LAB 1 – TUTORIAL 1
LIVING IN A NETWORK-CENTRIC WORLD

1.1 COMMUNICATING IN A NETWORK-CENTRIC WORLD

Humans are social animals who need to communicate with each other. Communication was once limited to face-to-face conversations, but it has evolved over the years to encompass many types of media, ranging from paper to fiber-optic cabling. High-speed data networks that span the globe with cabling and networking devices have had a profound effect on human communication and will continue to revolutionize how humans interact with each other.

A. Concept Questions

1. In addition to data networks, what other breakthroughs in communication media have extended the reach of human interactions?
2. How has data networking changed your community (your family, school, city, or country?)
3. Early data networks carried character-based messages between computer systems. What types of network traffic do modern networks carry, and how has this changed human interactions?

B. Vocabulary Exercise: Completion

Fill in the blanks in the following questions.

1. _____ is a form of online real-time communication between two or more people based on entered text.
2. A _____ is a web page that is easy to update and edit by someone who wants to publish a record of his or her thoughts on a subject.
3. A _____ is a web page that groups of people can edit and view together.
4. _____ is an audio-based medium that lets people record audio and publish it on a website.
5. _____ is a Cisco collaborative learning tool that provides a way to build virtual representations of networks that behave much like actual networks.

1.2 COMMUNICATION: AN ESSENTIAL PART OF OUR LIVES

Communication helps us work, play, and learn. Because communication is so important, communication networks include rules (or protocols) that help ensure reliable delivery of messages. Rules help data networks function despite the many factors that can degrade communication. Factors that are external to the message can affect reliability, as can internal factors that are related to aspects of the message itself.

A. Concept Questions

1. List four external factors that affect data networks.
2. List three internal factors that affect data networks.

1.3 THE NETWORK AS A PLATFORM

Data networks provide a platform for humans to communicate and thus play an increasingly important role in the business and personal lives of humans. Modern networks support fast and reliable message transfer among millions of users across the globe. To achieve the scale, speed, and reliability that are required, network experts have standardized many elements and components of a data network.

A. Vocabulary Exercise: Define

Table 1-1 lists the four fundamental elements of a network. Fill in the definition for each element.

Table 1-1 Network Element Definitions

Element	Definition
Rule	
Medium	
Message	
Device	

B. Vocabulary Exercise: Identify

Networks consist of many elements. Network engineers often include these elements in network topology drawings. Engineers use a set of standard icons to refer to the elements. Figure 1-1 shows some of these icons. The figure shows a network topology for a typical small company.

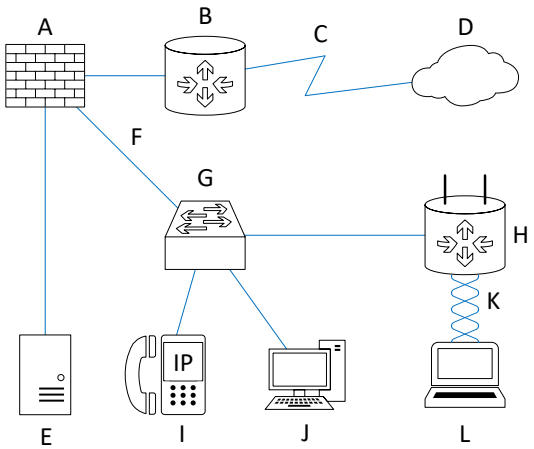

Figure 1-1 Network Topology Icons

Provide the name of each element in the network topology shown in Figure 1-1.

	Name of Element		Name of Element		Name of Element
A		E		I	
B		F		J	
C		G		K	
D		H		L	

C. Vocabulary Exercise: Completion

In Table 1-2, match the term on the left with its definition on the right.

Table 1-2 Network Devices

Name of Element	Device Definition
	One form of a wide-area network (WAN) connection
	Interconnects computers and cabling to form a local-area network (LAN)
	Summarizes a group of network elements in topology drawings
	A device often found in home and small networks that lets laptop computers connect to a network without cabling
	Connects two or more networks and directs messages as they travel across a set of networks
	Provides network security

D. Exercise: Completion

Fill in the blanks in the following questions.

1. In wired connections, the medium is either _____, which carries data in the form of electrical signals, or _____, which carries data in the form of light signals.
2. Wireless media include the wireless connection between a _____ and a computer in a home network, the _____ wireless connection between two ground stations, or the communication between devices on Earth and _____ in orbit.
3. Network _____ such as web browsing, e-mail, and instant messaging require a network to provide _____.
4. _____ are the rules that network devices use to communicate.
5. _____ is a set of standard protocols that is widely used in home and business networks as well as on the Internet.
6. Messages must be converted to _____ (binary coded digital signals) before they are sent to their destination.

E. Concept Questions

1. List the steps that take place on a network when you send an instant message.
2. What is meant by the term *converged network*, and why are converged networks becoming so common? What advantages do converged networks offer?

1.4 THE ARCHITECTURE OF THE INTERNET

A network architecture describes a network's physical infrastructure and the high-level services and protocols that move messages across that infrastructure. The Internet's architecture shares many of the same characteristics of any large network that supports numerous users. Business networks, education networks, and the Internet must provide fault tolerance, scalability, quality of service, and security. Many large networks, including the Internet, are also hierarchical, with different tiers offering different levels of service.

A. Vocabulary Exercise: Define

Table 1-3 lists four fundamental characteristics of network architectures. Fill in the definition for each characteristic.

Table 1-3 Network Architecture Characteristics

Characteristic	Definition
Fault tolerance	
Scalability	
Quality of service	
Security	

B. Vocabulary Exercise: Completion

Fill in the blanks in the following questions.

1. The two types of network security concerns are network _____ security, which protects devices and cabling, and _____ security, which protects the information carried in packets and stored on network-attached devices.
2. Tools to provide security for individual messages must be implemented on top of the underlying _____, which are the rules that govern how packets are formatted, addressed, and delivered.
3. Three fundamental security measures include ensuring _____ so that only intended and authorized recipients can read data, maintaining _____ to ensure that information is not altered in transmission, and ensuring _____ so that timely and reliable access to services are not disrupted by security breaches.
4. Network _____ can help ensure system reliability by detecting, repelling, and coping with network attacks.

1.5 TRENDS IN NETWORKING

Data networks continue to evolve quickly. Modern networks need to be ready to support increasing numbers of users who will make innovative use of the networks to enhance human communication. Networks will need to be scalable, fault-tolerant, and flexible as users continue to depend on their networks to help them live, learn, work, and play.

A. Multiple-Choice Questions

Choose the best answer for each of the following questions.

1. Which of the following are major trends that are contributing to the current evolution of networks? (Choose two.)

   A. The increasing number of mobile users
   B. Fewer services as networks converge
   C. Fewer applications as networks converge
   D. Increasing use of simplified network devices
   E. The need to protect networks from unauthorized access
   F. The need to support circuit switching

2. Which of the following is most associated with the concept of converged networks?

   A. More users wanting to access web pages in character mode
   B. More voice and video transmissions that require a level of consistent quality and uninterrupted delivery
   C. More networks that are locked down so that new applications and services cannot be added
   D. More networks that are open and unconcerned with protection from unauthorized access

3. Which of the following is a relatively new information technology (IT) job title?

   A. Programmer
   B. Information security officer
   C. Network technician
   D. Software engineer

4. Which of the following best defines a fault-tolerant network?

   A. A fault-tolerant network supports users who have different viewpoints.
   B. A fault-tolerant network limits the impact of hardware or software failures and recovers quickly when a failure occurs.
   C. A fault-tolerant network can expand quickly to support new users and applications without causing errors for existing users.
   D. A fault-tolerant network is built to withstand earthquakes.