

Chapter 5 · Introduction to Computer Networks

CBSE Class 12 Informatics Practices (065) · Unit 3 = 10 marks · Ultimate Revision Sheet

60-SECOND RECALL

4 network types	PAN (few m) → LAN (building) → MAN (city) → WAN (country/world)
6 devices	Modem · Hub · Switch · Repeater · Router · Gateway
4 topologies	Star · Bus · Tree · Mesh
Hub vs Switch	Hub broadcasts to ALL · Switch sends only to the intended device
Router vs Gateway	Router joins similar networks · Gateway joins dissimilar ones
Website vs Webpage	Website = collection of webpages · Webpage = a single document

1. Network and Its Types

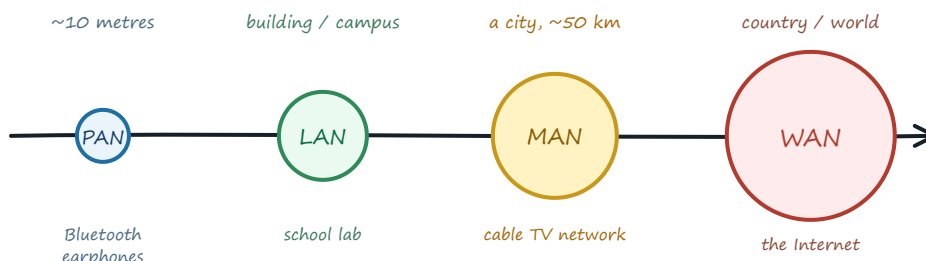
DEFINITION A computer network is a collection of computers and devices connected together to share data, hardware and software resources.

THE FOUR TYPES — by geographical spread

Type	Full form	Range	Example
PAN	Personal Area Network	A few metres (up to ~10 m)	Bluetooth between a phone and earphones; a phone hotspot
LAN	Local Area Network	A room, building or campus (up to a few km)	A school computer lab; an office network
MAN	Metropolitan Area Network	A city (up to ~50 km)	Cable TV network; all branches of a bank in one city
WAN	Wide Area Network	A country or the world	The Internet — the largest WAN

As range increases: speed decreases, cost increases, and error rate increases.

The only thing that separates them is how far they reach.



As the range grows: speed falls, cost rises, error rate rises.

The Internet is the largest WAN — a 1-mark answer that appears almost every year.

2. Network Devices

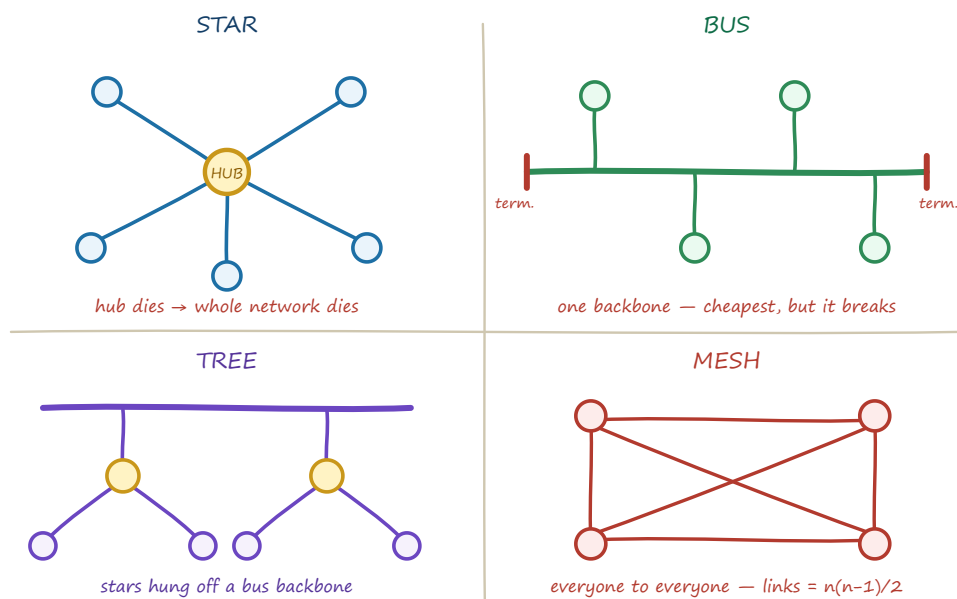
ALL SIX PRESCRIBED DEVICES

Device	What it does
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Modem	MO dulator- DEM odulator. Converts digital signals to analog for transmission over telephone lines, and back again. Needed to connect to the Internet over a phone line.
Hub	Connects multiple devices in a LAN. It broadcasts incoming data to ALL connected ports — it cannot tell which device the data is for. Result: more collisions, less secure, slower.
Switch	Like a hub, but intelligent . It reads the MAC address and forwards data only to the intended device. Faster, more secure, fewer collisions.
Repeater	Regenerates and amplifies a weak signal so it can travel a longer distance. Used when cable length exceeds the medium's limit.
Router	Connects two or more networks of the same type and chooses the best path for data. Works with IP addresses .
Gateway	Connects two DISSIMILAR networks that use different protocols. It acts as a protocol converter — the entry and exit point of a network.

THE TWO PAIRS EXAMINERS TEST *Hub vs Switch: Hub broadcasts to all (dumb); Switch sends only to the intended recipient (intelligent, uses MAC address).*
Router vs Gateway: Router connects networks using the same protocol; Gateway connects networks using different protocols and converts between them.

3. Network Topologies



Most reliable → **Mesh**. Cheapest → **Bus**. Easiest to troubleshoot → **Star**. That trio answers most 1-markers.

THE FOUR PRESCRIBED TOPOLOGIES

Topology	Structure	Advantages	Disadvantages
STAR	All nodes connect to a central hub/switch	Easy to install and manage · failure of one node does not affect others · easy fault detection · easy to add nodes	Central device failure brings down the whole network · more cable needed · costly
BUS	All nodes connect to a single backbone cable ; terminators at both ends	Least cable , so cheapest · easy to extend · simple to set up	Backbone failure breaks the whole network · difficult fault detection · performance drops as nodes increase · collisions

TREE	Hierarchical — groups of star networks joined to a bus backbone	Scalable · easy to expand · good for large networks · supports grouping	Heavy cabling · backbone failure affects everything · costly and complex
MESH	Every node connects to every other node	Most reliable — multiple paths, failure of one link does not stop communication · very secure · no traffic problem	Most expensive — huge cabling · very complex to install and maintain

Mesh links for n nodes = $n(n - 1) / 2$

TRAP *Star fails if the central device fails. Bus fails if the backbone cable fails. Mesh is the most reliable but the most expensive. If a question asks for the most reliable topology the answer is Mesh; for the cheapest it is Bus; for the easiest to troubleshoot it is Star.*

4. Internet — Key Terms

Term	Meaning
Internet	A global network of networks connected using TCP/IP. The largest WAN.
WWW	World Wide Web — the collection of interlinked hypertext documents accessed over the Internet. The Web is a service ON the Internet, not the Internet itself.
URL	Uniform Resource Locator — the unique address of a resource on the web. https://www.cbse.gov.in/notes/ip.html Parts: protocol (https) · domain name (www.cbse.gov.in) · path (/notes/) · file name (ip.html)
Protocol	A set of rules for communication. HTTP, HTTPS, FTP, TCP/IP, SMTP.
IP address	A unique numeric address of a device on a network.
Domain name	The human-readable name of a website; translated to an IP address by DNS .

Applications of the Internet

Application	Meaning
Web	Browsing and accessing information through websites
Email	Electronic mail — sending messages and attachments
Chat	Real-time text conversation between users
VoIP	Voice over Internet Protocol — making voice calls over the Internet instead of a telephone line. Eg: WhatsApp call, Skype, Google Meet. Cheaper, but depends on connection quality.

5. Website, Webpage and Hosting

THE DEFINITIONS

Term	Meaning
Webpage	A single document written in HTML, viewable in a browser
Website	A collection of related webpages under one domain name
Home page	The first / main page of a website, usually index.html
Web server	A computer that stores websites and delivers them to browsers on request
Web hosting	The service of storing a website on a web server so it is available on the Internet

STATIC vs DYNAMIC WEB PAGE — a common 2-marker

Basis	STATIC	DYNAMIC
Content	Fixed — same for every user	Changes with user, time or input
Built with	HTML, CSS only	HTML + server-side scripting (PHP, ASP) + database
Speed	Faster to load	Slower — content is generated on request
Cost / complexity	Cheap and simple	Costly and complex
Example	A simple "About Us" page	Gmail inbox, a shopping site, a news feed

6. Web Browsers

DEFINITION A **web browser** is application software used to **access, retrieve and display** content from the World Wide Web. Examples: Google Chrome, Mozilla Firefox, Microsoft Edge, Safari, Opera.

Term	Meaning
Browser settings	Options to control the browser — home page, default search engine, privacy and security, downloads, clearing history and cache.
Add-on	A small program that extends the browser's own functionality — ad blockers, password managers, grammar checkers. It becomes part of the browser .
Plug-in	A third-party program that lets the browser display or handle a specific type of content it could not otherwise — PDF viewers, Flash, media players. It is a separate program that works with the browser.
Cookie	A small text file stored on the user's computer by a website, holding information such as login details, preferences and items in a cart. Used to remember the user on the next visit.
Cache	Temporarily stored copies of web content so pages load faster on the next visit.

ADD-ON vs PLUG-IN **Add-on** = enhances the browser itself, becomes part of it.
Plug-in = a separate third-party program that lets the browser handle specific content.
Cookies — the privacy angle: they improve convenience (staying logged in) but can **track** browsing behaviour, which is a privacy concern. This link to Unit 4 is often asked.

7. Question Triggers identify the device / type

If the question says...	The answer is
"connects a phone to earphones wirelessly"	PAN (Bluetooth)
"computers in one school lab"	LAN
"all branches of a bank within one city"	MAN
"offices in Delhi, Mumbai and London"	WAN
"signal weakens over a long cable"	Repeater
"sends data only to the intended computer"	Switch
"broadcasts data to every connected device"	Hub
"connects two networks using different protocols"	Gateway
"chooses the best path between networks"	Router
"converts digital to analog signals"	Modem
"one central device, all nodes connect to it"	Star topology

"single backbone cable with terminators"	Bus topology
"every node connected to every other node"	Mesh topology
"which topology is most reliable?"	Mesh
"which topology needs least cable?"	Bus
"voice call over the Internet"	VoIP
"a small file that remembers your login"	Cookie
"content changes for each user"	Dynamic web page
"storing a website on a server for public access"	Web hosting

MOST-ASKED BOARD QUESTIONS

1. **[3-4M] Case study:** an organisation has four buildings — suggest the topology, the device, the cable layout, and where to place the server.
2. **[2M]** Differentiate between hub and switch / router and gateway.
3. **[2M]** Differentiate between a static and a dynamic web page.
4. **[2M]** Differentiate between a website and a webpage / add-on and plug-in.
5. **[1M]** Expand VoIP / URL / PAN.
6. **[1M]** Which topology is the most reliable? → **Mesh**

THE HABIT THAT SCORES — The **case-study question** is worth 3–4 marks and follows the same shape every year: name the **topology** (usually Star or Bus), name the **device** (usually Switch for within a building, Router between buildings), and put the **server in the building with the most computers**. Give a one-line **reason** for each — the reason is the mark.