Computer Networks

Today we cant imagine our life without any networks. Nowadays networks are everywhere and everyone wants to be connected.

Network – group of devices, that connected between each other (3+). Networks can be classified according to their size and geographic scope:

PAN – little area, not more than 10 meters

LAN – one building (personal computer) or 2 buildings that stands close

MAN – covers cities

WAN – large geographic area, world

Communication channels are divided into 2 general classification: wired and wireless.

Wired: phone connection(cooper – electric signals, fiber-optic – light impulses), cable connection, DSL/ADSL – assimetric/digital subscriber line (digital signal)

Wireless: Wi-Fi (wireless fidelity) – radiowaves, satellite – microwaves

Network media – wired/wireless

Network interface – connect any devices (hosts/nodes) to media

Network protocol – set of rules, that are necessary to communicate computer with others

Network devices

Network architecture:

Client-to-client –type of network that has a dedicated server - (star)

Peer-to-peer –but without any server (p-t-p, full mesh, partial mesh, bus)

Topologies:

Star – one central point for all devices

Bus – all nodes are connected to the same circuit

Full mesh – connects each network device to many other network devices

Partial mesh – some devices are connected to many others

Point-to-point – connected directly

Network protocols: HTTP (hypertext transfer protocol) – transfare data by packets:

1. TCP (transmition control protocol) – breaks data into packets
2. IP (Internet protocol) – address this packets

Cloud computing (store data on outsource server, don’t use computer harddisk, you can get your data using any device)

Private – dedicated to one organization

Public – shared by multiple organisations

Hybrid – combine public and private

Multi-cloud – using multiple public clouds, rents servers and services from several external vendors

Database – program for keep data organized

Internet – WAN (international computer network that allows people to share information around the world), Web – system for find information

Types of internet connection:

Dial-up – slow speed, cable

DSL – uses nowadays – fast, broadband internet connection

Cable – uses cable TV connection, fast, broadband internet con-on

3G/4G – wireless internet connection used by smartphones

\*narrowband channels – need less transmit power and take up less frequency than broadband

Technologies of the Web: browser, URL (uniform resource location), HTTP, HTML (hypertext markup language)

HTML – set of elements that author uses to mark up the document

Elements of the Web: weblink (set of HTML document), website(collect of web pages), web page (dispalayed to a user)

Web page – usually pages are not updates frequently/ Blog – informational website displaying information in reverse chronological order

Web server – virtual physical server that contain data

DNS – domain name server

Protocols:

FTP (file transmit protocol) - may include server (or not)

Bit torrent – without any server

IRC (internet relay chat) – text messages

VOIP (voice internet protocol) – only for voice messages

SMTP (simple mail transmit protocol) – from client to server

UDP (user datagram protocol) – alternative data transport to TCP

URL – uniform resource location

DNS – domain name server (request – запрос)

IoT – physical digital devices, share data (with other devices), makes analytics and decisions

IoT elements: chips, platforms, analytics, sensors, gateway, applications

IoT applications: smart home, industry energy production, medicine

Sensor – monitor data

Gateway – sorts data (hub)

Platform – stores data (server)

Database – program for specific tasks, consists of fields -> records -> one peace of data

Benefits of IoT: enterprises benefit from using IoT when a component is likely to fail and to swap it out before it causes damage, make life smarter, more comfortable and easier (routine tasks)

IoT challenges:

1. Lack of regulations ( government regulation often takes a long time to catch up with current state of technology
2. Understanding IoT ( how to use it?)
3. Challenges with compatibility (not all devices can be connected with other)
4. Cloud attacks (cybercriminal, cloud servers can be attacked by hackers)
5. Limited AI (people cant use AI how they need, most of the current AI offerings on the market have substantial limits)

How the Web work?

User enters a domain; browser sends a “request” to server; DNS server translate domain to IP address, then browser received IP address and request to the server with that IP address, then browser receives the request sent by the server and through the HTML data make web-site

