Data Communications

What Does Data Communications (DC) Mean?

Data communications (DC) is the process of using computing and communication technologies to transfer data from one place to another, or between participating parties.

DC enables the movement of electronic or digital data between two or more network nodes, regardless of geographical location, technological medium or data contents.

Techopedia Explains Data Communications (DC)

Data communications incorporate several techniques and technologies to enable any form of electronic communication. It's a very broad way to refer to all of this networked technology on any platform or in any digital environment.

Some common types of data communications technologies include telecommunications, computer networking and radio/satellite communication. Data communication usually requires the existence of a transportation or communication medium between the nodes wanting to communicate with each other, such as copper wire, fiber optic cables, or wireless signals.

For example, a common example of data communications is a computer connected to the Internet via a Wi-Fi connection, which uses a wireless medium to send and receive data from one or more remote servers.

Some devices/technologies used in data communications are known as data communication equipment (DCE) and data terminal equipment (DTE). DCE is used at the sending node, and DTE is used at the receiving node.

Another way to talk about different types of data communications is to refer to the functionality that is available for a sender and a receiver to use. In terms of communications function, you have simplex communications, which are only one-way data communications, and you have half-duplex and full-duplex data communications models, as well as serial data communications.

With half-duplex communications, information can go both ways, but not at the same time. Full-duplex models accommodate simultaneous two-way communication of data.

That last form, serial data communications, is widely understood in networking. It means that the data is packaged into units, and then sent serially to the receiver by the sender. This typically takes the form of creating data packets with their headers and other bits of information, and then sending them consecutively to the destination, typically through platforms using the seven-layer OSI model that demonstrates the natures of different paths between nodes.

Data communication also relies on various types of protocols, depending on the environment in which the messages sent. Internet protocols like FTP, HTTP and HTTPS were developed in order to optimize data communications over the Internet.

One other useful way to think about data communications is by analyzing the architecture through which it occurs.

For the Internet, the traditional model has been client/server architecture.

A client/server architecture consists of stations that are 'clients' or consumers, and stations that are 'servers' or producers. The client makes the request of the server, and the server returns a result.

Although this has been the dominant model, there are now emerging peer-to-peer architectures that do not assign traditional roles of client and server to each node in the data communications network.

Increasingly, new systems will contemplate situations where devices either have less defined roles, or other advances to make network activity more versatile.

New advances like the Internet of Things promise different connectivity and different data communications models.

Characteristics of Data Communication

Data communication has four critical characteristics that are as follows:

- Delivery
- Accuracy
- Timeliness
- Jitter

► Delivery

Data must be sent in the correct order from the source device to the correct destination.

► Accuracy:

The information must be supplied without errors. The data should be retransmitted if there is any inaccuracy during transmission.

► Timeliness:

Data must be given within the timeframe provided. The data that was given late has become unusable.

► Jitter:

Jitter is caused by an uneven or unexpected delay in the packet arrival time.

Data Communication System-

A distributed control system (DCS) is a computerised control system for a process or plant usually with many control loops, in which autonomous controllers are distributed throughout the system, but there is no central operator supervisory control. This is in contrast to systems that use centralized controllers; either discrete controllers located at a central control room or within a central computer. The DCS concept increases reliability and reduces installation costs by localising control functions near the process plant, with remote monitoring and supervision.

Distributed control systems first emerged in large, high value, safety critical process industries, and were attractive because the DCS manufacturer would supply both the local control level and central supervisory equipment as an integrated package, thus reducing design integration risk. Today the functionality of Supervisory control and data acquisition (SCADA) and DCS systems are very similar, but DCS tends to be used on large continuous process plants where high reliability and security is important, and the control room is not geographically remote.

➢ A data communications system has five components:

Message:

The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.

Sender:

The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.

Receiver:

The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.

Transmission medium:

The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves

Protocol:

A protocol is a set of rules that govern data communications.