| 1) | Basic of Computer Networks |
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Computer communications is the process of sharing data, programs, and information between two or more computers.

Numerous applications depend on communication systems, including:

- E-mail
- Instant messaging
- Internet telephone
- Electronic commerce
- Global positioning systems (GPS)
Computer network is an interconnection of two or more computers and other devices. Devices on a network can be linked by cables, telephone lines, radio waves or infrared waves.
Based on the network size, networks can be categorized into several types:

1) Personal Area Network (PAN)
2) Local Area Network (LAN)
3) Metropolitan Area Network (MAN)
4) Wide Area Network (WAN)
Advantages of computer networks

- Files sharing
- Devices sharing
- Communication
- Services sharing
Disadvantages of computer networks

- Virus attacks
- Hacker attacks
- Failures of a server may effect to the entire network
• Connectivity uses **computer networks** to link people and resources

• **The Wireless Revolution**
  - Single most dramatic change in connectivity and communications has been widespread use of mobile telephones with wireless Internet connectivity
PAN is wireless network connected with mobile devices such as mobile phones, PDAs, bluetooth printers, Headsets, etc.

The technology using in here is Bluetooth or infrared.
2b) Local Area Network (LAN)

- Coverage is about within 1 km.
  - Ex: a company network within a building or may be within two or more buildings
2c) Metropolitan Area Network (MAN)

- Coverage is about more than 1 km and less than 10 km.
  - Ex: A network of a large town
- Coverage is about more than 10 km.
- Satellites may be used to expand this network.
  - Ex: Internet
The Internet is a “network of networks” linking commercial, academic, and government computers in all but a handful of countries worldwide.

- **Public network** is a type of network wherein anyone, namely the general public, has access and through it can connect to other networks or the Internet.

- **Private network**, where restrictions and access rules are established in order to relegate access to a select few.
The Internet supports applications in the following major categories:

- **DISCOVERY**: Discovery involves browsing and information retrieval.
- **COMMUNICATION**: The Internet provides fast and inexpensive communication channels that range from messages posted on bulletin boards to complex information exchanges among many organizations.
- **COLLABORATION**: Due to improved communication, electronic collaboration between individuals and/or groups is on the rise.
5) Connecting to Internet

- Dial-up Connection
- ISDN - *Integrated Services Digital Network*
- Satellite Connection
- DSL - *Digital Subscriber Line*
- Cable Modem
- Wi-Fi - *Wireless Fidelity*
- WLan - *Wireless Local Area Network*
- WiMax - *Worldwide Interoperability of Microwave Access*
6) Basics of internet connectivity related troubleshooting

- Is Your Router Getting Power?
- Check Your Internet Connection Status
- Cable Connection Okay?
- Start REFRESH
- Make Sure Your Firmware Is Current
- Do You Need an Extender?
- Is Your PC/Phone/Tablet Configured Correctly?
- Make Sure Your PC Is Healthy
- Time to Upgrade Your Router?
An electronic document on the Web is called a **Web page**

A collection of related Web pages that can be accessed from the same starting location is called a **Web site**

Most Web sites have a starting point, and central reference point, called a **homepage**

Each Web page at each Web site has a unique address or **URL** (Uniform Resource Locator).
A URL specifies the protocol, domain name, and path for the Web page. HyperText Transport Protocol (HTTP) translates a URL into the IP address of the host on which a requested Web page is stored. Once the host is contacted, HTTP uses the path to access the requested page and transfer it to the user’s computer.
**http vs https**

- **https** is the **SECURE** version of HTTP, the protocol over which data is sent between your browser and the website that you are connected to.
- The 'S' at the end of HTTPS stands for 'Secure'.
- It means all communications between your browser and the website are **encrypted**.
A web browser is a **software** or program which allow us to browse web pages.

It retrieving, presenting and traversing information resources on the World Wide Web that may be a web page, image, video or other piece of content.

Web browser software:
9) Search Engines

- **Definition:**
  - An internet-based tool that searches an index of documents for a particular term, phrase or text specified by the user. Commonly used to refer to large web-based search engines that search through billions of pages on the internet.

- **Common Characteristics:**
  - Spider, Indexer, Database, Algorithm
  - Find matching documents and display them according to relevance
  - Frequent updates to documents searched and ranking algorithm
  - Strive to produce “better”, more relevant results than competitors
9) Search Engines
Uniform Resource Locator (URL): the complete **address** of a World Wide Web (website) page.

*It is always UNIQUE for a web page*

A URL is made up of several parts.

E.g.:

```
http://www.yahoo.com/weather/Lahore/weather.html
```

- **Protocol**
- **Fully qualified domain name**
- **Path of web page**
Internet security is a branch of computer security specifically related to the Internet, often involving browser security but also network security on a more general level, as it applies to other applications or operating systems as a whole.

Information transmitted over networks has a higher degree of security risk than information kept on an organization’s premises.
12) Mobile wireless technologies

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. cellular signal strength</td>
</tr>
<tr>
<td>2</td>
<td>2. cellular data connection</td>
</tr>
<tr>
<td>3</td>
<td>3. call forwarding</td>
</tr>
<tr>
<td>4</td>
<td>4. roaming</td>
</tr>
<tr>
<td>5</td>
<td>5. Wi-Fi connection</td>
</tr>
<tr>
<td>6</td>
<td>6. Bluetooth device</td>
</tr>
<tr>
<td>7</td>
<td>7. phone profile</td>
</tr>
<tr>
<td>8</td>
<td>8. input language and method</td>
</tr>
<tr>
<td>9</td>
<td>9. battery</td>
</tr>
<tr>
<td>10</td>
<td>10. clock</td>
</tr>
</tbody>
</table>

Mobile symbols in the top bar of a Windows phone.
- **G** stands for GPRS (*General Packet Radio Service*).
  - When you see **G** near your signal strength indicator, it is certain that your net connection is working at the slowest speed.

- **E** stands for EDGE (*Enhanced Data Rates for GSM Evolution*).
  - EDGE is faster than GPRS but still not good enough to browse the Internet.

- **3G** means the *third generation* of mobile telephone technology.
  - 3G is faster than EDGE and you can easily browse *websites* and stream music.
4G is the fourth generation of mobile technology.
- If you see 4G near the signal bar in your mobile phone, you’re lucky! It means you now have fast mobile internet connection.

5G is the fifth generation of mobile technology.
- More luckier, you’re using the fastest mobile Internet connection available on the globe at present.
- improved wireless network technologies deploying
- improve download speeds even more and might also save the average Brit big money.
- meet the needs of new use-cases such as the Internet of Things.
What is the difference between

1G  2G  3G  4G  5G

E   E  H, 3G  4G  5G

THE NEED FOR SPEED in kilobytes per second
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Standard</th>
<th>Full Name</th>
<th>Maximum Download Speed (Theoretical)</th>
<th>Maximum Upload Speed (Theoretical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2G</td>
<td>GSM</td>
<td>Global System for Mobile Communications</td>
<td>14.4 Kbits/s</td>
<td>14.4 Kbits/s</td>
</tr>
<tr>
<td>G</td>
<td>GPRS</td>
<td>General Packet Radio Service</td>
<td>53.6 Kbits/s</td>
<td>26.8 Kbits/s</td>
</tr>
<tr>
<td>E</td>
<td>EDGE</td>
<td>Enhanced Data rates for GSM Evolution</td>
<td>217.6 Kbits/s</td>
<td>108.8 Kbits/s</td>
</tr>
<tr>
<td>3G</td>
<td>UMTS</td>
<td>Universal Mobile Telecommunications System</td>
<td>384 Kbits/s</td>
<td>128 Kbits/s</td>
</tr>
<tr>
<td>H</td>
<td>HSPA</td>
<td>High-Speed Packet Access</td>
<td>7.2 Mbits/s</td>
<td>3.6 Mbits/s</td>
</tr>
<tr>
<td>H+</td>
<td>HSPA+</td>
<td>Evolved High-Speed Packet Access - Release 6</td>
<td>14.4 Mbits/s</td>
<td>5.76 Mbits/s</td>
</tr>
<tr>
<td>H+</td>
<td>HSPA+</td>
<td>Evolved High-Speed Packet Access - Release 7</td>
<td>21.1 Mbits/s or 28.0 Mbits/s</td>
<td>11.5 Mbits/s</td>
</tr>
<tr>
<td>H+</td>
<td>HSPA+</td>
<td>Evolved High-Speed Packet Access - Release 8</td>
<td>42.2 Mbits/s</td>
<td>11.5 Mbits/s</td>
</tr>
<tr>
<td>H+</td>
<td>HSPA+</td>
<td>Evolved High-Speed Packet Access - Release 9</td>
<td>84.4 Mbits/s</td>
<td>11.5 Mbits/s</td>
</tr>
<tr>
<td>H+</td>
<td>HSPA+</td>
<td>Evolved High-Speed Packet Access - Release 10</td>
<td>168.8 Mbits/s</td>
<td>23.0 Mbits/s</td>
</tr>
<tr>
<td>4G</td>
<td>LTE</td>
<td>Long Term Evolution</td>
<td>100 Mbits/s</td>
<td>50 Mbits/s</td>
</tr>
<tr>
<td>4G</td>
<td>LTE-A</td>
<td>Long Term Evolution - Advanced</td>
<td>1 Gbits/s</td>
<td>500 Mbits/s</td>
</tr>
</tbody>
</table>

Tabular comparison of data speeds offered by various generations of mobile technology. Image source.
Thank You