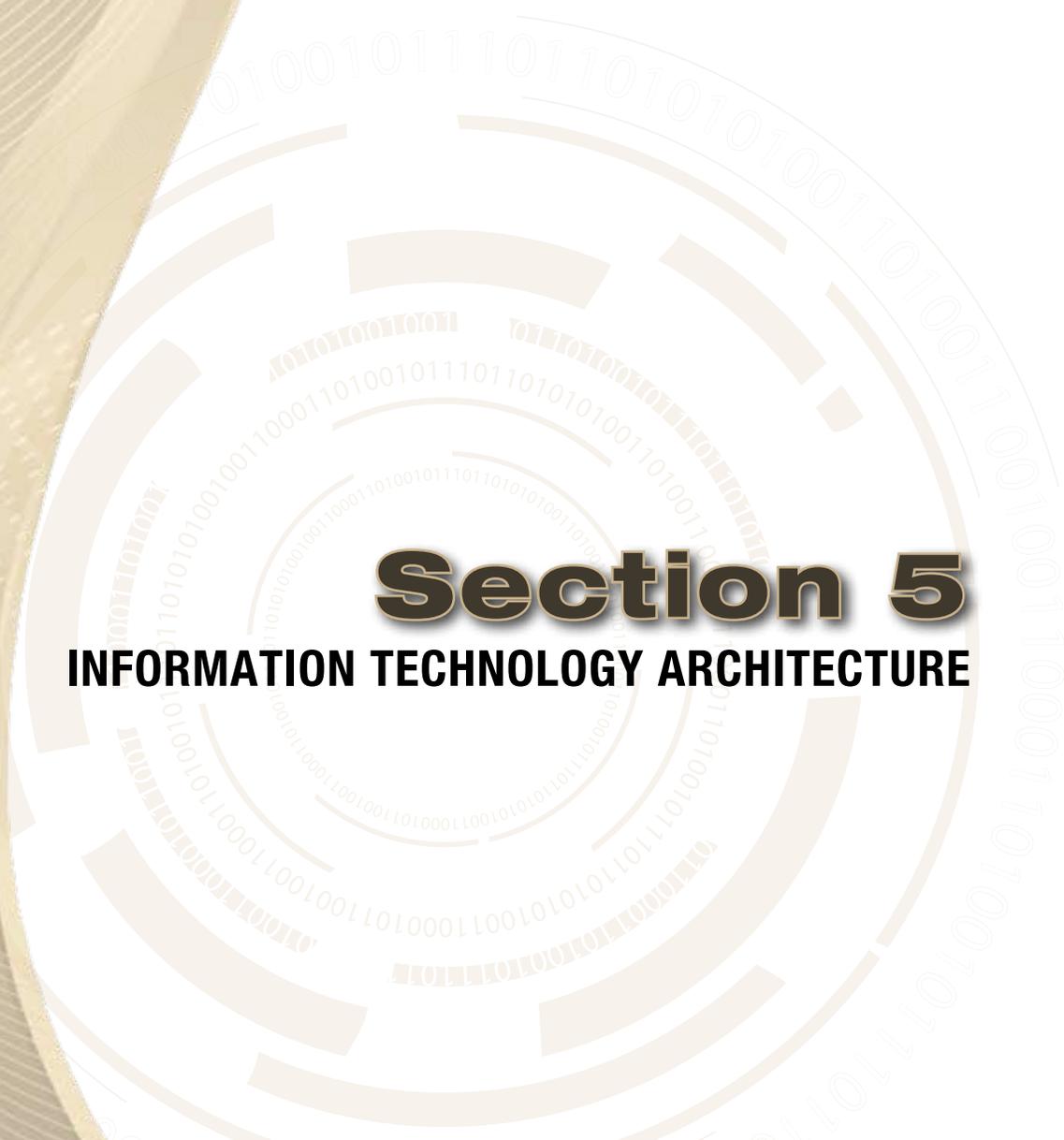




**Section 5**  
**INFORMATION TECHNOLOGY ARCHITECTURE**



# INFORMATION TECHNOLOGY ARCHITECTURE

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## SECTION 5

### INFORMATION TECHNOLOGY ARCHITECTURE

#### 5.1 Enterprise Architecture

This section identifies current information technology architecture implemented in Fairfax County. The County's technology architecture is a strategic asset that defines technology components necessary to support business operations and the infrastructure required for implementation of new technologies in response to the changing needs of government business. It is a multi-layered architecture that includes:

- Application and Data Architectures
- Platform Architecture
- Network Architecture
- Internet Architecture
- Security Architecture

#### IT Architecture Process Model

Fairfax County adopted Enterprise Architecture (EA approach) as the blue print or roadmap by which specific technology solutions are developed. Architecture defines the manner in which technology is used to enable flexible business solutions which enable expansion and change as requirements evolve, technology is updated, or becomes obsolete. Architecture as a foundation and roadmap enables the County to establish open standards, assess the impact of new requirements and evolving

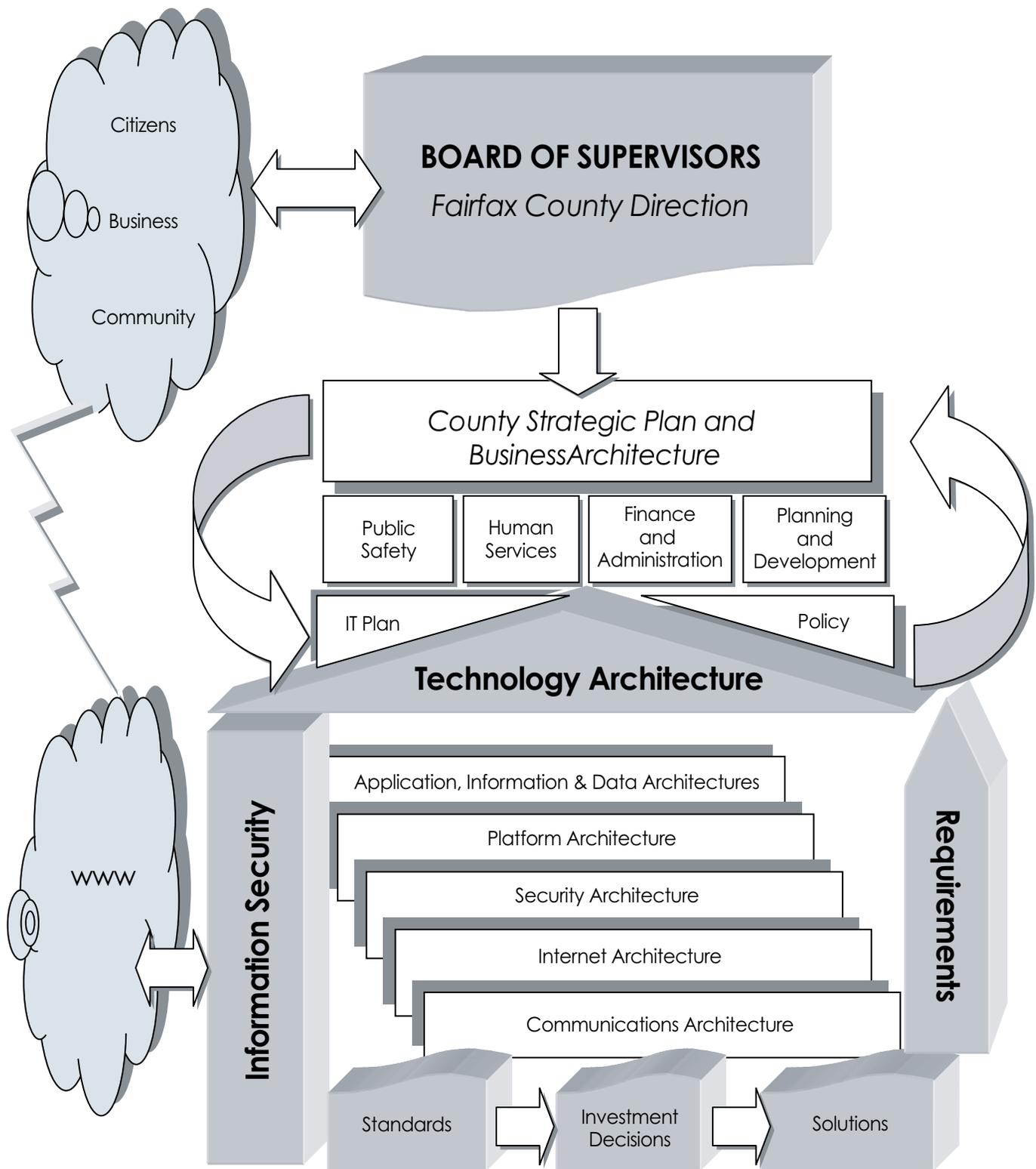
technologies, and allow for the incorporation of new technologies as part of an updated blueprint that benefits other solutions. Enterprise Architecture improves the efficiency and effectiveness of technology investments by reducing redundancy, leveraging solutions and platforms, optimizing value, and promoting the sharing of knowledge and best practices across County government.

The Enterprise IT Architecture Process Model on the following page illustrates the inter-relationships between the County's IT architecture and business, and the iterative processes involved to ensure the development of an IT enterprise that is efficient, cost-effective, responsive and business driven. For the purposes of the County's model, the businesses have been grouped into four major functional areas; Human Services (HS), Public Safety (PS), Planning and Development (PD), and Finance & Revenue (F&R), inclusive of over 50 departments and agencies representing hundreds of unique and often times cross-agency services.

The model is based on the following Mission Statement that directs the County's information technology activities. Every effort undertaken is framed and aligned with this mission statement:

"Delivery of quality and innovative information technology solutions for agencies and those doing business with Fairfax County Government."





## 5.2 Application and Data Architecture

Application architecture defines the design and correlation among software programs and applications. The Architecture promotes common development and presentation standards, enables optimum system integration, provides opportunities for use of shared infrastructure environments, servers, storage and related tools, enables shared use of data, facilitates the reuse of components, and the rapid deployment of applications in response to changing business requirements. Application Architecture includes elements of technology architecture that converts business process to business intelligence to support the County's goal of delivering timely, efficient and cost effective services. In Fairfax County a vast inventory of enterprise-wide and agency specific applications reside on mainframe, server, and/pr desktop computer platforms. New applications and application enhancements are constantly evaluated, developed or acquired, and implemented as older "legacy" applications retire, or, business organizations and related functions reorganize and/or have new needs.

A major component of mainframe based legacy applications will be replaced in the next 36 months, thus mainframe environment will retire sometime after the ERP transformation and the remaining legacy applications have been replaced or re-developed. Fairfax County is updating many of its administrative applications as well as acquiring new applications. County government and school system have embarked on a multi-year, joint initiative to modernize the portfolio of enterprise systems that support financial management, materials management, and related administrative applications with an integrated approach under a single application platform that has the flexibility to meet current and future requirements of both entities (See section 2). The common solution SAP ERP uses contemporary application architecture, and will be the application platform for other applicable system replacements, also providing interoperability, data mining, and integration with WEB architecture for improved on-demand search.

The County's goal is to use industry standard application development tools and language environments that are adaptive in web-enable models. The Application architecture also protects the County's investment in 'classic' systems by enabling enhancements that facilitate enhanced usability, improved data analytics, search and reporting and end user controls. In addition,

by keeping abreast of emerging technologies such as Web Services, XML, SOA and other contemporary methods, the County positions itself to take advantage of emerging opportunities offered by these technologies. An exhaustive discussion is beyond the scope of this section; however, some examples of the County's application architecture and some recent developments are described here.

As the County balances determination between Commercial-Off-The-Shelf (COTS) vs. in-house development for the diverse portfolio of agencies' business systems, the new framework for application development is applied. The new framework incorporates Software Engineering, Information Architecture, and Application Development Methodology. These principles and techniques are used to augment the current Systems Development Life Cycle Standards (SD LCS). The resulting approach encompasses application life cycles for "cradle to grave"; that is, from the earliest stages of planning, through requirements and design, to implementation and post-implementation support, and hot back-up. New applications will be built on the most current and promising platforms and an architectural framework based on the future of IT taking into consideration industry best practices and sustainable trends.

Development platforms such as .Net and standards such as XML and Web Services is a key part of the strategy. The .Net platform provides the foundation for departmental and enterprise-wide applications and offers a stable application environment with more opportunity for componentization of business logic, sharing of common components and the integration of business processes across application boundaries. A new class of tools such as Visual Studio.Net provides County developers with a robust and flexible development environment. Encapsulating both existing and new business logic into "Web services" provide the ability to expose business processes across organizational and application boundaries, within the County, other local jurisdictions, the state, the federal government, as well as business partners. XML provides the common "glue" to hold together and provide consistent information across boundaries to facilitate data sharing among disparate platforms and systems. Enterprise Application Integration (EAI) products such as WebMethods and Microsoft BizTalk allow virtually unlimited ability to share, incorporate information and business process from older, mainframe

and client/server applications in to the new environment. A detailed “Architectural Framework” document has been developed, and is intended to be an organic document flexible enough to reflect and incorporate rapid advances in information technology.

**Geographical Information System Applications (GIS)** – The ArcGIS software suite provides high-end geospatial technology, GIS tools and functionality and presentation to the GIS user community. The software integrates visual or graphic data in the form of maps, with descriptive or attribute information from an organization’s internal databases. ArcGIS provides tools for analysts to access, visualize, and query both graphic and tabular data for

### 5.2.1 The Application Tools

Application tools are information technology components used to develop and support application functions. Application tools include the support systems required to facilitate work planning and communications.

**Programming/Development Tools** – New applications are currently under development using fourth generation object oriented languages and tools. This approach will continue as web-based applications are developed, or as Commercial-Off-The-Shelf (COTS) systems or Cloud and SAAS applications are implemented. Industry standard life-cycle methodologies are employed to define, develop and implement new systems. Expert system technology is used to incorporate complex rule based functionality into systems. New developments use ASP and ASP.NET for the application layer. The County uses webMethods and Microsoft BizTalk to assist in the integration of applications at the presentation, business logic, and data layers. Documentum is the County’s enterprise content and document management software solution standard. The County also supports REAMS imaging solution.

Since often times there are no viable COTS available that meet agencies’ unique business needs, software development remains relevant, thus Software Engineering technologies are incorporated into the Systems Development Life Cycle Standards (SDLCS) to provide a disciplined and consistent development approach.

**Collaboration Tools** – The County uses Microsoft SharePoint and Office Communication Suite which include instant messaging and web conferencing. Additionally, the County uses other video conferencing and web conferencing tools to support collaborative communications. ThinkTank is used for Group session

better analysis and decision-making. There are three levels of license usage for ArcGIS that the county uses. The highest level, ArcInfo, is used by professional GIS analysts for sophisticated analysis and processes. The View level is used by most users for map creating and simply analysis of the County’s geographic data sets. Arc Internet Map Server (ARCIMS) and ArcGIS Server are two components used to distribute highly customized GIS based applications through the Internet / Intranet. Internet based mapping capabilities are incorporated as appropriate for augmenting and using available applications for public and internal government access via the WEB.

Collaborative Software in the Group Decision Support Center. Groups use the computer-supported meeting center and its software to conduct process improvements, strategic planning, program evaluation, and vendor selection sessions.

**Database Management Systems (DBMS)** – The County uses several database management platforms to support its business applications. Oracle and Microsoft SQL Server are the County’s databases standards. Currently most of the Oracle and SQL databases on standard COTS development architectures are consolidated for greater cost efficiency, supportability and performance. The County IT standards call for complex, Internet accessible or high access databases to use Microsoft SQL Server or Oracle as appropriate. However, there are also “fat client” and web-based agency specific applications that are maintained separately by agencies. The majority of small agency applications use Microsoft Access or Microsoft SQL Server as the database and programming language architecture. Remaining mainframe based legacy applications use DB2, IDMS, and /or VSAM databases.

**Enterprise Decision Support Systems and Business Intelligence** – The County’s portfolio currently contains a number of products used for reporting, analytic, and decision support. Business Objects/ Crystal Reports, SAS, QMF, SQL Reporting Services are the current tools supported for enterprise reporting, basic ad-hoc query and departmental reporting. Many of these products were acquired through COTS solutions with embedded tools. The proliferation of tools and the associated support, training, and infrastructure costs present a strong business case for rationalizing the portfolio, consolidation and virtualization. The County’s strategy is to provide shared

enterprise capability and infrastructure for reporting, query, transparency and decision support. As standards are defined for the County's enterprise solution(s), the portfolio will be rationalized into fewer products over time. This approach will enable DIT to continue to modernize the existing systems portfolio while creating economies of scale for improved interoperability, search, and cost control.

**Desktop Office Automation/Workstation Software –** Microsoft's E-mail and Office Suite is the standard for general productivity automation functions including Word, Excel, PowerPoint, and Outlook. Microsoft Internet Explorer is the standard for Web browsing, implemented in the standard image. Microsoft Project and Visio are available through enterprise software provisioning. Agencies may have other desktop based software for special, unique requirements.

### 5.3 Platform Architecture

Platform architecture defines the technical components of the infrastructure including server and client platforms, the operating systems and interfaces supported, as well as other software tools and equipment used to operate applications. Fairfax County's platform architecture includes over 700 servers: UNIX (Sun Solaris and Unisys ES), Microsoft Windows 2003/2008, and z/OS mainframe. Over 12,000 PC's provide end-user access to County systems. Laptops, Blackberries and other PDAs and mobile devices

#### 5.3.1 The Platforms

**Desktop PCs, workstations and Peripherals –** DIT prescribes hardware platforms and desktop applications standards as well as procurement vehicles to optimize support and cost. Desktop computers (PCs) are replaced in accordance with the County's PC Replacement Program cycle using adopted standards bundled with the MS Suite. The PC Replacement strategy applies to all agencies and provides the County economies of scale as well as a more robust, effective support environment.

County PCs are used for office productivity software, enterprise e-mail and groupware, application client software, Internet/Web access, and mainframe emulation. Windows 7 and Windows Mobile are currently being deployed.

Desktop and network printing is accomplished primarily through the County's enterprise multi-function copier/

**IT Service Desk software –** The IT Service Desk provides County employees centralized portal for computer support. InfraEnterprise is the web-based solution used to support the Service Desk function leveraging the ITIL framework. The Automatic Call Distribution telephone system is used to route calls. The IT Help Desk has a high percentage of first-call resolution.



also support employee access to agency business systems. All personal computers are standardized using Windows XP /Vista and/or 2007. The total data storage requirement has grown from 394 gigabytes in 1998 to the current total of over 400 terabytes. The County also uses State and other non-County hardware platforms as necessary. The following paragraphs describe the major features of the County's platform architecture.

printer/scan/fax machine fleet. Agencies also use stand-alone desktop or work-group printers, and special use machines, i.e. plotters, etc.

**LAN-based Network Servers –** Fairfax County's enterprise server environment utilizes Intel and Unix-based servers. Enterprise-class server technology (e.g. UniSys ES 7000, DELL/IBM Blade, SUN servers) support the County's enterprise infrastructure applications such as Exchange, Active Directory, SQL, Oracle, Citrix, and major business systems such as GIS, Tax systems, Human Services systems, Land Development and Public Works applications, Library, and Corporate systems. etc. The County supports virtualization as a standard platform for compliant COTS and infrastructure applications where feasible.

### 5.3.2 Storage Area Network

Fairfax County implemented its first Storage Area Network (SAN) in 2002. This enabled data storage in a centralized location, with redundancy and failover, mitigating the risk of data loss due to hardware failure. Data from all servers (mainframe, UNIX, and INTEL) now coexist on the same disk subsystem. In 2006, the County refreshed the enterprise disk arrays and fabric with EMC DMX-3 disks and Cisco fabric. The County recently enhanced storage by implementing Netapp and IBM XIV storage systems, which positions the County for future growth and the ability to meet strategic initiatives for Data Lifecycle Management.

Storage Management requirements addressed by the SAN are:

- Scalable storage capacity that allows users to increase storage as needed.
- Modular, adaptive architectures which allows users to deploy storage in a variety of centralized

and distributed environments with re-deployment capabilities as needed.

- Highly available architectures to prevent downtime.
- Cross-platform solutions that support a variety of operating systems, allowing users to reduce costs by standardizing on a single enterprise storage solution, rather than operating system specific solutions.
- Higher levels of performance to support the ever-growing volume of online data.
- Higher performance backup and restore operations to support shrinking backup windows.
- The ability to share data across the enterprise rather than building "islands of data."
- Easy to use, centralized management tools that allow hardware and data to be distributed."

### 5.4 Network Architecture

The County views a strong, viable communications infrastructure as a vital component in the overall IT strategy of maintaining its successful deployment of cost-effective solutions that optimize business goals. The enterprise communications infrastructure includes voice and data technologies, as well as various topologies, transmission services and protocols necessary to facilitate the interconnection of server platforms, intra-building and office networks (LANs), and inter-building and campus networks (WANs). The network is thus responsive and reliable for County business applications and allows for the uninterrupted flow of voice, data, and video information. The plan and architecture takes into account growth based on the needs of County agencies as programs expand for both intra and inter County connectivity. The core network for intra-county is supported by the County's fiber I-Net, integrated with carrier lines for full coverage, back-up and redundancy for certain critical systems. The underlying infrastructure will ultimately support voice, data, and video, providing increased, cost-effective bandwidth potential, and

improved output. The core fiber I-Net is a metropolitan fiber ring that connects over 400 County and Schools facilities, with DIT supporting over 14,000 data ports and over 15,000 voice ports on the communications infrastructure.

Network technologies tend to refresh every 18-24 months, which creates additional challenges for keeping network architecture and standards in line with evolving business requirements, security and other support needs. Web-enabled applications and Internet tools such as Social Media have rapidly expanded; this coupled with business continuity resulted in expansion from a single high capacity DS-3 for internet services to two DS-3's and one 50-100MBPS MAN circuit connected to two separate ISPs. e-Government applications, streaming video, teleconferencing, and more integrated and complex applications drive the requirements for the County's communication infrastructure and its components, thus the communications infrastructure is flexible and designed for low-cost, incremental enhancement.



*Fairfax County's Enterprise Technology Operations Center*

#### 5.4.1 Enterprise Data Communications Network

The Enterprise Data Communications Network for Fairfax County Government serves as the data communications backbone that provides countywide access to information technology resources. All systems connected on the enterprise network are based on recognized, open standards; compliance with published standards is required for any network-connected device or system. The County standard network protocol is TCP/IP. Gigabit Ethernet is the standard backbone speed in the County and 100 MBPS is the standard desktop speed. All platforms are interconnected via the enterprise network including PCs, servers, multi-function printer/scanner/copier device fleet, and the mainframe computer. Additionally, various wireless technologies are rapidly expanding throughout the County's network. The County currently uses commercial broadband wireless infrastructure to support wireless applications, data, images, live video to the field and mobile devices supporting primarily public safety responders. On-going strategy integrated the wireless and wire-line networks.

The Enterprise Wide Area Network (WAN) is built of two different architectures. One: I-Net or Institutional Network utilizing the dark fiber provided to the County through the

COX and Comcast Cable Franchise Agreements. I-Net spans seven hub sites and two key resource centers, Massey Public Safety Campus and the Government Center. These sites are networked via a 10 gigabit DWDM fiber optic backbone. The I-Net DWDM backbone provides connectivity to 180+ remote sites running a 1 gigabit uplink from the backbone to the site. I-Net also employs MPLS (Multiprotocol Label Switching)/VRF (VPN Routing & Forwarding) to allow I-Net to service many types of diverse traffic whether it is enterprise, public access, public safety, or voice over IP. Through MPLS/VRF each type of traffic can be separated logically for security support, as in enterprise vs. public access, or prioritized in the case of voice traffic. I-Net has now positioned the County Data Communications Network to respond quickly to the ever-changing technology needs of its customers. The remaining WAN sites are supported via Verizon ATM and TLS services. ISDN and DSL are in place for small sites such as group homes and small park sites. Use of the ISDN technology is being phased out in favor of I-Net, ATM, or DSL.

A dedicated Public Access Network was established in FY 2005. This network provides public access computers a

various county locations to citizens of Fairfax County for access to County and Internet resources separate from the government Enterprise Network for security reasons. The Public Access Network includes all public libraries, community and recreation services sites, and select human services sites. The design provides for separate physical networks at each site while sharing the existing WAN infrastructure and using logical separation on the WAN. A firewall between the Enterprise Network and Public Access Network allows for county IT staff to manage the infrastructure down to the desktop for each site. This model will be the standard for any new facilities requiring both enterprise and public access.

The County will continue to implement wireless LANs and wireless data over commercial systems as necessitated by business and operational requirements. The use of this technology is carefully evaluated to ensure all County

#### 5.4.2 Mobile Data Network

To support operations of the various public safety agencies, the County activated AT&T Commercial Wireless Broadband service integrated with a legacy 450MHz mobile data communications system (MDCS) that ties the response vehicles of the Police, Fire and Rescue and Sheriff's departments to the County's Computer-Aided Dispatch (CAD) system, the Law Enforcement Incident Management system mobiles, and access to various databases maintained by the Commonwealth of Virginia and Federal law enforcement databases. This system consists of more than 900 Mobile computers Terminals (MCT) and Vehicular Radio Modems (VRM) in vehicles of the various agencies, with transmitting equipment located at six sites in the County. The Fire

#### 5.4.3 Institutional Network (I-Net)

The County's network backbone (I-Net) was provided through the Cable Franchise Agreements with COX Communications — Northern Virginia and Comcast of Virginia. Fairfax County's I-Net is one of the largest and most complex local government networks in operation. This carrier-class network comprised of over 4,000 km of single mode fiber (SMF), in a ring, hub and spoke topology. There are seven Hub sites that are redundantly connected in a ring. The fiber optic infrastructure enables the County enhanced capabilities for transporting data, voice and video. The I-Net provides services such as high speed data, Voice over IP (VoIP), broadcast video, video conferencing, streaming video, and distance learning.

data is protected from unauthorized access. Currently, non-broadcast SSID's, NAT and MAC address registration, and digital certificates are required to gain access to the private WLAN. VPN technology is employed to protect data over commercial services.

Network Management is currently supported on four platforms using Orion Solarwinds – Monitors I-Net infrastructure for up/down alerting and performance issues, and Verizon Managed Services – Provides fault reporting of all ATM and I-Net sites.

In FY 2010, native Ethernet connectivity was implemented directly to the mainframe eliminating the need a dedicated Cisco router using CIP (Channel Interface Processor), supporting communications of the TN3270 (Telnet) sessions.

Department uses Verizon Wireless commercial broadband service for Emergency Medical System access and communication, while both carriers are used to support a growing portfolio of mobile applications including Public Works and Environmental Services, Zoning, Health Department, and various Human Services agencies.

Like a growing number of major local governments, the County applied for a FCC Waiver for use of 700 Mhz for Public Safety broadband. The design is part of the comprehensive enterprise network strategy that will leverage existing voice wireless infrastructure (see 5.4.2.1), and integrate with the County's fiber back-bone infrastructure for back-haul (see 5.4.1.2 below).

The network has several origination points, and facilities for controlling the switching and routing of data, voice and video signals among all participating sites.

Although broadband service is available through local telecommunication companies, it comes at a significant price, a loss of flexibility, and for some services, only limited availability. The I-Net provides bandwidth that is virtually "unlimited" while meeting the County's present and future communication requirements. The I-Net is becoming the "super highway" for the County's internal video, voice and data communications. The virtually "unlimited" bandwidth provided by the I-Net allows the County to

amortize its cost over the life of the I-Net with an overall long-term operating cost savings. The ultimate goal of converged voice, data and video technologies will be facilitated through I-Net.

The I-Net Video Network is a scalable integrated video transport system which provides a high quality image delivery system with scalable bandwidth, capacity, and growth potential for future Fairfax County Government and Fairfax County Public School applications. The I-Net video network transport has two distinct communication

links: Coarse Wave Division Multiplexing (CWDM) is the transport technology that provides forward and reverse transport for I-Net enabled County facilities. The forward (downstream) transport provides select cable TV operator channels and local origination content produced by the County's Video Production facilities for services such as distance learning. Each I-Net enabled facility is equipped to transmit reverse (upstream) video to the County's Video production facility for processing.

#### 5.4.4 Voice Communications Network

In FY 2007, the County began deployment of a new telephone architecture using an Avaya enterprise-wide VoIP capable platform. Implementation of the new voice communications platform is ongoing and will be substantially completed in FY 2011. The solution uses the latest technology that includes VoIP and the County's fiber-optic network I-Net as the transport network connecting County facilities, thereby reducing the total costs of providing telecommunications services. The continued implementation of the new Avaya communications platform will help meet the needs of Fairfax County citizens and employees, and leverage the high-speed, high bandwidth connectivity provided by the County's I-Net to form a fully integrated broadband network. To complement the cost saving advantage of using the I-Net for calls between locations, DIT is developing a strategy to implement Session Initiation Protocol (SIP) Trunking to further reduce the cost of connecting to the carrier network. This will ultimately lead to an end-to-end IP based broadband communications environment that is flexible, secure and very cost effective.

The voice system design uses two main Fairfax County government sites – the Massey Campus and the Government Center Campus serve as the "core" for the Avaya enterprise platform. The streamlined dialing plan enables more efficient and less cost for agencies that have a geographically dispersed footprint with much tighter voice communications integration between locations. Avaya collaboration applications, such as the Call Center Elite application, allow agencies to have call center agents dispersed across the County, yet they are part of the same work group from a citizen facing standpoint.

The system architecture is also integrated with a new Call Management System (CMS) solution from Avaya as part of the Voice Modernization platform. This solution's capabilities greatly improves the collection of necessary statistics used by Contact Center managers to evaluate the County's responses to citizens and constituents.

#### 5.4.5 Public Service and Public Safety Radio Networks

The County operates two voice radio 800 MHz trunked radio systems, one dedicated for public safety emergency response operations with over 6,000 units, and the other that supports more than 3,000 radios for Fairfax County Public Schools Transportation (school buses), and county agencies including the Department of Public works and Environmental Services, Park authority, FASTRAN, the CONNECTOR bus system, and other non-public safety County agencies. The Public Service System was refreshed in 2005. Continuing in FY 2011, the Public Safety Radio system will be upgraded

to a digital, IP based technology for improved data access, system management, improved integration with the new Computer Aided Dispatch system (Intergraph), and regional interoperability. The two system infrastructures are architected to allow interconnection and back-up.

The County will remain fully involved in the FCC mandated 800 MHz re-banding effort, managing the county's transition and the regional re-banding plan.

## 5.5 Internet Architecture

Fairfax County's Internet architecture supports the County's e-Government program which utilizes emerging WEB technologies to make County services and information readily accessible and available to the public, with interactive services to conduct business (e.g., pay taxes, apply for permits, etc.), and searchable access to data (real estate assessments, Human Services resources, etc). The e-Government architecture defines the standards, technologies and guidelines for public access, and requirements for conducting on-line business with County agencies, state agencies and outside entities. The County's Internet architecture is comprised of the following:

- **High Speed Connection to the Internet** – The County's fractional DS-3 connections to the Internet provide internet access for County staff as well as outside access to the County's Web server(s) by residents, business, and others via the Internet.
- **Public Access Web Server** – The County's Public Access Web Server provides Internet users with a vast amount of information made available by various agencies. The Web server can be viewed as an "on-line service counter" where residents and others may obtain information related to services, licenses, taxes, recreation, court filings, etc. The Web server also acts as the distribution or collection point for information obtained from or provided to enterprise databases via an "Application Server".
- **Intranet Web Server** – The County InfoWeb Intranet Web server provides a portal access to County information and applications for agency and employee use.
- **Application Servers** – provide the gateway between the County Web servers and the information stored in County enterprise databases. The application servers communicate with various databases on the County servers, accessing and collecting the requested information, formatting the information, updating the database where appropriate, and returning the result to the Web server for presentation. Application servers also provide additional levels of security to ensure that only allowable information is accessible.
- **Interfaces** – between the County Application servers and the enterprise databases provide the link that allows access to data residing in a wide array of sources. The interfaces make it possible to access data from virtually all of the County databases: Oracle, SQL, MS Access, DB2 and VSAM. The interfaces are comprised of "Application Program Interfaces" (APIs), Open Database Connectivity (ODBC), SOA, and other standards that enable the access layer of the web architecture.



## 5.6 Security Architecture

The Information Security Office defines and enforces the security standards and policies necessary to protect the County's information assets and technology infrastructure. IT Security continues to be a fundamental component of the County's e-Government strategy. The security layer employs best practices security principles coupled with a hardware and software infrastructure supported with policies, plans and procedures. This architecture is designed to provide an appropriate level of protection for all County information processing resources regardless of platform and includes incorporation of industry best practices for overall reduction of risk. The objectives of the information security program are to ensure confidentiality of information, integrity of data, systems and operations, technical compliance for HIPAA and PCI, privacy and availability of information processing resources. The information security program utilizes a multi-faceted approach to meet these objectives that includes threat reduction techniques, technological and managerial solutions, and vigorous implementation of awareness activities. The basic elements of identification and authentication, access control and monitoring of information processing activities are employed throughout the enterprise. The secure network architecture is a defense-in-depth approach to network security design including a method of network partitioning and the development of a modular infrastructure are deployed to better shield important resources within the network.

"Safe" architecture is in place for IT Security, dividing the network perimeter into five business groups E-Commerce, Internet Access, Partners, Emergency Operations, and Public Access. Each group has its own physical firewall tailored for the specific business area. This strategy has increased firewall performance and limited exposure to each business group.

- The E-Commerce business group supports all public facing web services providing access to County resources for both citizen and business.
- The Internet business group is used to control County employee access to the internet and allow for content and virus scanning.
- The Partners business group allows for connections to external "Trusted Partners" to include Fairfax County Public Schools, Fairfax County Water Authority, Commonwealth of Virginia (State Police, State Health, Department of Social Services, Supreme Court of Virginia, Department of Juvenile Justice,

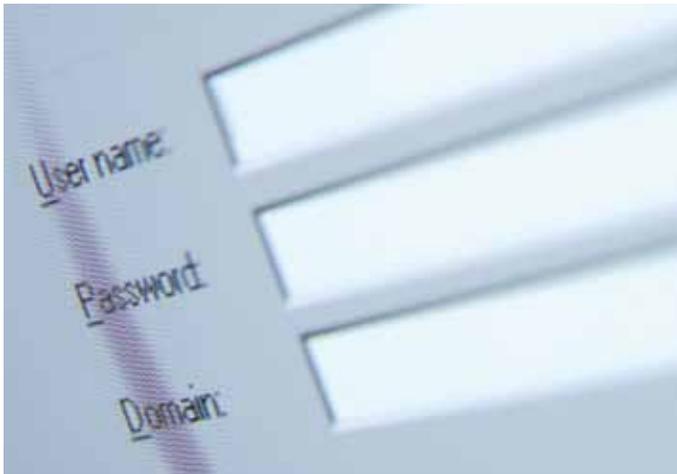
and State Board of Elections) as well as public safety connections for several adjoining jurisdictions.

- The Emergency Operations group was established to secure the Emergency Operations Center providing IT resources to the Department of Emergency Operations.
- The Public Access network was built for the Libraries and Community and Recreation Services.

Remote access via VPN and Citrix services provides access to the County's Enterprise Network resources for telecommuters, vendors, remote access users or business travelers, as well as several small Fairfax County offices. Security for remote access is managed through a Remote Access Server using security tokens and PIN numbers.

Firewall technology is used as the main perimeter defense with all access from the Internet routed through the County's system of firewalls. In addition, the County uses broad filtering and routing at the firewall portion nearest to the Internet connectivity, while more granular filtering and routing is exercised nearest the internal network connection. Classic authentication for each internal user is based upon a unique UserID (also called a sign-or log-on) combined with a unique strong password. To improve the secure access and authentication to web-based applications as well as backend servers, the County has procured identity management platform that positions DIT to leverage the security architecture framework well into the future. e-Trust, through its SiteMider module, provides a software platform of shared services that includes reduced sign-on, authentication management (who are you), and entitlement management (what you are allowed to do on the site) for web-based applications. eTrust also provides a secure reverse proxy solution that passes requests to enterprise backend content servers, and returns resources to the requesting client, thus allowing for a practical solution to the protection of internal assets. With Identity Management in place, the County will be in a position to manage user profiles for both internal staff and public access, making personalized e-Government a reality. Expansion of eTrust will continue in order to provide a secure access and an end-user authentication platform for internal and external users.

Intrusion Detection System (IDS) detect intrusions within the network, and Intrusion Prevention Systems (IPS) primary function is prevention rather than detection. IPS devices can proactively prevent intrusions by detecting signs of



an intrusion and/or detecting an actual intrusion attempt. IPS provides capacity to perform real-time analysis of Intrusion attempts to determine if sensitive data, systems or network devices are being attacked or if a breach of confidentiality, integrity, or availability has occurred. The primary objective of Intrusion Prevention is to reduce damage and isolate/ contain malicious traffic. With the large quantities of log and alarm data generated by firewalls and sensors, the need for a specialized application to support the role of correlation was implemented. The IPS solution conducts a comprehensive threat assessment and allows for quick identification of credible threats to the organization in order to facilitate expedited response and containment of intrusions and malicious activity.

As the key aspect of the IT Security strategy, the County employs a private/public network model. Sensitive and critical assets are located on the private portion of the network while information and services available for public use are located on the public section. CITRIX, VPN, Web Access and dial-up technologies are available for remote users. Each of these requires security tokens and LDAP authentication for access. Remote access is approved at the same level as if the user were physically at their work site. Identification and authentication, access control, and auditing functions are performed on the specific platforms using the capabilities inherent in the appropriate operating system. Mandates such as HIPAA and Procurement Card Industry (PCI) have increased system monitoring and user enforcement requirements. IT security awareness activities are implemented to effect a culture change for all employees. Through security conscious employees, realization of return on investment in security technologies can be leveraged further as overall risk to data and systems is reduced.

Fairfax County Government is dedicated to protecting its IT assets and the data and information in its charge and ensuring that no unauthorized access or use of such data and information occurs. As evidence of its long standing and best practices approach and implementation of IT Security, Fairfax County Government received Cybertrust's Enterprise Security Certification in May 2010 which attests that Fairfax County Government has made security a priority, and employs renowned security processes and technologies in establishing and maintaining a proactive and comprehensive information security program. The recognition acknowledges that the county's information security controls, policies and procedures have been examined, measured and validated against a stringent set of security requirements. The Security Management Program (SMP) is a comprehensive security assessment and certification program that validates an organization's security posture. The SMP utilizes proven International Organization for Standardization/ International Electrotechnical Commission 27002 security controls and helps customers such as Fairfax County Government prioritize and identify security risks in an ongoing manner, and then proactively manage threats before they have an impact. Fairfax County is the only local government within the National Capitol Region that holds this certification.

