SMPL_340

A-Team Networking

Providing a team approach to network design

Vision and Scope Document

for

The ABC Law Firm

Network Upgrade Project

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A-Team Networking

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Revision History

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| **Name** | **Date** | **Reason For Changes** | **Version** |
| Team A | 1/21/2009 | Initial document creation | 1.0 |
| Eric Wright | 1/24/2009 | Grammar and Spelling Checks and additions to assigned sections | 1.1 |
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| David Dalton | 1/29/2009 | Grammar and Spelling Checks of entire document | 2.0 |
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# Business Requirements

ABC Law Firm is one of the country’s most prestigious law firms. The firm has gained its notoriety by representing high profile clients and employing the top of the line technology. The firm employs 450 people over two locations to include junior and senior lawyers, clerical support, and IT staff.

The firm’s current operations include storing, retrieving, and annotating large amounts of paper documents between departments, including confidential client records. The senior partners have chosen an enterprise docket and document imaging application that will allow the firm’s associates to move the paper documents to network storage, which will allow the viewing of client documents in electronic format and process court records quickly regardless of where the associates are geographically located. However, their information technology (IT) administrator has concerns with network bandwidth requirements and security risks once the new application goes live later this year.

## Background

The ABC Law Firm upgraded all their servers, desktop, and notebook computers last year in preparation for the new docket and document imaging application. However, this upgrade did not include network hardware, which currently supports a non-managed 10-megabit (Mb) bandwidth network infrastructure. The new application, scheduled for a summer 2009 launch, requires the minimum of a 100Mb bandwidth with 1-gigabit (Gb) recommended by the application manufacturer. Additionally, senior associates cannot retrieve documents remotely nor file court documents electronically using the Internet. The senior partners are also very concerned about the security of the network as the files on the network are very sensitive and any disclosure could lead to lawsuits against the firm. They have contracted with A-Team Networking to upgrade their network hardware and minimize security risks concerning network integrity.

## Business Opportunity

The installation of a new docket imaging system will allow the firm to establish and efficiently maintain these files on their network, but will also create increased network traffic and security risks for their network. To resolve these inadequacies, A-Team Networking will upgrade the current non-managed 3-Com 10-megabit hardware with Cisco 1-Gb managed hardware, upgrade the existing copper wiring between buildings with fiber optic cable, and install a Virtual Private Network (VPN) for accessing the internal network via the Internet. This upgrade, in conjunction with the docket imaging system, will also allow the ABC Law Firm to submit dockets to the court system. Taking advantage of the network redesign, A-Team Networking will also add a wireless network for use within the firm’s café.

## Business Objectives and Success Criteria

A-Team Networking is dedicated to meeting all the business objectives as set forth within this vision and scope document. The network upgrade will allow the ABC Law Firm to implement their new application, but will also provide peace of mind to key partners and senior lawyers in the fact that their confidential information is safe and secure. An added benefit of this upgrade is an increased overall efficiency of network speed, which will improve email, Internet, and other daily network retrieval operations for the firm’s employees. A-Team Networking believes this improved efficiency will be measurable over time by enhanced office output and improved morale of employees. It will allow senior and junior associates more time to devote to clients, less time attempting to find documents, fewer trips to the courthouse to file documents, and confidence in the security of their network.

## Customer or Market Needs

Ideally, the ABC Law Firm’s partners and staff must have access to files over the network at all times. If the network is not available, then the firm will not be able to create, edit, maintain, or submit files. Therefore, high network availability is a major factor in the success of this project, the needs of the partners, senior and junior associates, and clerical staff of the ABC Law Firm. Just as important is the complete and prompt restoration of any network outages if they do occur. Implementing a network utilizing high quality Cisco routers and switches will allow A-Team Networking to meet these critical needs of the ABC Law Firm, its partners, senior and junior associates, and clerical staff. Table 1 summarizes these customer needs and project objectives.

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| **Table 1:** *Summary of project objectives and customer needs* | |
| **Customer Needs** | **Project Objectives** |
| Provide adequate bandwidth for new docket application and improve overall network access speeds. | Upgrade all old network hardware to Cisco gigabit Ethernet network hardware. |
| Provide a monitored network infrastructure to increase uptime and minimize downtime in the event of equipment failures. | Provide a managed network infrastructure that will offer port level monitoring. |
| Provide and maintain a fast network connection with minimal errors between buildings. | Replace existing copper cable between buildings with fast fiber optic cable. |
| Allow access to secure and confidential files from off premise sites and the filing of court documents over the Internet. | Create a VPN connection to the internal network. |
| Allow employees to work away from their desks while eating and meeting with other employees. | Install a wireless router access point in the firm’s café for employee use. |

## Business Risks

Risks are part of all projects, but can be minimized by proper evaluation and planning. Aside from risks involved with the new docket application, which is beyond the control of A-Team Networking, the network upgrade does contain potential for risks. However, A-Team Networking is confident that these risks are minimal. We base the risk assessment on certain assumptions and events that may be beyond the control of our company, but in the event they do occur, A-Team Networking will work with the ABC Law Firm and/or any outside suppliers or contractors to minimize the impact on this project. Table 2 lists the severity and mitigation of risks that A-Team Networking believes are associated with this vision and scope project.

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| **Table 2:** *Risk severity and mitigation* | | |
| **Risk** | **Severity** | **Mitigation** |
| There is a possibility of lost time due to team member illness or separation from the company. | This could slightly delay the project a few days to a week depending on position held by the team member. | As all our team members are cross trained, other members will be able to pickup the slack and proceed with tasks |
| Equipment delivery delays due to vendor backorders, discontinued models, or damage of equipment in transit or failure of equipment upon installation. | This could delay the project from several days to many weeks depending on the situation causing the delay. | A-Team Networking has several supply vendors in the event certain models are not available. In emergencies, the shipment of equipment can be overnight. |
| The discovery of a collapsed or damaged conduit between buildings could cause problems installing the new fiber cable. | This could delay the installation of the fiber optic cable between buildings for several weeks to a month depending on excavation and weather. | While this would delay the fiber installation between buildings, it would not delay the over all project. The network will still operate, but at a slower (100 Mb) rate between buildings. |
| The discovery that some network cabling is not CAT 5e compatible. | This may delay certain areas of the project a few days. | The running of small sections of network cabling is not a problem and will have minimal impact on the project. |
| Weather based emergencies such as storms, wind damage, floods, or other natural and human disasters. | It is hard to estimate delays caused by these types of events. | A-Team Networking will do everything possible to overcome any emergencies, natural or man-made, to finish the project on time. |
| Failure by Arrow Electric to have their electrical power installed by the time the network upgrade is complete. | This may delay the permanent power operation of network equipment until contractor is finished with upgrades | Power can be run temporarily using extension cords, however equipment may not be on backup generator. |
| Failure of the application vendor to have their application installed by the time the network upgrade is complete. | This will have no impact on the network upgrade as this failure is outside the scope of this project. | None. |

# Vision of the Solution

The vision of this solution is to provide a robust, fault tolerant, and secure gigabit Ethernet network infrastructure for ABC Law Firm. This will provide the necessary infrastructure for the implementation of ABC Law Firm’s new docket and document imaging system.

## Vision Statement

ABC Law Firm is rolling out a new docket imaging system to give it an edge over its competitors by shortening the time from case inception to official filing with the court system. This application will become the most critical system within the firm. As a result, it requires a robust and fault tolerant network to provide the gigabit speeds required to make the application functional. Security is of the utmost importance as data confidentiality is a concern to all the partners of the firm.

## Major Features

The network will provide the following features:

* Gigabit speed to all servers and desktop computers
* Redundant connectivity between the firm’s two adjacent locations
* No single point of failure in the critical network hardware for both the WAN and LAN
* Enhanced security on the WAN and LAN to further protect the firm’s data
* Wireless access for employees using the company cafe

## Assumptions and Dependencies

For the success of this project, A-Team Networking makes the following assumptions:

* ABC Law Firm has 450 associates divided up between 2 adjacent buildings that are 100 yards apart with a parking lot separating the buildings.
* Building A has two floors and houses the firm’s 15 Wintel servers.
* Another consulting firm is doing the docket and imaging system implementation.
* The existing CAT-5e cable plant will be sufficient for providing gigabit Ethernet to the desktops.
* The desktops and servers have a minimum of 1-Gb Ethernet cards installed.

For the success of this project, A-Team Networking is dependent on the following to occur:

* Arrow Electric to complete the necessary electric infrastructure upgrades to support the required increase in power consumption by the new networking gear.
* The existing conduit between Building A and Building B is intact.
* All Cisco equipment will replace the existing end of life 3-Com equipment.

# Scope and Limitations

The network upgrade includes all the necessary labor and hardware to replace the current networking environment of the ABC Law Firm with a modern gigabit Ethernet network including the replacement of the copper interconnect between buildings with redundant fiber optic cable. It also is to provide a new wireless Wi-Fi access point within the company’s café, and provide a virtual private network (VPN) access point into the company’s local area network (LAN) from the Internet. All new network infrastructures will be Cisco hardware with redundant systems to maximize uptime of the network environment.

Upon completion of this project, sufficient bandwidth will exist to support the new document imaging system as well as additional network intensive applications and systems.

## Scope of Initial Release

The scope of this initial document includes the replacement of all non-managed 3-Com hubs, switches, and routers with new managed Cisco switches and routers. The network upgrade includes the replacement of existing copper wire between the two buildings with multi-mode fiber optic cable. This includes any necessary interconnect hardware associated with the fiber-optic replacement.

The scope of this initial document includes the installation of a new wireless Wi-Fi access point within the company’s café using Cisco hardware. This will provide employees of the ABC Law Firm secure Internet access using notebook computers. In addition, this initial document provides for a virtual private network (VPN) back into the company’s local area network (LAN) from the Internet. This will permit employees to access documents and other data while away from the firm’s two buildings.

The scope of this initial document includes the intent to provide a methodology to provide high-level network availability by using only Cisco hardware with redundant power supplies, local uninterrupted power supplies (UPS), and multiple paths of connectivity between buildings.

## Scope of Subsequent Releases

The completion of this network upgrade will provide a modern, dependable, and secure high-speed networking environment, which will offer adequate network bandwidth for all current and near future networking applications and systems.

## Limitations and Exclusions

The network upgrade is dependent upon using existing Cat-5e LAN wiring within the two buildings, sufficient primary electrical services to provide the power for the new network hardware, and the ability to pull new fiber-optic cable through the existing conduit connecting the two buildings. In addition, this scope is dependent upon an initial site survey to assure all assumptions are correct.

The network upgrade does not include any general or specific software, software upgrades, or labor beyond that required to permit network communications over the new networking environment. All items falling outside the scope of this network infrastructure upgrade are to be the responsibility of ABC Law Firm and not that of A-Team Networking unless specifically agreed upon in writing.

# Business Context

The primary stakeholders of this project are the partners, senior and junior lawyers, and clerical staff of the ABC Law Firm, with the law firm’s information technology staff and A-Team Networking being secondary stakeholders. The completion of this network upgrade will provide the network bandwidth, which will allow the much-anticipated docket and document-imaging application project to move forward, a wireless environment in the firm’s café, and more importantly, access to the firm’s intranet through a new virtual private network.

Furthermore, the existing old 3-Com network hardware has been problematic, with network outages and hardware repairs occurring frequently. Upgrading this infrastructure will provide a significant cost savings in repairs and significantly boost in network up time, thus providing a more efficient office environment, which will allow increased productivity and a higher profit margin for the firm.

(Continued on next page)

## Stakeholder Profiles

Stakeholders are important to a project and define why the project exists and who has what to gain and lose. Table 3 provides profiles for each of these stakeholders.

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| **Table 3:** *Stakeholder Profiles* | | | | |
| **Stakeholder** | **Major Value** | **Attitudes** | **Major Interests** | **Constraints** |
| ABC Law Firm Partners | Increased productivity and improved accountability. | A 25% increase in productivity due to increased bandwidth. | Upgrade of network with minimal impact on the daily operation of the firm. | Maximum budget is  $1,000,000. |
| Lawyers and legal staff | Increased productivity, better security of client case files, ability to retrieve case files remotely. | Expectation is high that the new network and document imagining system will make job duties easier. | Upgrade of network with minimal impact on the daily operation of the firm. | Staff will have increased expectations of new network bandwidth. |
| Clerical Staff | Staff will have enhanced organization and improved retrieval of case files. | Excited about new system but concerned about disruption in daily operations. | Upgrade of network with minimal impact on the daily operation of the firm. | Staff will have increased expectations of new network bandwidth. |
| IT Staff | Staff will have fewer complaints about slow network and have a separate subnet for network monitoring. | I.T. is excited about upgrade, which will reduce hardware failures due to age of equipment and permit easier management of the network. | The network upgrade will move forward with minimal impact on current networking hardware and software. | The I.T. staff must integrate network upgrade seamlessly to minimize any downtime within the firm. |
| Law firm clients | Clients will have improved representation by law firm. | The upgrade will be transparent to most of the clients. | Clients will see no slowdown in the processing of client legal issues. | There are no anticipated constraints. |
| A-Team Networking | Provide networking services to ABC Law Firm at a fair cost. | Team is looking forward to the challenge of doing the upgrade of ABC’s network. | Project management stays on track with minimal impact on the ABC’s existing operation. | Team must deliver networking upgrade within budget and on time. |

## Project Priorities

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| **Table 4:** *Project Priorities* | | | |
| **Dimension** | **Driver** | **Constraint** | **Degree of Freedom** |
| Creation of overall Schedule | Project deadline | Completion date of 4/15/2009 | none |
| Site survey | Must be completed before network design | Upon delivery of this vision and scope document | Jan. 12 – Jan. 16, 2009 |
| Design of network | Design completed before ordering of hardware and fiber | Within two weeks of delivery of this vision and scope document | Jan. 16 to Feb. 2, 2009 |
| Ordering of hardware | Obtained from design specifications | As soon as possible | Jan. 16 to Feb. 2, 2009 |
| Installation of all hardware and fiber | To be determined by project schedule | Risks | Jan. 19 to Mar. 13, 2009 |
| Test of network | Upon completion of network upgrade | NLT 4/12/2009 | Mar 16 to Mar 20, 2009 |
| Staff | Existing staff of A-Team Networking | 2 network design and 2 field engineers | none |
| Cost | Available funding by the ABC Law Firm | Allotted funding:  Hardware = $500,000  Labor = $300,000  Total Cost $800,000 | Budget overrun up to 15% Acceptable without executive review |

## Operating Environment

The network upgrade includes many improvements over the existing network: including increased bandwidth, improved security, reliability, and availability. Replacement of old 10Mb 3-Com network hardware with modern Cisco gigabit routers and switches will provide remote management of all routers and switches and increases network bandwidth by over 1000 percent. Additionally, the Cisco hardware is more reliable as it provides redundant power supplies and built-in diagnostic firmware designed to detect problems with hardware before degrading network performance. With the addition of Cisco hardware, network up time should increase to approximately 99.9%.

The security of any network is important, but is especially important when involving the privacy of clients of a law firm moving paper documentation to network storage. The Cisco network will provide this security, both in design and physical security of the network. At the same time the new network, using a secure virtual private network (VPN), will allow authorized employees of the law firm to access records from anywhere via the Internet. It will also provide, as a convenience to employees of ABC Law Firm, secure wireless access to the Internet in the company’s café.

# Human Resources

The human resources section details the human interaction elements required for the successful completion of this project. This includes the team charter, a skills section detailing skill set, expertise, and role of each team member for this project. The communications section details the communication mechanisms of how the team will communicate among themselves and with the client.

## Team Charter

Upon the selection of team members for this project, the members met face-to-face on Saturday, January 17, 2009 to discuss the project and determine the preferred methods of inter-communication. The team consisted of Abdalla Al Ansari, David Dalton, Charles Legg, and Eric Wright. David Dalton volunteered to lead the team, with the other members in agreement. As team leader, David Dalton will take and publish notes of all meetings and will submit all completed documents to Professor Wayne Smith. The project of choice is a complete network upgrade for the fictitious ABC Law Firm. The team discussed the knowledge level and skill sets of each member, see Table 5.2 for details, and assigned responsibilities accordingly.

Team members agreed that all work for the project would be distributive, with each team member responsible for sections of the vision and scope document as well as the design, implementation, and testing phases of the network upgrade, see Table 5.3 for assignment details. The team agreed that the preferred communication media would be email in addition to those methods outlined in section 5.4, which follows.

## Technical Skills and Attributes

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| **Table 5:** *Technical Skills and Attributes* | | |
| **Name** | **Skills** | **Attributes** |
| Abdalla Al Ansari | Visio | Patient |
| David Dalton | Networking, information security, Project management, hands on experience | Outgoing, well organized, multi-tasking |
| Charles Legg | Networking hardware, Project management, technical writing, hands on experience | Detail oriented, well organized, good documentation skills |
| Eric Wright | Project management, technical writing, hands on experience | Outgoing, patient |

## Roles and Responsibilities

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| **Table 6:** *Team member roles and responsibilities* | | |
| **Name** | **Role** | **Responsibilities** |
| Abdalla Al Ansari | Visio development, implementation | Review documentation, complete network diagrams |
| David Dalton | Network design, Implementation | Act as team leader, record meeting minutes, develop end user and administrative documentation |
| Charles Legg | Field engineer, implementation | Ordering of hardware, tracking deliveries and drop-off at worksite, installation of hardware |
| Eric Wright | Technical engineer | Develop hardware documentation specifications and track labor and equipment costs |

## Communication Strategies

The majority of communication employed by the team will be via email; therefore, team members are to check their email on a daily basis. Periodic face-to-face team meetings will occur, as the team deems necessary. All communications and submittal of documents regarding this project to Professor Wayne Smith are to flow through David Dalton, the team leader. The collection and distribution of all written documents will utilize email on Tuesdays, Fridays, and Sundays of each week. This will allow adequate time for the team to review each other’s work before final delivery dates. Additionally, any delays in team members meeting the assignment deadlines are to be communicated to the other team members as soon as possible so everyone has a comfort level of the project’s progress.

# Project Management

The project management section details the deliverables, dependencies, and delivery schedule of the network upgrade by A-Team Networking for the client, ABC Law Firm. David Dalton will serve as the project manager and will act as the interface agent with the client. He will oversee all aspects of the project through its entire life cycle. Charles Legg will collect, oversee, and compile all documentation. Eric Wright will wordsmith the documentation. Abdalla Al Ansari will create the Visio diagrams along with David Dalton. All team members will take part in the site survey, configuration, installation, testing, and conversion. In addition, all team members will be on-site for the first 2 days of postproduction operations.

## Deliverables

The ABC Law Firm will receive the following deliverables:

* Detailed project plan and schedule in Adobe PDF format
* Regularly scheduled reports detailing specific project progress
* A fully upgraded, gigabit network using Cisco hardware
* A wireless solution to allow internet connectivity from the café
* A VPN solution allowing remote access into the internal network
* Full network graphic documentation in the form of Visio diagrams
* Complete removal and disposal of the old 3-Com hardware

All documentation is to be in both electronic format and hard copy.

## Dependencies

The following items are critical dependencies presented in chronological order:

1. Site survey to determine project requirements
2. Power upgrades being performed by the electricians
3. Delivery of new equipment
4. Installation of new equipment
5. Testing of new network
6. Migration weekend
7. First production day post migration
8. Delivery of final documentation
9. Removal and disposal of old equipment

## Schedule

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| **Table 7:** *Project schedule* |
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# Educational/Program Outcomes

The solution that we are proposing will enable the customer, ABC Law Firm, to create, maintain and file documents to the courts in a more reliable, convenient and secure way. The solution will also allow the firm to access, view, and change files from anywhere the Internet is available via VPN.

## General Education

The project will require extensive research to develop a robust, fault tolerant, and secure gigabit network that will handle the needs of the document imaging system. The deployment of Wireless technology will add an additional component to the technology to research. Using feedback from the client will provide A-Team Networking with the ability to understand the client needs and provide a tool to measure the success of the project.

## Information Technology

This proposal upgrades many elements in support of the implementation of the firm’s new document imaging system. The team will explore best practices for the implementation and documentation of the network as part of this project. This project will require research into proper network implementation configurations and deployments using Cisco equipment in addition to containing the following key networking concepts:

1. Deploying high availability switches
   1. VLAN Configuration
   2. Spanning tree configuration
   3. Redundant supervisor card configuration
   4. MSFC configuration and redundancy via HSRP
2. Deploying high availability routers
   1. Router hardware considerations and IOS selection
   2. Routing protocol features and selection verses static routing
   3. Redundancy deployment and EIGRP configuration
   4. Redundancy deployment and HSRP configuration
3. Deploying Cisco ASA devices
   1. Hardware and IOS selection considerations
   2. Correct installation and configuration
4. Deploying VPN solutions
   1. Hardware considerations
   2. Encryption strength decision
   3. Deployment architecture
5. Deploying Wireless
   1. Hardware considerations including wireless standard selection
   2. Proper antennae selection
   3. Security concerns
   4. Deployment location within the network
6. Security and Monitoring
   1. Secure management of routers and switches
   2. Securing redundant configurations
   3. Network monitoring

# Annotated Bibliography

Catalyst 6500 Supervisor Configuration (2008). *Catalyst 6000/6500 Series Switches with Redundant Supervisor Engines Software Image Upgrade Configuration Example.* Retrieved January 25, 2009 from http://www.cisco.com/en/US/products/hw/switches/ps708/ products\_configuration\_example09186a00807714cb.shtml

This link is a configuration guide for the Supervisor modules in the Cisco 6500 family of switches. This guide provides the required information for the proper configuration required when deploying redundant supervisor modules in a network requiring high availability.

Catalyst 6500 Switches (2008). *Model Comparison.* Retrieved January 25, 2009 from http://www.cisco.com/en/US/products/hw/switches/ps708/prod\_models\_comparison.html

Cisco offers a wide variety of switches. The 6500 model comparison guide gives an at a glance comparison of the features and functions of the 6500 family of switches. It is very useful for determining base module and capacity requirements for the 6500 switch.

Cisco Routers (2008). *Model Comparison.* Retrieved January 29, 2009 from http://www.cisco.com

/en/US/prod/collateral/routers/ps380/prod\_brochure0900aecd8070826d.pdf

Cisco’s router product model comparison guide. Very nice PDF that provides an at a glance overview reference guide to Cisco’s router product line.

Ferguson, Scott (2009, January). Cisco Offers 802.11n Access Point for Enterprises. *eWeek.* Retrieved January 30, 2009 from http://www.eweek.com/c/a/Enterprise-Networking/Cisco-Offering-New-80211n-Access-Point-for-Enterprises/

Good third party product review of Cisco’s Aironet 1140 wireless access point. Third party reviews are great to get a non-partisan opinion of a product so an informed decision can be made without one having to filter through all of the manufacturers marketing data.

Mathias, Craig (2007, January). Changes in standards, convergence and product architectures drive the market. *Network World.* Retrieved January 30, 2009 from http://www.networkworld.com /topics/wireless-lans.html?pg=881347&tool=info&tc=wm

This article in the journal Network World was very useful for a quick overview of the most popular wireless networking protocols. Somewhat dated as it was written in 2007, it was still a great resource.

New Data (n.d.). *Bulk Fiber Pricing.* Retrieved January 25, 2009 from http://www.nudata.com/cables/bulkcable/belden\_bulk.htm

This web site provides pricing for network cables and was used to determine a price point for the necessary fiber required for the project.

Northrup, Anthony (1998). *NT network plumbing: Routers, Proxies, and Web Services.* Foster City, CA: IDG Books Worldwide, Inc..

While this is an older book, it contains a wealth of information detailing setting up and troubleshooting networks. It covers TCP/IP, DNS, setting up routers, and building scalability into networks. It has been a valuable resource in establishing and troubleshooting networks over the years.

Perahia, E. (2008, July). IEEE802.11n Development: History, Process, and Technology.

Communications Magazine, *IEEE.* Retrieved January 30, 2009 from http://ieeexplore.ieee.org/ xpls/abs\_all.jsp?tp=&arnumber=4557042&isnumber=4557031

This article gives a fantastic overview of IEEE’s 802.11n wireless protocol. Although fairly technical in nature it does give a nice history of the development of the 802.11 protocol.

Venezia, Paul (2007, January). Cisco's Catalyst switch upgrades tout speed, ease, and innovation. *InfoWorld.* Retrieved January 30, 2009 from http://www.infoworld.com/article/07/11/06/cisco-catalyst-switches\_1.html

An excellent article summarizing the benefits of the Cisco Catalyst 6500 family switches supervisor module redundancy features. Some of the problems of the previous Catalyst IOS are detailed regarding the problems of failover delays with redundancy configurations.