Both **Virtual Circuits** and **Datagram Networks** are the types of connection services which are used for transmission of information from a sender to a receiver. The most basic difference between the two is that the virtual circuits are connectionoriented services that require resources like buffers, CPU, bandwidth, etc., for a data transfer session, while the datagram networks are connectionless services where no such resources are required for data transmission.

There are many other key differences between virtual circuits and datagram networks, which we will discuss in this article.

What are Virtual Circuits?

Virtual Circuit is a connectionoriented service in which resources like buffers, CPU, bandwidth, etc. are used for creating a data transfer session. Virtual Circuit is also known as **connection-oriented switching**.

In virtual circuits, the path that is followed by the first data packet would get fixed and all other data packets will also use the same path and consume the same resources. Consequently, a common and same header is used by all the data packets.

Due to all these reasons, virtual circuits are comparatively less complex and more reliable for data transmission, however they are expensive to install and maintain. Virtual circuits are mostly used in Asynchronous Transfer Mode (ATM) Networks that are used for the telephone calls.

What are Datagram Networks?

Datagram networks are connectionless services for data transmission, in which no resources like CPU, buffer, bandwidth, etc. are required for data transmission. In datagram networks, the path for data transmission is not fixed. Therefore, the data packets are free to decide the path on any intermediate router on the way by dynamically changing the routing tables on the routers.

Since the data packets follow different paths, they have different headers with information of the data packets. Due to dynamic resource allocation and dynamic path, datagram networks are errorprone and less reliable. However, datagram networks are cheaper to install and maintain. They are widely used in IP (Internet Protocol) services like internet.

Difference between Virtual Circuits and Datagram Networks

The following are the important differences between Virtual Circuits and Datagram Networks –

Key	Virtual Circuits	Datagram Networks
Definition	Virtual Circuit is a connection-oriented service in which there is an implementation of resources like buffers, CPU, bandwidth, etc., used by virtual circuit for a data transfer session.	Datagram networks are a type of connectionless service where no such resources are required for data transmission.
Path	In Virtual circuits, as all the resources and bandwidth get reserved before the transmission, the path which is utilized or followed by first data packet would get fixed and all other data packets will use the same path and consume same resources.	In a Datagram network, the path is not fixed as data packets are free to decide the path on any intermediate router on the go by dynamically changing routing tables on routers.
Header	As there is same path followed by all the data packets, a common and same header is being used by all the packets.	Different headers with information of other data packet is being used in Datagram network.
Complexity	Virtual Circuit is less complex as compared to that of Datagram network.	Datagram network are more complex as compared to Virtual circuit.
Reliability	Due to fixed path and assurance of fixed resources, Virtual Circuits are more reliable for data transmission as compared to Datagram network.	Datagram networks, due to their dynamic resource allocation and dynamic path, are more errorprone and less reliable than Virtual circuits.
Example and Cost	Virtual circuits are costlier in installation and maintenance. They are widely used by ATM (Asynchronous Transfer Mode) Network, which is used for the Telephone calls.	Datagram networks are cheaper as compared to the Virtual Circuits. They are mainly used by IP network, which is used for Data services like Internet.

Conclusion

The most significant difference between the two is that, in case of virtual circuits, the path which is followed by the first data packet would get fixed and all other data packets will also use the same path; whereas in datagram networks, the path is not fixed, thus the data packets are free to decide the path on any intermediate router on the go by dynamically changing the routing tables on the routers.