TRANSFORMATIONAL INITIATIVE #1

Centralizing LAN Services

Vision and Implementation Plan

Elvera Gleaton
National Agricultural Statistics Service

May 18, 2011

Research, Education and Economics (REE) **U.S. Department of Agriculture**

Table of Contents

I. Background: Information technology (IT) is continually evolving and NASS continues to change to maximize the benefits of technology. Two decades ago, our Agency implemented a decentralized Local Area Network (LAN) environment to expand the computer capabilities of our staff to significantly improve our survey processing. We were successful implementing numerous LAN-based systems, but over time realized we were underutilizing our data since it was decentralized and located in thousands of LAN files. In addition, we were duplicating our efforts since activities were being performed in 46 Field Offices (FO) that could be performed in one location.

NASS uses 96 LAN-based servers to maintain its information technology (IT) infrastructure. Each Field Office has had two Microsoft Windows Servers. One server is used for file and print sharing, and the other server is used for network authentication. The Field Office servers were procured in 2006 and the server life cycle will end in 2011. The Headquarters (HQ) servers were purchased in 2005 and their life cycle ended in 2010 when they were scheduled to be refreshed.

NASS has 46 Field Office LAN Administrators maintaining the servers in our Field Offices. LAN Administrators perform LAN updates daily for various application changes. LAN Administrators also manage the servers, create directories, give users access, and implement various security patches.

For this transformational initiative, we will centralize and consolidate our LAN services, which will provide much more flexibility and capability to our Agency by centralizing our data and applications so we can access all our data and information from anywhere for some or all Field Offices. However, we will not fully "optimize" the utilization of data until we completely implement our Agency's enterprise database architecture.

Since the tragedy of September 11, 2001, security has become a major concern within the federal government and has led to a movement to centralize rather than decentralize IT systems and resources to protect them better by having fewer facilities to physically secure and monitor. More recently, concerns about energy utilization have led to directives to consolidate and centralize servers to save energy. President Obama's administration has called for federal agencies to cut energy consumption in their data centers as part of the broader effort to green federal operations. An executive order was signed by President Obama on October 5, 2009 requiring Agencies to adopt best practices to manage their servers in an energy efficient manner. For example, our Field Office servers operate at about 20-30 percent utilization so energy savings can be realized by consolidating our servers. The Department of Agriculture's Chief Information Officer (CIO) has directed Agencies to migrate their servers to USDA Data Centers. Due to the need for NASS to maintain a strong degree of independence as a federal statistical agency, the Department's CIO has agreed to allow NASS to continue to manage our LAN servers, but centralize our servers for security and energy reasons.

Simultaneously, there has been a growing interest within NASS to operate more efficiently by having an infrastructure that allows us to easily move some work functions from Headquarters to Field Offices and have a Field Office perform work activities for

multiple Field Offices. For our Agency to pursue these types of opportunities, we need to transition from our distributed LAN environment to an environment where employees can access applications **anywhere and anytime** from their desktops, laptops, and smart phones. This would position us to explore ways to operate more effectively and efficiently by not being tied to a "local" file server when distributing work.

This initiative will not only centralize and consolidate, but will also standardize our LAN design and services. Our solution will streamline **"servers, storage, desktops, software, security, and staff."** It will include all LAN servers within our Agency, except the Agricultural Statistics Board Lockup area and associated COOP/Disaster Recovery servers, which the Department has exempted. In addition, the Department is moving forward with a plan to locate USDA geospatial data at an Enterprise Data Center. Therefore, the geospatial servers in NASS will likely migrate to this Data Center if directed by the Department. NASS LAN servers will be located in Headquarters in USDA space for Eastern Field Offices and Headquarters employees. The NASS Western Field Offices will be connected to servers at NITC in Kansas City, where we house our mid-range (UNIX) servers and still use their mainframe services for survey processing. If suitable space cannot be obtained in Headquarters for the Eastern servers, then the NITC facility in St. Louis may be used.

We are committed to having very effective communications and collaboration across the Agency to be successful with this centralization effort since we need to standardize our LAN processes, such as who has access to files and applications and where applications and data are stored. We successfully tested hundreds of applications to be certain they work properly in the centralized and consolidated LAN environment. This transformational initiative will take a commitment of resources across NASS to test applications. We also need to ensure we provide the same or better level of service to employees in a centralized environment. We have formed an outstanding team to lead this transformational initiative. Together, we will be successful.

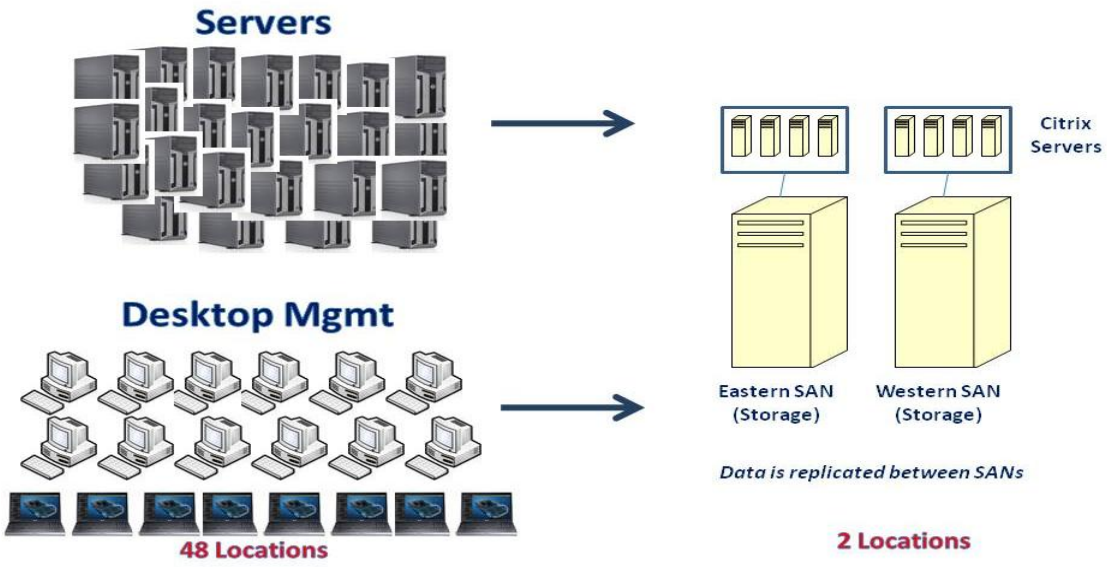
In Jim Collins' book, Good to Great, he states: ***"Good to Great organizations avoid technology fads and bandwagons, yet they become pioneers in the application of carefully selected technologies."*** Virtualization technology has been around for many years. Colleges, banks, airlines, just to name a few organizations, have been using virtualization for years. Virtualization is rapidly transforming the IT work environment and lets organizations run multiple virtual machines on a single physical machine, sharing the resources of that single computer across multiple environments.

II. Objectives: There are three objectives to this initiative for our Agency:

1. Consolidate and Centralize all File and Print Servers from 96 to 44 servers
2. Centralize Desktop Management rather than manage desktops from almost 50 locations
3. Streamline IT Support Needs for LAN and desktop services

Figure 1 provides a geographical depiction of the LAN centralization process.

Figure 1: Centralizing LAN Services



III. Benefits: There are numerous positive outcomes that can be expected by centralizing and consolidating our LAN services. We can streamline LAN administration since these activities will be performed by fewer employees. We can strengthen our security by having two rather than almost fifty physical locations containing servers and electronic Personally Identifiable Information (PII). We can provide the highest availability to our data by having on-line data redundancy that is not currently available. We can save equipment costs by more fully utilizing server capacity. We expect to migrate from 96 servers to about 44 servers. And, finally, we will reduce energy consumption through the consolidation and centralization of our LAN servers.

We will also create an IT infrastructure that will position employees in our Agency to continue to work if any of the following occurs: flu pandemic, natural disasters (i.e. hurricanes or floods), or server equipment failure.

The consolidation and standardization of LAN services will improve the Agency's operational efficiency by providing (1) more integration, (2) more streamlining, (3) more standardization, and (4) more flexibility.

(1) More Integration allows all users access to the same desktop. It will be much more efficient to manage desktops centrally. NASS will have data in only two locations which also gives us the ability to provide more integration with applications. We will have an on-line disaster recovery system, so if a system fails, we can fail over to another system. Since all applications have to reside on a single desktop, it forces application developers and users to consolidate the various software packages being used.

(2) More Streamlining means deploying this centralized environment allows NASS to have a significant reduction in staff resources devoted to LAN updates since only one person will apply an update for all 46 Field Offices. Desktops will be managed centrally where we install applications, updates, and patches once, and then the desktop is deployed to all users. This reduces the amount of redundant work in Field Offices. Administrators no longer have to go desk to desk to apply updates or deploy software. This initiative also reduces the amount of duplicate data in 46 different locations, as well as the number of servers to purchase as part of the NASS Infrastructure life cycle procurements. It will improve computer and physical security since desktops are read only so employees cannot install software -- only the central management is allowed to install software.

(3) More Standardization will provide the same desktop to all users. No matter where a user logs into the NASS network, whether in Mississippi or Hawaii, they will always get the same desktop and applications. We are standardizing our server configuration and deployments. We are standardizing the directory structures. We are standardizing roles and access rights.

We continue to see flooding, hurricanes, and tornadoes appearing across the country. Also watching the news, we hear about more hackers and power outages. NASS must be prepared for any type of disaster which could affect business anywhere in the Agency. In this transformational initiative, data is replicated in two locations. Our disaster recovery plan will allow for fail-over if an incident occurs.

(4) More Flexibility will occur for NASS employees. The centralized environment allows NASS staff to access applications/data from anywhere at any time. The virtual desktop can be accessed from various types of devices including laptops, desktops, iPads, and Smart Phones. This will allow NASS to have more remote users (teleworkers) due to ease of use. All users will be familiar with the virtual desktop, and will receive the same desktop remotely as they do in the office.

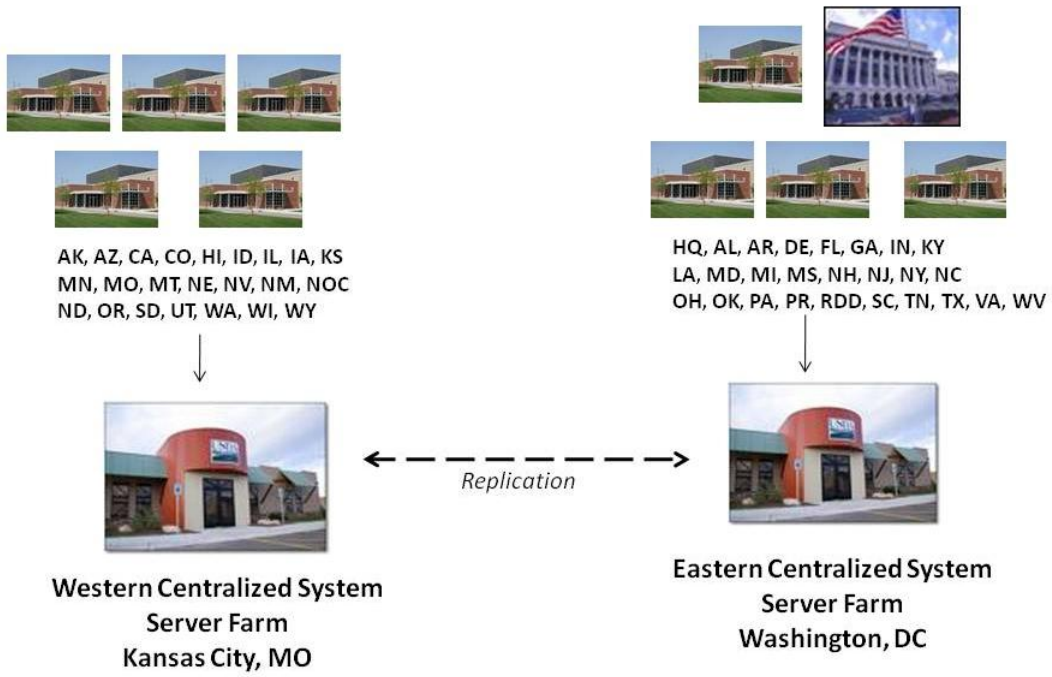
As an Agency, we will be able to readily perform tasks such as survey management, computer-assisted telephone interviewing, and analysis of survey

indications across Field Offices at a regional or national level when we centralize and consolidate our LAN servers.

IV. Technical Solution: The centralized system is composed of several components including blade servers[1], virtual servers, storage area networks, virtualization software, and switches. A great deal of research and consultation was involved in designing the technical solution for NASS. The design document for our centralized system is 168 pages and the installation and configuration documentation is 61 pages. This section will provide a brief overview of the technical solution.

The centralized solution consists of two server farms[2], which are called Eastern Centralized System (Washington, DC) and Western Centralized System (Kansas City, MO). Figure 2 shows the centralized location design. The 46 Field Offices have been divided to connect to one of the two server farms. Data are replicated between the two server farms. Users are automatically sent to the NASSvnet web server in their web browser which allows access the centralized system.

Figure 2: Centralized Location Design



[1]Blade Server is a stripped down server computer with a modular design optimized to minimize the use of physical space and energy.
[2]Server Farm is a cluster or collection of computer servers usually maintained by an enterprise to accomplish server needs far beyond the capability of one machine.

There is no technical requirement for all of the Eastern Field Offices to connect to the Eastern system or all of the Western Field Offices to connect to the Western system. Therefore, for business reasons, some Eastern Field Offices may be on the Western system or some Western Field Offices may be on the Eastern system. For example, NASS wants the calling center at the National Operations Center in St. Louis, Missouri on a different server farm than the Data Calling Centers (DCCs) in several Field Offices to ensure telephone calling can continue if a server farm fails.

Both server farms are critical pieces of the centralized system. Communication of all devices in the server farm are set up and configured as a private network. Each server farm is connected by four Virtual Local Area Networks (VLANs)[3].

A user connects to the centralized environment using a web browser. A virtual Windows desktop is sent to the user's web browser from the server farm. No data is sent over the connection.

Figure 3: Citrix Secured Application Delivery

Only mouse clicks and keystrokes are sent over the wire.

There are six critical pieces to the centralized environment. The critical pieces are:

A. Software
B. Desktops
C. Servers
D. Telecommunications
E. Storage
F. Disaster Recovery

[3]VLAN is a virtual LAN which is a group of hosts with a common set of requirements that communicate as if they were attached to the same broadcast domain, regardless of their physical location. A VLAN has the same attributes as a physical LAN, but it allows for end stations to be grouped together even if they are not located on the same network switch. Network reconfiguration can be done through software instead of physically relocating devices.

A. Software: NASS is using Citrix software, which is a global software leader in the virtualization market. The Citrix software allows us to virtualize the servers, applications, as well as desktops. Virtual applications will allow delivery of legacy applications over the web without rewriting a single line of code. The virtual desktops will allow us to create desktop images and push them down to users without ghosting machines. This solution provides us the flexibility to change desktop images and applications without having to push and load files to all locations. The centralized environment uses the following software:

(1) Citrix XenDesktop
(2) Citrix XenServer
(3) Microsoft Windows Server 2008
(4) Microsoft Terminal License
(5) Microsoft SQL Server

(1) Citrix XenDesktop allows delivery of virtual desktops and applications anywhere your users' work, to any type of device (which uses a web browser). Users access this software when loading their virtual desktop.

(2) Citrix XenServer is a complete, managed server virtualization platform built on the powerful Xen Hypervisor[4]. Xen technology is widely acknowledged as the fastest and most secure virtualization software in the industry. XenServer is designed for efficient management of Windows virtual servers and delivers cost-effective server consolidation.

(3) Microsoft Windows Server 2008 is a server operating system that allows multiple users to access services, applications, and data. It deploys policies and access controls to users.

(4) Microsoft Terminal License is a Windows software application which allows a user to access applications or data on a remote computer over a network connection. A Microsoft terminal license is required when using Citrix XenDesktop software.

(5) Microsoft SQL Server is a Microsoft database. It is used to host a data store for the XenDesktop server farm. It manages the connections between the virtual desktops and users. It is not used to manage any of our survey or census data[5].

[4] Xen Hypervisor is thin software layer which is inserted between the server's hardware and the operating system. This provides an abstraction layer that allows each physical server to run one or more "virtual servers", effectively decoupling the operating system and its applications from the underlying physical server.

[5] Transformational Initiative #2: Database-Optimized, Generalized, and Modular Applications, Vision and Implementation Plan, by Jack Nealon, National Agricultural Statistics Service, December 30, 2010, page 10.

B. Desktops: NASS is using Citrix XenDesktop software to deploy virtual desktops to NASS employees. The virtual desktop looks exactly like a regular Windows desktop. The desktops are all generated from one main image and then provisioned (distributed) to NASS users. The virtual desktops are stored on servers in the server web farms. NASS users will log into the NASS network and are automatically routed to the virtual desktops. Employees will access all NASS applications through a web browser. Desktop images are maintained centrally in Headquarters for all desktops. Users are able to change their wallpaper and minimum settings on their virtualized desktops. All software and applications will be deployed through the virtualized desktops. The virtual desktops are read-only so users are not able to install any software or devices to the virtual desktop. Users will be able to log into the NASS network from any physical location to access files and will have the same desktop interface.

Each of the two web farms is set up to provision or service 1300 virtual desktops.

There are five virtual desktop images available:

(1) **Standard Desktop:** This desktop is used by the majority of NASS users. It contains the following software: Adobe Reader, Blaise, Calendar Creator, Citrix Plug-in, Java, Hummingbird, Microsoft Office, Media Player, Winzip, Lotus 123, and .Net Framework.

(2) **All Apps Desktop:** This desktop is used by NASS staff who access software with limited licensing. This desktop is only used to access this software. The All Apps desktop contains all of the Standard Desktop plus the following software installed: Adobe Design Premium (Distiller, Photoshop, Dreamweaver, Fireworks, Flash, and InDesign), Microsoft Visio, Microsoft Project, Hyperion, and Viewchoice.

(3) **Developer Desktop:** This desktop is used by NASS staff responsible for developing and maintaining applications. It contains all of the Standard Desktop software plus the following software: Clipper, C#, Dreamweaver, Formula One, Javascript, SAS Base, SAS AF, Visual Studio, PowerBuilder, Visual Basic, FoxPro, PERL, etc.

(4) **System Administration Desktop:** This desktop is used by NASS staff responsible for administering servers, databases, security, and telecommunications equipment. It contains all of the Standard Desktop software plus the following software: Cisco Manager, Putty, IBM Director, Active Administrator, XenCenter Management Console.

(5) **Research and Development Desktop:** This desktop is used by the Research and Development staff. It contains all of the Standard Desktop software plus the following software: ERDAS, Imagine, R, ENVI, and ESRI.

These five images will be updated as software is added or deleted at NASS over time. A future goal of this initiative is to install a software metering agent which will control

access to various software products so users will not have to access multiple desktops for software.

As we have migrated different Field Offices, we have found them using various non-centralized software. We have not loaded the software on the desktop images because only one or two users access the software. Instead, the software was loaded on a host computer and will be submitted for evaluation by the NASS Software Oversight Action Panel. Some of the software installed on host machines are CoolEdit, Card Scan, PageMaker, Dymo Label Writer software, ArcGis*, Rightfax**, iTunes, and Live Meeting. Some of these software may be added to the virtual desktops in the future.

**ArcGis – When the centralized environment was designed, there was a Departmental project scheduled to centralize geospatial applications throughout USDA at a single data center. There are one to two ArcGIS users in each Field Office. There is a web version of the software which needs to be evaluated.*

***Rightfax is older faxing software that is scheduled to get upgraded to a web version.*

C. Servers: The technical solution involves implementing two server farms. Each server farm hosts a cluster of virtualized servers. We are consolidating the 94 Field Office servers into 44 servers with 22 servers located in Washington, DC and 22 servers located in Kansas City, MO.

Each server farm hosts 22 physical servers. Since each server farm will be used as a fail-over system, we must provide enough computing power for 1300 users at each location. The server numbers were based on performing simulation tests. We will continue to monitor the environment as we migrate Field Offices.

NASS purchased Dell Blade Chassis *(model Power Edge M1000e)* which can contain up to 16 blade servers. There are two chassis on each server farm. We are using Dell blade servers *(model Power Edge M610*) as the physical infrastructure and XenServer 5.5 as the virtual infrastructure.

The 22 servers perform different functions in the centralized environment. They are all running the Windows Server 2008 operating system. However, the Citrix virtualization software (XenServer) loads various services on the servers. Below are some of the server functions:

Citrix Desktop Delivery Controller Server (DDC) connects users to the virtualized desktops. This is what allows a user's web browser to connect to a virtual desktop.

Citrix XenDesktop Server is a collection of virtualized servers that are grouped together to provide desktops to end users. The XenDesktop server functions as a single administrative entity, and load balances virtualized desktops. All of the desktops are centrally managed.

Citrix Provisioning Server is the actual server that provisions (deploys) the virtual desktops to users. It receives the request from the DDC and sends the request to the XenDesktop Servers.

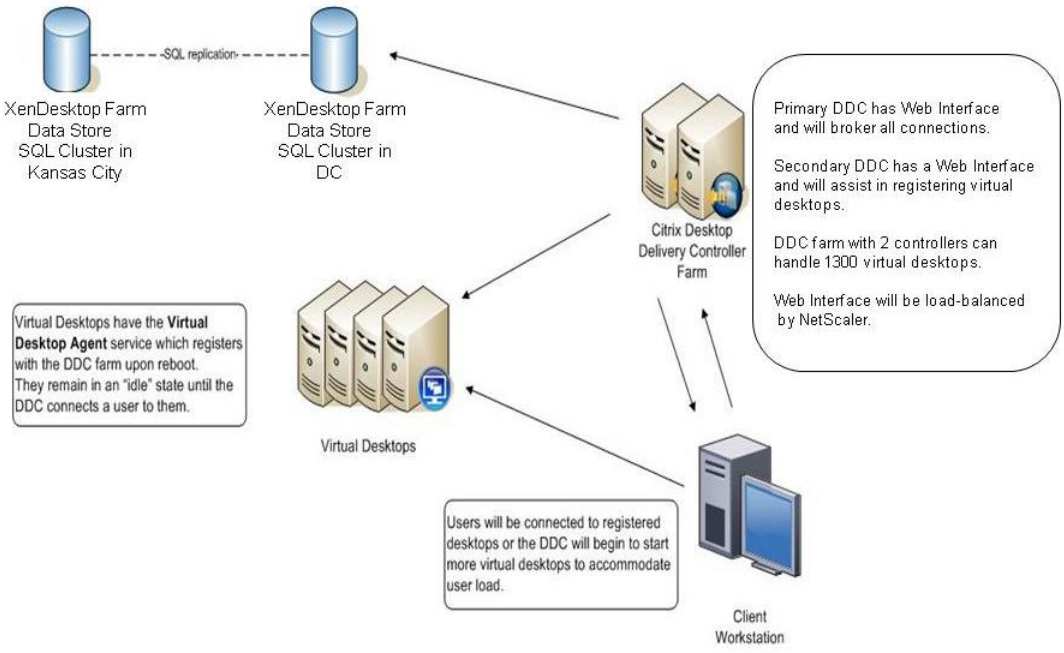
SQL Server stores all of the configurations of servers in the Citrix server farm. The database also contains all of the applications installed on the virtual desktops. This database is a critical part of the Citrix environment.

Active Directory Group Policies are applied to servers to provide centralized administration, a consistent server environment, manage user profiles, and secure the user environment. The Active Directory policies are built into the NASS Windows Server environment.

All users access virtual desktops in the server farm using a Citrix Web Interface. Before connecting to instances of a virtual desktop and applications, users will authenticate with their Active Directory usernames.

Figure 4 depicts the implementation of a Citrix server farm network layout.

Figure 4: Server Clusters in the Centralized Environment



*Note: DDC is a **Citrix Desktop Delivery Controller Server** that connects users to the virtualized desktops.*

D. Telecommunications: The most critical piece of the centralized environment is telecommunications. We plan to provide three levels of telecommunications in each Field Office (Primary, Backup, and a Disaster Recovery). In addition, we purchased WAN optimization equipment to reduce bandwidth consumption by compressing traffic and byte caching. The WAN Optimization will provide better performance of applications.

Solarwind software was purchased to evaluate the bandwidth demands for all operational demands at NASS from our ongoing program and from the various transformational initiatives. The monitoring is performed to determine how much bandwidth is needed to operate effectively.

(1) Primary Telecommunication Connection:

Our original design called for an upgrade of each Field Office UTN connection. This was completed by December 2009. Figure 5 shows the current bandwidth for each site. This will serve as the Agency primary connection for this transformational initiative.

Figure 5: Agency T1 Connection Summary

3 – T1 Connections (4.5 mb)	2 – T1 Connections (3 mb)	T3 Connections	DSL Connection
AR, CA, FL, IA, KY, MS, MT, NC, OK, TX, VA, WY, Research Division (Fairfax, Virginia)	AL, AZ, GA, HI, ID, IL, IN, KS, LA, MD, MI, MN, MO, ND, NE, NH, NJ, NM, NV, NY, OH, OR, PA, PR, SC, SD, TN, UT, WA, WI, WV	CO, Headquarters (DC), National Operations Center (St. Louis, MO)	DE, AK

(2) Backup Telecommunication Connection:

NASS will use a combination of Digital Subscriber Lines (DSL), T1 Lines, and 3G Wireless as backup connection types to a separate network. We expect complete implementation of the backup network by June 2011. We are installing a secondary connection for each location in case the primary telecommunications is disrupted so an office will be able to continue to operate. We contracted with a company to provide redundant telecommunications connections and manage the backup network.

The Delaware and Alaska Field Offices will not have a backup connection installed because there are so few employees at the location. Delaware and Alaska will use a hotspot for backup communications. The Colorado Field Office will not have a separate backup connection because it has a redundant T3 multi-link. The multi-link allows the Colorado Field Office to connect through multiple links. The NASS Headquarter office is connected directly to a major Universal Telecommunications Network (UTN) node which has high availability built in. The National Operations Center redundant

telecommunications is still being investigated. Figure 6 displays the bandwidth and type of backup connection.

Figure 6: Agency Backup Connection Types

DSL *Down Speed:* ***3 Mb*** *Up Speed:* ***384 - 894 Kb***	**T1** Down Speed: **1.5 Mb** Up Speed: **1.5 Mb**	**3G WLS** Down Speed: **1.5 Mb** Up Speed: **1.5 Mb**
AL, AR, AZ, CA, GA, HI, ID, KS, KY, LA, MD, MI, MN, MS, MT, NC, NJ, NV, OK, OR, PA, SC, SD, TX, VA, WA, WY, Research Division (Fairfax, Virginia)	FL IL, IN, MD, ND, NM, NY, WI	IA, NE, NH, OH, PR, TN, UT, WV

(3) Disaster Recovery Telecommunication Connection:

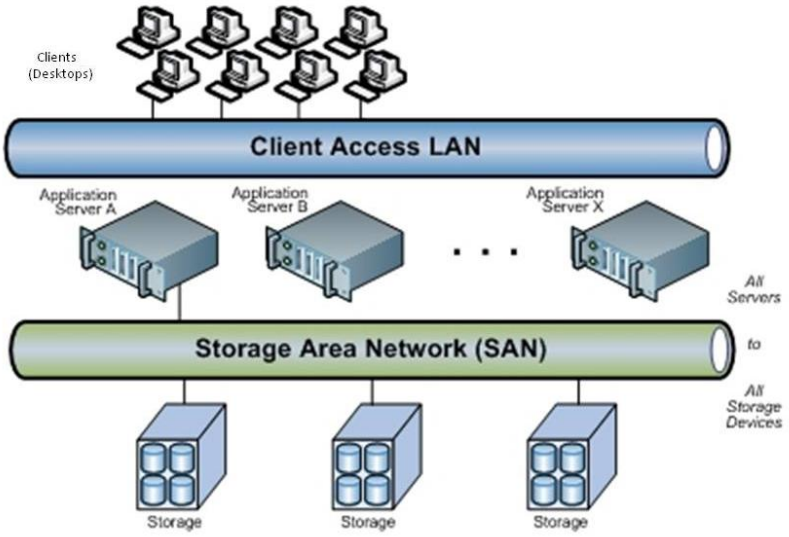
Since both the primary and secondary connections are wired solutions, there is a chance that an act of man or nature can cause a disruption in the service (i.e. flood, construction, or hurricane). Each Field Office still needs the ability to work so that we continue to provide our agricultural statistics reports on time to the public. As a result, NASS is also implementing wireless hot spots. Each Field Office has received a wireless hot spot, USB connectors, and instructions. The wireless hot spots will be treated as a remote connection and will not be connected to the NASS Network.

Each Field Office has identified five emergency personnel. The personnel will be equipped with a laptop or wireless USB device. If using the wireless USB device, the computer must be disconnected from the NASS network. Each user will need a token to access the NASS network through the Virtual Private Network (VPN). All existing security protocols will remain in place.

E. Storage:

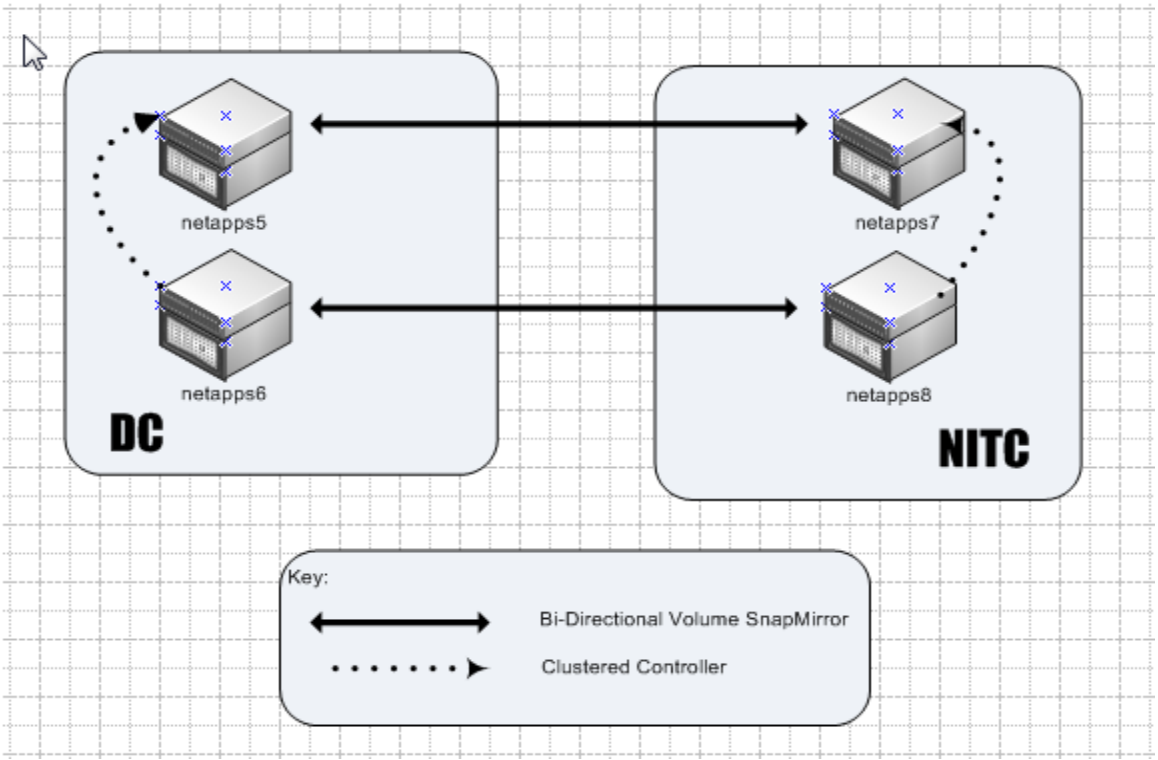
Storage is where applications and/or data are held on electromagnetic devices also known as hard disks. A storage area network (SAN) is a dedicated network for storage which provides access to consolidated disks. The disk can be broken into areas (partitions or virtual disks). The SAN provides high speed shared storage for our virtual servers and desktops. NetApp was selected as the SAN provider for the NASS centralized environment. Disks in a storage network are managed by a device known as a controller. Figure 7 depicts a Storage Area Network with clients and servers connected.

Figure 7: Desktops and Servers accessing a Storage Area Network



NASS is using four NetApp controllers which are clustered together for high availability. The controllers are used to access the NetApp hard drives. The SAN has enough disk space to hold all of NASS data, plus the storage for the virtual servers and virtual desktops. Figure 8 depicts how the NetApps controllers are configured.

Figure 8: Storage Network for the Centralized Environment



There are two controllers (controllers are labeled with a NetApp and a number) located in each centralized system for redundancy.

NetApp 5 and NetApp 6 are located in the Eastern centralized system. The storage contains migrated data from the NASS Eastern Field Offices. It also contains Western replicated data (used for fail-over) as well as storing the virtual servers and desktop images. There is enough storage to manage 1300 virtual desktops on each web farm.

NetApp 7 and NetApp 8 are located in the Western centralized system. The storage contains migrated data from the NASS Western Field Offices. It also contains Eastern replicated data (used for fail-over) as well as storing the virtual servers and desktop images. There is enough storage to manage 1300 virtual desktops on each web farm.

Each Field Office data is being reviewed and then migrated to the centralized SAN. The data for each Field Office is separated by access controls. Only users in a specific Field Office have access to that Field Office's data. Data and applications which were duplicated on the Field Office servers were not migrated. Once all users have been migrated and data are located centrally, we plan to conduct a more detailed review of the data, such as archiving data which is over 7 years old.

F. Disaster Recovery: We are constantly looking for new ways to improve disaster recovery. We have implemented redundancy in all of the critical areas as much as feasible. We are providing redundant servers, storage, databases, switches, and telecommunications. There are still several moving parts and we will continue to provide the most stable and reliable environment possible. In case of failure of one server farm, we can connect users to the other server farm. If a server farm experiences a problem and is down between 1 and 4 hours, we will fail users over to the other server farm. This is currently a manual process and involves several steps. We have plans to automate this process later once all users are migrated.

NASS is working on a plan to create backup users at opposite server farms so that Western users can still access their system without requiring a complete fail over (and vice versa). NASS is currently testing this plan and will release more details once it is put into production.

V. Implementation Timeline:

In the Spring of 2010, two Field Offices were migrated to the centralized environment as a proof of concept. The team traveled to the Field Offices and monitored the Field Office bandwidth, applications, and performance. The proof of concept was conducted over two months.

Once NASS deemed the proof of concept successful, NASS hired an independent contractor to perform a verification and validation of our centralized system. The contractor made several recommendations, so NASS delayed further migrations to focus on applying all of the recommendations.

The NASS team felt the smoothest transition to the virtual environment would be to travel to each Field Office and perform the migration. Each Field Office/Headquarters Branch was assigned a contact person. The contact person is responsible for all communication between the NASS team and the Field Office/Headquarters Branch. All desktops are re-imaged before being migrated to the virtualized environment. The team travels to each Field Office on Sunday. The contact person meets with Office Management and the Field Office staff to demonstrate the new environment and answer questions from the staff. The team re-images all desktops on Monday evening and migrates the office data to the centralized environment. The team is in the office when the first person arrives on Tuesday morning to provide support for the desktop and virtual environment. Wednesday and Thursday are devoted to cleaning up/fixing any lingering issues, troubleshooting, and helping the employees adjust to the new virtualized environment. The team then leaves on Thursday.

The NASS Team ensures each Field Office/Headquarters Branch meets the pre-migration requirements:

- ☐ Field Office applications has been listed on the Application Portfolio website
- ☐ Directory structure and files reviewed
- ☐ Field Office data is migrated to the centralized environment
- ☐ Pre-meeting with Field Office employees (to describe the process, discuss files, roles, etc.)
- ☐ Pre-testing with key personnel before the entire Field Office is migrated

TELECOMMUNICATIONS:

- ☐ Telecommunications T-1 lines upgraded
- ☐ New router and switches installed
- ☐ WAN optimization equipment installed (check with Telecomm before migrating a Field Office)

Shown below in Figure 9 is the implementation schedule for all locations in NASS.

Figure 9: Centralized Migration Schedule

FO/Branch	Migration Date
Virginia (DCC)	*Migrated - April 20, 2010*
Idaho	*Migrated - June 20, 2010*
South Carolina	*Migrated - July 13, 2010*
Michigan	*Migrated - July 27, 2010*
External Verification and Validation Performed August 2010	
Oregon	*Migrated - October 19, 2010*
Minnesota	*Migrated - October 19, 2010*
Mississippi (PMC)	*Migrated - October 26, 2010*
Arizona	*Migrated - October 26, 2010*

Colorado/FSS(PMC)	***Migrated - November 30, 2010***
Washington/Alaska	***Migrated - December 7, 2011***
No migrations from December 8, 2010 through January 10, 2011 since peak time for County Estimates, December Agricultural Survey, etc. Conduct an internal assessment based on feedback from 11 Field Offices.	
Texas	***Migrated - January 11, 2011***
Illinois	***Migrated - January 11, 2011***
Oklahoma (DCC)	***Migrated - January 19, 2011***
Tennessee	***Migrated - January 19, 2011***
New England	***Migrated - January 25, 2011***
Arkansas (DCC)	***Migrated - February 01, 2011***
California	***Migrated - February 08, 2011***
Nebraska	***Migrated - February 08, 2011***
Iowa	***Migrated - February 23, 2011***
Wyoming(DCC)	***Migrated - February 23, 2011***
Maryland/Delaware	***Migrated - March 01, 2011***
Alabama	***Migrated - March 08, 2011***
West Virginia	***Migrated - April 05, 2011***
Wisconsin	***Migrated - April 05, 2011***
Georgia	***Migrated - April 19, 2011***
North Dakota	***Migrated - April 19, 2011***
South Dakota(PMC)	***Migrated - April 26, 2011***
Utah	***Migrated - April 26, 2011***
Indiana	***Migrated - May 3, 2011***
New Mexico	***Migrated - May 3, 2011***
New Jersey	***Migrated - May 10, 2011***
New York	***Migrated - May 10, 2011***
Kentucky(DCC)	***Migrated - May 17, 2011***
Missouri	***Migrated - May 17, 2011***
Puerto Rico	Tuesday, June 07, 2011
No migrations from June 8th - June 21st due to heavy Field Office workload in June, e.g. June Agricultural Survey. The NASS Team will set up a test network.	
Nevada	Tuesday, June 21, 2011
Montana(DCC)	Wednesday, June 22, 2011
North Carolina (PMC)	Tuesday, June 28, 2011
Ohio	Tuesday, July 12, 2011
Hawaii	Tuesday, July 19, 2011
Louisiana	Tuesday, July 19, 2011

Pennsylvania	Tuesday, July 19, 2011
NOC (St. Louis)	July 2011
Kansas	Tuesday, July 26, 2011
Florida	Tuesday, July 26, 2011
HQ Statistics Division/Field Operations/ASB/IMG/MISO	Tuesday, August 02, 2011
HQ Census and Survey Division/Office of the Administrator/International Programs/ AA/BASO/HRSO	Tuesday, August 09, 2011
HQ Information Technology Division	Tuesday, August 16, 2011
HQ Research Division	Tuesday, August 23, 2011
NPC (Jeffersonville)	TBD - Working with Security at Census Bureau

DCC=Data Collection Center PMC=Print Mail Center

VI. Change Management Plan: All changes to the centralized environment are submitted to the NASS Configuration Control Board (CCB) and documented on the CCB SharePoint site. Any request for a change to the virtualized environment is submitted the Project Manager using the change request information below.

A. Change Request Information - The requester provides information concerning the requested change along with any supportive documentation.

1. Proposed Change Description - Describe the proposed change.
2. Justification for Proposed Change - Provide a justification for the proposed change.
3. Impact of Not Implementing The Proposed Change - Explain the impact of not implementing the proposed change.
4. Alternatives - Identify other actions that may be taken as an alternative to making the proposed change.

B. Analysis of Change Request - The NASS Team then would review the request and provide detailed information on the impact the change will have on the project.

1. Describe Impact – Describe the impact (positive or negative) this request will have on the project.
2. Impact on Project Budget - Detail the impact of implementing the change to the Project Budget.
3. Impact on Project Schedule – Detail the impact of implementing the change to the Project Schedule.
4. Impact on other Project Resources – Detail the impact of implementing the change to the other project resources.

C. Change Request Initial Review – The Project Manager will conduct a review of the recommendation with the NASS Team. Based upon this review, a recommendation will be made to either 1) approve the request to be implemented and make all necessary modifications to the project documentation; 2) not approve the request; 3) hold the approval to be implemented in a follow-on project; or 4) submit the request with supporting documentation to the Team's Business and Executive Sponsors for a decision.

D. Final Review Results - Record the final decision with appropriate comments.

VII. Return on Investment:

There are two major components to the return on investment with this transformational initiative. The first part of the return of investment deals with staffing. The second part of the return on investment deals with infrastructure (hardware and software).

A. Staffing: In Fiscal Year 2010, we conducted a survey of all Information Technology Field Office Staff at NASS. Figure 10 summarizes the information gathered in Fiscal Year 2010. We determined there were twenty-one GS-2210s who spent 79% of their time on IT activities. The salaries of the GS-2210s were $2,075,560. There were nineteen GS-335 who spent 67% of their time on IT activities, and their total salaries totaled $1,242,329. Therefore, net savings is ($2,075,560 * .79) + ($1,242,329 * .67) = $2,472,054.

However, we determined that 8 additional positions would be needed to support the new virtualized environment. Three positions (Server and Storage) would be needed solely for this transformational initiative. One position network/telecomm is needed for all five NASS efficiency initiatives. The four Help Desk positions are needed for several of NASS efficiencies. The total salaries for these eight positions attributed to this transformational initiative would be $603,593. Therefore, the total staffing return on investment is:

Field Office IT savings – Salaries of 8 positions
$2,472,054 - $603,593 = **$1,868,461**

Figure 10: LAN Administrators Activities by Job Series

	Job Series -2210	Job Series - 335
# of Staff in positions	21	19
% of time on IT Activities	79%	67%
Salary Totals	$2,075,560	$1,242,329
IT Savings	$1,639,693	$832,361

B. Infrastructure (hardware and software):

The Agency had an IT budget which already planned for the replacement of file and print servers in HQ and the Field Offices, as well as annual PC refreshment costs. This cost is noted below as the IT Lifecycle costs.

Centralization Savings is calculated by taking the Project Total Investment Cost and subtracting the Lifecycle Cost already in the IT Budget.

Five –Year Project Savings:

Total Project Costs	$2,489,000
IT Lifecycle Cost	$3,255,000
Savings	**$ 766,000**

In summary, the total return on investment (ROI) including staff and annual infrastructure savings is:

$1,868,461 + $766,000/5 = **$2,021,661****

** *This projection is based on Fiscal Year 2010 salaries and benefits. The savings may increase over time due to base salary and benefit increases for federal employees over time.*

VIII. Conclusion:

After the deployment of the new centralized infrastructure in a Field Office or Headquarter Division, each NASS employee is provided basic training on how to log on and access the system. Each user receives a hand-out entitled "Welcome to the Virtual World".

By September 2011 through the consolidation and centralization of our LAN servers in 48 locations, our employees will be able to access applications **anywhere** using a web browser, which will provide new opportunities for NASS to operate more efficiently and effectively in the future when processing hundreds of surveys annually to produce over

500 Agricultural Statistic Reports. Examples of the virtual desktop images that employees will access are shown in Figures 11 and 12.

With a projected annual savings of over $2 million, this will position NASS to continue to be a relevant in Agricultural Statistics under expected challenging upcoming budgets.

Figure 11: Screen shot of a virtual desktop

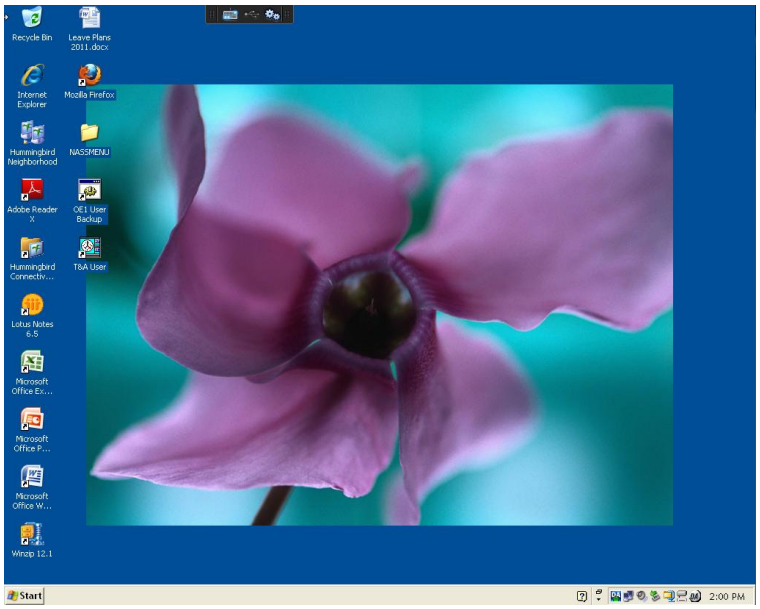


Figure 12: Four virtual desktops loaded on one computer screen