

Analysis of network topology using Venn diagram

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Abstract: The right approach is important when organizing a network. Many types of networks are the main task of the work, choosing what you need from them and building a network. The article lists the services provided by the network. The Venn diagram is used to contrast (separate) ideas and shows the general and individual characteristics of the objects being compared. Individual and general aspects of computer network structures based on existing topologies (structures) using Venn diagrams were considered.

Keywords: topology, network, Venn diagram, bus network, ring network, star network and mesh network.

Introduction

The concept of network can be understood in different ways: the first meaning is to divide, the second means to generalize, the second means to unite. The network allows the transmission of information, the organization of the interaction of separate computers, the solution of a single problem using multiple computers. Such networks that facilitate the exchange of information between computers are called computer networks.

Main part

A network is a set of computers, terminals, and other devices that communicate with each other through communication channels.

Network types

1. PAN (Personal Area Network) - can have a maximum of 8 participants and a radius of up to 30 meters.

2. LAN (Local Area Network) - can have from 10 to 100 users and a radius of up to 100 meters.

3. CAN (Corporate Area Network) - combines several LANs. A large and multi-segment LAN is created.

4. MAN (Metropolitan Area Network) - a city-wide network. It covers a distance of 1,000 meters and unites 1,000 users.

5. WAN (Wide Area Network) is a global computer network. It unites millions of subscribers (Internet).

Type of network organization

While there are many different ways to connect computers, there are two main types: peer-to-peer and client-server networks.

In a peer-to-peer network, all computers have equal rights.

In client-server-type networks, the computer, called the server, is the heart of the network. It stores information and resources and distributes them to other computers on the network. The rest of the computers that use the network to get this information are called clients.

Computer networks are environments that specialize in transmitting and receiving information in the form of electrical signals. Examples of network services include:

File server service. In this case, all computers on the network can use the data of the host computer (server) or place their data in the memory of the host computer;

Print server service. In this case, all computers on the network can print their data on paper through the computer control, which is implemented in the service;

Proxy server service. In this case, all computers connected to the network can simultaneously use the Internet or other services through the computer management in which the service is implemented;

Computer and user management service. It monitors and controls the behavior and operation of all computers connected to the network and the users registered on them.

About network types and structure. Bus network - In this case, all computers are connected in series to a common communication channel. Each computer uses the bus to communicate with another computer (Figure 1).

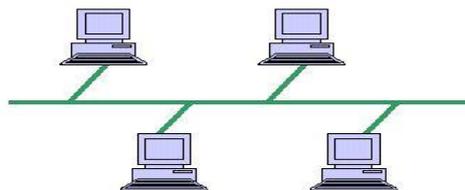


Figure 1 Bus network

Ring network - all computers are connected to each other in a series of loops. In this case, all computers have equal rights (Figure 2).

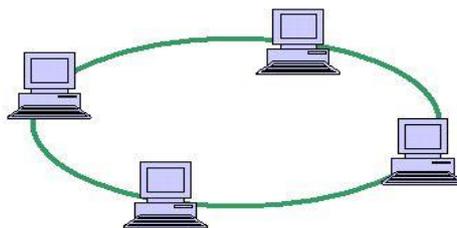


Figure 2 Ring network

Star network - In a star structure, all computers are connected radially through a central node to communicate with each other (Figure 3).

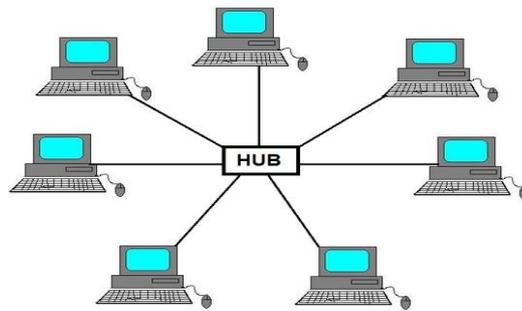


Figure 3 Star network

Investigate the structure of a local area network using the Venn diagram method

A Venn diagram is based on two or more large intersecting circles. There should be enough space for writing between the circles. This diagram is mainly used to contrast (separate) ideas and shows the general and individual characteristics of the objects being compared. The individual and general aspects of the structure of computer networks are considered using the Venn diagram (Figure 1.2.5) based on existing topologies (structures).

- A-bus structural network.
- B-ring structural network.
- C-star structural network.

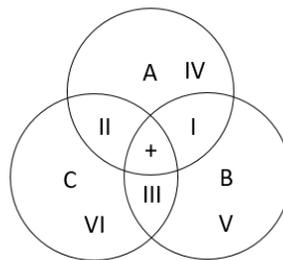


Figure 4 Venn diagram of three network topologies

General aspects for I - A and B network structures:

1. Cheapness;
2. Serial connection;
3. Coaxial cable.
4. Low speed of data exchange

II - Common aspects for network structures A and C:

1. Cable connection.

III - General aspects for B and C network structures:

1. Reliable;

IV is only relevant for structured network A: cheap, unreliable, interconnection between computers on the network.

V is only for B-structured network: equality between computers on the network, dependence on neighboring computers.

VI - only aspects that are relevant to the C structured network: relatively expensive, parallel connection, single management, relatively good data exchange rate.

Common to all three network structures:

- creation of a single structural network;
- connection by IP address;
- cable connection;
- opportunity to exchange information;
- connect all computers to a single network

Based on the Venn diagram above, we will look at the general aspects of the four network topologies. This requires information about another topology test topology.

Mesh network - direct communication between nodes in a network (Figure 5).

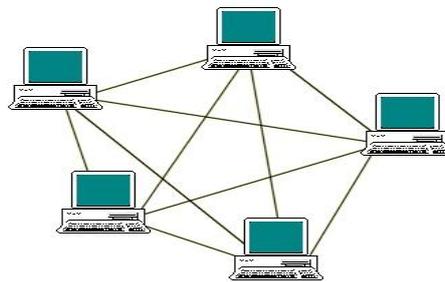


Figure 5 Mesh network

Determine the general and specific cases by combining the four networks based on the Venn diagram (Figure 6):

- A-bus structural network.
- B-ring structural network.
- C-star structural network.
- D- test structural network.

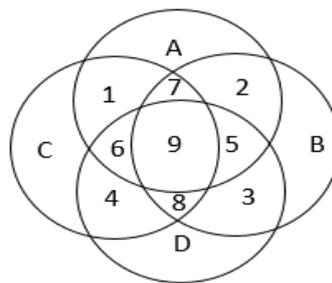


Figure 6 Venn diagram for four networks

- 1 - Common aspects for network structures A and C
 - Cable connection.
- 2 - General aspects for network structures A and B
 - Cheapness;
 - Serial connection;
 - Coaxial cable;
 - Low speed of data exchange.

3 - General aspects for B and D network structures:

- Cable connection.

4 - General aspects for C and D network structures:

- Relatively expensive;
- Connected in parallel;
- Twisted pair cable;
- Good data transfer speed.

5 - General aspects for network structures A, B and D

6 - General aspects for network structures A, C and D

- Cable connection.

7 - General aspects for network structures A, C and B

- Creation of a single structural network;
- Connect via IP address;
- Cable connection;
- Ability to share information;
- Connect all computers to a single network.

8 - General aspects for network structures D, C and B:

- Cable connection;

9 - Common to all four network structures:

- creation of a single structural network;
- Connect via IP address;
- cable connection;
- ability to share information;
- connect all computers to a single network.

Conclusion

Comparative analysis of network topologies.

| Indicator | Topology | | | |
|-------------------------------------|----------|------|------|-----|
| | Mesh | Star | Ring | Bus |
| Expansion value (less) | + | + | - | - |
| Add subscribers (average) | + | + | + | + |
| Damage protection (good) | + | + | - | - |
| Network length (optional) | - | + | + | - |
| Subscriber value (less) | + | + | + | - |
| Network load condition (good) | + | + | - | - |
| Ability to work in real time (good) | + | + | + | - |
| Network service (good) | + | + | - | - |
| Price (cheap) | - | - | + | + |
| Connection (series) | + | - | + | + |
| Security (reliable) | + | + | - | - |

| | | | | |
|---|---|---|---|---|
| Cable type (UTP twisted pair) | + | + | - | - |
| Form of management (single management) | + | + | - | - |

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