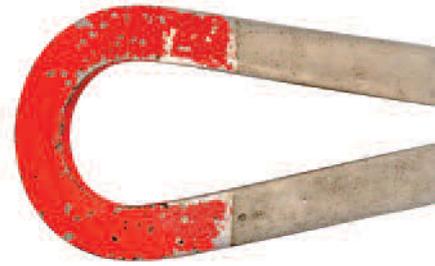


Connectivity. We love I.T.

---





**CONNECTIVITY**  
We love I.T.

**Connectivity...**  
Attractive I.T solutions.

**Why Claritas:**

Founded in 1997, Claritas Solutions provides independent IT services and solutions across all industry sectors.

Claritas works closely with clients to understand business strategies, utilising an independent approach to defining solutions that underpins a clients business objectives.

Claritas design solutions to enable companies to gain a competitive advantage, whilst reducing costs and mitigating risk.

Claritas work with organisations in a variety of different sectors, ranging from manufacturing to finance in the private sector and securing some the UK's most prominent public sector organisations such as police and government departments. These organisations rely on the IT team of technical experts to deliver truly exceptional 24/7 service, and to ensure the smooth running of their own businesses.

**Contents:**

Why Claritas	1
What is Connectivity	2
Private or Public	2
How it all fits together	2
Physical Media	3
Size is everything	3
Providers/Carriers	3
Symmetrical Communication	4
Contention	4
Levels of Service	4

**Claritas Solutions**

West Wing, Bowcliffe Hall,  
Bramham, Wetherby  
LS23 6LP

T. 01937 849 966

E. [contact@claritas-solutions.com](mailto:contact@claritas-solutions.com)

**CONNECTIVITY**  
We love I.T.

## The Claritas clear thinking introduction to... Connectivity.

### What is Connectivity?

Connectivity relates to data communication. This is the transfer of information from one place to another. This can be enabled by using various transmission media, both internally and externally within an organisation.

Usually when people refer to connectivity in a business environment, they are talking about data transfer between different physical sites.

### Private or Public

Organisations will need to have the ability to access information in different ways. Broadly speaking, there are two ways that this communication happens.

Firstly, an organisation may have two or more physical locations, which may be in different parts of the country or even internationally. It is likely that remote sites will want to exchange computer information; access shared applications, and use the same stored data. To enable this they must connect to each of these sites in a secure and private manner. This can be achieved by using Wide Area Network (WAN) - private communication links that connect the sites together, and allow the computer systems to "talk" securely to each other.

Secondly, Connectivity relates to communication to public networks, such as the Internet. This enables communication with public web sites, blogs, email etc. to people who are not in the sending or receiving organisation, and interaction by social media. e.g. Facebook, twitter, etc.

### How it all fits together

There are various components that make modern data communications possible.

The most important part of this communications pathway, from a customer's perspective, is the access method used to connect to the chosen provider's network. These can be delivered in various ways.



---

#### Claritas Solutions

West Wing, Bowcliffe Hall,  
Bramham, Wetherby  
LS23 6LP

T. 01937 849 966

E. [contact@claritas-solutions.com](mailto:contact@claritas-solutions.com)

---

## CONNECTIVITY We love I.T.

### The Claritas clear thinking introduction to... Connectivity.

#### Physical Media. What can be used to transfer the information?

How is the data actually transferred? Well, using various communication paths. The most common of which is using electrical pulses that are sent down copper wires. This is very similar to the technology used in telephone calls, and is why the telecommunication industry and the data communications industry are very similar. Most companies that operate in one of these market sectors usually operate in the other.

Other "physical media" that can be used in connectivity include radio frequencies, microwaves, satellite communication, fibre optics (where light is shone down thin glass tubes) and lasers.

#### Size is everything

When we talk about size in connectivity, we are talking about two inter-related properties of the connection. Either:

#### How much information I can transfer in a set amount of time

Or

#### How much time it takes to transfer a set amount of information

These measurements are called the bandwidth, or, throughput of the connection. This "speed" is measured in bits per second, written as "bit/s". Because modern data communication can happen really fast, bandwidth is more often represented as Kilobits (1024 bits), Megabits (1024 Kilobits) and even Gigabits (1024 Megabits).

\*note here - a bit refers to a single small piece of data, either a binary one "1" or binary zero "0". A single character of information such as the letter "A" can take 8 or 16 bits of information to represent/transfer.

#### Providers/Carriers

Once the data has been sent down the physical media of the Access Circuit, at the line's speed, it is passed on via the carrier to the provider's network. The provider can then send this information to another site on their network (WAN), or by using links to other provider's networks, i.e. the Internet.



#### Claritas Solutions

West Wing, Bowcliffe Hall,  
Bramham, Wetherby  
LS23 6LP

T. 01937 849 966

E. [contact@claritas-solutions.com](mailto:contact@claritas-solutions.com)

## CONNECTIVITY We love I.T.

### The Claritas clear thinking introduction to... Connectivity.

#### Symmetrical Communication

Data transfer is a two way thing. You send information and expect to receive information back. The sending and receiving of information can happen at the same speed, and is referred to as symmetrical (or sometime synchronous). This is usually the case for business connections.

Sometimes you don't need to send information at the same speed as it is required to be received. For instance when someone is browsing web pages - a small web page request (the web address/URL) is sent, and lots of page content (the text, images, sound and even video) is received. Therefore some connectivity technologies send and receive at different speeds. These are called asymmetrical or asynchronous. Domestic Internet connections used by home users are usually asymmetric.

#### Contention

Sometimes, particularly in domestic connectivity, it is necessary for customers to share the resources of the network carrier or provider. This is referred to as contention, and is measured as a ratio. This ratio expresses the number of users who "contend" or share the available bandwidth and network resource. Contention ratio of 20:1 (twenty to one) and 50:1 (fifty to one) are not uncommon.

#### Levels of Service

The last element to consider when comparing connections is what happens when something goes wrong. This can relate to the problem with the physical media (someone accidentally digs up a cable or snaps a telephone wire, interference with radio communications, etc.) or the equipment placed on the ends of the media (routers or switches) loses power or goes faulty.

Some types of media are inherently more stable than others, such as an electrical wire is usually less open to interference than a radio connection.

If a problem is encountered with the connection, then how quickly the network carrier or provider fixes the problem is important. This "time to fix" is usually set out in the connectivity provider's service level agreement (SLA). In some case no "time to fix" exists at all, and repairs are performed on a "best endeavors" basis. Other connections have guaranteed fixed time of a couple of hours. It follows that services with a shorter time to fix are typically more expensive than those that have a longer fix time or none at all.

Services can be made even more available, by deploying redundant or back up connection paths and multiple sets of edge equipment. This should enable a service to continue, even if one of its components fails. Care needs to be taken when designing these types of redundant systems to ensure that no "single points of failure" exists (e.g. primary and backup wires go down the same hole in the road, or terminate in the same piece of equipment).



#### Claritas Solutions

West Wing, Bowcliffe Hall,  
Bramham, Wetherby  
LS23 6LP

T. 01937 849 966

E. [contact@claritas-solutions.com](mailto:contact@claritas-solutions.com)

Name	Description	Physical Media	Speed Range	SLA/Time to Fix
Asymmetric Digital Subscriber Line (ADSL)	Digital broadband connection for residential and business locations.	BT OpenReach Telephone network. Copper/Aluminum wires	Variable depending on distance from Exchange/ Quality of cabling Up to 2Mb/s downstream Up to 512Kb/s Upstream	None – Best Endeavors only
ADSL Max	Later generation of digital broadband connection for residential and business locations.	BT OpenReach Telephone network. Copper/Aluminum wires	Variable depending on distance from Exchange /Quality of cabling Up to 8Mb/s downstream Up to 768Kb/s Upstream	None – Best Endeavors only
ADSL 2+	Latest generation of digital broadband connection for residential and business locations.	BT OpenReach Telephone network. Copper/Aluminum wires	Variable depending on distance from Exchange/Quality of cabling Up to 24Mb/s downstream Up to 1.5Mb/s Upstream	None – Best Endeavors only
E1 Leased Line	Using multiple bonded digital (ISDN) connections	Digital phone lines (usually copper)	Fixed Speeds (i.e. not variable) up to 2Mb/s	Usually 4 hour fix SLA
E3 Leased Line	Using multiple bonded digital (ISDN) connections	Digital phone lines (usually copper)	Fixed Speeds (i.e. not variable) up to 34Mb/s	Usually 4 hour fix SLA
E4 Leased Line	Using multiple bonded digital (ISDN) connection	Digital phone lines (usually fibre)	Fixed Speeds (i.e. not variable) up to 155Mb/s	Usually 4 hour fix SLA
10Mb/s Ethernet	LAN or Wide Area Extension Service	Usually fibre	Fixed Speeds (i.e. not variable) up to 10Mb/s, usually in 2Mb/s increments	Usually 4 hour fix SLA
100Mb/s Ethernet	LAN or Wide Area Extension Service	Usually fibre	Fixed Speeds (i.e. not variable) up to 1Mb/s, usually in 10Mb/s increments	Usually 4 hour fix SLA
1Gb/s Ethernet	LAN or Wide Area Extension Service	Usually fibre	Fixed Speeds (i.e. not variable) up to 1Gb/s, usually in 100Mb/s increments	Usually 4 hour fix SLA
GPRS (General Packet Radio Service)	LAN or Wide Area Extension Service	Usually fibre	Fixed Speeds (i.e. not variable) up to 1Gb/s, usually in 100Mb/s increments	Usually 4 hour fix SLA
Enhanced Data rates for GSM Evolution (EDGE)	Data service on Mobile carriers network	Microwave/GSM	Up to 400Kb/s depending on signal strength	N/A – Location dependent
3G/HSDPA	Latest service on Mobile carriers network	Microwave/GSM	Typically 3.6Mb/s or 7.2Mb/s, but up to 56Mb/s in theory	N/A – Location dependent
WiMax	Wireless access circuits, usually located in metropolitan areas	Radio/ Point-to-Point Wifi	Currently 40Mb/s, but future deployments may be up to 1Gb/s	Dependent upon supplier/carrier
Satellite	Usually bundled with voice and streaming IP services, and "satellite communication in a box"	radio wave uplink and downlink via space-borne satellite	Usually offered in asymmetric packages, up to 492Kb/s downlink	Not location dependent SLA can vary