



Building Your Network Foundation: Routing and Switching Made Simple

Whatever the size of your organization, a business-class network is within your reach. By understanding and taking some simple steps, you can implement a network infrastructure that provides your company with significant and substantive benefits. From empowering your employees to greatly improving customer service, networking technology can have a lasting impact on your business.

This guide examines the critical issues of networking, how it works, and how it can help you achieve a competitive edge. Topics include:

- The basics: What is a network and how does it work?
- What are routers and switches and what is their role in the network?
- How does a network help you control your costs?
- How does a network improve your operational efficiency?
- How does a network help provide complete security for your information?

From increasing efficiency to decreasing costs to boosting customer satisfaction, every small and medium-sized business (SMB) faces unique challenges. Let's start by understanding how networks are put together, and then examine how they address your business needs.

Moving Data Around: Routers and Switches

The Internet revolution is based on the ability to transport "packets" of data, where each packet is a unit of data sent between an origin and a destination.

Routers and switches transport data—in fact, they are the basis of the Internet, as well as all other networks. The movement of data permits one device (such as your PC) to talk to another device (for example, another PC, an e-mail server, or a printer), whether the device is in the same building or on the other side of the world.

At first glance, a router and switch may appear physically similar (see Figure 1). In reality, routers and switches have different functions that complement one another.

Figure 1A Examples of Routers



Figure 1B Examples of Switches



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What Is a Network?

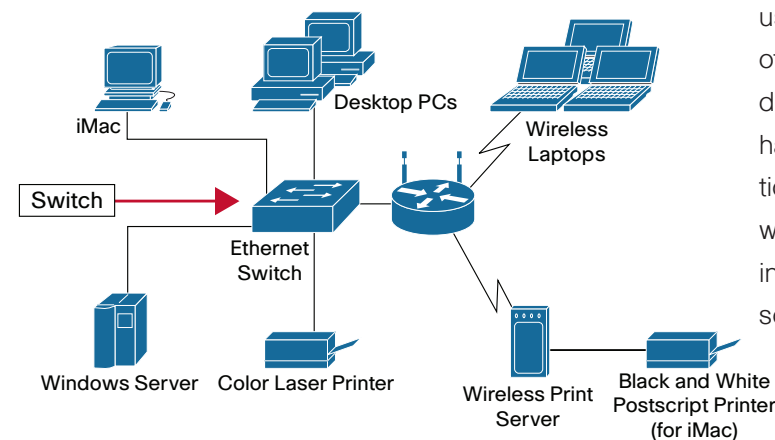
There are two main types of networks: local area networks (LANs) and wide area networks (WANs). For many businesses, a LAN is typically used to communicate within a building or campus, and a WAN is used to connect multiple LANs, and to communicate across a region, country, or the world.

A more official definition of a LAN is a group of computers and associated devices that share a common communications line or wireless link within a small geographic area (for example, within an office building). The importance of a LAN is that it enables PCs to talk to one another, and to share printers or servers. This sharing of data and resources enables cost savings and increased productivity.

Figure 2 shows a LAN within an office building that is set up using a switch, so that desktop PCs and wireless laptops can access and share servers or printers.

A WAN is a network that links together multiple geographically dispersed LANs, usually via high-speed phone lines. (You may already be familiar with the various types of DSL connections that are used in homes and businesses, as well as even faster technologies such as T1/E1 lines). A WAN covers a relatively broad geographic area (for example, communications between two countries) and often uses transmission facilities provided by telephone or cable companies.

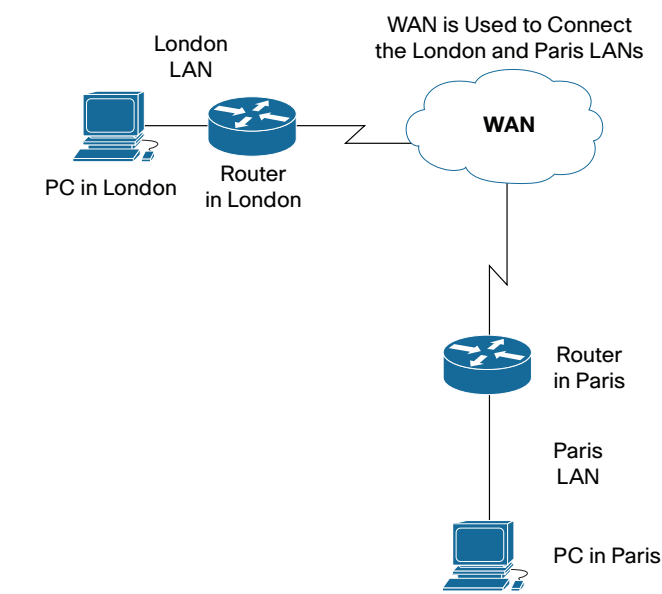
Figure 2 LAN Example



WANs are helpful in many ways. Merchants use WANs to validate buyers' credit cards when performing a transaction. Virtual private networks (VPNs) employ WANs when creating secure connections between users on different private networks. Companies provide traveling employees with access to network resources via private dial-up links. In short, the WAN extends network resources beyond the local area.

Figure 3 shows London and Paris offices communicating with one another using routers in a WAN.

Figure 3 WAN Example



Routing and Switching Form the Foundation of the Network

We've seen that switches are used to connect multiple devices on the same network (the LAN), while routers are used to connect multiple networks (on the WAN) to each other. While both were originally designed just to transport data, today they also do much more. Routers and switches have become the foundation for all business communications—not just data, but also security, voice, video, and wireless access. Many of these features are often contained in modules that plug into the router or switch, or available as software upgrades.

Containing Your Costs with Routers and Switches

Routing and switching technologies can make a significant and positive impact on your company's profit line. *The Net Impact Study*, sponsored by Cisco® and conducted by Momentum Research Group, found that companies that combined network infrastructures with network-based business applications, and were willing to reengineer their business practices to take best advantage of the technology and actively measure the results, reduced their annual operating costs by more than 20 percent. What's more, they measured a 20 to 25 percent increase in customer satisfaction.

The award-winning Cisco routing, switching, security, unified communications, wireless, and networked storage products stand on their own individual merits, but are also designed to provide an exponential increase in benefits when integrated and deployed together. An integrated network delivers significant savings in time and resources by anticipating the capabilities and integration needs of technologies.

According to a study by Sage Research (Figure 4), organizations with a primary networking vendor (in other words, one networking vendor provides all their network technologies) realized benefits in three main categories: financial savings, enhanced network performance, and

infrastructure and end-user benefits. The financial reality is compelling—the network cost of ownership per endpoint (each PC, telephone, laptop, PDA, or other device) in a primary vendor network is 29 percent lower than that of a multi-vendor network.

An integrated approach to routing and switching lets all workers—even those at different sites—have the same access to business applications, unified communications, and videoconferencing as their colleagues at headquarters. Cisco lets you grow your network over time, adding features and functionality as you need them while ensuring complete investment protection. An added benefit of this integrated approach is that your IT personnel can centrally manage the network from headquarters, which keeps staffing counts low.

How Is Your Customer Responsiveness?

SMBs face serious challenges in keeping pace with the business world's rapidly moving, globally competitive, connected environment. Customers today have more options than ever. They have more choices in what and how they buy, and require options for communicating and obtaining information. Customers are used to shopping and interacting with businesses over the Internet, and they expect instant responses and rapid, personalized service.

As a result, it is no longer enough to provide basic connectivity. Sophisticated systems and applications are being asked to link your employees to each other—as well as to customers, partners, and vendors—by providing responsive and secure access to relevant data and business processes. They also need to manage security threats and meet new government regulatory requirements. At the same time, while the number of devices, mobile users, work sites, and security threats continues to rise, limited IT resources and training budgets make it difficult to monitor, support, and manage your networks.

Improving Data Security with Routers and Switches

Perhaps the greatest concern companies have in doing business over the Internet is the security risk. Hackers, denial-of-service (DoS) attacks, identity theft, and even cyber-terrorism are very real dangers. In addition, you may wonder how to guarantee the performance and reliability of your Internet-based services. Or, you may not be certain that you have the resources and support needed to deploy and manage e-commerce services and processes.

The good news is that a sound network infrastructure can address all these issues. At the foundation of a robust e-commerce infrastructure are the routers and switches.

Some routers and switches marketed to SMBs are actually consumer-grade devices designed for home users who need simple Internet access. Cisco has led the way in designing award-winning routers and switches for small and medium-sized organizations. A business-class router or switch incorporates features that address the security, performance, reliability, and manageability concerns of companies that rely on their network for their business success.

Security is a critical consideration to most SMBs when choosing a networking solution. By installing a complete solution and managing it centrally, you can protect valuable business data and guard against viruses, spyware, Internet attacks, and other security concerns.

Routers, for example, can add security to your WAN. If your WAN is accessed by many users, or if it passes over high-speed digital phone lines or the Internet, your WAN is a potential target. Cisco integrated services routers can be configured with features such as:

- Built-in firewalls
- Intrusion detection and prevention
- Authentication technologies such as Network Admission Control (NAC)
- Encryption
- Virtual private networks, providing encryption via the Internet

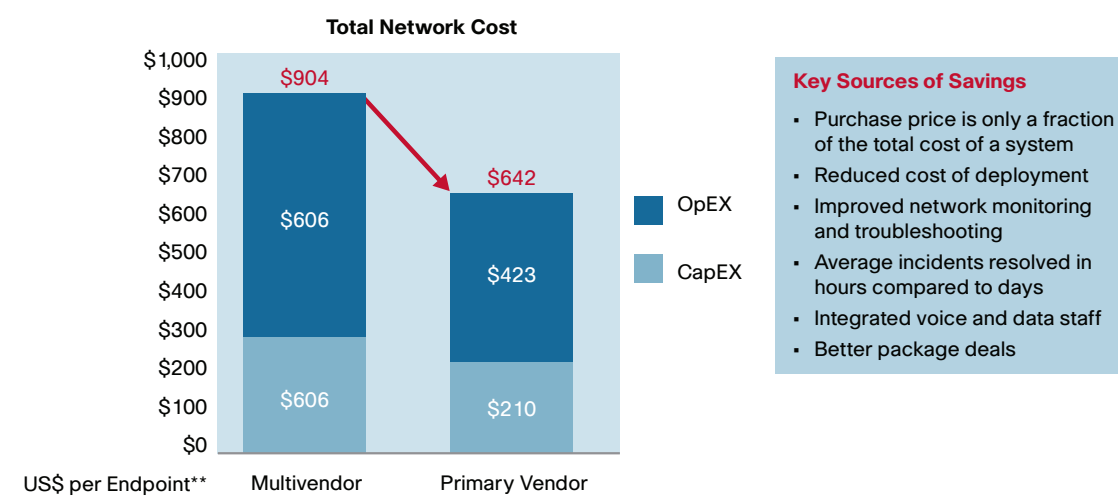
Based on these powerful technologies, the Cisco Self-Defending Network offers layers of protection and self-healing to secure your information across the company.

Your Next Step

Cisco delivers a complete line of networking products that provide a strategic platform for basic data connectivity as well as security, voice, and wireless services. To help you take best advantage of all these tools, Cisco has designed a Smart Business Roadmap for SMBs. This Roadmap provides a structured path that maps business challenges and "pain points" to technology solutions to help evolve your business over time toward its optimal performance.

To learn more about Cisco networking solutions, please visit: www.cisco.com/uk/youinc

Figure 4 Total Network Cost



Source: Sage Research

**Endpoint is defined as a network-connected computer

- Key Sources of Savings**
- Purchase price is only a fraction of the total cost of a system
 - Reduced cost of deployment
 - Improved network monitoring and troubleshooting
 - Average incidents resolved in hours compared to days
 - Integrated voice and data staff
 - Better package deals