



Module 1: Networking Today

Introduction to Networks v7.0
(ITN)



Module Objectives

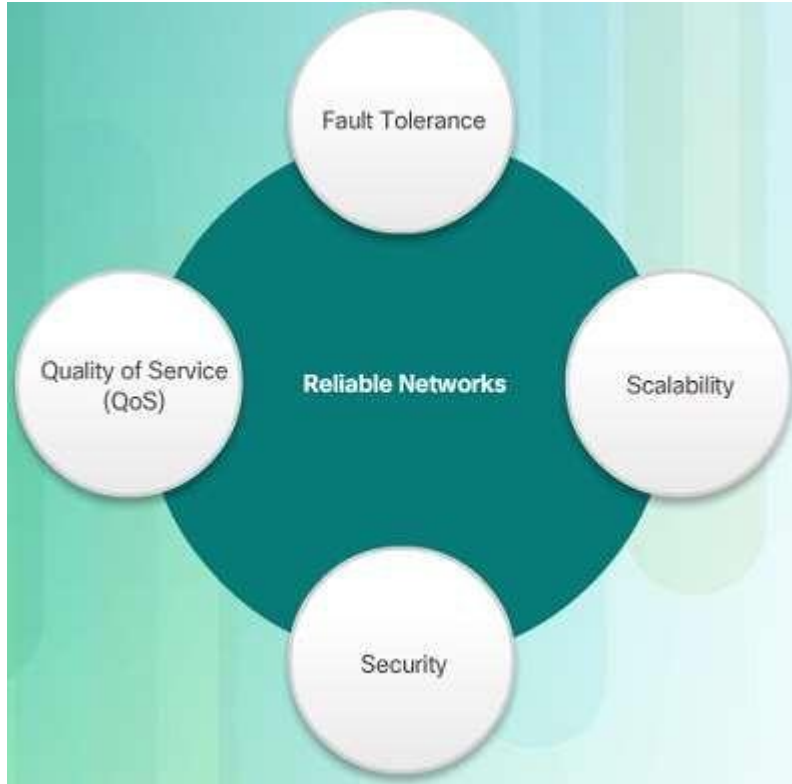
Module Title: Networking Today

Module Objective: Explain the advances in modern technologies.

Topic Title	Topic Objective
Networks Affect our Lives	Explain how networks affect our daily lives.
Network Components	Explain how host and network devices are used.
Network Representations and Topologies	Explain network representations and how they are used in network topologies.
Common Types of Networks	Compare the characteristics of common types of networks.
Internet Connections	Explain how LANs and WANs interconnect to the internet.
Reliable Networks	Describe the four basic requirements of a reliable network.
Network Trends	Explain how trends such as BYOD, online collaboration, video, and cloud computing are changing the way we interact.
Network Security	Identify some basic security threats and solution for all networks.
The IT Professional	Explain employment opportunities in the networking field.

1.6 Reliable Networks

Reliable Network Network Architecture



Network Architecture refers to the technologies that support the infrastructure that moves data across the network.

There are four basic characteristics that the underlying architectures need to address to meet user expectations:

- Fault Tolerance
- Scalability
- Quality of Service (QoS)
- Security

Reliable Network

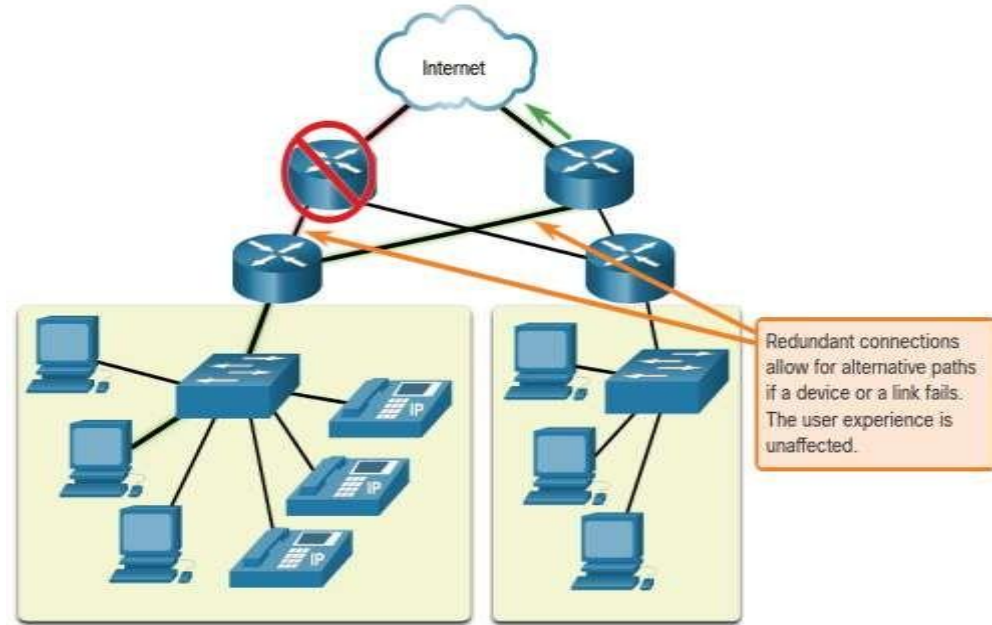
Fault Tolerance

A fault tolerant network limits the impact of a failure by limiting the number of affected devices. Multiple paths are required for fault tolerance.

Reliable networks provide redundancy by implementing a packet switched network:

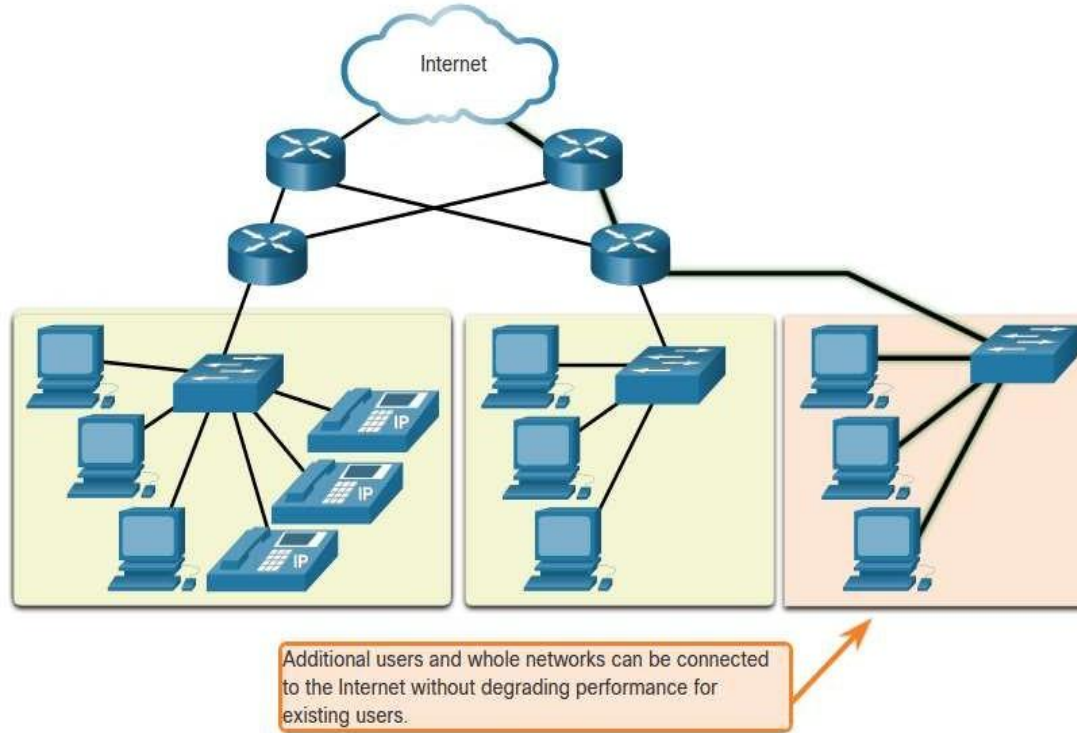
- Packet switching splits traffic into packets that are routed over a network.
- Each packet could theoretically take a different path to the destination.

This is not possible with circuit-switched networks which establish dedicated circuits.



Reliable Network

Scalability



A scalable network can expand quickly and easily to support new users and applications without impacting the performance of services to existing users.

Network designers follow accepted standards and protocols in order to make the networks scalable.

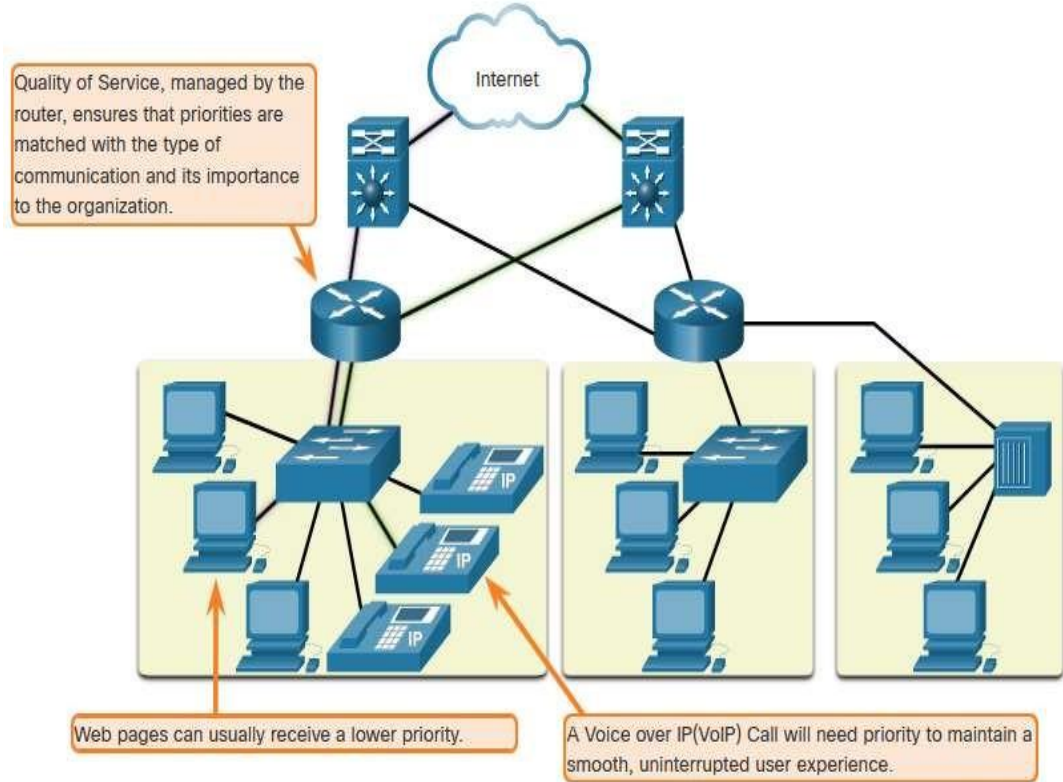
Reliable Network

Quality of Service

Voice and live video transmissions require higher expectations for those services being delivered.

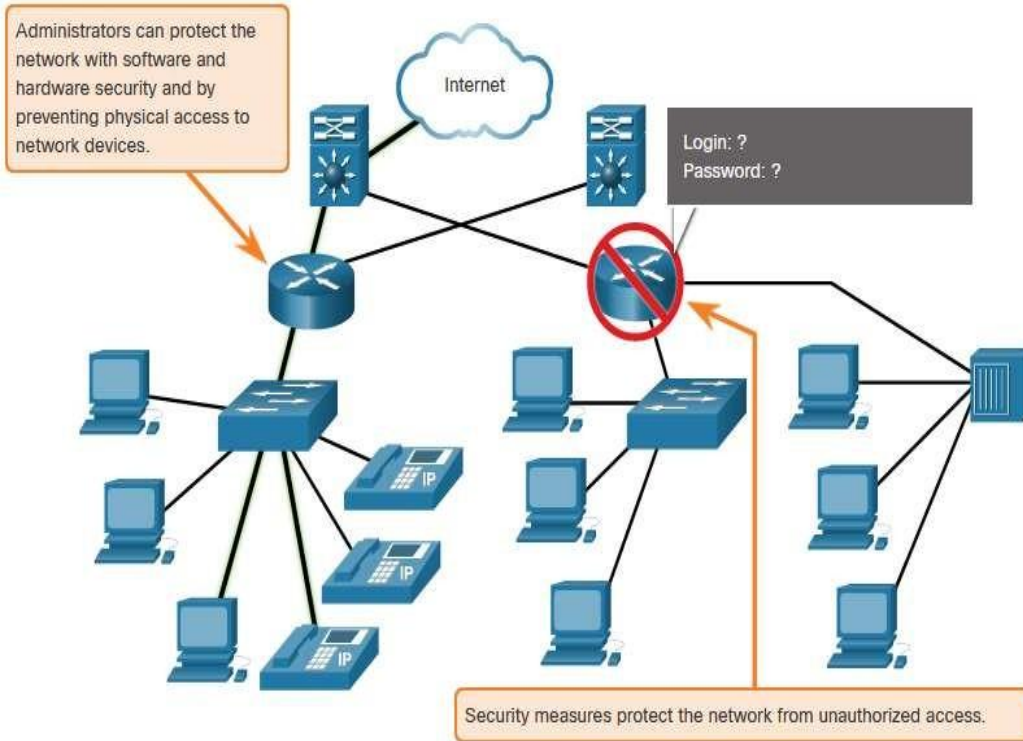
Have you ever watched a live video with constant breaks and pauses? This is caused when there is a higher demand for bandwidth than available – and QoS isn't configured.

- Quality of Service (QoS) is the primary mechanism used to ensure reliable delivery of content for all users.
- With a QoS policy in place, the router can more easily manage the flow of data and voice traffic.



Reliable Network

Network Security



There are two main types of network security that must be addressed:

- Network infrastructure security
 - Physical security of network devices
 - Preventing unauthorized access to the devices
- Information Security
 - Protection of the information or data transmitted over the network

Three goals of network security:

- Confidentiality – only intended recipients can read the data
- Integrity – assurance that the data has not be altered with during transmission
- Availability – assurance of timely and reliable access to data for authorized users

1.7 Network Trends

Network Trends

Recent Trends



The role of the network must adjust and continually transform in order to be able to keep up with new technologies and end user devices as they constantly come to the market.

Several new networking trends that effect organizations and consumers:

- Bring Your Own Device (BYOD)
- Online collaboration
- Video communications
- Cloud computing

Bring Your Own Device



Bring Your Own Device (BYOD) allows users to use their own devices giving them more opportunities and greater flexibility.

BYOD allows end users to have the freedom to use personal tools to access information and communicate using their:

- Laptops
- Netbooks
- Tablets
- Smartphones
- E-readers

BYOD means any device, with any ownership, used anywhere.

Network Trends

Online Collaboration

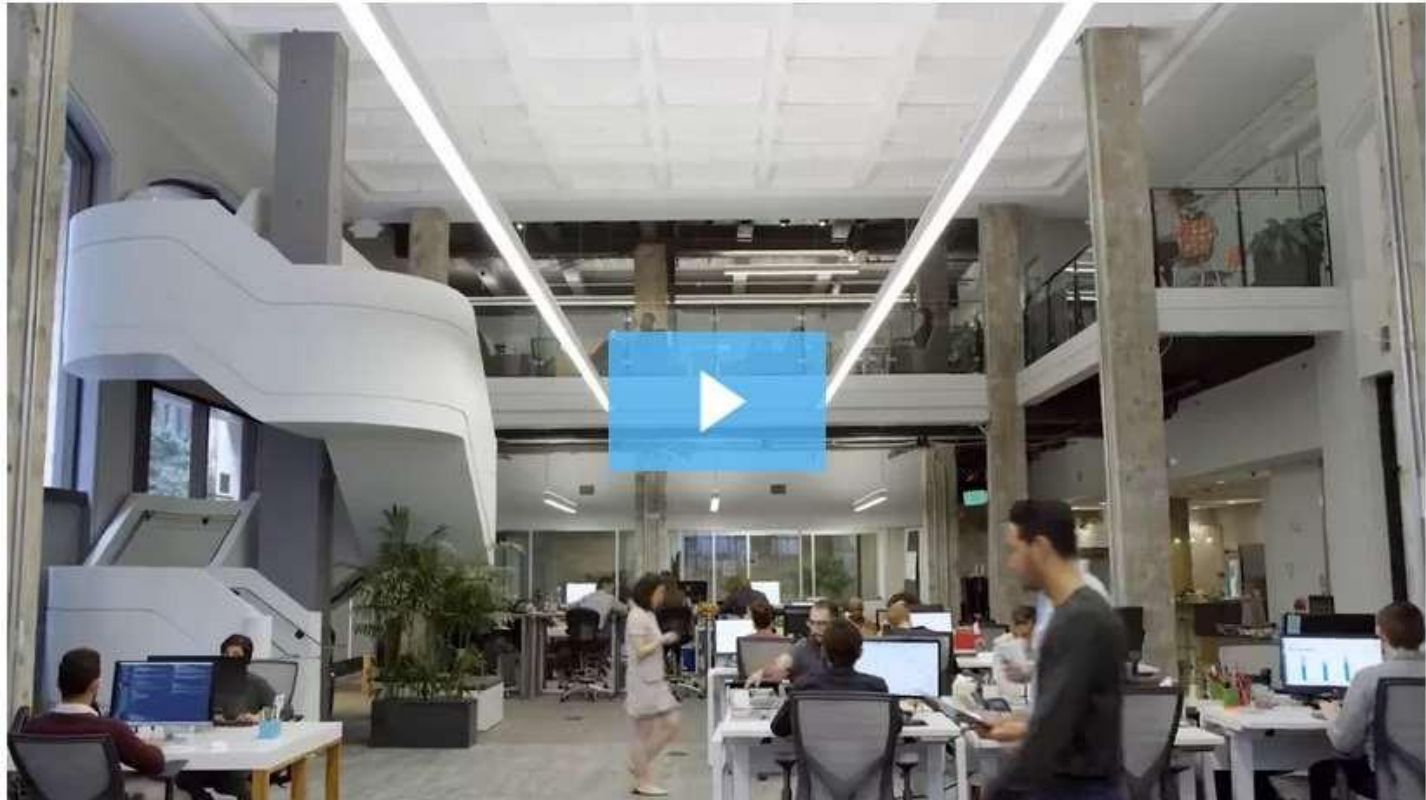


- Collaborate and work with others over the network on joint projects.
- Collaboration tools including Cisco WebEx (shown in the figure) gives users a way to instantly connect and interact.
- Collaboration is a very high priority for businesses and in education.
- Cisco Webex Teams is a multifunctional collaboration tool.
 - send instant messages
 - post images
 - post videos and links

Video Communication

- Video calls are made to anyone, regardless of where they are located.
- Video conferencing is a powerful tool for communicating with others.
- Video is becoming a critical requirement for effective collaboration.
- Cisco TelePresence powers is one way of working where everyone, everywhere.

Video – Cisco WebEx for Huddles



Cloud Computing

Cloud computing allows us to store personal files or backup our data on servers over the internet.

- Applications can also be accessed using the Cloud.
- Allows businesses to deliver to any device anywhere in the world.

Cloud computing is made possible by data centers.

- Smaller companies that can't afford their own data centers, lease server and storage services from larger data center organizations in the Cloud.

Cloud Computing (Cont.)

Four types of Clouds:

- Public Clouds
 - Available to the general public through a pay-per-use model or for free.
- Private Clouds
 - Intended for a specific organization or entity such as the government.
- Hybrid Clouds
 - Made up of two or more Cloud types – for example, part custom and part public.
 - Each part remains a distinctive object but both are connected using the same architecture.
- Custom Clouds
 - Built to meet the needs of a specific industry, such as healthcare or media.
 - Can be private or public.

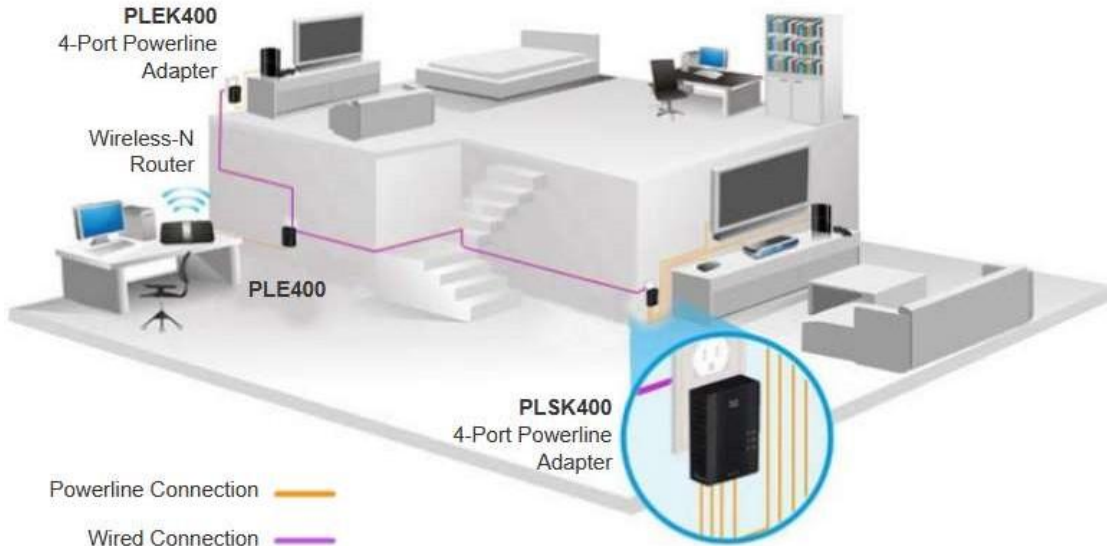
Technology Trends in the Home



- Smart home technology is a growing trend that allows technology to be integrated into every-day appliances which allows them to interconnect with other devices.
- Ovens might know what time to cook a meal for you by communicating with your calendar on what time you are scheduled to be home.
- Smart home technology is currently being developed for all rooms within a house.

Network Trends

Powerline Networking



- Powerline networking can allow devices to connect to a LAN where data network cables or wireless communications are not a viable option.
- Using a standard powerline adapter, devices can connect to the LAN wherever there is an electrical outlet by sending data on certain frequencies.
- Powerline networking is especially useful when wireless access points cannot reach all the devices in the home.

Wireless Broadband



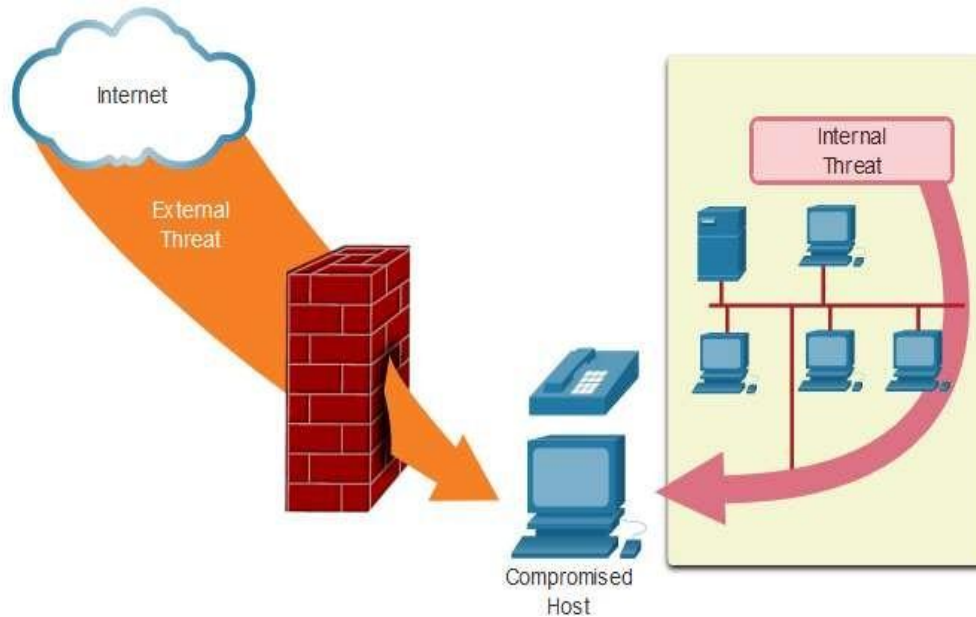
In addition to DSL and cable, wireless is another option used to connect homes and small businesses to the internet.

- More commonly found in rural environments, a Wireless Internet Service Provider (WISP) is an ISP that connects subscribers to designated access points or hotspots.
- Wireless broadband is another solution for the home and small businesses.
- Uses the same cellular technology used by a smart phone.
- An antenna is installed outside the house providing wireless or wired connectivity for devices in the home.

1.8 Network Security

Network Security

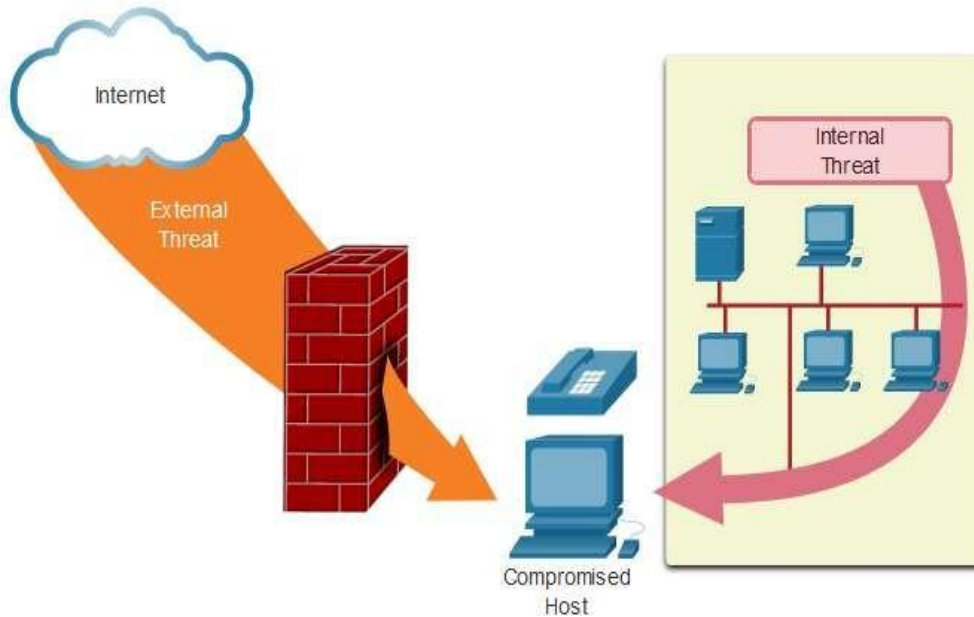
Security Threats



- Network security is an integral part of networking regardless of the size of the network.
- The network security that is implemented must take into account the environment while securing the data, but still allowing for quality of service that is expected of the network.
- Securing a network involves many protocols, technologies, devices, tools, and techniques in order to secure data and mitigate threats.
- Threat vectors might be external or internal.

Network Security

Security Threats (Cont.)



External Threats:

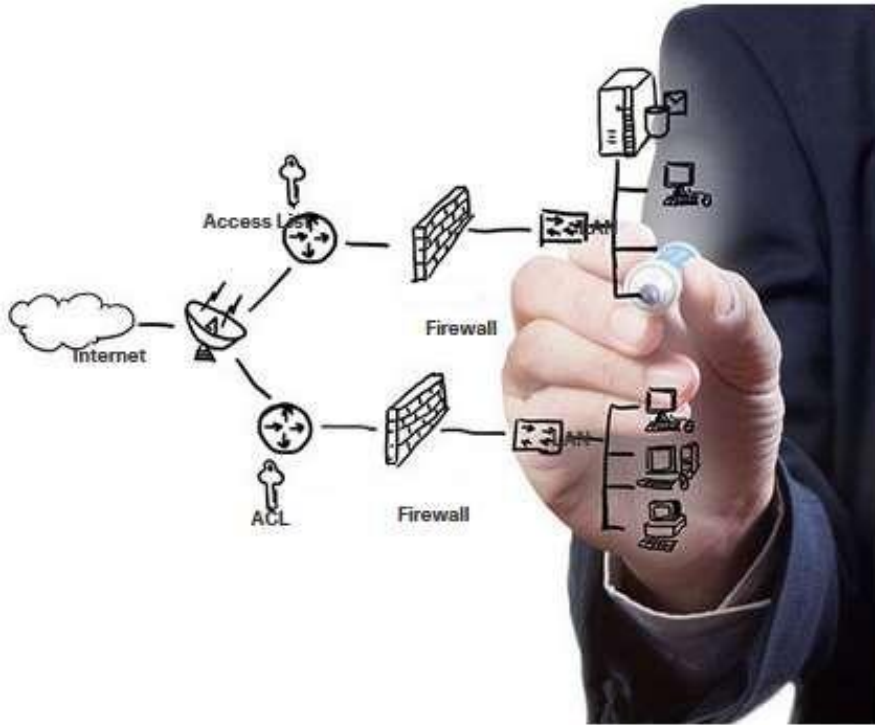
- Viruses, worms, and Trojan horses
- Spyware and adware
- Zero-day attacks
- Threat Actor attacks
- Denial of service attacks
- Data interception and theft
- Identity theft

Internal Threats:

- lost or stolen devices
- accidental misuse by employees
- malicious employees

Network Security

Security Solutions



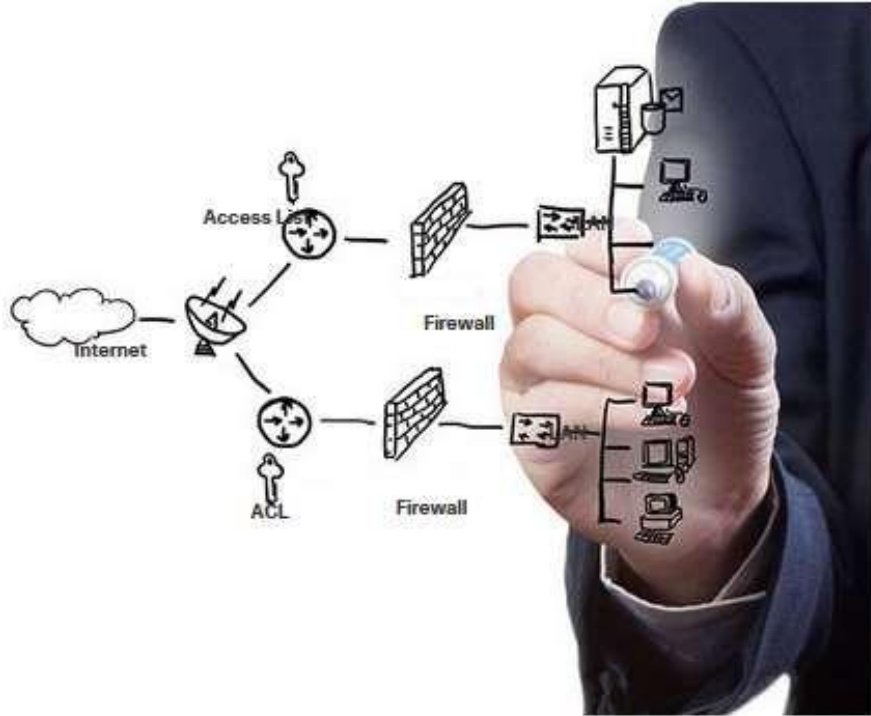
Security must be implemented in multiple layers using more than one security solution.

Network security components for home or small office network:

- Antivirus and antispyware software should be installed on end devices.
- Firewall filtering used to block unauthorized access to the network.

Network Security

Security Solutions (Cont.)



Larger networks have additional security requirements:

- Dedicated firewall system
- Access control lists (ACL)
- Intrusion prevention systems (IPS)
- Virtual private networks (VPN)

The study of network security starts with a clear understanding of the underlying switching and routing infrastructure.

1.9 The IT Professional

The IT Professional

CCNA



The Cisco Certified Network Associate (CCNA) certification:

- demonstrates that you have a knowledge of foundational technologies
- ensures you stay relevant with skills needed for the adoption of next-generation technologies.

The new CCNA focus:

- IP foundation and security topics
- Wireless, virtualization, automation, and network programmability.

New DevNet certifications at the associate, specialist and professional levels, to validate your software development skills.

Specialist certification validate your skills in line with your job role and interests.

The IT Professional

Networking Jobs

Employment Opportunities

Discover career possibilities and options from our Talent Bridge employment program.



Talent Bridge Matching Engine

Find employment opportunities where you live with the new pilot program the Talent Bridge Matching Engine. Search for jobs with Cisco as well as Cisco partners and distributors serving Cisco Networking Academy students and alumni. Register now to complete your profile. Must be 18 years of age or older to register and participate in the Matching Engine.

Be Part of Our Dream Team

We offer opportunities to gain hands-on experiences throughout the year. There are specific projects that we invite students to participate in as a Dream Team member. Learn more about this experience and how you can participate.

Your Career, our Talent Bridge Resources

Learn about the resources we have to offer that will help you on your journey to becoming confidently employed.



Match with jobs



Connect with Peers



Start on a Career Preparation Outstop

At www.netacad.com you can click the Careers menu and then select Employment opportunities.

- Find employment opportunities by using the Talent Bridge Matching Engine.
- Search for jobs with Cisco, Cisco partners and distributors seeking Cisco Networking Academy students and alumni.

Lab – Researching IT and Networking Job Opportunities

In this lab, you will complete the following objectives:

- Research Job Opportunities
- Reflect on Research

1.10 Module Practice and Quiz

What did I learn in this module?

- Through the use of networks, we are connected like never before.
- All computers that are connected to a network and participate directly in network communication are classified as hosts.
- Diagrams of networks often use symbols to represent the different devices and connections that make up a network.
- A diagram provides an easy way to understand how devices connect in a large network.
- The two types of network infrastructures are Local Area Networks (LANs), and Wide Area Networks (WANs).
- SOHO internet connections include cable, DSL, Cellular, Satellite, and Dial-up telephone.
- Business internet connections include Dedicated Leased Line, Metro Ethernet, Business DSL, and Satellite.

What did I learn in this module? (Cont.)

- Network architecture refers to the technologies that support the infrastructure and the programmed services and rules, or protocols, that move data across the network.
- There are four basic characteristics of network architecture: Fault Tolerance, Scalability, Quality of Service (QoS), and Security.
- Recent networking trends that affect organizations and consumers: Bring Your Own Device (BYOD), online collaboration, video communications, and cloud computing.
- There are several common external and internal threats to networks.
- Larger networks and corporate networks use antivirus, antispyware, and firewall filtering, but they also have other security requirements: Dedicated firewall systems, Access control lists (ACL), Intrusion prevention systems (IPS), and Virtual private networks (VPN)
- The Cisco Certified Network Associate (CCNA) certification demonstrates your knowledge of foundational technologies.

