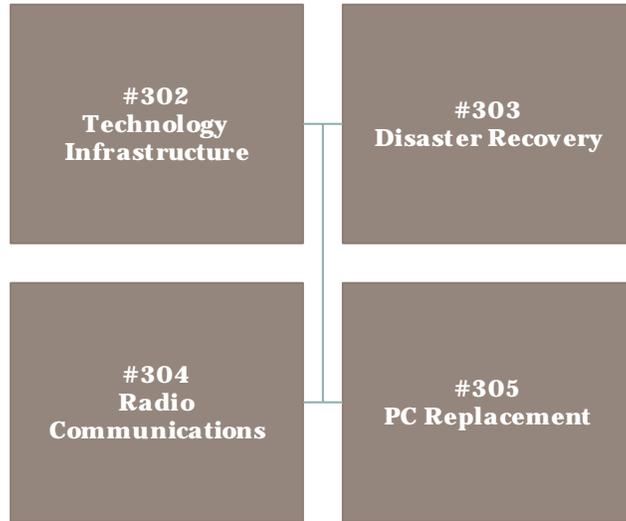


# Technology Infrastructure Services

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## Fund Overview

Fund 60030, Technology Infrastructure Services, provides the underlying technology foundation supporting information technology (IT) systems platforms, hardware, and communications systems for Fairfax County government. This consists of the enterprise portfolio of computers, data communications equipment, radio systems, data center operations, and other critical infrastructure. The Department of Information Technology (DIT) coordinates all aspects of IT for the County and plays an enabling role to County agencies in advancing the strategic value of technology to transform work processes and provide quality services. Technology infrastructure is managed as an enterprise asset and plays an essential enabling role to County agencies in advancing the strategic value of technology to transform work processes and provide quality services. Technology infrastructure services function 24 hours per day, seven days per week.

Fund 60030 is an internal service fund supported by revenues from County agencies and other entities such as the Fairfax County Public Schools (FCPS). Expenditures are primarily driven by the customer agencies' use of the IT infrastructure utility including software licenses, data center operations, computer equipment refresh, PC Replacement Program, network carrier services, Radio Center, and the staff support positions and outside services. In addition, the chargeback also includes enterprise-wide applications on the platforms in the data center, including the Fairfax County Unified System (FOCUS), which is a joint system for Fairfax County Government and FCPS for the finance and procurement systems, and the County human resources system on a contemporary enterprise resource planning (ERP) application suite.

# Technology Infrastructure Services

## Fund Resources

| Category  | FY 2014 Actual      | FY 2015 Actual      | FY 2016 Adopted     |
|---|---------------------|---------------------|---------------------|
| <b>FUNDING</b>                                    |                     |                     |                     |
| <b>Expenditures:</b>                              |                     |                     |                     |
| Compensation                                      | \$5,093,881         | \$5,062,333         | \$5,683,174         |
| Benefits  | 1,735,282           | 1,765,151           | 1,919,998           |
| Operating Expenses                                | 19,651,276          | 25,646,539          | 24,146,784          |
| Capital Projects                                  | 4,769,195           | 4,778,355           | 4,007,322           |
| <b>Total Expenditures</b>                         | <b>\$31,249,634</b> | <b>\$37,252,378</b> | <b>\$35,757,278</b> |
| <b>Transfers Out:</b>                             |                     |                     |                     |
| Transfer Out to General Fund                      | \$1,500,000         | \$0                 | \$0                 |
| <b>Total Transfers Out</b>                        | <b>\$1,500,000</b>  | <b>\$0</b>          | <b>\$0</b>          |
| <b>Revenues:</b>                                  |                     |                     |                     |
| Radio Charges                                     | \$944,346           | \$881,450           | \$940,000           |
| PC Replacement Charges                            | 5,884,782           | 6,225,252           | 6,243,148           |
| DIT Infrastructure Charges                        |                     |                     |                     |
| County Agencies and Funds                         | 20,669,176          | 20,769,081          | 20,886,693          |
| Fairfax County Public Schools                     | 1,786,295           | 1,857,747           | 1,913,479           |
| <b>Total Revenue</b>                              | <b>\$29,284,599</b> | <b>\$29,733,530</b> | <b>\$29,983,320</b> |
| <b>Transfers In:</b>                              |                     |                     |                     |
| Transfers In from Other Funds                     | \$4,475,253         | \$5,870,771         | \$4,621,425         |
| <b>Total Transfers In</b>                         | <b>\$4,475,253</b>  | <b>\$5,870,771</b>  | <b>\$4,621,425</b>  |
| <b>POSITIONS</b>                                  |                     |                     |                     |
| Authorized Positions/Full-Time Equivalents (FTEs) |                     |                     |                     |
| <b>Positions:</b>                                 |                     |                     |                     |
| Regular   | 73 / 73             | 73 / 73             | 73 / 73             |
| <b>Total Positions</b>                            | <b>73 / 73</b>      | <b>73 / 73</b>      | <b>73 / 73</b>      |

## Lines of Business

| LOB #        | LOB Title                 | FY 2016 Adopted     |           |
|--------------|---------------------------|---------------------|-----------|
|              |                           | Disbursements       | Positions |
| 302          | Technology Infrastructure | \$25,483,618        | 51        |
| 303          | Disaster Recovery         | 2,034,630           | 0         |
| 304          | Radio Communications      | 1,334,496           | 10        |
| 305          | PC Replacement            | 6,904,534           | 12        |
| <b>Total</b> |                           | <b>\$35,757,278</b> | <b>73</b> |

# Technology Infrastructure Services

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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.

## Technology Infrastructure Services

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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.

# Technology Infrastructure Services

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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 3<sup>rd</sup> 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.

# Technology Infrastructure Services

Other challenges for the network include:

- Being able to sustain 24 x 7 uninterrupted operations without having a dedicated 2<sup>nd</sup> and 3<sup>rd</sup> 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

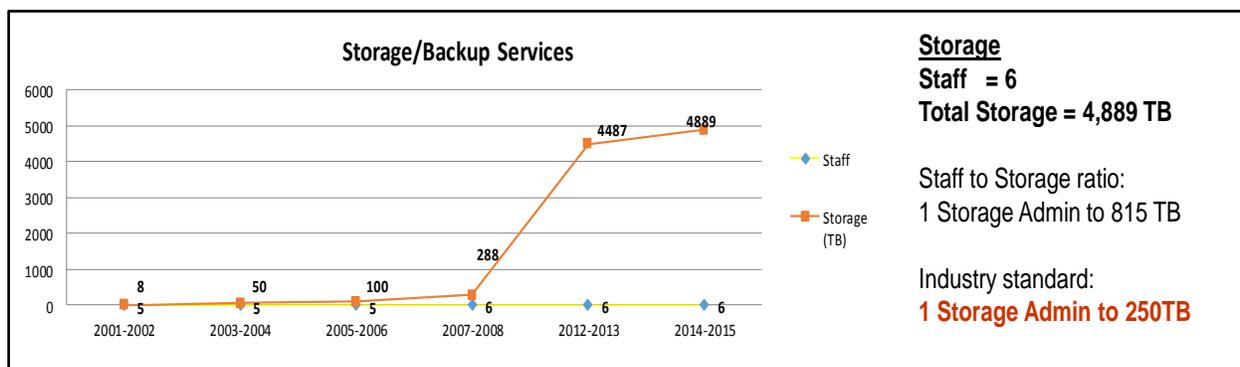
| Category  | FY 2014 Actual      | FY 2015 Actual      | FY 2016 Adopted     |
|---|---------------------|---------------------|---------------------|
| <b>LOB #302: Technology Infrastructure</b>        |                     |                     |                     |
| <b>FUNDING</b>                                    |                     |                     |                     |
| <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           |
| <b>Total Expenditures</b>                         | <b>\$25,586,568</b> | <b>\$27,351,484</b> | <b>\$25,483,618</b> |
| <b>Total Revenue</b>                              | <b>\$22,503,367</b> | <b>\$22,626,828</b> | <b>\$22,800,172</b> |
| <u>Transfers In:</u>                              |                     |                     |                     |
| Transfers In from Other Funds                     | \$4,475,253         | \$5,870,771         | \$4,621,425         |
| <b>Total Transfers In</b>                         | <b>\$4,475,253</b>  | <b>\$5,870,771</b>  | <b>\$4,621,425</b>  |
| <b>POSITIONS</b>                                  |                     |                     |                     |
| Authorized Positions/Full-Time Equivalents (FTEs) |                     |                     |                     |
| <u>Positions:</u>                                 |                     |                     |                     |
| Regular   | 51 / 51             | 51 / 51             | 51 / 51             |
| <b>Total Positions</b>                            | <b>51 / 51</b>      | <b>51 / 51</b>      | <b>51 / 51</b>      |

# Technology Infrastructure Services

## Metrics

| Metric Indicator                                      | FY 2013<br>Actual | FY 2014<br>Actual | FY 2015<br>Actual | FY 2016<br>Estimate | FY 2017<br>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.

# Technology Infrastructure Services

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LOB #303:

## **DISASTER RECOVERY**

### **Purpose**

Disaster Recovery (DR) for IT is a capability to restore enterprise-wide technology infrastructure, applications and data that are interrupted from a disaster event such as natural disasters (storms), utility outages affecting the Data Center (power), explosives that may destroy the data center, or mass system failures. Since the County is highly reliant on technology to perform services for all programs, and in advent of 9-11 and in more recent years, the occurrence of natural disasters on a more frequent basis than in the past, having ability to be more resilient and avoid interruptions and to continue to operate supporting disasters, traditional disaster recovery is now known as high-availability and is an operational necessity. Along with technology recovery, agencies should have a Continuity of Operations Plan (COOP) to be able to function in any gap period or worse-case scenario.

Continuity planning is operational mission assurance that the required critical services, technology and resources are available when alternate methods of assuring prioritized essential functions and capabilities need to be sustained or quickly restored. The Fairfax County Continuity of Operations Program provides the County Executive, his leadership team, and the County's senior managers with the ability to continuously direct, manage and sustain essential government services and business functions regardless of threats or disruptions, and under potentially ongoing adverse conditions. COOP planning priorities include the deployment of resources to protect the lives and safety, property, and economic security of Fairfax County's residential and corporate citizens during disruptions or long-term/large-scale emergencies where County resources or other critical infrastructure may be compromised.

### **Description**

Disaster Recovery (DR) is a discretionary, discrete program supporting the entire County government for all systems in the DIT Data Center, and FOCUS for FCPS. Also within the scope of the DR LOB, the County's COOP program is an essential partner function, aligned, thus herein represented. DIT has had DR as an essential part of its Data Center operations since its inception. In the 1990s, almost all County applications were on the mainframe environment, and in that era, DR was a process by where organizations had a contract to be able to load their applications at an off-site commercial data center and run for an interim period. This required staff to retrieve back-up tapes in a bonded commercial vault, go to the back-up site, load and activate the service. In the time that the County had this service, it never had to be formally activated as the County's processing technology was reliable and stable.

As technology evolved and most systems moved from the old mainframe environment to a variety of server and storage platforms, the traditional DR business model and contract structure was ultimately not well suited to meet the availability requirements of these newer environments. Such contracts while in normal disaster recovery scenarios would work, in reality, availability was built on science that suggested a small percentage of customers would need the service simultaneously, thus a shared environment with limited total available capacity.

In 2014, as the FOCUS project removed most of the last of the old mainframe based systems, and with its new technology and 24 x 7 availability, the business case was strengthened to move to a more modern approach for business continuity and system availability. As a result, in FY 2014, reinforced by a report of the Auditor to the Board, DIT established new disaster recovery capabilities in-line with contemporary business and technical specificities and developed a commercial-class production failover architecture that could be shared by all critical enterprise and county-agencies' IT services and applications. The new DR- 'High Availability' service began implementation during FY 2014. It provides for near real-time availability from a third party off-site facility, a significant improvement over the legacy DR processes whereby system recovery would be achieved over several days. The failover environment includes a secure, certified off-site location, high-speed network connectivity between the Fairfax Government Center and the off-site location, and critical infrastructure (power, network, storage, servers, etc.) and state-of-the art replication and

## Technology Infrastructure Services

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recovery processes and tools. The process of planning, designing, and implementing an IT environment at a failover site to deliver the following services include: Services Failover / Application Recovery, High Availability / Redundancy, Data Backup / Archiving, Data Restore, Data Replication.

FOCUS was the initial application set-up, and the initial investment is being leveraged for and will continue to be expanded for agency applications housed in official County data centers through failover capability. There are over 600 applications in the DIT Data Center.

The task to move agencies' mission critical applications to the third-party off-site hosting/DR facility will take place throughout FY 2016. Staff in the Data Center, FOCUS Tech Team, Platform, and Network divisions of DIT are responsible for activating DR.

### **COOP**

The continuity program coordinates the efforts of more than 110 (part-time assignment) staff, representing all 45 departments and agencies. Using this matrix model provides the County with a fiscally-responsible, yet robust continuity framework to address the important challenges of assuring each agency has a viable COOP Plan. The Program Manager is assigned to the Office of the County Executive, reporting directly to the Deputy County Executive for government operations. The program framework ensures every Agency COOP Plan adequately captures and reflects the structural interdependencies with other agencies, and identifies the requisite collaboration necessary with critical State or Federal partners, community stakeholders, corporate partners and private sector vendors – upon which many County services depend for successful continuity of operations.

Fairfax County Continuity of Operations Planning is conducted under the leadership and direction of the Office of the County Executive. Continuity planning is a collaborative and coordinated effort across all departments and agencies – empowered and guided by Federal, State and municipal laws and policy directives. Additionally, Fairfax County executive policy memorandums regarding prioritization of essential services; information technology systems priorities; and human resource policies dictate the parameters for creating and maintaining viable COOP Plans for each agency. Beginning in FY2014, the County Executive directed that each County agency, including numerous divisions and sub-units conduct tabletop exercises to evaluate the viability of their respective plans.

This comprehensive framework reflects the commitment of government leaders to fulfill their responsibility to protect the safety, property and economic security of Fairfax County during any type of emergency or catastrophic event that threatens or inhibits government operations. Continuity planning has been a function of County departments and agencies since 2001. Beginning in 2010, the County has been partnering with the Virginia Department of Emergency Management, Department of Homeland Security and Federal Emergency Management Agency (FEMA) to develop and share continuity plan templates, host regional workshops and training events, and provide planning and staffing resources. Many of these resources have been shared with neighboring jurisdictions in the National Capital Region (NCR), throughout the State and across the country. The County's continuity program has been offered as an example of a best practice for State, Territorial, Tribal and local government continuity of operations planning by FEMA's National Continuity Programs office.

The County's continuity of operations program has been managed as a very lean effort, with interruptions caused by staff turnover since its inception. In the past five years, the program has focused on revamping and enhancing the plan template used by the agencies (reducing the document from a cumbersome 70+ pages to a base template of 12 pages). Since 2014, the COOP Coordinator has worked closely with DIT on DR and Cyber matters.

# Technology Infrastructure Services

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## Benefits

The benefits of instituting a DR capability will allow for reducing the possibilities of downtime to County operations through IT failover capabilities through a seamless, robust, and carefully designed DR capability. Additional benefits include:

- Fast and complete recovery.
- Selected applications and infrastructure services operational during a disaster or temporary outage at Government Center.
- Elimination of Government Center as a single point of vulnerability
- High availability enabling the County to continue operations and delivery of services in the event of a disaster.
- Stronger protection and integrity of data, hardware, software, and County IT services.
- Ability to build on scalable infrastructure.
- Minimal to no disruption to users or systems.
- Increased confidence from stakeholders, users and the public.

DR-High Availability is a high industry best practice, mostly implemented in major commercial corporations, not yet adopted in many governments due to cost and residual portfolios of obsolete technology systems. Having this capability strengthens the County's posture for financial rating and is a key element in audits.

## COOP

Mission assurance and business continuity are good business practices. The 21<sup>st</sup> century challenge for local governments is continuing to sustain critically important services for its community. Whether the threat is cybersecurity, terrorism, or a significant weather event, local governments must maintain mission assurance. Continuity of operations and business continuity planning ensures resilient capabilities exist across the organization so essential services, critically important resources and competent staff are always available to provide for the community's safety, well-being and economic vitality.

Using the highly-efficient matrix staffing model, a single full-time program manager is funded by the County's General Fund. Coordinating this staffing structure from the Office of the County Executive demonstrates the value and importance of the continuity program, and the recognition of having the support of the organization's chief administrative officer. This empowers the program with the ability to work across all levels of the organization, coordinating with each of the other Deputy County Executives, the Chief Financial Officer, Chief Information Officer, and each department head. This program works closely with DIT in supporting DR and Cyber activities.

The continuity program directly supports every County agencies capability to perform the services and functions for which it was created, and assures the County elected leadership that each vision element.

# Technology Infrastructure Services

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## Mandates

### **Disaster Recovery (DR)**

This program is not mandated however, the requirement for a Disaster Recovery program was requested by the Fairfax County Board of Supervisors.

### **COOP**

Federal, State and local statutes that provide legal authorities for the continuity program vary between departments and agencies. Many agencies are legally empowered and/or required to provide services, enforce Federal, State or county laws and ordinances. Other agencies are legally obligated to ensure the security of personal, financial, health and safety information. Examples of some laws, statutory regulations and/or guidelines include:

- United States of America
  - U.S. Constitution (1992)
  - U.S. Code (2011)
    - Title 6. Chapter 2. National Emergency Management
    - Title 10. Chapter 18. Military Support for Civilian Law Enforcement Agencies
    - Title 32. National Guard, Deployment
    - Title 42. Chapter 68. Disaster Relief
      - Robert T. Stafford Act, PL 93-288, as amended (2007)
- U.S. Code of Federal Regulations (2011-2012)
  - 6 CFR 29 – Domestic Security, Protected Critical Infrastructure
  - 36 CFR Part 1236 – Vital Records Management
  - 41 CFR 102-74 – Facility Management
  - 44 CFR – Emergency Management and Assistance
- National & Homeland Security Presidential Policy (NSPD, HSPD & PPD) Directives
  - HSPD 5 – National Incident Management System
  - HSPD 8 & PPD 8 – National Preparedness
  - HSPD 20 – Continuity of Operations
- U.S. Department of Homeland Security – FEMA
  - National Response Framework (2008)
  - National Infrastructure Protection Plan (2009)
  - National Preparedness Goal (2011)
  - Continuity Guidance Circular 1 (2009)
  - Continuity Guidance Circular 2 (2010)
  - Comprehensive Planning Guidance 101 v2 (2010)
- Commonwealth of Virginia
  - Virginia Constitution (1971)
    - Article VII – Local Government

# Technology Infrastructure Services

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- Code of Virginia (2011)
  - Title 15.2, Chapter 14; §15.2-1413
  - Title 44, Chapter 3.2; §44-146.13 – §44-146.29:1
  
- Virginia Emergency Operations Plan (2012)
  - Volumes I-VIII
  
- County of Fairfax
  - Fairfax County Code (2012)
  - County Executive Priority of Services Policy Memo (12 Mar 2010)
  - DIT Priority of Systems Policy Memo (13 Nov 2009)
  - Protection of Personal Information Policy Memo (11 Oct 2011)
  - Fairfax County Emergency Operations Plan (2015)
  - Fairfax County Pre-Disaster Recovery Plan (2012)
  
- Private, Non-Governmental Organizations
  - NIST – Business Continuity Guidance & Industry Standards
    - ISO 22301
    - ISO 27001
  
- National Fire Protection Association NFPA 1600 (2010)

# Technology Infrastructure Services

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## Trends and Challenges

### Disaster Recovery (DR)

#### Trends

- The County is on the leading edge of implementing high availability, near real time failover. The occurrence of disasters and business demands are increasing for Fairfax County which requires minimal downtime of systems/applications, and minimal inaccessibility of county data and services.
- Clouds – major Cloud infrastructure providers would most likely have at least a secondary site failover process, which should be in contracts.

#### Challenges

In today's increasingly complex data center environment, providing automated high availability and disaster recovery is a major challenge.

- Complex design and planning required for the number of systems, applications, infrastructure, and data required to failover over as part of County applications.
- Appropriate resource allocations (funding, resources, schedule) continue to be required.
- Competing Priorities – (Staff and Vendors) – County FTEs and vendors may not all be available due to other priorities from other approved projects, normal operations, or production emergencies.
- Funding– Possible delays in equipment/resources due to the approval/funding of any needed purchase orders.
- Functional Buy-In – Possible delays in implementation/testing due to required approvals by stakeholders for any work being performed which may impact their business (i.e. outages).

In times of budgetary constraints, coupled with a record of sustained reliability of the core systems and lack of actual disaster situations necessitating failover, maintaining commitment to funding a robust DR solution could be problematic.

#### COOP

The trend for COOP is expanding in government, and considered a best practice. County agencies should automatically have COOP embedded in their operations as a normal procedure. However, with years of budget reductions limiting available resources in agencies, finding time to modify plans along with deployment of new services and technology capabilities and exercise plans is an on-going challenge. Further, providing ongoing workshops and training opportunities to support staff across all 45 agencies with consistent guidance and full-time technical assistance is a challenge.

# Technology Infrastructure Services

## Resources

| Category  | FY 2014 Actual | FY 2015 Actual | FY 2016 Adopted |
|---|----------------|----------------|-----------------|
| <b>LOB #303: Disaster Recovery</b>                |                |                |                 |
| <b>FUNDING</b>                                    |                |                |                 |
| <u>Expenditures:</u>                              |                |                |                 |
| Operating Expenses                                | \$1,077,191    | \$1,989,905    | \$2,034,630     |
| Total Expenditures                                | \$1,077,191    | \$1,989,905    | \$2,034,630     |
| Total Revenue                                     | \$0            | \$0            | \$0             |
| <b>POSITIONS</b>                                  |                |                |                 |
| Authorized Positions/Full-Time Equivalents (FTEs) |                |                |                 |
| <u>Positions:</u>                                 |                |                |                 |
| Regular   | 0 / 0          | 0 / 0          | 0 / 0           |
| Total Positions                                   | 0 / 0          | 0 / 0          | 0 / 0           |

## Metrics

| Metric Indicator                                    | FY 2013<br>Actual | FY 2014<br>Actual | FY 2015<br>Actual | FY 2016<br>Estimate | FY 2017<br>Estimate |
|---|-------------------|-------------------|-------------------|---------------------|---------------------|
| Percent Uptime of FOCUS ERP System                  | 98%               | 99%               | 99.99%            | 99.99%              | 99.99%              |
| Enterprise Production Applications with DR/Failover | 4%                | 13%               | 21%               | 38%                 | 92%                 |

The County is on the leading edge of implementing high availability, near real time failover. The potential for disasters, less disruption tolerance to business operations, and more demand for supporting technology in all business areas are increasing for Fairfax County which requires minimal downtime of systems/applications, and optimal accessibility of county data and services.

There are over 600 Enterprise and Agency Open Systems Applications and databases in the DIT County Data Center. Prior to FY 2015, the only apps in the legacy DR model were those on the old mainframe environment. In FY 2015, the County awarded a contract for modern near-real time back-up recovery, with budget provided to cover the data center landscape. The process to implement the new strategy started with the core FOCUS system, and incrementally the inventory of data and compliant systems will be implemented. Careful planning and testing is required for each application and subsystem for the DR environment.

# Technology Infrastructure Services

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LOB #304:

## **RADIO COMMUNICATIONS**

### **Purpose**

The primary purpose of the Radio Communications LOB is to provide critical dedicated wireless communications infrastructure and radio systems serving Fairfax County Government, Fairfax County Public Schools (FCPS) and interoperability with the 23 localities in the National Capital Area. The footprint includes Public Safety and Public Service 800 MHz radio systems with 19 tower sites and 22 transmit antennas. This activity while staffed with single shift – Monday through Friday, is responsible to support the service needs of Public Safety response operations 24 x 7, seven days a week, 365 days per year.

### **Description**

The Radio Communications LOB is a specialized, discrete program in Fund 60030, Technology Infrastructure Services, specifically supporting the equipment, maintenance services, and staff positions dedicated to the County's critical radio systems and devices used by all public safety agencies, public works, FASTRAN and Connector bus fleets, Park Authority, Facilities Management, Fairfax County Water Authority, other County agencies, Fairfax County Public Schools, and the local police departments in the City of Fairfax and Towns of Herndon and Vienna. Radio communications are the primary dedicated critical infrastructure relied upon by public safety organizations world-wide, and like Fairfax County, it is managed locally. To support the operational and maintenance requirements of the systems, costs are recovered from County user agencies and FCPS.

The Radio Services Center (RSC) has ten staff employees that have specialized expertise and perform design, engineering, implementation, system programming and maintenance for the radio systems and network, and, install and maintains all the land-mobile subscriber radios (LMR) utilized by the Fairfax County Government agencies and Fairfax County Public Schools totaling 11,000 radios, that in addition to voice communications, allow for mobile computing, computer aided dispatch, automatic vehicle locating and routing. The RSC performs routine preventive maintenance on subscriber units, programming, analytical troubleshooting for complex issues. The radio network integrates the 9-1-1 Computer Aided Dispatch (CAD) system and mobile computer terminals, and GIS.

RSC also administers and maintains compliance of the two supporting primary FCC 800 Mhz. licenses, and expert staff assist in inquiries related to RF (radio frequency) matters affecting Fairfax County including carrier applications for installing antennae in Fairfax County locations, performing custom in-building coverage studies and engineering. RSC is also responsible for County building intercom systems, and Fire Station Response Alerting Systems which are installed in all 38 stations.

The RSC mission includes coordination of regional interoperability initiatives and Department of Homeland Security (DHS) national strategy to ensure effective communication between local, state and federal partners for responders. This includes regional planning and coordination so that seamless communication across jurisdictional borders supporting mutual-aid response for first responders is maintained. A map of each localities' system profile is maintained for a comprehensive view of the National Capital Region 23 member locality partners, as well as Federal responder organizations. Fairfax coordinates the group of radio managers across the region for planning forward, interoperability strategy and ensuring that any individual locality's plan is consistent with the overall goal of preserving seamless communications.

The RSC are members of the Federal Partnership for Interoperable Communications, commonly referred to as the FPIC, this group identifies and enhances wireless communications interoperability capabilities within the Federal Government and coordinates these efforts with ongoing/existing state and local interoperability programs, in coordination with SAFECOM and Grants & Training.

Finally, the Radio Services staff is the primary resource for the development of the County's Public Safety Broadband wireless plan for data and integration with Next Generation 9-1-1.

# Technology Infrastructure Services

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## Benefits

The governmentally provided private land mobile radio system is the core, essential communications capability required and relied upon by all public safety operations world-wide for response operations and emergency support functions. It is critical to the accuracy of command and control, the life safety of responders and the public. For example, during 9-11, commercial wireless capabilities were overwhelmed and capacity was limited through loss of key towers that served the east coast; responder operations would have been severely compromised if they had to rely on public, commercial wireless devices.

The County's program is centralized as a part of the overall County communications infrastructure that leverages all current and future supporting technology, and continuity of technical architecture and operational and financial sustainability.

The County's radio systems and network have functioned with a high degree of performance and sustained an exemplary record of 99.999% availability over the past 15 years, and, because of the central inventory, Fairfax has done exceptionally well in price point negotiations.

These systems have proven through many emergency events to be optimally reliable, surviving and sustaining operational integrity through extreme weather such as the Derecho, as well as other regional emergency and high security events while commercial telecommunications carrier networks were jammed or compromised.

## Mandates

While this specific technology function is not mandated, it is regarded by all public safety and emergency support functions as a core base-line key capability, and the frequency use is regulated.

## Trends and Challenges

Trends in the area of public safety wireless communication include leveraging the LMR (land mobile radio) systems to provide geospatial positioning (GPS) location services, bio-metrics and Next Generation 9-1-1 data pushed to the field. The newer radio systems are no longer proprietary architectures, and use industry standard technology and the functionality is software defined, thus supporting hardware is now the same as information technology server processor technology.

Radio systems are also being encrypted to protect sensitive radio communications that can easily be intercepted with commercial, off-the-shelf radio scanner equipment. The use of encryption ensures the freedom of movement of emergency response personnel. It denies adversaries, whether a criminal organization, gang, or a terrorist cell, the ability to take advantage of our communications to circumvent or defeat public safety efforts.

Another trend in governments that have their own private, fiber networks is to use the fiber networks to inter-connect their radio towers and reduce reliance on increasingly expensive and less reliable commercial telecomm facilities. This also allows the regional partners to interconnect and serve as mutual back-up as needed.

Perhaps the biggest challenge presented to regional interoperability within the Greater Metropolitan Washington Area, National Capital Region (NCR) is the agency or jurisdiction that makes a unilateral system, subscriber or policy change that affects interoperability. In the judgment of the agency or jurisdiction in that situation whereby they make a change, their need for the change outweighs the need for interoperable communications, and a conscious decision is made to disrupt the ability of the agency or jurisdiction to support interoperability with other agencies or jurisdictions. Interoperability among Northern Virginia localities is extremely important supporting daily mutual aid emergency response.

# Technology Infrastructure Services

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The Cities and Towns within Fairfax County and surrounding NCR jurisdictions have prepared budgets through 2020 to pay for the upgrades necessary to attain the proper subscribers equipment that meet the national standards for encryption and enhanced modes of operation needed to increase system infrastructure capacity for their fleets.

The radio experts are being tapped as the lead analysts for the national public safety broadband initiatives and associated projects. This infrastructure will facilitate data, video and other visual image technologies with adequate capacity, coverage and security.

Challenges for the County include providing for a more aggressive schedule to keep the radio wireless infrastructure updated as necessitated due to manufacture end-of-life schedules and long term sustainability; imbalance in the State's structure affecting Fairfax County's share of the 9-1-1 receipts that are the appropriate revenue stream for public safety communications: capital investment availability needed for new equipment; and, buy-in for the inevitable migration to newer technologies in the future.

## Resources

| Category  | FY 2014 Actual     | FY 2015 Actual     | FY 2016 Adopted    |
|---|--------------------|--------------------|--------------------|
| <b>LOB #304: Radio Communications</b>             |                    |                    |                    |
| <b>FUNDING</b>                                    |                    |                    |                    |
| <u>Expenditures:</u>                              |                    |                    |                    |
| Compensation                                      | \$674,760          | \$841,529          | \$834,094          |
| Benefits  | 227,847            | 305,391            | 286,202            |
| Operating Expenses                                | 183,364            | 200,678            | 214,200            |
| <b>Total Expenditures</b>                         | <b>\$1,085,971</b> | <b>\$1,347,598</b> | <b>\$1,334,496</b> |
| <b>Total Revenue</b>                              | <b>\$896,450</b>   | <b>\$881,450</b>   | <b>\$940,000</b>   |
| <b>POSITIONS</b>                                  |                    |                    |                    |
| Authorized Positions/Full-Time Equivalents (FTEs) |                    |                    |                    |
| <u>Positions:</u>                                 |                    |                    |                    |
| Regular   | 10 / 10            | 10 / 10            | 10 / 10            |
| <b>Total Positions</b>                            | <b>10 / 10</b>     | <b>10 / 10</b>     | <b>10 / 10</b>     |

# Technology Infrastructure Services

## Metrics

| Metric Indicator   | FY 2013<br>Actual  | FY 2014<br>Actual  | FY 2015<br>Actual  | FY 2016<br>Estimate   | FY 2017<br>Estimate  |
|--|--|--|--|---|--|
| New vehicle builds for communications equipment install for new vehicles | 191 Public Safety and 34 general agencies  | 215 Public Safety and 89 general agencies  | 214 Public Safety and 89 general agencies  | 220 Public Safety and 300 general agencies  | 250 Public Safety and 300 general agencies   |
| Productivity Calls for Services (Police, Fire, Sheriff and DPSC)         | <ul style="list-style-type: none"> <li>• 908 radio service in-take</li> <li>• 132 CAD-ICV</li> <li>• 25 FSA</li> </ul> | <ul style="list-style-type: none"> <li>• 440 radio service in-take</li> <li>• 74 CAD-ICV</li> <li>• 3 FSA</li> </ul> | <ul style="list-style-type: none"> <li>• 262 radio service in-take</li> <li>• 74 CAD-ICV</li> <li>• 3 FSA</li> </ul> | <ul style="list-style-type: none"> <li>• 200 radio service in-take</li> <li>• 80 CAD-ICV</li> <li>• 10 FSA</li> </ul> | <ul style="list-style-type: none"> <li>• 150 radio service in-take</li> <li>• 90 AD-ICV</li> <li>• 10 FSA</li> </ul> |
| Radio System Uptime performance  | 99.999%  | 99.999%  | 99.999%  | 99.999%   | 99.999%  |

DIT installs radios, Mobile Computer Terminals (MCTs), In-Car Video (ICV), printers, and docking stations as a part of the Police Car Get Ready process.

DIT responds to a variety of radio and MCT repairs due to equipment failures or rough ride or accident caused disconnections. The trend over the past several years has been for less calls for service repairs due to retiring legacy equipment. Usually work is accomplished in one day. Work also includes support of the Fire Station Alerting system (FSA). DIT Radio staff work standard Monday - Friday business schedules; however, are on-call 24 x 7 for immediate response requirements supporting the three Public Safety shifts.

The County's radio system uptime had been 99.999 percent availability (less than 6 seconds downtime per month), exceeding industry standards.

# Technology Infrastructure Services

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LOB #305:

## **PC REPLACEMENT**

### **Purpose**

The PC Replacement Program LOB provides a funding mechanism and asset management for the regularly scheduled replacement of end-user devices (desktop PCs, laptops and tablets) and associated software and support for all County agencies. This equipment replacement program ensures that County agencies have supportable equipment designed to use the County's enterprise-wide and agencies' specific software applications and access to WEB based services securely and at the most efficient cost.

### **Description**

The PC Replacement Program is a single, discrete county-wide program under the management of the Department of Information Technology (DIT). It was established as a key program at the inception of DIT to ensure standards and that funding is available on a regular cycle for replacement of the authorized inventory of PCs, laptops, tablets, etc., devices. The cost per PC in the program includes PC hardware, required software licenses, security requirements, protected disposal, service desk and desk-side staff support. DIT works with individual County agencies to determine the device type best match to the type of work performed by the designated end-user and to his or her remote access and mobility requirements.

DIT continually reviews industry options for efficiencies in the acquisition and deployment of devices, while ensuring that the program remains cost effective and competitive against other options, and with the long-standing goal of maintaining optimal performance, reliability and productivity for County agencies. The updated program strategy implemented in FY 2015 took into consideration a more fluid evolutionary process of industry innovation and agency and worker requirements, including mobility and plans for continuity of operations (COOP).

During FY 2014, the PC Replacement Program underwent a comprehensive review that included a review of the County PC inventory, which had expanded over the years. Expansion typically occurs as agencies have new needs that requires devices, which includes mobility, telework, public access initiatives, and dedicated devices needed for utility systems, etc. The review included an examination of industry innovation, the replacement-cycle structure, and new workplace requirements including mobility and COOP plans. Also during FY 2014, a new agreement was negotiated for the required Microsoft user licensing program previously on a per device basis to a per user basis. This allows for multiple devices to be operated by the same user under a single license. This contributed to significant cost avoidance and supports software license compliance. The program also includes a five year warranty program. Adjustments were included in FY 2015 for the PC Replacement Program to reflect both updated inventory counts, flexibility in device type selections, new software licensing structure, and revised costs.

At present, there are approximately 14,000 computers in the program. Each agency pays into the program a set amount per authorized computer over the (current) five-year replacement cycle. The cost per PC in the program covers the expenses associated with the PC hardware; extended warranties; desktop-productivity software licenses (e.g., Microsoft and Adobe); security software and threat monitoring; protected equipment disposal; and staff support for the preparation and installation of the replacement computers, as well as for the removal and temporary storage of the old equipment. Various external and internal factors can affect the number of replacements that actually occur in a fiscal year. These factors include the timing of the release of new products, work requirements of individual customer agencies, and the balance between supply and demand within the PC, laptop and tablet markets. In the new plan, DIT has the flexibility to purchase more or less computers in a given period depending on prices and obsolescence factors. Apart from these factors, which can change continually, the overall program objective is to replace one-fifth of the computers in the program each fiscal year. Since there are currently approximately 14,000 computers covered by the program, the target number for annual replacements is 2,800. Sometimes DIT may accelerate a replacement if deemed necessary to sustain supportability.

# Technology Infrastructure Services

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There are 12 positions directly funded in this program that conduct asset management, inventory control and installation activities on a business day schedule. The staff sometimes work outside business hours as needed for agencies to reduce downtime while new PCs are in the process of being installed.

The work of the PC Replacement team includes installation of the approved standard County software image, plus agencies' specific applications. The software image installation includes installing the Commonwealth of Virginia Department of Social Services on about 1,000 state provided PCs to the Fairfax County Department of Family Services. The state issued PCs support associated assigned staff for County access to enterprise systems, which if not, would mean another 1,000 PCs would have to be added to the PC Replacement Program.

## Benefits

This program leverages County resources and implements standards for the best overall productivity and cost to provide and sustain end-user computer equipment. The County's program has been recognized as a cost-effective, best-value and best-practice model in the governmental and commercial sectors. The key strengths of the program are that it fully optimizes the allocation of IT assets and it results in an efficient and predictable level of effort to provide desktop maintenance and support.

- County end-users are able to perform their day-to-day tasks using equipment and software that is up-to-date and secure, and the equipment is protected against failure by extended warranties.
- The centralized nature of the PC Replacement Program allows the County to avoid costs through bulk purchases of equipment and software.
- By having staff members who are trained for and dedicated to PC Replacement, DIT is able to perform this function more efficiently and with greater effectiveness than would be the case if each agency had to deal with this process on its own.
- DIT also has the expertise and resources required to select properly configured equipment, test it before deployment and modify the equipment setup to ensure that it will operate properly and securely within the County's IT enterprise environment.
- Individual agencies do not have to seek periodic one-time increases to their budgets to cover the expense associated with a large-scale equipment replacement effort. Conversely, agencies also do not have to deal with the compatibility issues that might result from more frequent replacements on a smaller scale.
- Software licenses are also included and purchased on an enterprise-scale for best cost and accountability, allowing flexibility for the number of licenses needed, ensuring licensing compliance and continuity for industry audits.

## Mandates

This Line of Business is not mandated.

## Trends and Challenges

In the end-user device arena, the trend is to move away from traditional desktop PCs to mobile laptops and tablets that may be more appropriate for certain jobs. The new workforce will be expecting a more mobile workplace environment, which also enables increased productivity. End-users are interacting among themselves and with their customers and clients via a variety of devices, and some of this interaction occurs outside of the traditional workplace environment. The County also views remote access as part of a strategy to address environmental and quality-of-life issues. The deployment of tablets in the County as well is expanding each year.

# Technology Infrastructure Services

In the market, manufacturers try to preserve their profits by accelerating obsolescence so that customers have to buy new computers through the inclusion of new features and functionality. The software companies try to keep their products relevant by introducing enhancements designed to take advantage of the improved hardware capabilities. Software manufacturers such as Microsoft are finding themselves in direct competition with web service providers who can offer users similar products via web-based applications.

Wearable devices may become available for County workers and may require interfaces with their end-user devices.

## Challenges

- Security threats continue to increase at a rapid rate, and defending against them requires an increase in the level of expertise among the County’s IT analysts. End-users also have to accept more responsibility for the physical security of their devices than was previously the case.
- Deciding which desktop, laptop and tablet models represent the best value for the County in terms of being able to satisfy end-user expectations at a reasonable cost.
- Rapid change in technology - selecting the software products and web-based services that will maintain the productivity of County employees with little or no increase in annual expense.
- Ensuring that end-user devices and software are compatible with the security safeguards adopted by the County, and making sure that end-users are extremely diligent when it comes to reporting lost and stolen devices.
- Anticipating how end-user requirements might be shifting and subsequently helping customer agencies select the right mix of devices.
- Ongoing issue of inclusion of contractor staff in the inventory assignment.

## Resources

| Category  | FY 2014 Actual     | FY 2015 Actual     | FY 2016 Adopted    |
|---|--------------------|--------------------|--------------------|
| <b>LOB #305: PC Replacement</b>                   |                    |                    |                    |
| <b>FUNDING</b>                                    |                    |                    |                    |
| <u>Expenditures:</u>                              |                    |                    |                    |
| Compensation                                      | \$655,971          | \$637,716          | \$674,555          |
| Benefits  | 229,619            | 236,024            | 223,254            |
| Operating Expenses                                | 2,614,314          | 5,689,651          | 6,006,725          |
| <b>Total Expenditures</b>                         | <b>\$3,499,904</b> | <b>\$6,563,391</b> | <b>\$6,904,534</b> |
| <u>Transfers Out:</u>                             |                    |                    |                    |
| Transfer Out to General Fund                      | \$1,500,000        | \$0                | \$0                |
| <b>Total Transfers Out</b>                        | <b>\$1,500,000</b> | <b>\$0</b>         | <b>\$0</b>         |
| <b>Total Revenue</b>                              | <b>\$5,884,782</b> | <b>\$6,225,252</b> | <b>\$6,243,148</b> |
| <b>POSITIONS</b>                                  |                    |                    |                    |
| Authorized Positions/Full-Time Equivalents (FTEs) |                    |                    |                    |
| <u>Positions:</u>                                 |                    |                    |                    |
| Regular   | 12 / 12            | 12 / 12            | 12 / 12            |
| <b>Total Positions</b>                            | <b>12 / 12</b>     | <b>12 / 12</b>     | <b>12 / 12</b>     |

# Technology Infrastructure Services

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## Metrics

| Metric Indicator  | FY 2013<br>Actual | FY 2014<br>Actual | FY 2015<br>Actual | FY 2016<br>Estimate | FY 2017<br>Estimate |
|---|-------------------|-------------------|-------------------|---------------------|---------------------|
| Percent failure rate of devices in PC Replacement Program                                 | 1%                | 1%                | 1%                | 1%                  | 1%                  |
| Number of PCs and Devices in the Program  | 12,800            | 13,680            | 14,000            | 14,000              | 14,200              |
| Ratio of support staff in program to devices compared to industry standard which is 300:1 | 1,066:1           | 1,140:1           | 1,167:1           | 1,167:1             | 1,183:1             |

Due to optimal quality that supports multiple applications and built in warranty protection, the failure rate for Fairfax is better than the industry standard failure rate of 3 percent for similar sized organizations.

In FY 2015, the PC replacement program was reviewed and PCs, laptops and tablets and associated required licensing that had been acquired by agencies that were not in the program were added. DIT anticipates growth in tablets and dedicated PCs for industrial systems and for secure access by contractors. Mobility for County agencies is growing. DIT estimates that there may be additional equipment and software licenses required to be added in FY 2017. The numbers take into account reductions in equipment due to staff reductions in some agencies. Cost is optimized since standards are enforced thus volume buying power is leveraged, and the new licensing program is based on users, not the number of devices. Each County employee user has up to 5 devices per license potential, which includes software on tablets and smart phones.

DIT staff resource handles three times the recommended industry standard for support staff to number of devices supported, with reasonable response time performance.