**Network**

Is a set of computers or other electronic devices that are interconnected with the purpose of sharing resources and/or exchange data. It can be as small as two or as large as billions of network nodes/devices. They can be connected through cables, telephone lines, radio waves, satellites, etc.

**Types of Network**

Networks can be classified into different types based on geographical coverage area as follows:

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| **Name** | **Description** | **Picture** |
| Local Area Network(LAN) | Is a network designed to operate over a small area geographical or physical area like an office, building or group of buildings, etc.  Its speed varies from 10mpbs to 1gbps. Its generally used with bus, star and ring topologies. | LAN Definition - What is a local area network (LAN)? |
| Metropolitan Area Network(MAN) | Is a bigger version of LAN, it spans over a larger geographical area such as a town or an entire city.  Can be connected using a fiber cable as a communication medium. LANs can be connected to create a MAN. It spans over a geographical area of about 50km.  When this network is created for a specific campus, then it is termed as CAN(campus area network) | Arti dan Fungsi Metropolitan Area Network (MAN) | Griyasis |
| Wide Area Network(WAN) | Is the largest spread network. It spans over very large distances such as a country, continent or even the whole globe. Example, the internet Communications can be wired or wireless, telephone lines for wired and satellite links for wireless communication. It connects a huge amount of people. | What is WAN (Wide Area Network)? - PC Networking Audiobook | Himalaya |
| Personal Area Network(PAN) | Is a network that is used for communicating among nodes in close proximity of around a few meters within a room |  |

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| LAN | MAN | WAN | PAN |
| It spans over a small area | It spans over an area of about 50km | It spans over an area of about 100km or as big as the globe itself | Its span over a very small area, maybe withing a room |
| High data rate transfer, low error rate, easily scalable | High speed data connectivity | The error rate is high | Can use wireless or wired communications |
| Minimum propagation delay | Propagation delay is moderate | Propagation delay is greater | Used to communicate between devices themselves |
| Easy to design and troubleshoot | Less fault tolerant | Data rate is low |  |
| Equipment and support may be costly and hardware devices may not inter-operate properly | Hard to design and maintain, congestions are more | Its complex to design |  |

They can be classified by it’s functionality:

* Client-server Network
* Peer-to-Peer Network

They can typed based on it’s ownership

* Private Network
* Public Network

Based on transmission media:

* Bound/Guided Media Network
* Unboud/Unguided Media Network

**Network Topology**

Refers to the arrangement of different elements in a computer network, such as links, nodes and the interconnections between them. Is a framework that guides the layout and design of a network, influencing its communication and performance characteristics.

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| Name | Description | Picture |
| Bus | All devices are connected to a single central cable known as the backbone. It’s simple and code effective but has limitations in scalability and fault tolerance | Types of network topologies | Computers and Accessories |
| Ring | Devices are connected in a close loop, with data traveling in one direction. Efficient for managing network traffic but can be disrupted by a single failure | Difference Between Star and Ring Topology (with Comparison Chart ... |
| Star | Each node connects to a central hug or switch. It is easy to install and manage but relies heavily on the central node’s functionality. | An Introduction to Network topology - Cablify |
| Mesh | Every device is connected to every other device, offering multiple paths for data transmission. It’s highly reliable but can be complex and expensive to implement | What Is Mesh Topology? Advantages And Disadvantages Of Mesh Topology |
| Tree | Combines elements of bus and star topologies, forming a hierarchical structure. It supports scalable and organized network growth | Tree Topology Diagram |
| Hybrid | Integrates two or more different topologies to form a composite network. It’s flexible and adaptable to specific needs but can be complex to design | Hybrid Topology | What Is Hybrid Topology? | THE INSTRUMENT GURU |

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| --- | --- | --- | --- | --- | --- |
| Bus | Ring | Star | Mesh | Tree |  |
| Cost of cable is less but is used to build small networks | Data transmission is high-speed | Easy to set up | Communication is very fast between nodes | More devices can be attached to a hub thus it decreases the distance that a signal has to travel |  |
| Installation and troubleshooting are well known, there is a lot of documentation and support | Possibility of collision is minimum | Is reliable, if a link fails it will not affect other links | Is a robust topology | Allows a network to get isolated and also prioritize from different computers |  |
| Simple but requires a lot of cabling | Cheap to install and scale | Fault detection and isolation is easy | Fault diagnose is easy. Data is reliable because data is transferred through dedicated channels | Error detection and correction is very easy |  |
| If the backbone network fails all network fails | A single node failure can crash the whole network | Is cost effective | Provides security and privacy | When central hub fails entire system fails |  |
| If traffic is heavy collisions increases this is avoided some protocols are implemented | Troubleshooting is difficult | If the hub at the center fails all topology fails | Installation and configuration is difficult | Cost is high because of the cabling |  |
| Security is very low. Adding new devices slows down network | Less secure | Cost of installation is high and performance is is based on a single concentrator | Expensive to implement and maintain | Difficult to scale. Difficult to reconfigure if new devices are added |  |