

### 19.3 Communication Systems

When participants within the information system have a need to transmit and receive data or information, the type of system required is a communication system. Communication systems support people who are working together, by enabling the exchange of data and information electronically. In this topic, the information processes of transmitting and receiving are featured, with the other processes considered when relevant because all information processes play a role in communication systems.

#### Outcomes

A student:

- H1.1 applies and explains an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops and explains solutions for an identified need which address all of the information processes
- H3.1 evaluates and discusses the effect of information systems on the individual, society and the environment
- H3.2 demonstrates and explains ethical practice in the use of information systems, technologies and processes
- H4.1 proposes and justifies ways in which information systems will meet emerging needs
- H5.1 justifies the selection and use of appropriate resources and tools to effectively develop and manage projects
- H5.2 assesses the ethical implications of selecting and using specific resources and tools, recommends and justifies the choices
- H6.1 analyses situations, identifies needs, proposes and then develops solutions
- H6.2 selects, justifies and applies a methodical approach to planning, designing or implementing a solution
- H7.1 implements and explains effective management techniques
- H7.2 uses methods to thoroughly document the development of individual and team projects.

## 1. Characteristics of communication

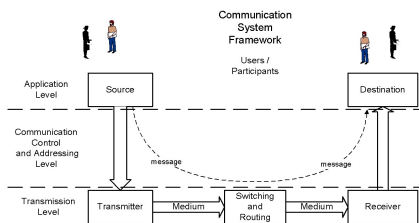
*Students learn about:*

*Notes:*

- communication systems as being those systems which enable users to send and receive data and information

- Communication system: enables people to send and receive data and information**
- Examples of Communication system:
  - Telephone
  - Radio
  - Television
- Communication systems components (5):**
  - Data source** is what the data is produced from
  - Transmitter** encodes the data in the appropriate signal for the transmission medium
  - Transmission Medium** is a channel where the encode data travel through, to get to its destination. This signal can be intercepted or distorted. Can be wired [cables] or wireless [channel] transmission
  - Receiver** decodes the signal back into the original data
  - Destination** is the location that the data needs to be. [Via IP address]
- Protocol: A set of rules that must be followed for communication succeed.**
  - They govern the transfer of data between devices. They also detect errors and are an international standard. Without the same protocols, transmission of data will be incompatible. This can be governed by the 7 OSI reference.

- the framework in which communication systems function, demonstrated by the following model



- There are **3 levels of protocol** [Framework] in which communication systems must follow to function.
  - Application Level:** It creates and **organises the data into suitable data** so that the receiving device can understand it.
    - Then formats it's into an appropriate protocol for transmission.
    - Examples of Transmission Protocol for sending are:
      - HTT(s)** [Hypertext Transfer Protocol (secure)]: Most common protocol for web browsers to communication, sending and receive webpages.
      - SMTP** [Simple Mail Transfer Protocol]:
      - SSL** [Secure Socket Layer]
      - DNS, FTP, POP, IMAP
  - Communication Control and Addressing Level:** This level **check for errors** and that the data is **sent to the right receiver** using an **IP Address**. And router for fast access.

	<ul style="list-style-type: none"> <li>▪ Protocols used for Communication Control and Addressing Level: <ul style="list-style-type: none"> <li>– <b>TCP [Transmission Control Protocol]:</b> Check for errors to ensure that the message/data/information is delivered correctly. TCP requires IP to operate and transmit data via the internet.</li> <li>– <b>IP [Internet Protocol]:</b> IP move the data packets from the sender to the receiver. They don't check for errors [Since that's TCP's job]. Unique address to send data to the right device.</li> </ul> </li> <li>– <b>Transmission Level:</b> This is the level showing how data is shared and transmitted, converting bits to signals for transmission. <ul style="list-style-type: none"> <li>▪ Protocols used for Transmission Level: <ul style="list-style-type: none"> <li>– Token Ring</li> <li>– Ethernet</li> </ul> </li> <li>▪ Transmitter: A piece of hardware that encodes the data onto the medium, from digital bits as waves. A receiver is usually contained with the transmitter in a hardware device.</li> </ul> </li> <li>▪ <b>Frames:</b> A term for large data packets <ul style="list-style-type: none"> <li>–</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ the functions performed within the communication systems in passing messages between source and destination, including: <ul style="list-style-type: none"> <li>– message creation</li> <li>– organisation of packets at the interface between source and transmitter</li> <li>– signal generation by the transmitter</li> <li>– transmission</li> <li>– synchronising the exchange</li> <li>– addressing and routing</li> <li>– error detection and correction</li> <li>– security and management</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ These processes are how messengers are passed between the source and destination. [All these are overviews and will be explained in depth throughout the syllabus]. <ul style="list-style-type: none"> <li>– Message Creation: The message is compiled at the source in preparation for sending. <ul style="list-style-type: none"> <li>▪ Usually done by a software application.</li> <li>▪ Examples of Message creation: <ul style="list-style-type: none"> <li>– User writing an email, using an email software such as Outlook.</li> <li>– Speaking during a VOIP [Voice Over Internet Protocol] phone conversation.</li> <li>– Pressing the delete key to remove a file stored in file server.</li> </ul> </li> </ul> </li> <li>– Organisation of packets at the interface between source and transmitter <ul style="list-style-type: none"> <li>▪ As the messages get transmitted and descends from the layer of protocols [Frameworks], it is equipped with a header and trailer. They contain the data relevant to the protocol, the address and the errors.</li> <li>▪ Basically, this process will form a triangle as each stages will be wrapped with a header and trailer. When the data is received, it is unwrapped into just the data.</li> </ul> </li> <li>– Signal generation by the transmitter: <ul style="list-style-type: none"> <li>▪ This is the process where transmitters encode data into signal for the medium. The transmitter and the receiver are usually in the one hardware.</li> <li>▪ This process occurs in the transmission level.</li> </ul> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ The main purpose of a transmitter is to represent individual bits as a wave, allowing it to go through the medium and to the receiver for decoding.</li> <li>– Transmission <ul style="list-style-type: none"> <li>▪ Transmission of data is the transfer of data in a waveform. The transmitter will create individuals bit into wave and maintain it on the medium for a small period.</li> <li>▪ Thus, data can't be sent all at once, requiring for a data to be split into data packets. This means that flow control also is required.</li> </ul> </li> <li>– Synchronising the exchange <ul style="list-style-type: none"> <li>▪ To allow for accurate decoding of the data, the receiver must sample the incoming signal using the precisely same time used by the transmitter during encoding.</li> <li>▪ Having a common clock will achieve almost perfect synchronous communication. Where the transmitter encodes it and the receiver decodes it.</li> </ul> </li> <li>– <b>Addressing and routing</b> <ul style="list-style-type: none"> <li>▪ During transmission, data packets will travel different routes in varies links [Mainly communication over the internet].</li> <li>▪ This mean that the data packets will experience different protocols in different links. Meaning that the packets will ascend the protocol stack and again prepare for transmission down the next path.</li> </ul> </li> <li>– Error detecting and correction <ul style="list-style-type: none"> <li>▪ As the message descend the transmission, the protocols will calculate the checksum and Cyclic Redundancy Check (CRC) value which is contained in the header and trailers [footer].</li> <li>▪ The receiver is to calculate the values and ensure that the values match checksum/CRC's value. [Known as error checking].</li> <li>▪ If error is detected, then all the protocols discard the entire packet and the sender must resend the message.</li> <li>▪ Used by TCP</li> </ul> </li> <li>– Security and management. <ul style="list-style-type: none"> <li>▪ Many protocols will have restrictions and that means enabling Username and Passwords.</li> <li>▪ Others many have encryption and decryption.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ the roles of protocols in communication <ul style="list-style-type: none"> <li>– handshaking and its importance in a communications link</li> <li>– functions performed by protocols at different levels</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Protocols <ul style="list-style-type: none"> <li>– A formal set of rules that must be followed to ensure a successful and efficient data transfer.</li> </ul> </li> <li>▪ Handshaking <ul style="list-style-type: none"> <li>– <b>Handshaking in communication are needed so that the devices are compatible when data transferring occurs. The agreement between two or more devices about which protocols will be used to accomplish the exchange of information. Every time handshaking occurs, Flow control is considered.</b></li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ <b>Flow Control</b> <ul style="list-style-type: none"> <li>– <b>Is a command that inform other</b> devices that the sender is clear to send or requests to send.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ the client–server model <ul style="list-style-type: none"> <li>– the role of the client and the server</li> <li>– thin clients and fat clients</li> <li>– examples of clients such as web browsers and mail clients</li> <li>– examples of servers such as print servers, mail servers and web servers</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Client-server architecture</b> is a network structure, mainly used as a form of distributed processing where clients request data for processing and waits for the server to process the request.</li> <li>▪ They provide convenient in distributed networks over different location.</li> <li>▪ Example: A client-server is the internet. The webpage is the client that allows for a request of a particular data [searching] and the request is sent to the web server for processing using their IP address. The server responds to the request, processes it and send back the required information back using the IP address.</li> <li>▪ <b>Only either the client or the server can be processing, but both can't.</b> One <b>needs to wait</b> for the other. <ul style="list-style-type: none"> <li>– The role of the client and the server: <ul style="list-style-type: none"> <li>▪ <b>Clients:</b> are the hardware that allows for the request of data made by users. They are usually PC, computers or workstations.</li> <li>▪ <b>Servers:</b> are powerful computers made for processing data requested by the client. Servers can be a print server, mail server, web server.</li> <li>▪ Clients rely on the servers for resources, files and documents.</li> </ul> </li> </ul> </li> <li>▪ <b>Thin clients and fat clients:</b> <ul style="list-style-type: none"> <li>▪ <b>Thin clients: or dumb clients rely entirely on the server to process and perform the request. They have low specification and usually don't contain a secondary storage. All the application and all the processing power are provided by the server computer.</b></li> <li>▪ <b>Fat clients: or thick clients doesn't rely on the server. They have the processing power and the ability to stores application software. They can function independently without a server.</b></li> </ul> </li> <li>– Examples of clients such as web browser and mail clients</li> <li>– Examples of server print server, mail server and web server.</li> <li>▪ NOS [Network Operating System]: A core software that is used in Fat clients.</li> </ul>

<i>Students learn to:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>▪ communication systems as being those systems which enable users to send and receive data and information</li> </ul>	<ul style="list-style-type: none"> <li>▪ A</li> </ul>

<ul style="list-style-type: none"> <li>▪ establish a communications link and describe the steps that take place in its establishment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Overview of how data is transmitted from sender to receiver. <ul style="list-style-type: none"> <li>– <b>Handshaking</b> occurs when <b>protocol agree on the compatibility of data that will be transmitted</b></li> <li>– It is then moved to the application level where the data is broken up in data packets containing headers and trailers, added with the suitable protocol and a SSL for a secure transmission.</li> <li>– In communication control and addressing level, the data packets are further given a TCP protocol for an increase in accuracy of data when being sent added with a IP Address to ensure that the data packets are sent to the correct address. Sometime the FTP is use to send data.</li> <li>– It is then handed to the transmission level, where the device with the data packet it sent via Ethernet cables to the modem for the conversion of digit data to analogy signal wave for long range transmission using ADSL lines. A router is usually installed in modems to determine a more fast and reliable pathway for data packets to travel to their destination. As it travels to receiver’s modem, the hardware will check for the correct TCP requirement and decode/demodulates the analogy back to recognisable digit data for display.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ identify and describe specified protocols at different stages of the communication</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Application Level</b> → <b>HTTPs</b> for websites / <b>SMTP</b> for emails / <b>SSL</b> for secure transmission</li> <li>▪ <b>Communication control and Addressing Level</b> → <b>TCP</b> for error checking and <b>IP</b> for the addressed destination</li> <li>▪ <b>Transmission Level</b> → <b>Token Ring</b> for network / <b>Ethernet</b> for worldwide</li> </ul>
<ul style="list-style-type: none"> <li>▪ identify client processing and server processing</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ identify client processing and server processing</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ describe the advantages and disadvantages of client–server architecture</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>

<h2>2. Examples of communication systems</h2>	
<i>Students learn about:</i>	<i>Notes:</i>

<ul style="list-style-type: none"> <li>▪ teleconferencing systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Teleconferencing: Teleconferencing is another method of a face to face meeting.</b> <ul style="list-style-type: none"> <li>– Using electronic hardware and software transmission to allow real time communication in different location to be all into one group [video conference].</li> <li>– Transfer video and audio data.           <ul style="list-style-type: none"> <li>▪ Audio conference: A single telephone call involving a lot of people in different location. [Skype]</li> <li>▪ Video conference: Allows individual for different geographical locations to see each on screen and can virtually interact and discuss their topics. [Webcams and Skype]</li> </ul> </li> <li>– <b>Advantages</b> of teleconferencing systems:           <ul style="list-style-type: none"> <li>▪ Allows for a <b>face to face</b> meeting <b>without the needs to spend money</b> on unnecessary <b>travels</b> and accommodations.</li> <li>▪ <b>Save</b> individual <b>time</b> and <b>energy</b> of having to physically meet their client or others.</li> <li>▪ Provide <b>everyone to contributes</b> not just the people would <b>can't afford</b> to be there.</li> <li>▪ Only requires a <b>telephone</b> and high speed connection</li> </ul> </li> <li>– <b>Disadvantages</b> of teleconferencing systems:           <ul style="list-style-type: none"> <li>▪ <b>Require high-speed connections</b> for a high def. meeting.</li> <li>▪ Lacks <b>inter-personal relationships</b> since <b>physical</b> and informal discussions are often require to clarify ideas and develop partnerships.</li> <li>▪ <b>Reduced personal contact.</b></li> </ul> </li> </ul> </li> </ul>
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- messaging systems

- Messaging systems is a system that allows for transmission of messages to a specific individual or group3.
- **History**
  - Historical example of a massaging system is the post office, when the messages [Letters} are delivered off to their destination.
  - More modern form of the system is message app on phones and chatting software.
- **Example**
  - **Telephone:** A telephone is a system for transmitting sound and speeches via telephone lines. It's answering machines using a messaging system it allows for the creation of messages and stores it for the receiver to hear it later.
  - **Fax:** These are like photocopier machines, where they take a scanned image o the document and sending it via telephone lines.
  - **Voice mail:** Voice mail [V-mail] is a system for storing and forwarding sound and speeches. A sender stores a piece of message in the voice mail system, and is only allowed access for the receiver. For the receiver to access this message, they must dial into the voice mail system using a telephone and enter an account number and password. After granted access they can listen to all the pre-recorded message held on that account.
  - **Voice over Internet Protocol [VoIP]:** this allows for transfer of voice calls over the internet. Basically, Skype and WeChat are example of VoIP. They require broadband internet connection.
  - **Electronic mail: Electronic mail [E-mail]** is the most efficient and well known method of communication. It's fast, economical and convenient, allowing user to send massager and information from around the world. Requires a computer or a phone that has internet access, and an email account. Protocols that uses email uses are SMTP [Simple Mail Transfer Protocol], POP [Post Office Protocol] and IMAP [Internet Message Access Protocol].



<ul style="list-style-type: none"> <li>▪ other systems dependent on communication technology such as: <ul style="list-style-type: none"> <li>– e-commerce</li> <li>– EFTPOS</li> <li>– electronic banking</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Modern more efficient systems which are more dependent on communication technology such: <ul style="list-style-type: none"> <li>– <b>E-commerce:</b> <ul style="list-style-type: none"> <li>▪ Electronic Commerce [E-commerce]: Buying and selling goods via the internet. They are a way of <b>doing business online</b>.</li> <li>▪ Transaction and withdrawal made via the electronic networks are examples of E-commerce.</li> <li>▪ E-commerce is a <b>global reach, 24/7 hours' availability</b>.</li> <li>▪ Examples of E-commerce sites are: <ul style="list-style-type: none"> <li>– Amazon</li> <li>– EBay</li> </ul> </li> <li>▪ Advantages of E-commerce: <ul style="list-style-type: none"> <li>– Provides new ways for opening small business.</li> <li>– Allows the good and services to obtain quicker and easier.</li> <li>– Less labour and paperwork.</li> </ul> </li> </ul> </li> <li>– <b>EFTPOS:</b> <ul style="list-style-type: none"> <li>▪ <b>Electronic Fund Transfer at Point Of Sale [EFTPOS]:</b> Electrical method of <b>paying</b> via a <b>debit and credit card</b>. Meaning that they don't pay by cash, but the payment is withdrawn off their bank account to the retailer's account.</li> <li>▪ Usually located at the POS register, they fund transfer is done by <b>swiping the card, via magnetic strip readers</b>. They then must enter a PIN number to identify the customer. When it is approved, a direct transfer of the funds from the customer's bank account is transferred to the retail's.</li> </ul> </li> <li>– <b>Electronic Banking or Internet Banking:</b> <ul style="list-style-type: none"> <li>▪ Electronic Banking allows customers to view their <b>account balances, check transaction histories, transfer money</b> between accounts ad pay bills.</li> <li>▪ Some electronic banking providers have a banking system application designed for electronic banking.</li> <li>▪ All banking service are required to be secure and safe. The use of Data encryption is used to secure the data transfer between customer's computer and bank's computer.</li> </ul> </li> <li>– <b>Automatic Telling Machine:</b> <ul style="list-style-type: none"> <li>▪ <b>Automatic Telling Machines [ATM]</b> are operates by different banks but are all connect to the same network.</li> <li>▪ They consist of a <b>magnetic strip reader, keypads and button</b> for the actions.</li> <li>▪ They must be highly secure with cameras and anti-virus to prevent any corruption and theft.</li> </ul> </li> <li>– <b>Trading Over the Internet:</b> <ul style="list-style-type: none"> <li>▪ Trading over the internet</li> </ul> </li> </ul> </li> </ul>
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<i>Students learn to:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>▪ use a communication system to transmit and receive audio, video and text data</li> </ul>	<ul style="list-style-type: none"> <li>▪ A</li> </ul>
<ul style="list-style-type: none"> <li>▪ for given examples, identify the participants, information/data, information technology, need and purpose</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ for given examples explain how data is transmitted and received</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ for given examples, identify the advantages and disadvantages of the system</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>

**3. transmitting and receiving in communication systems**

<i>Students learn about:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>▪ transmission media, including: <ul style="list-style-type: none"> <li>– wired transmission</li> </ul> </li> <li>▪ wireless transmission</li> </ul>	<ul style="list-style-type: none"> <li>▪ Transmitting and receiving is the process where data and information is transfer and received. The information is sent through a <b>transmission media</b> (a place where data can travel) and is <b>measured in bandwidth or bps</b>.</li> <li>▪ <b>Wired Transmission</b></li> <li>▪ <b>Data is transferred with the need of cables and wires.</b></li> <li>▪ <b>Twisted Pair</b> <ul style="list-style-type: none"> <li>▪ Insulated copper wire are twisted to form twisted pair cables. By doing this they <b>reduce EM interference</b>. These are relative cheap and high used.</li> </ul> </li> <li>▪ <b>Coaxial Cable</b> <ul style="list-style-type: none"> <li>▪ A <b>copper wire is encased in an insulator with a protective layer of copper mesh</b>. They allow for <b>more than one signal transmission</b> making them <b>reliable and efficient, however costly</b>.</li> </ul> </li> <li>▪ <b>Optic Fibre</b></li> </ul>

	<ul style="list-style-type: none"> <li>▪ Strings of <b>thin fibre made from clear glass is surrounded by a layer of thin plastic cladding</b>. These allow for <b>light waves (lasers) as carriers for data</b>. TIR is used to reflect the data at the speed of light, making them <b>very fast</b> and <b>reliable</b> offering <b>greater security</b>. But, will this advancement can be <b>very expensive</b> and <b>heavy maintenance</b> is required.</li> <li>▪ <b>Wireless Transmission</b> <ul style="list-style-type: none"> <li>– <b>Data that is transfer without the needs of cables</b>. Hence they use atmosphere to travel such as <b>air and space</b>.</li> </ul> </li> <li>▪ <b>Point to Point Terrestrial Microwave</b> <ul style="list-style-type: none"> <li>▪ Transmit microwave type of data in the atmosphere through <b>straight lines (Line of Sight)</b> from station to station. This means the waves can't be bent by the curvature of Earth. They are inefficient for wireless transmission, however, are <b>faster than coaxial cables</b>.</li> </ul> </li> <li>▪ <b>Satellite</b> <ul style="list-style-type: none"> <li>▪ Satellites are microwave station <b>orbiting around the Earth</b>. Their purpose is to <b>amplify, tracking and direct signals</b> and waves to the correct and available path. In communication systems, the data from a ground station to transmitted to the satellite, where it will amplify and redirect the data back to another ground station.</li> <li>▪ Satellites are used for <b>GPS, Weather Forecasting, Television Broadcasting, Radio Communication or Internet Mobile Phones</b>.</li> </ul> </li> <li>▪ <b>Wifi/Bluetooth</b> <ul style="list-style-type: none"> <li>▪ <b>Wireless Fidelity (Wi-Fi)</b> is <b>wireless transmission that connection devices to the internet</b>.</li> <li>▪ <b>Bluetooth</b> is a <b>wireless transmission for short range connection</b> designed to <b>connect/sync two portable devices</b>.</li> </ul> </li> <li>▪ Infrared waves <ul style="list-style-type: none"> <li>▪ Another wave form for wireless transmission.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ characteristics of media in terms of speed, capacity, cost and security</li> </ul>	<ul style="list-style-type: none"> <li>▪ The characteristic of a media is important for transmission of data, as it will affect how efficient and effective data transfer will be.</li> <li>▪ Speed: Bit per second, Baud rate and bandwidth are measurements commonly used to determine the speed of communication.</li> <li>▪ Bits Per Second: <ul style="list-style-type: none"> <li>▪ Bits per second [bps] or bit rate, is the maximum number of bits that can be transmitted in one second. [Textbook definition: The number if bits transferred in one second. The speed of binary data transmission].</li> <li>▪ E.g. 2400 bps, means that 2400 bits [made from 0's and 1's] is transferred each second.</li> <li>▪ They can be used in asynchronous transmission.</li> <li>▪ There are other conversions for bps, like bytes per second [Bps], kilobit per second [kbps], kilobytes per second [kBps] and megabyte per second [Mbps].</li> </ul> </li> <li>▪ Baud Rate:</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Baud rate is the maximum number of signals that occur in one second. [Textbook definition: The number of signal events occurring in one second along a communication channel. Equivalent to the number of symbols per second]</li> <li>▪ Each signal/symbol event is known as a baud.</li> <li>▪ A data symbol or a baud can be made from one than one bit of data.</li> <li>▪ Bandwidth: <ul style="list-style-type: none"> <li>▪ Bandwidth is simply the highest frequency minus the lowest frequency. [Textbook definition: The difference between the highest frequencies and the lowest frequencies in a transmission channel].</li> <li>▪ Note that bandwidth is not the measurement of speed, rather it is the range of frequency used in a transmission channel.</li> <li>▪ A frequency is how many wavelengths pass in one second. Since frequency is measured in Hertz [Hz], Bandwidth is also measured in Hertz.</li> <li>▪ The higher the bandwidth the fast the transmission of data.</li> <li>▪ E.g. Optic fibre cables have high bandwidth, thus television would use optic fibre cable, as that different channels are be transmitted at the same time.</li> </ul> </li> <li>▪ Capacity: The max rate at which data can be transfer and how much can be stored. Basically, bit rate and bandwidth.</li> <li>▪ Cost: Cost to upset and maintain</li> <li>▪ Security: Protection against tapping and interference.</li> </ul>
<ul style="list-style-type: none"> <li>▪ communication protocols, including: <ul style="list-style-type: none"> <li>– application level protocols <ul style="list-style-type: none"> <li>- http</li> <li>- smtp</li> <li>- SSL</li> </ul> </li> <li>– communication control and addressing level protocols <ul style="list-style-type: none"> <li>- TCP</li> <li>- IP</li> </ul> </li> <li>– transmission level protocols <ul style="list-style-type: none"> <li>- Ethernet</li> <li>- Token ring</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Application level protocols <ul style="list-style-type: none"> <li>– HTTP: <ul style="list-style-type: none"> <li>▪ Hypertext Transfer Protocol [HTTP]: A protocol that allows uses to send and retrieve file using the internet. HTTP allow users to access webpages via a Hypertext or URL.</li> </ul> </li> <li>– SMTP: <ul style="list-style-type: none"> <li>▪ Simple Mail Transfer Protocol [SMTP]: It is used for sending and retrieving emails.</li> </ul> </li> <li>– SSL: <ul style="list-style-type: none"> <li>▪ Secure Socket Layer [SSL]: This is a security protocol protecting data.</li> <li>▪ Require two keys to encrypt data that only the user and the receiver or the website can view. This allows for private data to be transmitted via the internet.</li> <li>▪ SSL will support most browser websites. This can be identified via the URL. If the webpage has got a lock and contains the text [HTTPS], it means it is secure.</li> </ul> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ Communication Control and Addressing level protocols <ul style="list-style-type: none"> <li>– TCP</li> <li>– IP</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ strategies for error detection and error correction</li> </ul>	<ul style="list-style-type: none"> <li>▪ TCP is main role in the Communication Control and Addressing level is to provide an error checking method for an accurate transmission of data.</li> <li>▪ Types of error detection method. Parity bit checking &lt; Checksum &lt; CRC.</li> <li>▪ Parity bit checking: <ul style="list-style-type: none"> <li>▪ Used in asynchronous transmission, where the error method is used by setting the parity bit an odd or even.</li> <li>▪ During handshaking, protocols decide where it is odd or even.</li> <li>▪ Seven bit is usually represented in normal ASCII, with the eight-bit being the parity bit. When adding the total number of 1's in the value, it will determine if the ASCII value requires the addition one or zero depending the decided odd/even.</li> <li>▪ This is the worst method of error checking because and even amount of flips and modification will make the error undetectable with difference values.</li> </ul> </li> <li>▪ Checksum: <ul style="list-style-type: none"> <li>▪ Error detection method which counts or adds all the binary value together, and the total is divided by 256. The remainder of the division is the checksum.</li> <li>▪ The checksum is then placed at the end of the data packet so that the receiver is able to calculate the checksum and see if the values match and agree.</li> <li>▪ Checksum have issues but is more accurate than parity bit checking. If even numbers of bit flip values, then the error will not be detected. → Same problem like parity checking. Another problem is that error will be undetectable if the remainder of the checksum is the same when dividing with two different values.</li> </ul> </li> <li>▪ CRC: <ul style="list-style-type: none"> <li>▪ CRC also known as Cyclic Redundancy Checking is the best error checking method is performed at the transmission level. This method will include the Checksum as well as the CRC value in the header and trailer.</li> <li>▪ 99% accuracy</li> <li>▪ Put the binary values in 8 bit values and the entire message is added by totalling up the values. It is then divide by either a 16 bit or 32 bit CRC.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ This is the best method of error detection as the flip switches, it will be still harder to detect since the values of all binary will change, meaning an error.</li> </ul>
<ul style="list-style-type: none"> <li>▪ network topologies, including: <ul style="list-style-type: none"> <li>– star</li> <li>– bus</li> <li>– ring</li> <li>– hybrid</li> <li>– wireless networks</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ The topology of a network describes the way in which device [nodes] are physically connected and layout as well as how the data is logically transferred through nodes.</li> <li>▪ Nodes: are any device that are connected to the network, such as PC, printers, hubs, switches and routers, hub, storage devices [RAID].</li> <li>▪ Types of topology, Physical and Logical</li> <li>▪ Types of topology: Star, bus, ring, hybrid and mesh.</li> <li>▪ Star: <ul style="list-style-type: none"> <li>▪ All nodes are connected to a central node [point], via their own dedicated cable.</li> <li>▪ Mainly used in LAN.</li> <li>▪ The central node can be any connecting devices, but is mainly a switch. This allows for a direct and accurate access of sender and receiver in a LAN. The switch will consist of many ports or many other nodes.</li> <li>▪ With the connections of all nodes data packets can be transmitted and recieved to any other nodes throughout the system.</li> <li>▪ If one node were to failure, it will have no effect on the remaining nodes.</li> <li>▪ For wireless Star topology in LAN, a WAP [Wireless Access Point] is implemented as the central node.</li> <li>▪ Star topology is usually good for LAN connection within close range, when the all he cables are in reach with the central node to the nodes. Cables are UTP [Unprotected Twisted Pair]. This means is requires a lot of cabling maintenances → disadvantage.</li> <li>▪ Another disadvantage is that an unexpected failure with the central node will affect the whole network.</li> <li>▪ But they are usually used for mainframes.</li> </ul> </li> <li>▪ Bus: <ul style="list-style-type: none"> <li>▪ All nodes are connecting to a backbone [trunk or bus] [simplest design of networking].</li> <li>▪ The data transmitted is sent to all nodes via the backbone but only the to which it is addressed to accepts and processes the data. The remain data is sent to the terminals.</li> <li>▪ Terminals [terminators, resistors] are at the ends of the backbone. Function of a backbone is to prevent reflection of data signal begin sent back down the cable.</li> <li>▪ Many optic fibre is used to transmitted on the backbone and hence the electricity signal are dispatched as heat into the atmosphere.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ Each node is attached with a T-connector or a Vampire connectors, which is used to listen to the data.</li> <li>▪ Disadvantage of Bus topology → As more nodes are added, it causes data traffic jams and thus will occasionally cause collision in data, backing the backbone and affecting all connected nodes.</li> <li>▪ CSMA/CD [Carrier Sense Multiple Access With Collision Detection] is the protocol that governs the bus and star topology.</li> <li>▪ Ring: <ul style="list-style-type: none"> <li>▪ Consists of nodes connect to two other nodes. Thus, all the node combined to connect to a close loop.</li> <li>▪ The data circulate through node to node to its destination in one direction.</li> <li>▪ Disadvantage → If one cable break, the whole networks breaks. OR if a removal or an addition of node is implemented then the whole network is disabled. Also in order to send the data to its designated node, all nodes must be powered on.</li> <li>▪ A ring topology works by having a token ring that nodes capture in order to pass data between nodes. The data as well as address is attached to the token and is sent. Once completed it return to the original node.</li> <li>▪ There is only one token ring in a ring topology and once that token is busy, it cannot be captured. Hence very inefficient, as there will be a collision will two nodes try to capture the token at the same time.</li> </ul> </li> <li>▪ Hybrid: <ul style="list-style-type: none"> <li>▪ Also, known as tree topology uses a combination of the connected bus, star and ring topologies. They are combined to form a bigger unit to share data between different parts of an organisation.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ the functions performed by the following hardware components used in communication systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ These hardware's provide for a connection and interaction of one network to other, or just within other nodes in that network.</li> <li>▪ They consist of a transmission media (wired or wireless) Connection devices (hub, routers, modem) Network server (print server, web server)</li> <li>▪ Type of hardware used mainly used for transmitting and receiving data:</li> <li>▪ Hubs <ul style="list-style-type: none"> <li>▪ Hubs are a central connection point connecting all nodes in a network.</li> <li>▪ Unlike switches, hubs are dumb terminals that sends data to all the nodes which slows down the network. The data received by the one it addresses to.</li> <li>▪ Hubs sometimes include routers that had CPU and Network Operating System (NOS) some of the functions of the server.</li> <li>▪ Though it may be cheap, it's half duplex makes transmissions difficult under high network traffic.</li> </ul> </li> <li>▪ Switches <ul style="list-style-type: none"> <li>▪ Switches are smart devices that allows for a direct connection between sender and receiver.</li> <li>▪ As all nodes are connected to a switch, containing an IP address with allow the switch to know where to direct it data to.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ It's full duplex allows for data to be simultaneously sent and received making them very efficient and secure. (reduces traffic and potential data collision).</li> <li>▪</li> <li>▪ Routers <ul style="list-style-type: none"> <li>▪ Device that allows for direct message between two network with similar protocol.</li> <li>▪ Works in the Communication and Addressing Level.</li> <li>▪ Routers first look at the data's destination address then direct that data from send to its destination along the most efficient path.</li> <li>▪ Allows for the connection of two network which reduces data collision.</li> </ul> </li> <li>▪ Network Interface Cards (NIC) <ul style="list-style-type: none"> <li>▪ Small chip located in motherboards that allow for devices to connect to a network.</li> <li>▪ Works in the Transmission Level where data entered from the computer is converted into a form of suitable for transmission across the network.</li> <li>▪ Basically, encodes and decodes the data.</li> </ul> </li> <li>▪ Repeaters <ul style="list-style-type: none"> <li>▪ Is a hardware that receives a signal, amplifies it and then retransmits the amplified signal down another link.</li> </ul> </li> <li>▪ Bridges <ul style="list-style-type: none"> <li>▪ A product that connect a LAN to another LAN with the same protocols.</li> <li>▪ It allows for communication between the two networks.</li> </ul> </li> <li>▪ Gateways <ul style="list-style-type: none"> <li>▪ A gateway connects two networks with different protocols.</li> <li>▪ They translate one protocol to another for communicate and transmission of data.</li> </ul> </li> <li>▪ Wireless Access Point (WAP)</li> <li>▪ Other Hardware Network:</li> <li>▪ Modems</li> <li>▪ Mobile Phones</li> <li>▪ Bluetooth devices</li> </ul>
<ul style="list-style-type: none"> <li>▪ characteristics of network operating software</li> </ul>	<ul style="list-style-type: none"> <li>▪ Network Operating System (NOS) : is a software that allow multiple computers to communicate, share files and hardware with one another.</li> <li>▪ List of characteristic: Allocate network addresses, secure logins for users, controlled access to network resources, scheduling of tasks</li> </ul>



<ul style="list-style-type: none"> <li>▪ similarities and differences between the Internet, intranets and extranets</li> </ul>	<ul style="list-style-type: none"> <li>▪ Internet Benefits and Drawbacks: <ul style="list-style-type: none"> <li>▪ Speed and efficiency in communications</li> <li>▪ Convenient as it reduce the need to physical go to the communicator places which reduces the cost</li> <li>▪ But it lack privacy and security of the data</li> <li>▪ Induces new form of cyber crime and scams</li> <li>▪ Individuals may misuse the communication over the internet.</li> </ul> </li> <li>▪ Internet: <ul style="list-style-type: none"> <li>– A network that connects world-wide [Global system].</li> <li>– Use for the access of world wide web, the largest network, since everyone is connected.</li> <li>– Content on the internet is accessible by everyone.</li> <li>– Security of the information is depended on the node.</li> <li>– No one owns an internet, is it public.</li> <li>– Uses a IP/TCP.</li> </ul> </li> <li>▪ Intranet: <ul style="list-style-type: none"> <li>– A network design for specific organisation to share information.</li> <li>– Low maintenance and is great to share information, create content, communicate and develop, but only within the organisation.</li> <li>– A private network.</li> <li>– The organisation will have full control, and thus will have high security.</li> <li>– Uses LAN and is has one server, connected to client computers.</li> <li>– Uses only IP.</li> </ul> </li> <li>▪ Extranet: <ul style="list-style-type: none"> <li>– Extranet is an extension of intranet.</li> <li>– A LAN network that allows specific outsiders to access the network.</li> <li>– So it has an intranet for the organisation and some other authorised individuals.</li> <li>– The use of Virtual Private Network [VPN], is an</li> </ul> </li> <li>▪ Similarities: <ul style="list-style-type: none"> <li>– All networks are used to access and share information.</li> <li>– They are all type of networks.</li> </ul> </li> <li>▪ Differences:</li> </ul>
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	<ul style="list-style-type: none"> <li>- Both have different type of security. Internet has no firewall, whereas intranet and extranets have firewalls to protect from outsiders.</li> <li>- How different level of access for each network.</li> <li>- Internet is a global communication system, and intranet and extranet is organisation base.</li> </ul>
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<i>Students learn to:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>▪ compare and contrast traditional communication systems with current electronic methods</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ represent a communication system diagrammatically</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ predict developments in communication systems based on current trends</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ simulate activities involved with communication in areas such as <ul style="list-style-type: none"> <li>- e-commerce</li> <li>- EFTPOS</li> <li>- Internet banking</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ for a given scenario, choose and justify the most appropriate transmission media</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ diagrammatically represent the topology</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ describe the location and role of hardware components on the network</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ compare the functions of different hardware components</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>

<ul style="list-style-type: none"> <li>▪ identify the main characteristics of network operating software</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ compare and contrast the Internet, intranets and extranets</li> </ul>	<ul style="list-style-type: none"> <li>▪ Internet, is a network that allows all users with Wi-Fi to access information online, whereas Intranet, is a network for a specific network, where the required network user have access to their shared information. Extranet, is an extension of an Intranet, allow certain others to access the Intranet network.</li> </ul>

<b>4. other information processes in communication systems</b>	
<i>Students learn about:</i>	<i>Notes:</i>

<ul style="list-style-type: none"><li>▪ collecting, such as<ul style="list-style-type: none"><li>– the phone as the collection device with voice mail</li><li>– EFTPOS terminal as a collection device for electronic banking</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Collecting is when data is entered the system for further uses.</li><li>▪ Collecting data requires a large range of devices to suit to compatibility of the entered data.<ul style="list-style-type: none"><li>– The phone as the collection device with voice mail<ul style="list-style-type: none"><li>▪ Using cellular or the internet, data can be collected with voice mails, automated bills and paying orders.</li><li>▪ Using voice mail, the callers can provide the receiver will options which then the receiver can enter data by entering the data using a keypad provided on the phone.</li></ul></li><li>– EFTOPS terminal as a collection device for electronic banking<ul style="list-style-type: none"><li>▪ A keypad/board is used to allow users to enter data into the transaction system.</li><li>▪ Also other hardware can collect data, like the card inputted with allow the system to collect the account holder's information and allow for verification.</li></ul></li></ul></li></ul>
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| <ul style="list-style-type: none"> <li>▪ processing, including:             <ul style="list-style-type: none"> <li>– encoding and decoding analog and digital signals</li> <li>– formation of data packets</li> <li>– routing</li> <li>– encryption and decryption</li> <li>– error checking                 <ul style="list-style-type: none"> <li>- parity bit check</li> <li>- check sum</li> <li>- cyclic redundancy check (CRC)</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>▪ Processing is the manipulation of data.</li> <li>▪ In communication system, the collected data must be processed into a suitable form of data for transmission.             <ul style="list-style-type: none"> <li>– Encoding and decoding analog and digital signals                 <ul style="list-style-type: none"> <li>▪ For transmission of data to be successful, the transmission and receiving of data must be successful.</li> <li>▪ Encoding is the process where data is converted in a different form suitable for the transmission.</li> <li>▪ Decoding is the reversed process where the suitable transmission of data is converted into the devices suitable form for further uses.</li> <li>▪ Utilizes ADC and DAC</li> <li>▪ Analogy data to Analogy signals → These data are surreal in our environment. They must be use the dame waveform using electric current for successful communication</li> <li>▪ Digital data to Analogy signals → Data in form of zero's and one's are converted into signal waveform for transmission over long distances. Uses a DAC. Modem are a modulation process of digital to analogy.</li> <li>▪ Digital data to Digital signals → Data into zero's and one's are sent using the channel of the same precise time interval. Light are switched off and on. [Represented through the voltages].</li> <li>▪ Analogy data to Digital signals → Data is transmitted via ADC.</li> </ul> </li> <li>– Formation of Data packets                 <ul style="list-style-type: none"> <li>▪ Data formation is into data packets for routing on a network. They usually are split up and will contain a header, payload and trailer.</li> </ul> </li> <li>– Routing                 <ul style="list-style-type: none"> <li>▪ The selection of path at which the data packets are route to its destination.</li> <li>▪ Improve security and efficiency.</li> <li>▪ They are sent through the quickest and most secure path in a network traffic.</li> <li>▪ Encryption and decryption:                     <ul style="list-style-type: none"> <li>▪ Improves the security of the processed data.</li> <li>▪ Uses keys for individuals to grant access.</li> <li>▪ Both Asymmetrical and symmetrical encryption/decryption using public/private keys.</li> </ul> </li> </ul> </li> <li>– Error checking                 <ul style="list-style-type: none"> <li>– Parity bit checking                     <ul style="list-style-type: none"> <li>▪ Uses odd/even parity bit for transmission.</li> </ul> </li> <li>– Checksum                     <ul style="list-style-type: none"> <li>▪ Uses the addition of all binary numbers and is divide with 256.</li> <li>▪ Where the remainder is then the Checksum.</li> </ul> </li> <li>– Cyclic Redundancy Check</li> </ul> </li> </ul> </li> </ul> |
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	<ul style="list-style-type: none"> <li>▪ Uses the addition of binary bits and is divided with a 16/32 bit.</li> <li>▪ The remainder is then the CRC.</li> </ul>
<ul style="list-style-type: none"> <li>▪ displaying, such as <ul style="list-style-type: none"> <li>– the phone as the display device with voice mail</li> <li>– EFTPOS terminal as a display device for electronic banking</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Displaying is an information process where data is represented on a format for the user and participants for viewing.</li> <li>▪ A form of presentation of information in a form of multimedia <ul style="list-style-type: none"> <li>– The phone as the display device with voice mail <ul style="list-style-type: none"> <li>▪ The displaying of audio is used in telephones.</li> <li>▪ When voice mails or messages are received, the display device is the phone.</li> </ul> </li> <li>– EFTPOS terminals as a display device for electronic banking</li> </ul> </li> <li>▪ A screen presented to display the account's information and allow for the interaction and approval of the transaction.</li> </ul>

<i>Students learn to:</i>	<i>Notes:</i>
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<ul style="list-style-type: none"> <li>▪ distinguish between data in analogy and digital form</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data in analogy form → signal wave, represent like sine waves</li> <li>▪ Example → Cassette tapes</li> <li>▪ Data in digit form → binary digits, zero and ones, represented as square waves [lands and pits]</li> <li>▪ Example → Compact discs</li> <li>▪ A modem is used to modulate digital data into analogy and demodulate analogy back into digital data.</li> <li>▪ Both are method of storing data.</li> </ul>
<ul style="list-style-type: none"> <li>▪ justify the need to encode and decode data</li> </ul>	<ul style="list-style-type: none"> <li>▪ The need to encode and decode data is to found suitable and compatibility for transmission of data, from one node to another.</li> <li>▪ Also, the data encoded or decoded can allow for an analogy and digital storage of information.</li> </ul>
<ul style="list-style-type: none"> <li>▪ identify where in a communication system signal conversion takes place</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ describe the structure of a data packet</li> </ul>	<ul style="list-style-type: none"> <li>▪ Data packets are unit of data that can packaged, so that they can travel in a network path.</li> <li>▪ Data packets can be converted into different forms of data.</li> <li>▪ They are structure when data is collected on a source and distributed into a header, payload, and a trailer to end the package.</li> <li>▪ The header contains the metadata, routing information and the protocol. <ul style="list-style-type: none"> <li>– Example: IP data packets will have a IP address of the destination and routing information.</li> </ul> </li> <li>▪ The payload contains the information of the source. Any data needed for remission.</li> <li>▪ The trailer is the end of the package that can contain the error checking number.</li> <li>▪ Each data packet should have: <ul style="list-style-type: none"> <li>– A start and stop bit to indicate the start and end of each data packet.</li> <li>– An error detection method for a secure transmission</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>▪ describe methods to check the accuracy of data being transmitted</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Data integrity is a method to check if data is both accurate and valid.</b></li> <li>▪</li> </ul>

<b>5. managing communication systems</b>	
<i>Students learn about:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>▪ network administration tasks, such as: <ul style="list-style-type: none"> <li>– adding/removing users</li> <li>– assigning users to printers</li> <li>– giving users file access rights</li> <li>– installation of software and sharing with users</li> <li>– client installation and protocol assignment</li> <li>– logon and logoff procedures</li> <li>– network-based applications</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Network Administration is a job</b> that keeps all the system and the <b>network</b> of the organisation <b>up to date and protected</b>. <ul style="list-style-type: none"> <li>– <b>adding/removing users</b></li> <li>– <b>assigning users to printers</b></li> <li>– <b>giving users file access rights</b></li> <li>– <b>installation of software and sharing with users</b></li> <li>– <b>client installation and protocol assignment</b></li> <li>– <b>logon and logoff procedures</b></li> <li>– <b>network-based applications</b></li> </ul> </li> </ul>

<i>Students learn to:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>• detail the network management software in a given network</li> </ul>	<ul style="list-style-type: none"> <li>▪ A network management software is the software that manages a network.</li> <li>▪ They allow for network admins to supervise the individual nodes within a network, in a large network.</li> <li>▪ Make less of a work for IT professions.</li> <li>▪ These hardware and software allow for an investigation of the devices in the network, it performances, and alerts them encase of a situation.</li> </ul>
<ul style="list-style-type: none"> <li>• describe the role of the network administrator and conduct network administration tasks</li> </ul>	<ul style="list-style-type: none"> <li>▪ Network administrators' tasks is to maintain an up to date network, keeping the network secure, the hardware/software updated and inputting new feature to help improve the network.</li> </ul>
<ul style="list-style-type: none"> <li>• demonstrate logon and logoff procedures, and justify their use</li> </ul>	<ul style="list-style-type: none"> <li>▪ When given upon the login page, users must enter their allocated username and password to validate access.</li> <li>▪ A user session is now opened and they are allowed to have access to information they have rights to.</li> <li>▪ A logoff is done to disconnect the user from the network. This is a security method so that others can't use that account and hack.</li> </ul>



<ul style="list-style-type: none"> <li>• adopt procedures to manage electronic mail</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
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<b>6. issues related to communication systems</b>	
<i>Students learn about:</i>	<i>Notes:</i>
<ul style="list-style-type: none"> <li>▪ security</li> </ul>	<ul style="list-style-type: none"> <li>▪ A</li> </ul>
<ul style="list-style-type: none"> <li>▪ globalisation</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ changing nature of work</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ interpersonal relationships</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ e-crime</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ legal</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ virtual communities</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>

<ul style="list-style-type: none"> <li>▪ current and emerging trends in communications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Current and emerging trends in communication           <ul style="list-style-type: none"> <li>– Blogs               <ul style="list-style-type: none"> <li>▪ A public webpage that is designed as a digit journal</li> <li>▪ Others can view their daily life and plans, but only the blog owner can edit and update.</li> <li>▪ Trends that are occurring is that blogs are interactive so that other people can share similar experiences.</li> <li>▪ Things like group blogs a emerging trend for personal but relational person entries.</li> <li>▪ Blogs are now used as educational, so knowledge purposes.</li> </ul> </li> <li>– RSS feed               <ul style="list-style-type: none"> <li>▪ News mail</li> <li>▪ Really simple syndicate is a web fed format.</li> <li>▪ Users are subscribed to the feed and are regularly update with the content changes and updates.</li> </ul> </li> <li>– Wikis               <ul style="list-style-type: none"> <li>▪ Server software that allow for the public to free create or edit web pages.</li> </ul> </li> <li>– Podcast               <ul style="list-style-type: none"> <li>▪ Podcast are audio file that are download from a computer to a MP3 player.</li> <li>▪ Audio form of a RSS feed.</li> </ul> </li> <li>– Online radio               <ul style="list-style-type: none"> <li>▪ Real time streaming media player or streamed on the internet.</li> </ul> </li> <li>– 4G               <ul style="list-style-type: none"> <li>▪ Wireless technology used by mobile phones.</li> <li>▪ 4G has all prior features in 1G, 2G and 3G.</li> <li>▪ 30 x faster than 3G.</li> <li>▪ Gaming and heavy video and audio streaming</li> <li>▪ Conferencing.</li> <li>▪ International roaming capability.</li> </ul> </li> </ul> </li> </ul>
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<p><i>Students learn to:</i></p>	<p><i>Notes:</i></p>
<ul style="list-style-type: none"> <li>▪ describe and justify the need for ethical behaviour when using the Internet</li> </ul>	<ul style="list-style-type: none"> <li>▪ A</li> </ul>

<ul style="list-style-type: none"> <li>▪ discuss the social and ethical issues that have arisen from use of the Internet, including: <ul style="list-style-type: none"> <li>– the availability of material normally restricted</li> <li>– electronic commerce</li> <li>– domination of content and control of access to the Internet</li> <li>– the changing nature of social interactions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ identify the issues associated with the use of communication systems, including: <ul style="list-style-type: none"> <li>– teleconferencing systems</li> <li>– messaging systems</li> <li>– e-commerce</li> <li>– EFTPOS</li> <li>– electronic banking</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ design and implement a communication system to meet an individual need</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
<ul style="list-style-type: none"> <li>▪ predict developments in communication systems based on current trends</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>