

# Network Speeds and Data Access Times

## Network Structure

A basic domestic network might consist of a PC or Laptop (and/or other devices) and a wireless Modem/Router which is also a network switch or hub which, in turn, accesses the Internet as shown below in Diagram 1.

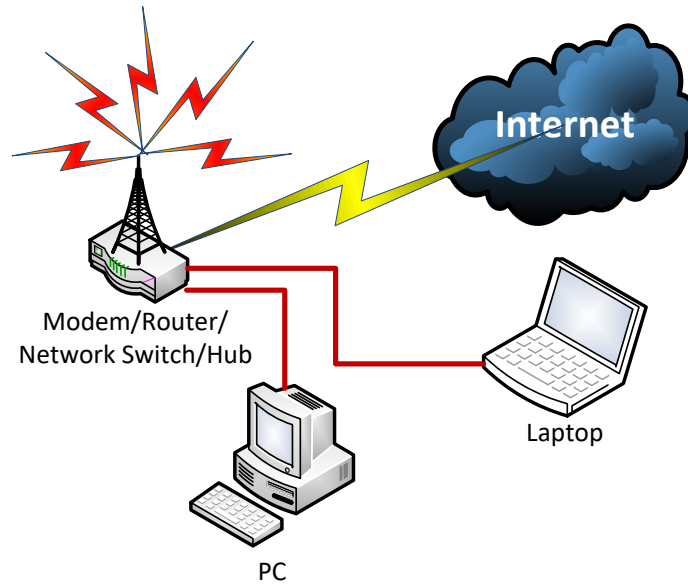


Diagram 1

A more sophisticated domestic network might involve various devices attached to the modem/router via a separate, more powerful network switch such as shown below in Diagram 2.

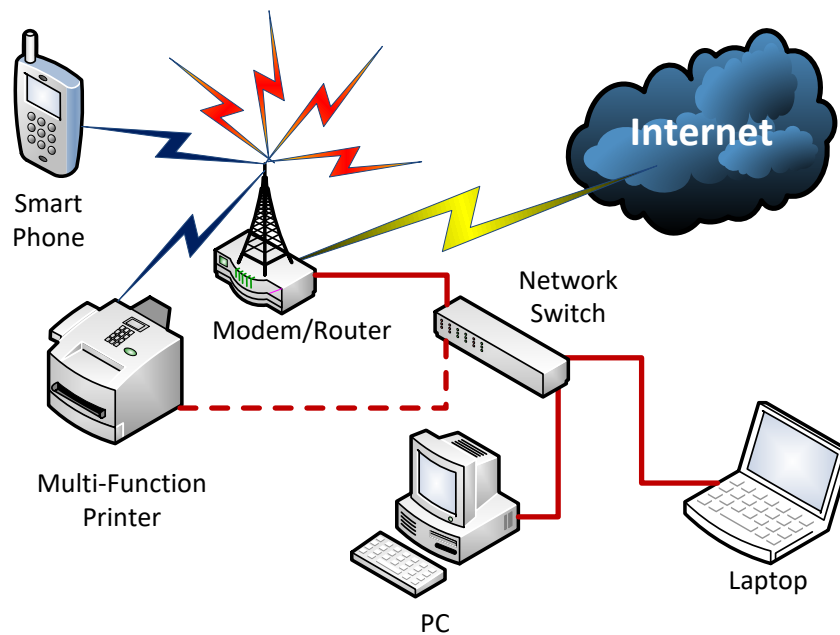


Diagram 2

A basic office network will incorporate the use of one or more physical servers as shown below in Diagram 3

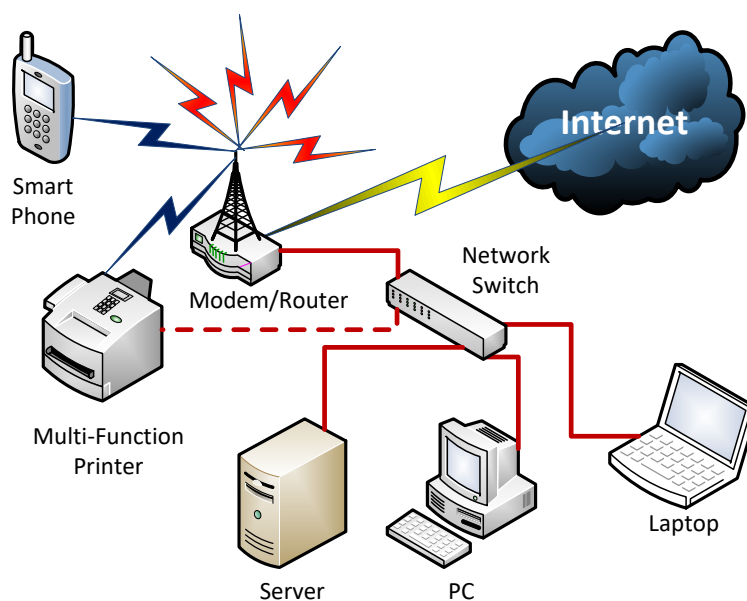


Diagram 3

### Network Speeds

In all cases, the speed of the network connections ( shown as dotted red lines (-----) or solid red lines (————) or blue lightning bolts (—————)) in the above diagrams directly influences the speed of the operations of the software which is installed and used on the various devices which communicate over the network.

Those network speeds have increased over time to the point where the most common speeds in use today for cabled networks are 10 megabits per second (mbps), 100 mbps (Fast Ethernet), 1000 mbps (Gigabit (Gb)) and 10Gb speeds for the newer networks.

There are also two types of connections which can be utilised over cabled networks – simplex and duplex. Simplex is one-way communication only at any one time. Simply put, this means that a computer talks to the server, then the server answers and talks to the computer. The two cannot communicate simultaneously. Duplex is Bi-Directional - where both computers talk to each other almost simultaneously. This effectively doubles the speed of that particular cabled network, so that on a gigabit network, for example, the speed can be almost 2gbps instead of the 1gbps experienced on the simplex network.

Wireless network connections are considerably slower – from 54mbps or slower, depending on the quality of the radio signal, up to 300mbps on those networks which can accommodate the newer wireless protocols and components.

In all cases on a wireless network, the communication is always simplex – it's physically impossible to duplex communications on wireless (radio) networks.

## The Fastest Data Access Speed

When accessing data – particularly when using SQL – the fastest speeds can be obtained when not using the network at all, by running the SQL database on the same computer which is running the client (E.G. Forecast5) software which is trying to access that data.

The main CPU/RAM/Motherboard communications bus in modern laptops and PCs computers runs at speeds which are many times quicker than the fastest of the networks (10gbps) types discussed heretofore. Indeed, modern databus speeds can easily far outrun the access times of the Hard Drive(s) upon which that data is stored, be that standard hard disks or SSDs. So much so that where the data is being accessed on a single computer, the access time of the hard disk is the bottleneck, or limiting factor.

This is because the time needed to access data on a standard Hard Drive can range from five thousandths of a second on a 10,000rpm server hard drive to 30 thousandths of a second or more on a 5400rpm laptop HDD. In a SSD, that access time is typically under 0.1ms (one ten thousandth of a second).

In real data terms, this means that regular HDD can perform read/write operations at between 50 and 150MB per second while an SSD can perform the same operation at between 200 and 500MB per second. So, in rough terminology, a Solid State Drive is, at least, 4 times and up to ten times quicker than a regular hard drive in real data read/write terms.

Therefore, the best situation to be in for fast data access and computing speeds is to install the Forecast5 program and SQL Server (be that SQL Express or the full MS SQL Server(with the highest available amount of RAM dedicated to the SQL Server programme)) on a reasonably quick PC or laptop which is using a SSD drive.

When forced to use a networked SQL storage base, make sure the computer running the SQL server software is of the best possible specs with the highest available amount of RAM dedicated to the SQL programme and that the interconnecting network is running at the fastest possible speeds – preferably duplexed, cabled network - not wireless.

Best regards.



Chris M. Riley, MSc, Cert Ed., CITP, MBCS