Unit 4. Computer Networks

Lesson 7

Whole-Class Activity

Task 1. Pre-Assessment

You are going to read questions about computer networks. Use your background knowledge to answer them. You may turn to Activity Pack if you need any scaffolds. You have 5 minutes to complete this task.

RATIONAL CONCERN

1. What impact do computer networks have on our lives?
2. What are the benefits of computer networks?
3. What are the drawbacks of computer networks?

Practical Concern

1. What computer networks do you use?
2. What are the characteristics of computer networks?
3. What skills are needed to use computer networking technology?

Creative Concern

1. What concepts are associated with computer networks?
2. How would you illustrate the work of computer networks?
3. Why are computer networks called that way? What other names can you suggest?

Analytical Concern

1. What is the future of computer networks?
2. What aspects should be taken into account when establishing home network?
3. What are the risks of having your own computer network?

Task 2. Reading

Read the text about computer networks mark the statements as True (T) or False (F). Justify your answer. You have 20 minutes for this activity.

1. Computer networks allow computers to change data. □
2. The Internet is the best-known computer network. □
3. Computer networking is in the scope of computer science only. □
4. Every user may access the information stored on other networked computers. □
5. Hackers may use computer networks to spread viruses. □
6. Power line communications does not interfere with radio communications. □
7. Computer networks stimulate the development of computer hardware and software. □

Connecting the Planet

A **computer network** or **data network** is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data to each other along data connections. The connections between nodes are established using either cable media or wireless media. The best-known computer network is the Internet.

Network computer devices that originate, route and terminate the data are called network nodes. Nodes can include hosts such as servers and personal computers, as well as networking hardware. Two devices are said to be networked when a device is able to exchange information with another device.

Computer networking may be considered a branch of electrical engineering, telecommunications, computer science, information technology or computer engineering, since it relies upon the theoretical and practical application of the related disciplines. A computer network has the following properties:

- Facilitates interpersonal communications.
  People can communicate efficiently and easily via email, instant messaging, chat rooms, telephone, video telephone calls, and video conferencing.
- Allows sharing of files, data, and other types of information.
  Authorized users may access information stored on other computers on the network. Providing access to information on shared storage devices is an important feature of many networks.
- Allows sharing of network and computing resources.

Users may access and use resources provided by devices on the network, such as printing a document on a shared network printer.

- May be insecure.
  A computer network may be used by computer hackers to deploy computer viruses or computer worms on devices connected to the network, or to prevent these devices from accessing the network (denial of service).
- May interfere with other technologies.
  Power line communication strongly disturbs certain forms of radio communication, e.g., amateur radio.
- May be difficult to set up.

A complex computer network may be difficult to set up. It may be costly to establish an effective computer network in a large organization.

Today, computer networks are the core of modern communication. Telephony increasingly runs over the Internet Protocol, although not necessarily the public Internet. The scope of communication has increased significantly in the past decade. This boom in communications would not have been possible without the progressively advancing computer network. Computer networks continue to drive computer hardware, software, and peripherals industries. The expansion of related industries is mirrored by growth in the numbers and types of people using networks, from the researcher to the home user.

(The text is borrowed and modified from http://en.wikipedia.org/wiki/Computer_network as of 18th January 2013)

Task 3. Vocabulary Practice

Match the types of networking terms with their definitions. You have 5 minutes for this task.

1. repeater	a. connects and filters traffic between two network segments
2. hub	b. is used to connect network nodes via wire not originally designed for digital network traffic, or for wireless
3. network bridge	c. an electronic device that receives a network signal, cleans it of unnecessary noise, and regenerates it
4. network switch	d. an internetworking device that forwards packets between networks by processing the routing information included in the packet
5. router	e. a repeater with multiple ports
6. modem	f. a network device for controlling network security and access rules
7. firewall	g. a device that forwards and filters datagrams between

ports based on the addresses in the packets

Task 4. Vocabulary Practice

Read the text and fill in the gaps (1-10) with the words (a-d). You have 10 minutes to complete this task.

A computer (1) …….. is a group of computer systems and other computing hardware devices that are (2) ……. together through communication (3) ……. to facilitate (4) …….. and resource-sharing among a wide range of (5) ……... One of the earliest (6) …….. of a computer network was a network of communicating computers that (7) …… as part of the U.S. military's Semi-Automatic Ground Environment. In 1969, several universities of the USA were (8) ……. as part of the Advanced Research Projects Agency Network (ARPANET) (9) …….. It is this network that (10) ……. to become what we now call the Internet.

(The text is borrowed and modified from http://www.techopedia.com/definition/25597/computer-network as of 20th January 2013)

1.	a. link	b. network	c. hardware	d. station
2.	a. made	b. tied	c. bound	d. linked
3.	a. channels	b. holes	c. media	d. works
4.	a. participation	b. dialogue	c. communication	d. interference
5.	a. users	b. resources	c. actions	d. computers
6.	a. cases	b. variants	c. problems	d. examples
7.	a. established	b. functioned	c. made	d. acted
8.	a. tied	b. united	c. connected	d. bound
9.	a. work	b. case	c. project	d. topic
10.	a. stopped	b. originated	c. was	d. evolved

Task 5. Language in Use

In your professional activities you will sometimes face the need to relate someone`s words. These skills are necessary to report someone`s orders, suggestions, refer to someone else`s ideas or render the words of researches. Study the box explaining the rules of Reported Speech. After doing so, transform the quotes of famous people into reported speech. You have 10 minutes for this task.

Reported Speech

Reported speech, unlike direct speech, is not the exact words someone used, but words which only relate the same meaning**:**

e.g. 'I want to set up a network,' he said. – Direct speech

He said that he wanted to set up a network. – Reported speech

If the introductory verb is in a past tense, we change verb tenses and time expresses in reported speech as follows:

1. present simple → past simple:
   'I want to set up a network,' he said. → He said that he wanted to set up a network.
2. present continuous → past continuous**:**
   'I am using a computer right now,' she said. → She said that she was using a computer at that time.
3. present perfect → past perfect:
   'I have sent an e-mail,' Tom said. → Tom said that he had sent an e-mail.
4. past simple → past simple or past perfect
   'I made a report on the topic,' Jane said. → Jane said that she made (had made) a report on the topic.
5. past continuous → past continuous or past perfect continuous
   'I was still working at six o`clock yesterday,' he said. → He said that he was (had been) still working at six o`clock the previous day.
6. Will → would
   'I will complete the task tomorrow,' she promised. → She promised to complete the task the following day.
   The verb tenses may remain the same in reported speech when reporting a general truth or laws of nature.

1. Computers are useless. They can only give you answers (Pablo Picasso).
2. I think it's fair to say that personal computers have become the most empowering tool we've ever created. They're tools of communication, they're tools of creativity, and they can be shaped by their user. (Bill Gates)
3. I do not fear computers. I fear the lack of them. (Isaac Asimov)
4. Personally, I rather look forward to a computer program winning the world chess championship. Humanity needs a lesson in humility. (Richard Dawkins)
5. The real danger is not that computers will begin to think like men, but that men will begin to think like computers. (Sydney J. Harris)
6. We're entering a new world in which data may be more important than software. (Tim O'Reilly)
7. Access to computers and the Internet has become a basic need for education in our society. (Kent Conrad)
8. Supercomputers will achieve one human brain capacity by 2010, and personal computers will do so by about 2020. (Ray Kurzweil)
9. People are mostly focused on defending the computers on the Internet, and there's been surprisingly little attention to defending the Internet itself as a communications medium. (W. Daniel Hillis)

10. We've seen computers play chess and beat grand masters. We've seen computers drive a car across a desert. But interestingly, playing chess is easy, but having a conversation about nothing is really difficult for a computer. (Hod Lipson)

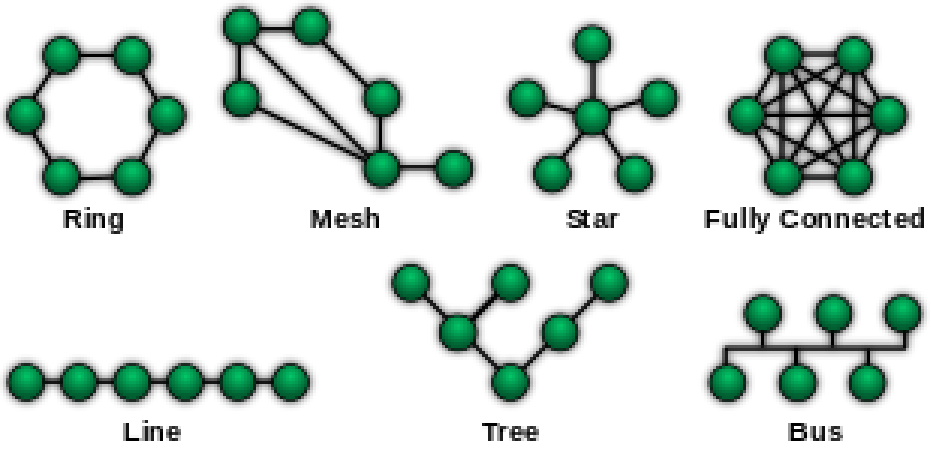
(The text is borrowed and modified from http://www.brainyquote.com/quotes/topics/topic_computers.html as of 20th January 2014)

Differentiated Activity

Task 6. Tiered Task

Work in groups. Choose and complete any part of the task suggested below. Prepare to report your results to the class. You have 10 minutes for this task.

Group 1. Look at the following scheme representing common network topologies. Explain how nodes are connected in each case to the class.



(The picture is borrowed from http://en.wikipedia.org/wiki/Computer_network as of 20th January 2014)

Group 2. Read the following text. Explain the differences between organizational types of network to the class. Draw a classification scheme.

An **intranet** is a set of networks that are under the control of a single administrative entity. The administrative entity limits use of the intranet to its authorized users. Most commonly, an intranet is the internal LAN of an organization. A large intranet will typically have at least one web server to provide users with organizational information.

An **extranet** is a network that is also under the administrative control of a single organization, but supports a limited connection to a specific external network. For example, an organization may provide access to some aspects of its intranet to share data with its business partners or customers. These other entities are not necessarily trusted from a security standpoint.

An **internetwork** is the connection of multiple computer networks via a common routing technology using routers. The Internet is the largest example of an internetwork. It is a global system of interconnected governmental, academic, corporate, public, and private computer networks.

(The text is borrowed and modified from http://en.wikipedia.org/wiki/Computer_network as of 20th January 2014)

Group 3. Read the keywords describing different types of computer networks. Place them in order from the smallest to the largest. Explain the geographical types of the networks and their characteristics to the group.

Wide Area Network WAN – spans over a large physical distance; a collection of LANs through a router; collective ownership and management.
Metropolitan Area Network MAN – spans over a city; smaller than a WAN but larger than a LAN; owned and operated by single entities (government bodies, corporations).
Local Area Network LAN – connects network devices over a relatively short distance; a networked office building, home or school; group of nearby buildings; usually owned by one organisation.
Campus Area Network CAN – spans over multiple LANs; smaller than a MAN; connects universities or local business campuses.

(The text is borrowed and modified from http://www.computernetworksit.com.au/blog/underestimating-support-2/ as of 20th January 2014)

Task 7. Listening

You are going to watch a video about computer routers. Choose any part you feel confident to complete or do them all. You have 10 minutes for the task.
Use the following link to watch the video:
http://www.youtube.com/watch?v=9LhkW_dkZvU

Part 1. Decide whether the following statements are true (T) of false (F). Justify your answer.:

1. Router is essential device in establishing a computer network. □
2. Computer network consists of a number of computers. □
3. Transmitting between the computers is done by a scheme called Ethernet. □
4. There is only one type of routers. □
5. Wired routers transmit data using cable. □
6. Wireless router also needs cable to be provided with the information. □

Part 2. Fill in the gaps with one to three words:

Computer (1)……. is a device that you must have in order to establish a (2) ……. . A network consists of a (3) ……. of computers that are connected together to share information or work on common (4) …….. or projects. A computer router is used to take the data that is being (5) …… between the computers and make sure that it gets routed to the right computers. This is done by a (6) ……. called (7) …… . These days we use (8) …….. , which allows the data to flow over a cable and go between computers.

There are (9) …… types of routers – wired routers and (10) …….. routers. Wired router will only transmit data if you have an (11) ……. cable. On a wireless router you could (12) ……..either a cable or just use (13) …….. that come out of a wireless router. However, wireless routers have to be (14) ……. with the information through a (15) ……. and then they transmit it out by radio waves.

Part 3. Give definitions to the following terms according to the text:

1. Router .....
2. Network .....
3. Addressing .....
4. Wired router.....
5. Wireless router.....

Task 8. Pair work

Work in pairs. Read the following dialogue on setting up a network between a customer and a consultant. Turn the dialogue into reported speech. Use such introductory words as ***ask, inquire, say, explain, suggest, assure, answer***. Don't forget to begin the reported question with if / whether when the direct question begins with modal or auxiliary verb. You have 10 minutes for the task.

Customer: I`m trying to set up a home network. Is there a way to do it without stringing Ethernet cable?
Consultant: Sure. You may consider setting up wireless network.
Customer: What hardware is required to build a wireless network?
Consultant: Strictly speaking, no hardware other than wireless adapters is required to build a small wireless LAN (WLAN).
Customer: How many computers can share one Wi-Fi network?

Consultant: The exact number of devices that can connect and effectively share a WiFi varies but is probably larger than you think.
Customer: Can two routers be used on the same home network?
Consultant: Installing two routers on the same home network can be useful when building a hybrid wired and wireless network or generally expanding the existing capability.
Customer: How Does Wi-Fi Use Affect Computer Battery Life?

(The text is borrowed and modified from http://compnetworking.about.com/od/wirelessfaqs/ as of 21st January 2014)

Task 9. Pair Work

Act dialogues between a customer and a consultant about setting up a network. You have time until the end of the class.
Student A. As a customer, you need to explain your needs and ask questions about setting up network.
Student B. As a consultant, you need to suggest the most suitable network type to your customers.
Switch the roles and act the next dialogue.

Customer 1.
You need to establish a small LAN over your apartment. You have only two desktop PCs and need a low-cost option.

Customer 2.
You have a small house and need to connect your several laptops, smart phones and PC over a fast and reliable network.

Customer 3.
You are a representative of a small IT company and you need to set up a network over three-storage building with lots of computers.

Home Assignment

Do Tasks 1-3 from Workbook section.

WORKBOOK

Task 1. Tiered Task

Part 1. Read the sentences and choose one appropriate word from options. Explain the difference.

1. Computer networks allow computers to …… data.
   a. change b. split c. exchange
2. Computer devices that originate, route and terminate the data are called …….
   a. servers b. nodes c. hosts
3. Computer networks …….. interpersonal communications.
   a. complicate b. facilitate c. substitute
4. People can communicate effectively via …… messaging.
   a. instant b. moment c. quick
5. Users may access and use resources provided by …….. devices on the network.
   a. split b. divided c. shared
6. Computer networks may be …… because they may be used by hackers.
   a. insecure b. protected c. violent
7. A complex computer network may be difficult to ……. .
   a. start b. set up c. make
8. Power line communication strongly …….. certain forms of radio communication.
   a. burden b. damage c. disturb

Part 2. Put the words in the correct order and make up sentences.

1. networks / exchange / computer / allow / to / computers / data.
2. hosts / hardware / nodes / and / include / can / networking.
3. networks / interpersonal / facilitate / computer / communication.
4. may / information / on / authorized / access / stored / other / users / computers.
5. network / by / hackers / computer (x2)/ may / used / deploy / be / to / viruses //.
6. be / set / computer / may / up / complex / network / difficult / to.

Part 3. Fill in the gaps with the words from the Unit.

Networks are (1) …….. of computers, software, and hardware that are all connected to help their (2) …… work together. A network (3) …….. computers by means of (4) …….. systems, specialized software, and devices that (5) ……. data traffic. A network enables users to (6) ……. files and resources, such as printers, as well as (7)…… messages electronically (e-mail) to each other.
Computer networks (8) …… two main types: client / server networks and peer-to-peer networks. A client/server network uses one or more dedicated machines (the (9) ……) to share the files, printers, and (10) …….. A peer-to-peer network (11) ……. any user to share files with any other user and doesn't (12) …….. a central, dedicated server.
The most common networks are (13) …….. Area Networks or LANs for short. A LAN connects computers within a single geographical location, such as one office building, office suite, or home. By contrast, (14)…… Area Networks (WANs) span different cities or even countries, using (15) …….. or satellite links.

(The text is borrowed and modified from http://tecschange.org/classic/networks/network-syllabus.html as of 22nd January, 2014)

Task 2. Tiered Task

Read the text and do at least one part of the task after reading.

Firewall Security

In computing, a **firewall** is a software or hardware-based network security system that controls the incoming and outgoing network traffic by analyzing the data packets and determining whether they should be allowed through or not, based on applied rule set. A firewall establishes a barrier between a trusted, secure internal network and another network (e.g., the Internet) that is not assumed to be secure and trusted.

Many personal computer operating systems include software-based firewalls to protect against threats from the public Internet. Many routers that pass data between networks contain firewall components and, conversely, many firewalls can perform basic routing functions. There are different types of firewalls depending on where the communication is taking place, where the communication is intercepted and the state that is being traced.

Network layer firewalls, also called packet filters, operate at a relatively low level of the TCP/IP protocol stack, not allowing packets to pass through the firewall unless they match the established rule set. The firewall administrator may define the rules; or default rules may apply.

Application-layer firewalls work on the application level of the TCP/IP stack (i.e., all browser traffic, or all telnet or ftp traffic), and may intercept all packets traveling to or from an application. They block other packets (usually dropping them without acknowledgment to the sender).

On inspecting all packets for improper content, firewalls can restrict or prevent the spread of networked computer worms and trojans. The additional inspection criteria can add extra latency to the forwarding of packets to their destination.

A proxy server (running either on dedicated hardware or as software on a general-purpose machine) may act as a firewall by responding to input packets (connection requests, for example) in the manner of an application, while blocking other packets. A proxy server is a gateway from one network to another for a specific network application, in the sense that it functions as a proxy on behalf of the network user.

(The text is borrowed and modified from http://www.wisegeek.com/what-is-a-competitive-marketing-strategy.htm as of 20th January, 2014)

Part 1. Mark the statements as true (T) of false (F).

1. Firewall is a hardware-based network security system that controls the incoming and outgoing network traffic. □
2. A firewall establishes a barrier between a secure internal network and another network. □
3. Firewalls are not able to perform basic routing functions. □
4. Packet filters, operate at a high level. □
5. Packet filters allow packets to pass through the firewall if they match the established rule set. □
6. Application-layer firewalls may intercept all packets traveling to or from an application. □
7. Firewalls cannot restrict the spread of networked computer worms. □
8. A proxy server is a gateway from one network to another for a specific network application. □

Part 2. Answer the following questions:

1. What is a firewall?
2. What functions does it perform?
3. What are the criteria of firewalls` classification?
4. How does a network layer firewall operate?
5. How does an application-layer firewall operate?

6. What is a proxy server?

Part 3. In writing, explain the difference between different level firewalls` operation.

Task 3. Internet Search

Search through the Internet for information about the history of computer networks development. Stress the milestones and key reasons for technological advances.