FEASIBILITY STUDY REGARDING THE SHARED AND ENHANCED DELIVERY OF TECHNOLOGY SERVICES BETWEEN THE CITY OF NEW ROCHELLE AND THE CITY SCHOOL DISTRICT OF NEW ROCHELLE

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Prepared By:
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Contents

Introduction

Objectives

In response to the requirements identified in request for proposal SPEC # 4851 Black Box Network Services (hereafter BB) took a comprehensive look at technology and information systems services as they were being delivered and utilized in the City of New Rochelle (hereafter City) and the City School District of New Rochelle (hereafter District). The primary objective of the study was to determine opportunities for service improvement or cost savings that may be possible through network integration, cooperative procurement, and consolidated services. Specific needs addressed by the study included:

1. Cost containment of operations and maintenance of technology services.
2. Assessment of capital improvement schedules and costs.
3. Equipment and software audits.
4. An assessment of technology procurement policies and practices.
5. Assessment of all operational costs associated with technology services.
6. Assessment of the demand for technology services throughout the community.

A secondary objective of the study was to update the network documentation from the District's February 2008 EDUTEK study, and develop similar documentation for all City locations.

Scope

As the study got underway it was determined by the team that cost data, desktop inventories, and software audit data were all readily available to the City and District. Therefore, project resources were not expended exploring these areas.

During the project, we focused on the technical and cost control opportunities available to the two entities. Our baseline assumption was that anything that was

technically feasible and cost justified was possible. Organizational, political, and/or regulatory impediments (if any) were not considered in the development of our recommendations, as these are beyond our area of expertise.

Information Sources

Extensive discussions were held with Christine Coleman and Peter Campone, project team leaders for the District and City respectively. These individuals also provided reference documentation. Following these discussions, tours were made of all the data centers, wiring closets, and telephone company demarcs at 14 City locations and 12 District locations (see appendix A for a list of all locations visited). During each such tour BB representatives were accompanied by the technical personnel responsible for installation, operation, and maintenance of those specific facilities. City and District staff was also interviewed as available and appropriate.

Organization of Report

Including this introduction as Section 1, the report consists of six sections. Section 2 presents an overview of the City and District as a combined entity, highlighting areas where shared services and system integration can provide cost savings and or operational improvements. Section 3 discusses issues directly affecting the City. Some of these have already been touched upon in Section 2, but in this section they are addressed from the perspective of the City. Likewise Section 4 covers the District's issues and perspective. Section 5 provides a summary of recommendations and more specific action plans for each. Finally, Section 6 includes appendices containing location listings, drawings, and other information specific to each location.

Combined Overview

Network

Although they use totally different technologies and services, from the "10,000 foot" view the City and District networks are remarkably similar. They each have a very robust wide area network topology, with data links converging in the carriers' network cloud. This means that from a connectivity standpoint loss of any one location will not interfere with communications among the others. On the City side this connectivity is provided by Cablevision (also referred to as Lightpath or Optimum) under their contract with Westchester County. On the District side the connectivity is provided by the Lower Hudson Regional Information Center (LHRIC) which is part of BOCES. The LHRIC services ride on circuits provided by Verizon.

Both entities have centralized server resources that are accessed by clients in remote locations over the network; and both use a combination of on-site and online backup. The disaster recovery strategy for both entities is to restore the backups to either on-site or off-site hardware as necessary to resume operations.

Finally, from a voice perspective, both use carrier services on a separate network to communicate with "the outside world." District services are provided by PRI and Centrex from Verizon, while City hall services are provided by Lightpath PRI's with some Verizon Centrex lines as backup. City remote locations are all on Verizon Centrex. Internally both use a combination of Centrex and PBX systems. The District uses a variety of older technology analog and digital equipment, while the City has also implemented a Voice Over IP (VoIP) system at City Hall, the Police Department, and one downtown office location. While the technology of these various systems is quite different, the basic function of distributing delivered calls and handling person-to-person communication is the same across them all.

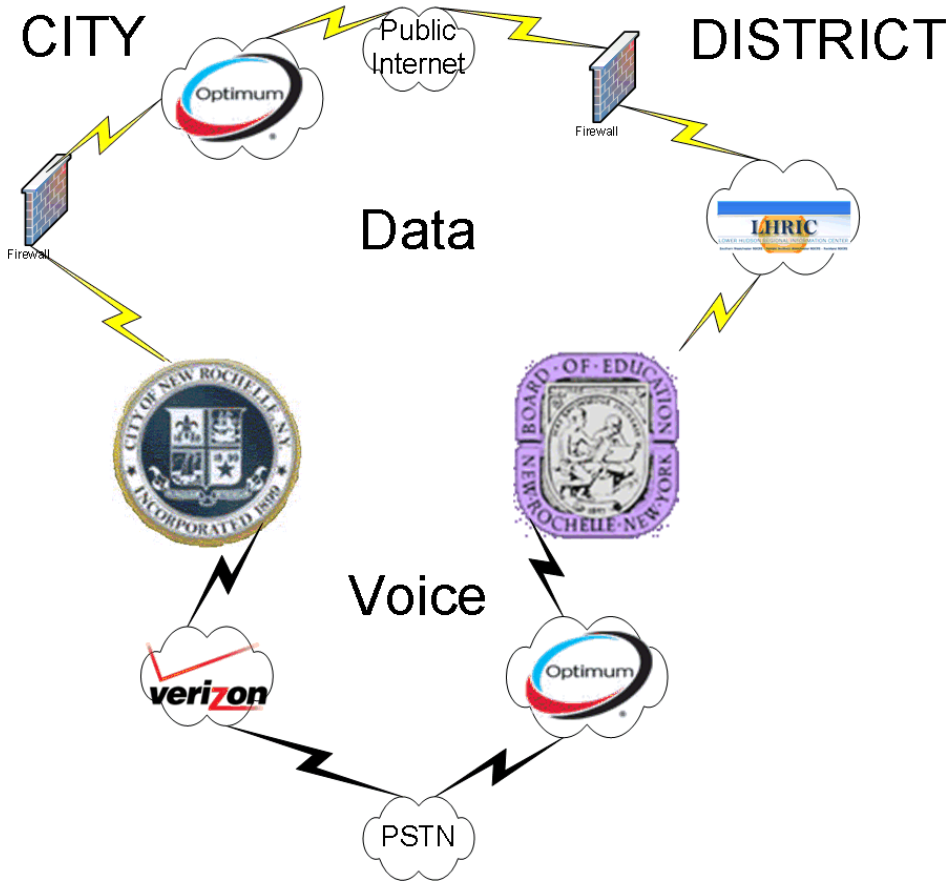

Figure 1 - New Rochelle Data and Voice Networks

There is one key critical difference between the two networks. All District locations access the Internet via the LHRIC cloud, while all City locations access the Internet through the connection at City Hall. In the former case, functions such as firewall and filtering are handled by LHRIC; while in the latter case these functions are provided by hardware and software in the City Hall data center. The effect of this difference is that loss of connectivity at City Hall will eliminate Internet access for all City locations. There is no similar single point of failure on the District side.

Key Opportunities

At the outset we would like to comment that we are very impressed with the overall network design and implementation exhibited by both entities. Likewise the personnel we met with were professional, knowledgeable, and have a great attitude. Starting with such a well thought out network managed by a competent team allowed us to focus on areas of enhancement and opportunities for synergy rather than remediation. As we developed the recommendations we found that they fell into three broad categories: Business Continuity/Emergency Operations, Cost Control, and Public Safety.

Business Continuity/Emergency Operations

As mentioned above both entities have solid backup strategies that will allow them to restore systems on new hardware, or at a different location, in the event of a serious failure. The key word here is "restore." This by definition involves a period when service was interrupted. Taking emergency preparedness to the next level entails constructing the systems and network such that the majority of personnel can continue their work without interruption during a system outage. In this regard we focused on two areas: environment and network design. The environmental factors are intended to reduce or eliminate circumstances that could cause the systems to go down, and the network design focuses on distributing and duplicating the resources such that there is no single point of failure.

Environmental Factors

When it comes to preventing outages the two major factors under our control are power and the physical environment in which the equipment is kept. As discussed in further detail below power is a concern at all City facilities, as well as in the District offices.

By far the most critical power related risk is the backup generator at City Hall. It is our understanding that this equipment is nearly 50 years old, and that significant problems have impaired its performance in the latest round of functional testing. Failure of the generator during an extended power outage will have a devastating impact on the following systems:

- City data center.
- District administrative data center.
- Fire Department Headquarters.
- The City Emergency Operations Center (EOC).
- Telephone service for City Hall, Housing/Section 8, and the District administrative offices.
- Internet access for all City departments.

In fact the only City entity that will remain up and running during such an event is the Police Department who had a new generator installed when their building was last remodeled. The PD will, however, lose a significant portion of their voice and data capacity as their primary Internet connection and two of the three Verizon PRI circuits run through the City Hall data center.

With regard to the physical environment, both the District and the City data centers appear to be well protected and have the appropriate climate controls. The same cannot be said, however, for many of the endpoints on both networks. The primary concerns are heat and access to the equipment, as described below. While in aggregate these factors do affect the overall reliability of technology services, specific failures will only affect a local user population such as a single City department, or a particular wing of one of the schools. As such addressing these problems is frequently squeezed out of overall technology plans by more visible issues. This is unfortunate in that relatively small and easy to implement fixes can

be made now that will prevent future failures that may entail operational outages and/or expensive equipment replacement.

Network design

As mentioned above both the City and the District have very robust wide area network architectures, each running on a different carrier platform. This provides an excellent foundation to support the move from disaster recovery to business continuity. During our review we were able to identify five "single points of failure," the loss of any of which would significantly impact the ability of the City or District to continue operations. They are:

- The generator at City Hall as discussed above
- The City Hall data center
- The City Internet connection at City Hall
- The District administrative data center at City Hall
- The District applications data center at the High School

In this context when we talk about "data center" we are also including the loss of a critical server within that data center. Both entities are in an ongoing process of weeding down the number of physical servers required for operations through the use of virtualization. This increases the reliability of the services run on such servers, while decreasing the cost and power consumption. Consolidation of multiple services on a single machine also sets the stage for implementing hot standby or "mirror" sites.

In a mirrored configuration servers at two different physical locations simultaneously run the same applications while constantly replicating the data between each other. Therefore loss of one server has no effect on continuing operations as the load is immediately taken up by the other one. This requires high-bandwidth connections between locations, but that is not an issue on the District network. The default bandwidth is 100 Mb per second, and this can be "dialed-up" as necessary to support mirror applications.

Implementing mirroring for the City servers is a slightly different story. The only connection with sufficient bandwidth to support mirroring is that to the Housing/Section 8 office. That office does not have sufficient space, however, to install the requisite hardware. Interconnection of the two networks is one way to resolve this issue. With the networks interconnected the City mirror site can be placed in one of the District locations, using that site’s high-speed connectivity, while still being available to all of the locations on the City network. This will also address the issue of Internet access for the City facilities should the primary connection be lost, as they would all have an alternate route through LHRIC.

In general there are three ways of interconnecting the two networks:

1. A "cloud to cloud" connection between the Cablevision/Westchester County network and the Verizon/LHRIC network. In point of fact such a connection already exists as all carriers at that level are interconnected. The challenge is to work out the provisioning of a private network connection between the two such that City workstations on the Cablevision network can access District resources without going outside of the LHRIC firewall.

2. At least two high-bandwidth interconnections between separate City and District locations. Obviously one of these would be a fiber connection between the District and City data centers which are both located in City Hall. A second pair would be required to provide redundancy. This will entail upgrade of the selected City location to provide both a high-bandwidth connection to the Cablevision network and a point-to-point fiber connection to one of the District locations.
3. The third option is use of a VPN connection through the public Internet. This will require opening the Cablevision connection, and providing a gateway/firewall device, at each City location to allow direct Internet access.

We note that much of the core Cisco switching equipment in both the City and District networks is either end of sale (EOS) or end-of-life (EOL). This includes the 1700 series routers in most City locations, as well as the 6500 and 3500 switches that is the core of the District network. It will become increasingly difficult to support these products across the three year planning horizon, as support and manufacture of spare parts for most of them end in 2011 or 2012.

Network interconnection and an expansion of VoIP services will also create some interesting opportunities to increase the survivability of voice services. Since each entity uses a different primary carrier (Verizon and Lightpath) it is theoretically possible to construct a failover plan should one or the other carrier experience a local or regional outage. While such events are extremely rare, they do happen. While we do not think a focus on such interconnection at this time is a priority when compared to some of the other network opportunities, this concept should be kept in mind as part of the long-term network design and plan.

Cost Control

Our study uncovered a variety of opportunities to control and reduce costs including joint purchasing, managed print services, VoIP, and power conservation.

Joint Purchasing

It is obvious that the District purchases significantly more technology equipment, services, and supplies than the City does. Likewise, the District purchasing consortium, BOCES, has far greater purchasing power than Westchester County. This purchasing power allows the District to obtain better pricing on a wide variety of goods and services. Further, the availability of pre-negotiated contract pricing for a variety of commodities can reduce the cost to the City of acquiring such goods and services.

Managed Print Services

Many vendors and manufacturers are offering managed print services as an alternative to the traditional purchasing of printers and consumables. In these arrangements the vendor provides the printer, toner, paper, and ongoing maintenance services, typically charging monthly for actual usage on a per page basis. The intelligence and network connectivity of the print devices allows them to track and report on usage and manage supplies. On a TCO basis the cost of managed print services is typically less than the cost of buying and supplying

printers and paper. More importantly, managed print services provide two key economic advantages:

1. It aligns the timing of printer costs with usage converting a capital outlay to an operating expense.
2. It provides individual visibility and accountability for printing expenses. Such individual accountability is far more effective in reducing print volume than measures like little notes at the bottom of e-mails saying "do not print this unless you need to." Reduction of print volume, in addition to saving the cost of printing, reduces power consumption and environmental impact. Further, to the extent that individuals do not or cannot reduce their printing volume, the reporting provides management with the ability to identify high-cost print operations and either seek alternatives or budget appropriately.

VoIP

When used within the enterprise, as is the case with the City and PD systems, VoIP can provide cost and operational advantages. These include significant reductions in the cost for moves adds and changes, productivity enhancements such as unified messaging, and the elimination of the ongoing Centrex charges for each individual phone line. The City has made an investment in the Cisco VoIP infrastructure, and it certainly makes sense to leverage that investment as legacy telecommunications hardware reaches obsolescence at City and District locations.

VoIP services can also provide cost advantages when used to replace traditional carrier voice services. Cablevision and Verizon, as well as a host of other players, are bringing VoIP services online that greatly reduce or eliminate the cost of in-state, interstate, and international calls. We understand that Lightpath delivers services to City Hall via traditional voice PRI. An interesting avenue of inquiry would be the extent to which these services may be delivered over the IP network, and further deployed to the remote locations as an IP Centrex working in conjunction with the existing Cisco call managers.

Productivity enhancements such as Voicemail, Unified Messaging (notification of voice messages via email), Presence (allows users to see if other users on the phone or out to lunch or on vacation and also a click to call feature), and Single number reach (allows a user to input a sequence of personal phones to ring subsequently after a few unanswered rings at the previous hop) will help create a robust and reliable network, thus creating an end-user that can work faster, more efficiently and be more productive.

Based on our study, converting and merging the Board of Education (BOE) current Centrex based phone system with the City's Call Manager VOIP phone system, could result in substantial long term cost savings as well as provide reliability and productivity enhancements and security features. The costs and poitential savings are broken down in Appendix A, B and C The ease and efficiency enabled by joining with a singular converged network is immeasurable.

Generator Replacement and Power Conservation

Replacement of the Cities outdated unreliable diesel powered generator is highly recommended. Adding a new Gas fired generator to power the City of New

Rochelle and the Board of Education (BOE) Data Centers as well as phone rooms are essential to ensure reliability for secure power to the hardware as well as provide uptime to all computer systems as well as users for the City as well as the BOE. To update the current generator a cost quote is outlind in Appendix D. This type of generator will provide the most current energy savings.

Power conservation is another area where small steps taken throughout the enterprise can have a large impact. In addition to the savings resulting from the virtualization and print management initiatives discussed above, and better management of heat in equipment rooms as discussed below, the power sapped by peripherals (including such things as cell phone chargers, monitors, printers, etc.) is being increasingly recognized as a target for conservation. Timer equipped surge protectors automatically turn peripheral devices off at night, and make it easy for users to turn them back on in the morning. Such devices should be used wherever possible.

Another opportunity is the replacement of end-of-life network infrastructure components with newer "green" replacements. Manufacturers continue to make advancements in lowering the power utilization of their equipment, and many are offering incentives for upgrade to the new versions. Likewise there may be grant funds available through various state and federal agencies to support such initiatives.

Public Safety

During our meeting with the Police Department we discovered that effective utilization of their primary case management and investigative applications requires more bandwidth than is available over the current generation cellular network. This means that officers frequently come into headquarters to do many functions that otherwise would be performed from the workstations in their patrol vehicles. Making high-speed Wi-Fi connections available in the parking lots of all the schools will provide the officers with islands of connectivity, allowing them to work with these applications without taking them off the street. A natural result of this will be an increased police presence in the school parking lots at all hours of the day and night, providing improved security for school property and personnel. Finally, such connectivity will allow real-time access to the schools CCTV security systems for police responding to an incident.

Operational Overview

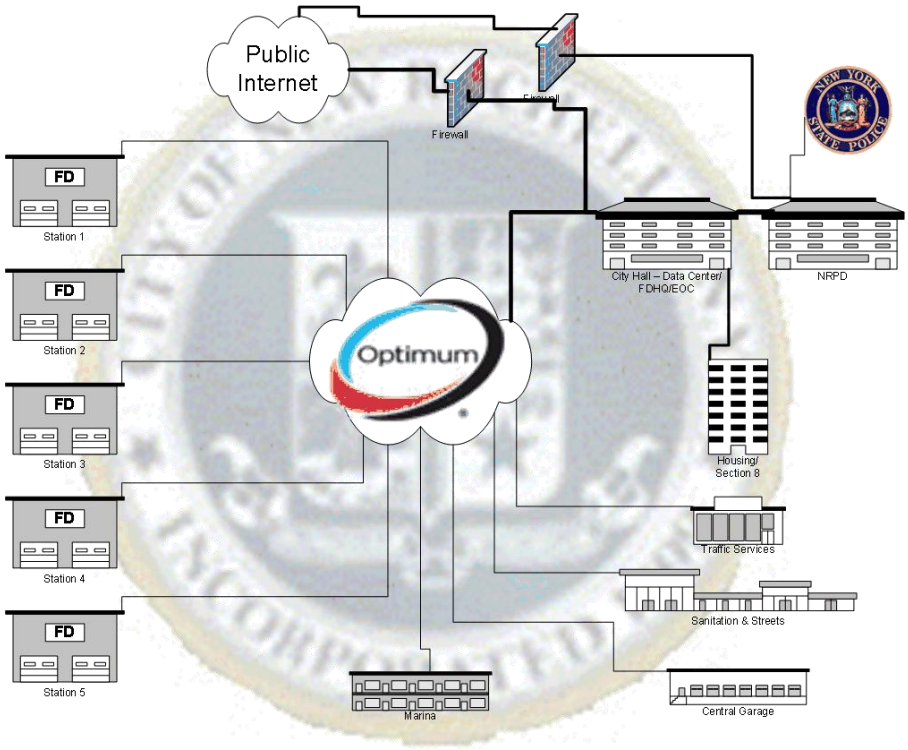

Figure 2 - City Data Network

Data Center

The data center is served by 20 MB Metro E fiber provided by Lightpath under contract with Westchester County. This connection is "split" as it enters the building. Internet traffic, whether inbound or outbound, is routed through an ASA 5520 firewall. Internal traffic (defined as from locations on the City network) is routed directly to the data center network. Thus an Internet request from one of the locations, for example sanitation, will travel the private network across the Metro Ethernet into the switch, then go back out via the ASA 5520 and on to the public Internet. A response from the remote Internet site follows the same path in reverse. Therefore all Internet traffic uses essentially double the bandwidth that it normally would on the 20 meg pipe as it is routed in for inspection and then back out to the Internet.

The majority of application servers for City entities are maintained in the data center. The center appears to have appropriate cooling, and is physically secure. Servers and active network components are all on battery backup. Power to the data center is backed up by the building generator but, as discussed above, that generator has become unreliable.

From a voice perspective the Cisco Call Manager VoIP Publisher and Cisco Unity Messaging Server are both located in the data center. Public switched telephone network connectivity is provided by two Lightpath PRIs in addition to a number of analog Centrex lines which serve as backup. The Unity Messaging System has 16 dedicated Centrex ports. The Call Manager serves all users located in City Hall

and, via a fiber connection, a small user population in the Housing/Section 8 office.

Police Department

The PD has its own data center which is connected to the City Hall data center via a fiber link. All of the PD servers are located within their own data center. The PD is served by a 5 Mb Metro E circuit from Lightpath, which is routed through their own ASA 5520 firewall. They maintain a blackberry server which supports wireless communications with the patrol vehicles. The PD also has two small remote locations. These are configured the same way as is described for the City remote locations below. Finally, there is an encrypted link to the New York State Police Information Network (NYSPIN) which provides access to state and federal resources such as the NCIC.

All servers and network electronics are located within secure areas in the police department, and all have the appropriate battery backups. Further, the building has a backup generator which is of recent vintage and considered to be fully reliable.

From a voice perspective the PD data center hosts the Cisco Call Manager Subscriber Server (essentially a backup to the server in the City data center), complete with a single Lightpath PRI.

Fire Headquarters/EOC

Fire Headquarters and the Emergency Operations Center (EOC) share a wire closet in the City Hall building. Contained in the closet are the network electronics to support both operations, and the two Fire Department servers. The Fire Department servers are primarily used to handle incident reporting and preplannes. This closet is connected to the City Hall data center via a fiber link. Voice services are provided by the Cisco VoIP system, with some additional Centrex lines running as backup. The room is secure and properly air-conditioned, but the only sign we were able to find of any type of battery backup was a switch on the wall marked "UPS input". Our tour guide did not know the purpose of this switch, or if, in fact, it was connected to anything. It was not clear the extent to which the wiring closet and the EOC itself are supported by the City Hall generator, if at all. Even if they are connected, however, the reliability issues with that generator bring into question the ability of the EOC to remain in service during an incident that includes an extended power outage.

Housing/Section 8

The Housing/Section 8 offices are located in leased space in a commercial office building downtown. The location is served by a 10 MB Metro Ethernet connection provided by Lightpath. The Metro Ethernet fiber terminates at Telephone Company demarc in the basement of the building, and is extended to the office by a category five cable. The fiber link is on the “private” network, which brings all the services back to the City Hall data center.

The network electronics are placed on a shelf in the supply/coat closet of the office. There is no supplemental air conditioning or movement within the space. There is a small battery backup unit powering the equipment.

Voice services are provided using Cisco IP telephones working off the Call Manager in the City Hall data center. There is a single Centrex line run to the closet which appears to be dedicated to providing remote administration for the Cisco 1800 series router.

Remote Locations

With the exception of those discussed above, all City locations are served by Business Class Optimum Online (BC-OOL) via a cable modem. The modem is connected to a Cisco 1700 series router, with workstations connected directly to the router or to an additional switch as necessary. As mentioned above the 1700 series has been discontinued by Cisco, with the last date of support established as March 25, 2012. After this date technical support and parts for the equipment will no longer be available.

The BC-OOL services are procured under the Westchester County contract. While it is possible to configure the equipment for direct Internet access (the 1700 has firewall capabilities), at present all Internet access is funneled through the data center in City Hall.

In the vast majority of cases the modem and router are stacked on, under, or behind a desk, or stuck on a shelf in a supply closet. For the most part workstations are hardwired directly to the router or switch, that is the patch panels and jacks of a traditional structured wiring system are rarely found. The Marina was the only location with a battery backup on the network electronics. The Fire Stations all have emergency generators, but do not have battery backup on the network electronics or computers.

There is a fleet management server located at the Central Garage, and the Marina has QuickBooks and slip management software running on a local server there. In this context the term "server" refers more to the function than to the hardware as the applications are actually running on a workstation class machines.

Voice services are provided to each location via Verizon Centrex lines. Telephone stations range from single line sets to small business systems.

Network diagrams and comments as appropriate for each individual location are included in the appendix.

Business Continuity/Emergency Operations

Data Center

The two greatest risks to business continuity in the data center are power and loss of wide area network connectivity. As mentioned above the building generator is no longer reliable, and cannot be counted upon for a smooth transition in the event of a commercial power outage. During the last test we understand it took extensive manual intervention to bring the generator up and get all systems online. In a true emergency personnel required for such manual intervention may not be available, may not be able to complete their work before the batteries in the data center are exhausted, or may not be able to bring the systems up at all.

An extended loss of power to the data center will eliminate virtually all services for City users at all locations. They will not be able to access applications or data

residing on the servers, nor will they be able to get on the Internet. The personnel in City Hall, the EOC, and at the Housing/Section 8 office will lose telephone service as well.

Loss of connectivity to the network (i.e. the 20 MB Metro Ethernet pipe) will have virtually the same effect on all the remote users. There is an alternate route available through the Police Department connections, but we were unable to determine if the appropriate routing protocols are installed at all locations to enable that capability. It is also questionable whether the much smaller PD circuits will be able to deal with the resulting surge in traffic. Finally, with the PD and City Hall buildings being adjacent it is quite likely that an outage caused by something like a fiber cut will affect both simultaneously.

Our business continuity recommendations for the data center include:

1. Upgrade the generator at City Hall.
2. Interconnect the City and District networks such that one can failover to the other. In doing so ensure that separate routes are followed for the City Hall connections.
3. Set up a mirror location for application and data servers.

Police Department

The PD has a very robust and secure network configuration. They have a relatively new generator, so continuity of power is not the issue for them that it is for City Hall. They also have their own voice and data network links to serve as a backup the City Hall connections. Finally, their operations are quite centralized. They only have two remote locations, so a connectivity failure would not have the same impact. The police also have emergency radio systems that provide backup communications capabilities. While setting up a mirror site for their application and data servers may be a possibility, the increased availability needs to be weighed against security requirements associated with those applications and data.

There are no business continuity recommendations for the Police Department.

Fire Headquarters/EOC

Power is an absolutely critical issue for the EOC. By its very nature there is a high probability of a commercial power outage at times when the EOC is active. Therefore battery and generator backup for both EOC electronics and the workspace itself (lighting, HVAC, etc.) must be addressed. Being a part of the City Hall network, they also have the same risks with regard to network connectivity.

Our business continuity recommendations for the Fire Headquarters/EOC include:

1. Install battery backup on the network electronics and servers in the wire closet.
2. Upgrade the generator at City Hall.
3. Interconnect the City and District networks such that one can failover to the other. In doing so ensure that separate routes are followed for the City Hall connections.

Housing/Section 8

The Housing/Section 8 offices are entirely dependent upon their connection to City Hall for both voice and data services. While there is some risk of loss of connectivity at their end, the greatest risks are associated with availability of the City Hall data center as discussed above. Therefore our recommendations for this department mirror those for the City Hall data center.

Remote Locations

The balance of the remote locations depend on connectivity to City Hall, therefore the recommendations made to keep City Hall available online are equally germane to these locations. Each of them also faces local challenges to remain online and working. Key among these are power, environment, and physical security.

With regard to power, consideration should be given to providing battery backup on workstations as well as the network electronics. When accessing database applications, particularly across a wide area network, a sudden drop by the client can adversely affect data integrity. Installation of battery backups will allow users to shut down such databases in the event of a power interruption, reducing the possibility of data corruption creating a more widespread problem.

Environmentally the equipment is typically located in common spaces, exposing it to both heat and dirt. These factors shorten reliability and lifespan of the hardware. By the same token, having the equipment out in public creates a risk in terms of its physical security. In many locations critical hardware can easily be unplugged, kicked, run into with a vacuum cleaner, knocked off the shelf, or have coffee dumped on it. Ideally the equipment will be locked in a small wall cabinet located in an air-conditioned space. Barring that every effort should be made to keep it up off the floor and protected from physical trauma.

Our business continuity recommendations for the remote locations include:

1. Install battery backups on network electronics and workstations as appropriate.

2. To the extent possible place network electronics securely on shelves in air-conditioned spaces. Wall mounted, lockable, racks or cabinets should be used if at all possible.
3. Plan and budget for replacement of the Cisco 1700 switches. We recommend that replacement switches be configured with firewall and filtering software such that direct Internet connections from the remote locations via the Cablevision network may be supported.

Cost Control

Our review identified four primary areas for cost savings and control within the City IT operations: purchasing, managed print services, VoIP, and power conservation.

Purchasing

When it comes to technology, ranging from supplies like toner cartridges to complete computers, the City's purchasing power is miniscule when compared with that of the District. On a macro level the same can be said when comparing Westchester County to BOCES. Therefore the District pays considerably less for technology hardware, supplies, and services than the City pays for essentially similar items. Our recommendation is that the City review their technology purchases, identify those that consume the majority of the budget, and purchase them through the District. Note that we are not recommending the City purchase all of their supplies and equipment through the District, because at some point, particularly on smaller quantities and low-cost commodities, the incremental "cost" of making and tracking the order through two different purchasing departments will outweigh the realized cost savings.

Managed Print Services

As discussed above managed print services provides an opportunity to reduce costs at a variety of levels including the cost of the service, conservation through greater awareness of use and budget tracking, reduction in staff time in dealing with printer issues, and power savings. While print services are definitely appropriate for the offices located in City Hall, a closer look at each of the remote locations is required to determine the applicability there. For the most part they appeared to be very low-volume convenience printing. Any locations which do have a high volume requirement will be candidates for the program.

VoIP

With the VoIP infrastructure successfully implemented in City Hall and the Police Department, the next step is to explore expansion of the technology both within the City network, and externally for access to the public network.

Internally this will entail a number of upgrades to the environment at each location:

1. Battery backup will need to be provided on the network electronics
2. Power support will also need to be provided for each of the telephone sets. Options for doing this include using power over Ethernet switches, using

power injectors, or providing local battery backup at the workstation. From a cost standpoint the least expensive way is to provide only the equipment necessary to support each particular user configuration. For example, a workstation that accesses a central database should have its own battery backup to minimize potential for database corruption in a power outage. This same battery will also support the telephone set. From a support standpoint, it will be easier to configure all locations the same using either power over Ethernet routers/switches or power injectors located with the central equipment.

3. Finally, a bandwidth check will need to be made at each location. Any locations that do not meet the minimum speed and quality requirements require an upgrade to their BC-OOL services.

This internal rollout can be done at any time and at any pace. Our recommendation is that it be combined with the other network initiatives we have described in these pages for the remote locations.

Lightpath, Verizon, and a host of web based carriers are all rolling out VoIP calling services. These services integrate voice into your high-bandwidth network connections (the 20 MB Metro E at City Hall) eliminating the incremental expense of maintaining voice PRI circuits. More importantly, the cost per call or per minute for using the services is typically significantly less than equivalent calls made over the traditional switched network. The City can begin exploring these options with their carriers immediately (particularly Lightpath), and rollout services on a trial basis where warranted.

Power Conservation

Power "leakage" is rampant in today's office environment. Everything from PC speakers and printers to cell phone chargers place a small but continuous draw on the power grid. While the impact of any one of these devices in isolation is miniscule, in aggregate they add a lot to the electric bill, without delivering any concomitant benefit, when left on overnight. To the extent possible the City should utilize the computer and network capabilities that allow workstations to be turned on and off based on a central schedule. Peripherals should be controlled using a device such as the Belkin Conserve Surge with Timer. This device places an on-off switch on the employee desktop that allows control of up to six devices. Should the employee forget to turn them off when leaving work they automatically turn off after 11 hours. The desktops which makes it convenient for employees to turn off the power at the end of the day, and the timer takes care of things should they forget to do so.

Continuing the server virtualization initiative that already has begun will also contribute to power conservation. Likewise, managed print services as discussed above will contribute through reducing power consumption by printers.

Public Safety

From a public safety perspective there are two projects that we have already touched upon briefly. The first is making improvements in the City network to prevent the Fire Stations from losing Internet access due to issues at City Hall.

The second is the implementation of wireless access points at each of the schools that may be accessed by officers in the patrol vehicles. These "hotspots" will allow the patrol vehicles to remain in their sectors providing better coverage and reducing response times.

Recommendations and Action Plans

Combined

Combined VoIP Rollout for City and the BOE

Action Plan

- Explore Carrier VoIP Alternatives
    - SIP trunking to replace PRI and POTS at Call Manager or PBX locations
    - BC-OOL voice offerings for remote City sites.
- Purchase and Install appropriate VOIP Phone system
    - RFP or Established vendor
- Roll out and merge a Call Manager VoIP phone system to the Board of Education with the Cities current VOIP system.

Time Frame

Carrier discussions can begin immediately. VoIP roll out will range from four months to six months.

Generator at City Hall

Action Plan

- Power engineer determine start-up and draw requirements for:
    - Data Centers
    - Wiring Closets
    - Telecommunications
    - EOC
        - Workstations
        - Lighting
        - HVAC
    - Board of Education
- Purchase and Install appropriate generator
    - RFP or Established vendor
- Run full load test

Time Frame

High priority. Will take three to six months to complete.

Wireless in School Parking Lots

Action Plan

- RF engineering survey of all school buildings/lots to determine equipment requirements and optimal placement.
- Purchase and install appropriate hardware in Schools
- Determine software requirements, if any, for PD access to CCTV
- Purchase and install appropriate hardware and software in Patrol Vehicles (if any).
- Establish appropriate SOP/SOG for Patrol Officers and train as necessary.

Time Frame

Immediate need and benefit. Fast turn around if bidding is not required. Will take four to six weeks to complete.

Server Virtualization

Action Plan

- Continue ongoing initiatives in both City and Schools.

Time Frame

Ongoing as part of technology plan.

Interconnect Data Networks

Action Plan

- Evaluate opportunities for interconnection at carrier level in addition to fiber link in City Hall

- Internet Fail-Over for City Network
    - To School network
    - Alternative gateway site
    - Via the WAN with local security

Time Frame

Ongoing as part of technology plan. Priority will increase to support mirroring and/or VoIP initiatives.

Mirror Locations

Action Plan

- Id location for School Admin and App servers
    - One for the other or third site for both
- Determine feasibility of adding City App servers
- Adjust bandwidth as required
- Install and test necessary hardware and software
- Make appropriate routing changes

Time Frame

Priority to be determined by organizations involved. Prerequisite of network interconnection if City facilities are included. Project duration between three and six months.

Managed Print Services

Action Plan

- Collect inventory of existing printers by type/location
- Determine or estimate monthly usage
- Procure managed services via RFP or existing vendor

Time Frame

May result in significant cost savings. Data collection and cost comparisons should take between four and six weeks.

Reduce Power Demand

Action Plan

- Peripherals
    - Continue to use network commands to shut down and power up CPUs.
    - Procure and install power strips with timers that will automatically shut down peripherals.
- Core
    - Continue server virtualization initiatives.

- Identify network switching components that are EOL or fully depreciated (e.g. Cisco 65xx switches) and evaluate greener alternatives
    - Vendor upgrade/trade-in programs
    - State and Federal Grants

Time Frame

Ongoing as part of technology plan. Incorporate into other projects such as workstation upgrades, VoIP implementation, Wire Closet upgrades, etc.

Address Environmental Concerns

Action Plan

- Insulate all AC exhaust vents where they run through conditioned space.
- Consolidate cabinets and racks where appropriate
- Place equipment in secure cabinets when not in secure, dedicated rooms.
    - At least place on shelves rather than balanced on table edges or on the floor under desks.

Time Frame

Heat management a priority for completion prior to next summer. Physical security enhancements should be incorporated into ongoing maintenance and technology plans.

City

Joint Purchasing

Action Plan

- Review costs and pick items with greatest potential leverage for initial program. Can then expand to additional items as appropriate.
- Form team of School, City and BOCES personnel to set up policies, procedures and information flow.

Time Frame

Immediate and ongoing. First priority is to identify the selected commodities and determine the mechanism for order flow and fulfillment.

Appendices:

Appendix A

Location List - City

Location No	Name	Voice Connection	Data Connection	Applications or Servers
1	Data Center	2 PRI/VoIP	20 MB Metro E Fiber	Most Municipal
2	Central Garage	Centrex	BC-OOL Cable	Fleet Mgt.
3	Sanitation	Centrex	BC-OOL Cable	
4	Streets	Centrex	BC-OOL Cable	
5	Fire Station 1	Centrex	BC-OOL Cable	
6	Marina	Centrex	BC-OOL Cable	Quick Books and Slip Management
7	Traffic Services	Centrex	BC-OOL Cable	Maps and Plotting – Server in City Hall DC
8	FD HQ/EOC	Centrex	Fiber to DC	Dispatch, Reporting, EOC
9	Fire Station 5	Centrex	BC-OOL Cable	
10	Fire Station 3	Centrex	BC-OOL Cable	
11	Fire Station 2	Centrex	BC-OOL Cable	
12	Fire Station 4	Centrex	BC-OOL Cable	
13	Housing/Section 8	VoIP	10 MB Metro E	
14	PD	1 PRI/VoIP	Fiber to DC	Comms and OPS, NCIC, NYSPD

Location List - District

Location No	Name	Voice Connection	Data Connection	Applications or Servers
1	Barnard	Centrex	100 MB Fiber to LHRIC	
2	Trinity	Centrex	100 MB Fiber to LHRIC	
3	Young MS	Centrex	100 MB Fiber to LHRIC	
4	Campus Alternative	Centrex	T-1 to CO	
5	Jefferson	Centrex	100 MB Fiber to LHRIC	
6	Columbus	Centrex	100 MB Fiber to LHRIC	
7	Webster	Centrex	100 MB Fiber to LHRIC	
8	Davis	Centrex	100 MB Fiber to LHRIC	
9	Ward	Centrex	100 MB Fiber to LHRIC	
10	Leonard MS	Centrex	100 MB Fiber to LHRIC	
11	NRHS	Centrex	100 MB Fiber to LHRIC	Academic Servers
12	District Offices	Centrex	100 MB Fiber to LHRIC	Administrative Servers

Appendix B

BOE Expansion

QUOTE # :	00435		OGS #: PT64525	
QUOTE DATE:	2/16/2011			
PRODUCT#	**PRODUCT DESCRIPTION**	**QTY**	**UNIT COST**	**EXTENDED COST**
Fiber Cabling:				
EX4070A-1000	6 Strand M/M Plenum Armored Fiber	1	$ 563.75	$ 563.75
JPM407A-R4	Rckmt Fiber Shelf, 1U, 3-Adapter Panel	4	$ 95.82	$ 383.29
JPM405A-R2	Fiber Adapter Panel, (3) SC Pairs	6	$ 7.51	$ 45.08
JPM408A-R2	Blank Adapter Panel	6	$ 2.05	$ 12.33
Labor	Cable Installation	1	$ 3,198.00	$ 3,198.00
Hardware:				
CP-7945G=	Phone 7945, Gig Ethernet, Color, spare	75	$ 316.20	$ 23,715.00
CON-SNT-CP7945	SMARTNET 8X5XNBD	75	$ 8.00	$ 600.00
CP-7965G=	Phone 7965, Gig Ethernet, Color, spare	5	$ 404.60	$ 2,023.00
CON-SNT-CP7965	SMARTNET 8X5XNBD	5	$ 8.00	$ 40.00
VWIC2-2MFT-T1/E1	2-Port 2nd Gen Multiflex Trunk Voice/WAN Int. Card - T1/E1	1	$ 1,360.00	$ 1,360.00
LIC-CM-DL-100=	CallManager Device License - 100 units	3	$ 3,400.00	$ 10,200.00
LIC-CM-DL-10=	CallManager Device License - 10 units	2	$ 340.00	$ 680.00
WS-X4306-GB	Catalyst 4500 G Enet Module, 6-Ports	1	$ 2,036.60	$ 2,036.60
GLC-SX-MM	GE SFP, LC connector SX transceiver	4	$ 340.00	$ 1,360.00
WS-C3750X-48P-L	Catalyst 3750X 48 Port PoE LAN Base	4	$ 7,072.00	$ 28,288.00
C3KX-NM-1G=	Catalyst 3K-X 1G Network Module	4	$ 340.00	$ 1,360.00
CON-SNTP-3750X4PL	SMARTNET 24X7X4	4	$ 880.00	$ 3,520.00
GLC-SX-MM=	GE SFP, LC connector SX transceiver	8	$ 340.00	$ 2,720.00
UNITYU5-USR-E	1 Unity User	80	$ 44.20	$ 3,536.00
CON-ESW	Software Support for 1 Unity User	80	$ 8.00	$ 640.00
Labor	Installation	1	$ 8,937.21	$ 8,937.21
			Total:	**$ 95,218.26**

Appendix C

Combined VOIP Projected Cost Savings - New Rochelle BOE

Current Carrier Services / costs:

1) 150 Centrex Lines (A) Cost = $15.11 per line/per month
   $ 2,266.50 x 12 = $27,198.00

2) Nortel Phone Maintenance = $2,900.00 per year

3) Site Visit Premise Fee (30 x $15.00 = $450.00 per year)

4) Moves, Adds & Changes (30 MAC's @ $12.00 = $360.00 per year)

Current Annual Costs = $30,908.00

The implementation of a combined VOIP between the City of New Rochelle and the Board of Education will eliminate the need for the above carrier costs.

Appendix B shows the estimated costs for Board of Education Expansion at $95,218.26. Estimated annual maintenance costs for this system is 10% or $9,522. The reduction of carrier costs of $30,908.00 will provide a payback in year 5. See below.

		VOIP	Carrier Cost
Year 1		$104,739.26	$30,908
Year 2		$9,522	$30,908
Year 3		$9,522	$30,908
Year 4		$9,522	$30,908
Year 5		$9,522	$30,908
	Total =	$142,827.26	$154,540

Appendix D

Generator Replacement

QUOTE # :	00451		
QUOTE DATE:	2/16/2011		
PRODUCT#	**PRODUCT DESCRIPTION**		**COST**
Scope of Work:			
1. QTO 4842 Quiet Source Natural Gas 208 volt 3 Phase Emergency back-up generator with 200 amp automatic transfer switch			
2. 2" Galvanized Gas Line with proper roof supports and shutoff valves. Will run on roof of adjacent building & tie into gas line in mechanical rm.			
3. 200 Amp 3 phase main disconnect in data room			
4. Conduit and wiring from generator to data room for power supply			
5. Conduit and wiring from generator to data room for controls including trickle charge.			
6. Conduit and wiring from data room into BOE data room to feed existing sub-panel.			
7. Saw cut and patch walkway between data room and adjacent buildings roof.			
8. Fabricate steel lentels between bar joists in adjacent building to properly support generator.			
9. Crane-lift generator into place directly over steel support structure.			
Caveats:			
1. No access during survey to building where generator will reside. **Assumption:** Existing steel bar joists a maximum of six feet apart. Structural engineer may be needed to facilitate proper support.			
2. Final Connections of electrical switchgear will be coordinated with building to minimize downtime.			
3. This generator has a maximum output of 167 amps. The size of the generator is ample for the existing and future expansion as per customer request.			
Parts & Labor	**Total Cost of Implementation**		$ 69,225.00
		Total:	**$69,225.00**

Cisco EOL Documentation

End-of-Sale and End-of-Life Announcement for the Cisco Catalyst 3750 24- and 48-Port 10/100 Series, 3560 24- and 48-Port 10/100 Series, 3550 24-Port 10/100 DC, and 2950G 24-Port 10/100 DC Switches

EOL8926

Cisco announces the end-of-sale and end-of life dates for the Cisco® Catalyst 3750 24- and 48-Port 10/100 Series, 3560 24- and 48-Port 10/100 Series, 3550 24-Port 10/100 DC, and 2950G 24-Port 10/100 DC Switches. The last day to order the affected product(s) is July 5, 2010. Customers with active service contracts will continue to receive support from the Cisco Technical Assistance Center (TAC) as shown in Table 1 of the EoL bulletin. Table 1 describes the end-of-life milestones, definitions, and dates for the affected product(s). Table 2 lists the product part numbers affected by this announcement. For customers with active and paid service and support contracts, support will be available until the termination date of the contract, even if this date exceeds the Last Date of Support shown in Table 1.

Table 1. End-of-Life Milestones and Dates for the Cisco Catalyst 3750 24- and 48-Port 10/100, 3560 24- and 48-Port 10/100, 3550 24-Port 10/100 DC, and 2950G 24-Port 10/100 DC Switches

Milestone	Definition	Date
End-of-Life Announcement Date	The date the document that announces the end of sale and end of life of a product is distributed to the general public.	January 4, 2010
End-of-Sale Date	The last date to order the product through Cisco point-of-sale mechanisms. The product is no longer for sale after this date.	July 5, 2010
Last Ship Date: HW	The last-possible ship date that can be requested of Cisco and/or its contract manufacturers. Actual ship date is dependent on lead time.	October 3, 2010
End of Routine Failure Analysis Date: HW	The last-possible date a routine failure analysis may be performed to determine the cause of product failure or defect.	July 5, 2011
End of SW Maintenance Releases Date: HW	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes. After this date, Cisco Engineering will no longer develop, repair, maintain, or test the product software.	July 5, 2011
End of New Service Attachment Date: HW	For equipment and software that is not covered by a service-and-support contract, this is the last date to order a new service-and-support contract or add the equipment and/or software to an existing service-and-support contract.	July 31, 2011
End of Service Contract Renewal Date: HW	The last date to extend or renew a service contract for the product.	September 30, 2014
Last Date of Support: HW	The last date to receive service and support for the product. After this date, all support services for the product are unavailable, and the product becomes obsolete.	July 31, 2015

HW = Hardware OS SW = Operating System Software App. SW = Application Software

Table 2. Product Part Numbers Affected by This Announcement

End-of-Sale Product Part Number	Product Description	Replacement Product Part Number	Replacement Product Description
WS-C2950G-24-EI-DC	24 10/100 + 2 GBIC slots, Enhanced Image, DC version	WS-C3560V2-24TS-SD	Catalyst 3560V2 24 10/100 + 2 SFP + IPB Image + DC Power
WS-C3550-24-DC-SMI	24-10/100 + 2 GBIC ports(DC-Pwrd): SMI	WS-C3560V2-24TS-SD	Catalyst 3560V2 24 10/100 + 2 SFP + IPB Image + DC Power
WS-C3560-24PS-E	Catalyst 3560 24 10/100 PoE + 2 SFP + IPS Image	WS-C3560V2-24PS-E	Catalyst 3560V2 24 10/100 PoE + 2 SFP + IPS (Enhanced) Image

Cisco Systems

Product Bulletin No. EOL1021

End-of-Sale and End-of-Life Announcement for the Cisco 1700 Series

Cisco Systems® announces the end-of-sale and end-of life dates for the Cisco® 1700 series. The last day to order the affected product is March 27, 2007. Customers with active service contracts will continue to receive support from the Cisco Technical Assistance Center (TAC) until March 25, 2012.

Table 1 describes the end-of-life milestones, definitions, and dates for the affected products. Table 2 lists the product part numbers affected by this announcement.

Cisco encourages customers to migrate to the Cisco integrated services routers which are engineered for secure, wire-speed delivery of concurrent data, voice, video, and wireless services. An integrated systems approach to embedded services speeds application deployment to help reduce operating costs and complexities. Cisco is the first in the industry to embed security and voice services into a single routing system for fast, scalable delivery of mission-critical business applications to organizations of all sizes. For more information about integrated services routers, visit http://www.cisco.com/go/isr.

Table 1. End-of-Life Milestones and Dates for the Cisco 1700 series.

Milestone	Definition	Date
End-of-Life Announcement Date	The date the document that announces the end of sale and end of life of a product is distributed to the general public.	27-MAR-2006
End-of-Sale Date	The last date to order the product through Cisco point-of-sale mechanisms. The product is no longer for sale after this date.	27-MAR-2007
Last Shipment Date	The last-possible ship date that can be requested of Cisco and/or its contract manufacturers. Actual ship date is dependent on lead time.	26-JUN-2007
End of Software Maintenance Releases Date	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes. After this date, Cisco Engineering will no longer develop, repair, maintain, or test the product software.	27-MAR-2010
End of Routine Failure Analysis Date	The last-possible date a routine failure analysis may be performed to determine the cause of product failure or defect.	26-MAR-2008
End of New Service Attachment Date	For equipment and software that is not covered by a service-and-support contract, this is the last date to order a new service-and-support contract or add the equipment and/or software to an existing service-and-support contract.	26-MAR-2008
End of Service Contract Renewal Date	The last date to extend or renew a service contract for the product.	25-JUN-2011
Last Date of Support	The last date to receive service and support for the product. After this date, all support services for the product are unavailable, and the product becomes obsolete.	25-MAR-2012

End-of-Sale and End-of-Life Announcement for the Select Cisco Catalyst 6503, 6506, and 6509 Chassis

3037 - Amended

Cisco announces the end-of-sale and end-of life dates for the Select Cisco Catalyst 6503, 6506, and 6509 Chassis. The last day to order the affected product(s) is November 1, 2006. Customers with active service contracts will continue to receive support from the Cisco Technical Assistance Center (TAC) as shown in Table 1 of the EoL bulletin. Table 1 describes the end-of-life milestones, definitions, and dates for the affected product(s). Table 2 lists the product part numbers affected by this announcement. For customers with active and paid service and support contracts, support will be available until the termination date of the contract, even if this date exceeds the Last Date of Support shown in Table 1.

Table 1. End-of-Life Milestones and Dates for the Select Cisco Catalyst 6503, 6506, and 6509 Chassis

Milestone	Definition	Date
End-of-Life Announcement Date	The date the document that announces the end of sale and end of life of a product is distributed to the general public.	November 1, 2005
End-of-Sale Date	The last date to order the product through Cisco point-of-sale mechanisms. The product is no longer for sale after this date.	November 1, 2006
Last Ship Date: HW	The last-possible ship date that can be requested of Cisco and/or its contract manufacturers. Actual ship date is dependent on lead time.	February 1, 2007
End of Routine Failure Analysis Date: HW	The last-possible date a routine failure analysis may be performed to determine the cause of product failure or defect.	November 1, 2007
End of New Service Attachment Date: HW	For equipment and software that is not covered by a service-and-support contract, this is the last date to order a new service-and-support contract or add the equipment and/or software to an existing service-and-support contract.	November 1, 2007
End of Service Contract Renewal Date: HW	The last date to extend or renew a service contract for the product.	August 1, 2012
Last Date of Support: HW	The last date to receive service and support for the product. After this date, all support services for the product are unavailable, and the product becomes obsolete.	November 1, 2012

HW = Hardware OS SW = Operating System Software App. SW = Application Software

Table 2. Product Part Numbers Affected by This Announcement

End-of-Sale Product Part Number	Product Description	Replacement Product Part Number	Replacement Product Description	Additional Information
FAN-MOD-3	Standard Fan Module for C7603 and WS-C6503 chassis	WS-C6503-E-FAN	Catalyst 6503-E Chassis Fan Tray	–
FAN-MOD-3HS	High-Speed Fan Module for Cisco7603/Catalyst6503 Chassis	WS-C6503-E-FAN	Catalyst 6503-E Chassis Fan Tray	–
WS-C6503	Cat 6503 Chassis, 3slot, 4RU, No Pow Supply, No Fan Tray	WS-C6503-E	Catalyst 6500 Enhanced 3-slot chassis, 4RU, no PS, no Fan Tray	–
WS-C6503	Cat 6503 Chassis, 3slot, 4RU, No Pow Supply, No Fan Tray	WS-C6504-E	Catalyst 6500 Enhanced 4-slot chassis, 5RU,no PS, no Fan Tray	–
WS-C6503=	Catalyst 6503 Chassis, 3 slot, 4 RU, No Power Supply,Spare	See the Product Migration Options section below for detailed information on replacing this product.		
WS-C6506	Cat 6506 Chassis, 6slot, 12RU, No Pow Supply, No Fan Tray	WS-C6506-E	Catalyst 6500 Enhanced 6-slot chassis, 12RU, no PS,no Fan Tray	–