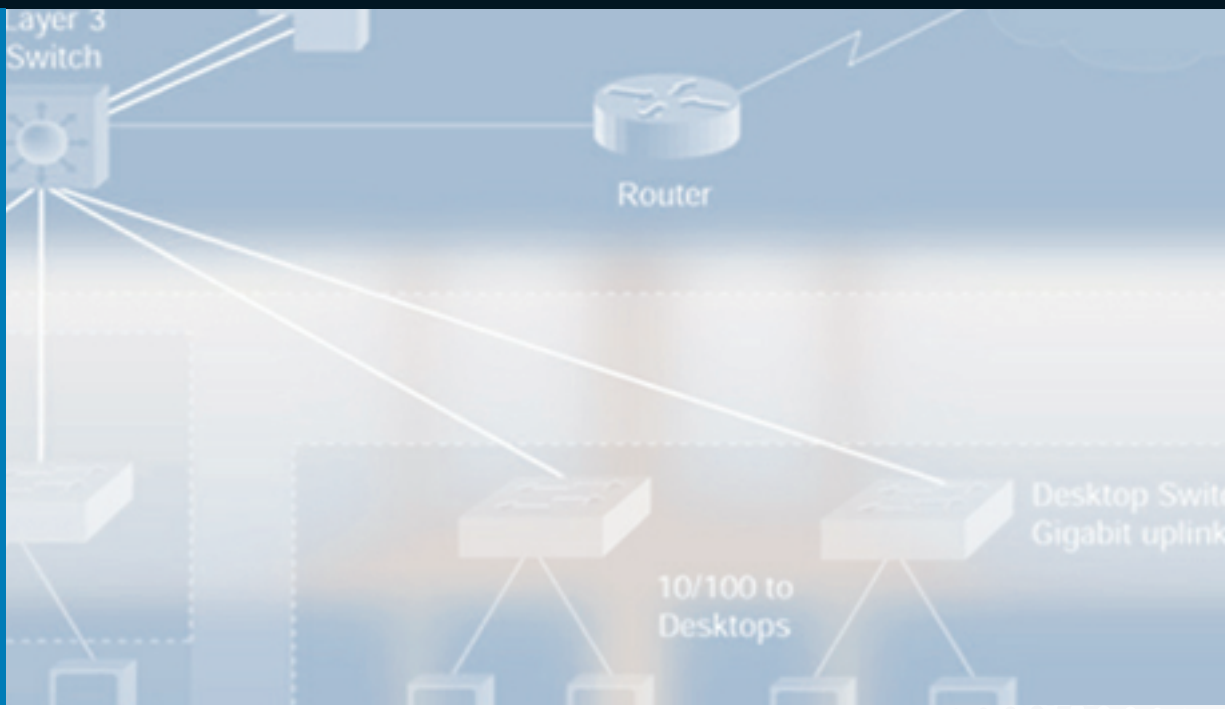
Cisco Systems

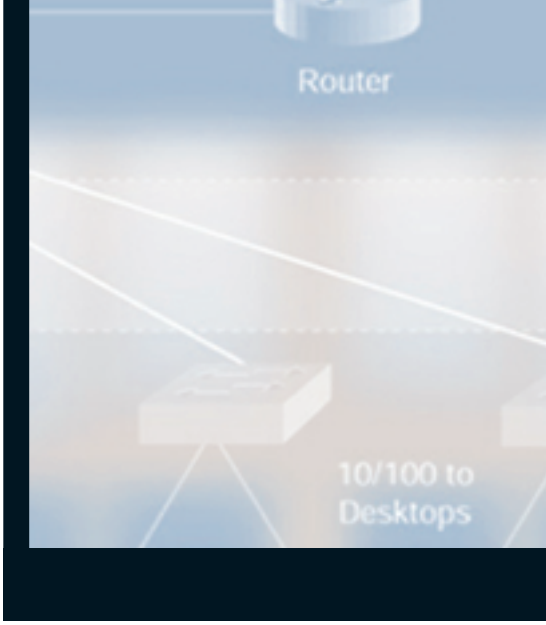
E-Seminar



Long Reach Ethernet

Internet Technology Solution

Seminar



Long Reach Ethernet

Internet Technology Solution

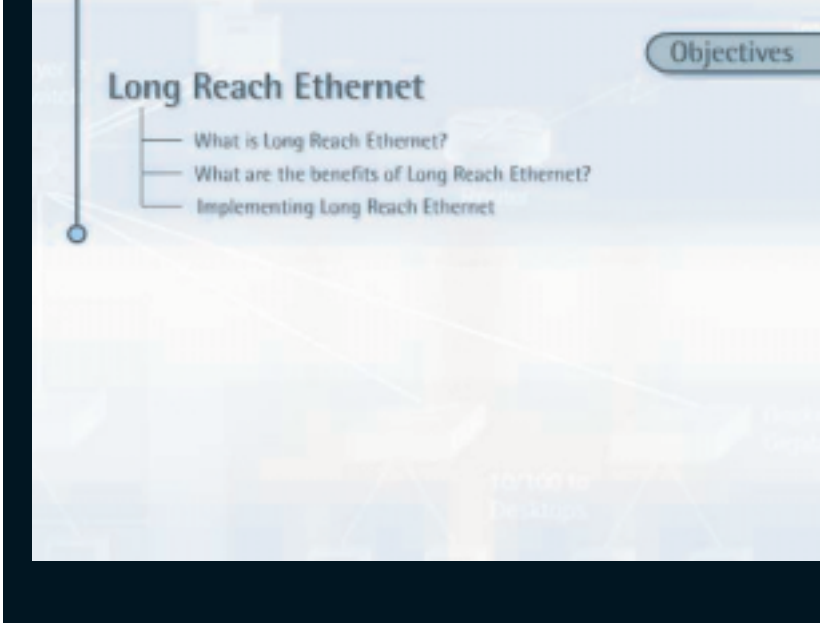
Seminar

Welcome

Welcome to the Technology Solutions E-seminar on Long Reach Ethernet.

Broadband Internet access is becoming more and more popular among both professional and residential Internet users. Many business solutions are based on applications which feature video, graphics and audio, and as such require high bandwidth. Unfortunately, the cabling infrastructure in many locations is a bottleneck to broadband connectivity. Older buildings often only have telephony cabling, and are therefore difficult to provision with high-speed service.

Long Reach Ethernet is a new technology which brings Ethernet connectivity over single-pair wiring, and over long distances.

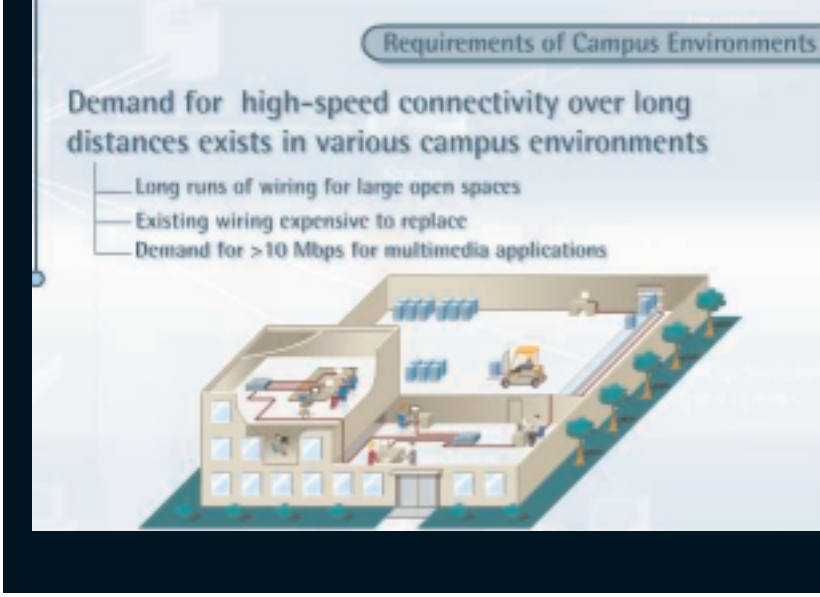


Objectives

In this seminar, we will discuss what L-R-E, or Long Reach Ethernet technology is about, and how it differs from other Ethernet technologies.

We will first explain what a Long Reach Ethernet is, and what the potential benefits could be for your company.

We will also discuss the technical aspects of implementing Long Reach Ethernet

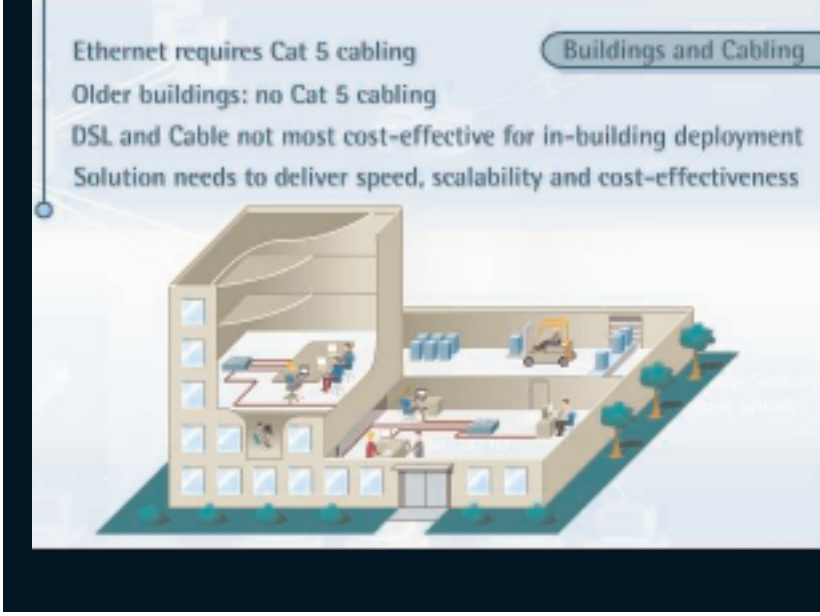


Requirements of **Campus Environments**

With Internet business solutions becoming increasingly important for the operations of many companies, Ethernet is the technology of choice for Local Area Networks, or LANs.

The characteristics of certain organisations, however, are such that enabling such networking is either difficult to accomplish or very expensive when based on traditional networking technologies.

Environments where organisations require large amounts of space, such as manufacturing plants, educational or healthcare environments, commonly have large open spaces, and as such large distances between different buildings. New network cabling, to accommodate Ethernet, would require long runs of wiring and a significant investment. At the same time, existing phone wiring or older network wiring exists in many such environments, but cannot be used to support the requirements of multimedia applications.



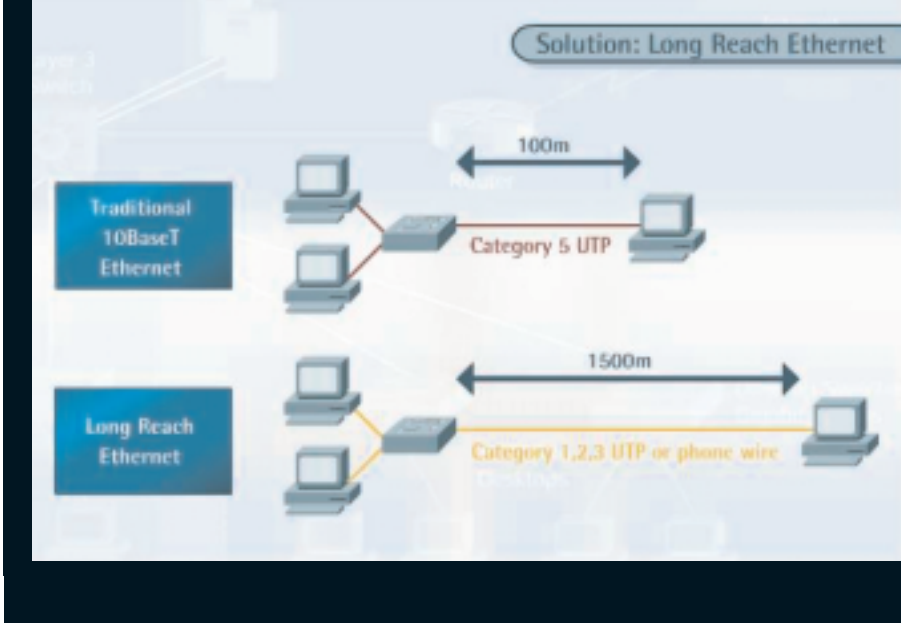
Buildings and Cabling

Another common environment which is challenging to equip with new Ethernet networks is a concentrated office environment in existing buildings.

Nearly all buildings constructed before 1985, as well as many built after this date, are almost guaranteed NOT to be appropriately wired for Ethernet. Native Ethernet connectivity requires what is known as “Category 5” cabling, which is high grade “twisted pair” wiring required to support the data rates of Ethernet.

In the absence of Category 5 cabling, only a few options are available to provision buildings with high speed networking, for instance broadband DSL or “Cable” connections. These are appropriate for Internet access to buildings, but when high speed connectivity - above 1Mbps - is required or if high speed services such as video and voice are expected, Cable or DSL do not provide the most cost effective solution.

The ideal solution needs to deliver the 3 vital components of broadband services: speed, scalability and cost-effectiveness.

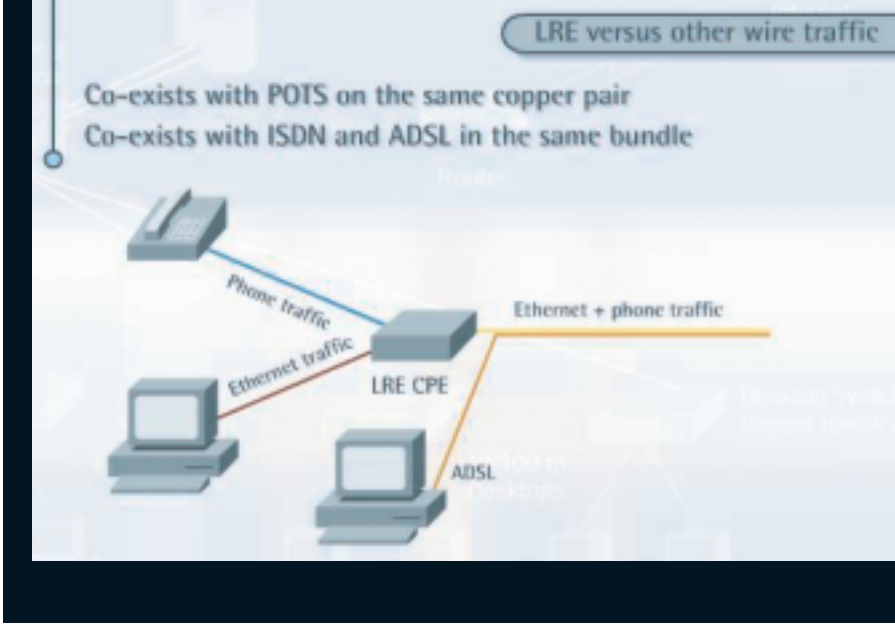


Long Reach Ethernet Seminar

Solution: **LRE**

Long Reach Ethernet is a technology solution that can meet these requirements. It makes high-speed access more convenient and affordable, by providing data transmission speeds of 5 to 15 megabits per second, over standard twisted-pair telephone wire, without disturbing normal phone conversations. As such, it enables high-speed Internet access with standard Ethernet protocols, allowing for all IP-based functions, such as Web access, multimedia, and virtual private networking.

For many years, Ethernet has proven to be a robust technology. The most common standard, also known as 10-Base-T, is a highly regarded networking technology, with a reach of 100 meters. LRE extends this distance reach up to about 1500 meters. While traditional Ethernet requires Category 5, Unshielded Twisted Pair, or UTP, cabling, Long Reach Ethernet can run over older Category 1, 2 or 3 cabling. It even enables Ethernet to run over existing, unconditioned telephone-grade wire, which is already widely deployed.

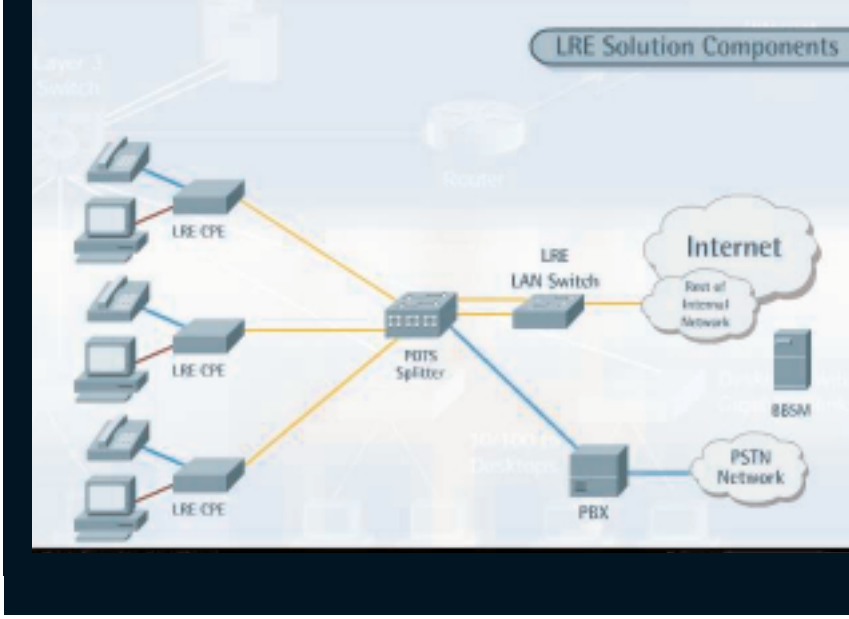


LRE versus other wire traffic

So when LRE can use the same wires as the existing phone infrastructure in a building, what is its impact on the phone system?

As a matter of fact, LRE transmissions are able to co-exist with traditional telephony traffic, also commonly referred to as “Plain Old Telephone Service” or POTS. It can also co-exist with digital phone traffic controlled by a PBX over the same pair of ordinary copper wires. At the end user location, PC and phone need to be connected to an LRE CPE device, “CPE” standing for Customer Premise Equipment. As we will see, the merged Ethernet and phone traffic will be split again further on in the network.

Long Reach Ethernet can also co-exist with ISDN or ADSL traffic in the same wire bundle. As ADSL also makes use of existing phone wires, as long as more than two wire pairs are available, both can travel together. As such, existing network and telecommunications infrastructures can be used in conjunction with LRE, providing broadband services for a very low overall cost.

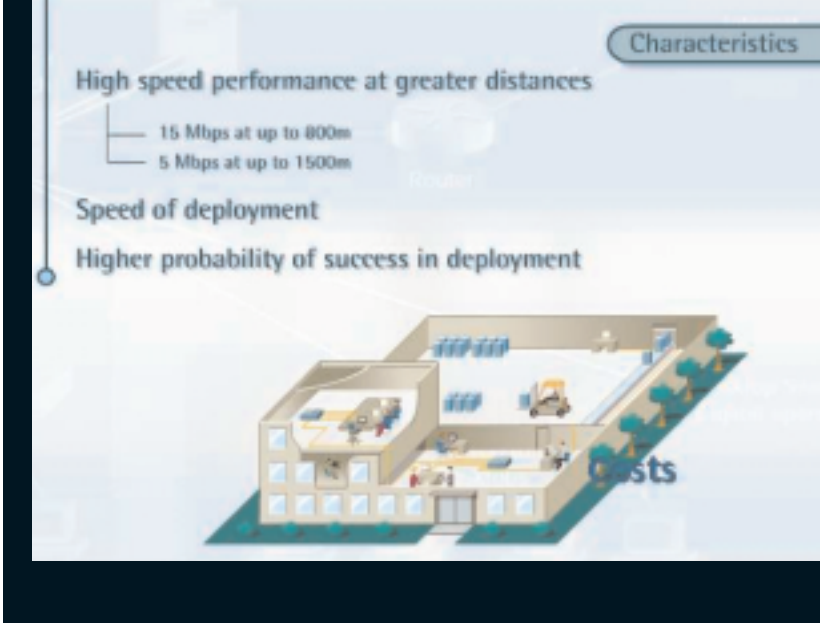


LRE Solution Components

Let's have a look at what happens beyond the LRE CPE device in a common network design. A POTS splitter separates the traffic again and sends phone traffic to the PBX and, if desired, on to the Public Switched Telephone Network, or PSTN. As there may be many end users in a company environment, a POTS splitter is capable of concentrating many LRE CPE connections.

Ethernet traffic follows a path to a special Long Reach Ethernet capable LAN switch, which forwards traffic onto the rest of the company's internal network, or beyond that, to the Internet.

In environments where multiple organisations or unrelated users are housed in the same building, network traffic will have to be separated per organisation. A special software platform, called a Building Broadband Service Manager, or BBSM for short, will take care of this. This system has several capabilities, including self-provisioning, authentication, tiered service levels and integrated billing, and even enables users to choose different types of service at different price points. Typical environments where the BBSM system is key are hotels, convention centres, airports and even hospitals



Characteristics

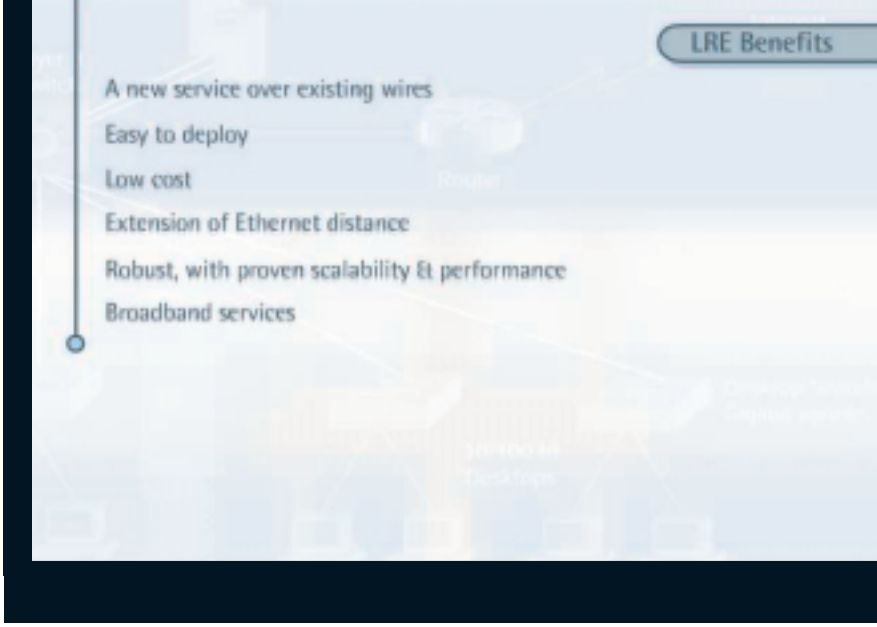
Long Reach Ethernet delivers a very compelling return on investment for the provision of high-bandwidth within older, multi-unit buildings. It dramatically lowers total infrastructure costs and total annual costs.

Furthermore, other, direct broadband options such as ADSL or "Cable", do not provide a bandwidth up to 15 Megabits per second.

Overall, the characteristics of Long Reach Ethernet are unmatched by any existing broadband technologies.

With LRE, distances become much less of an obstacle. LRE can offer speeds up to 15 Megabits per second at up to 800 meters, or 5 Megabits per second at up to 1500 meters. This eliminates the requirement to perform distance testing in 80% of the installations, saving time and cost.

Because Long Reach Ethernet works over existing telephone wiring, it can be deployed quickly. There's also a higher probability of successful deployment because it runs over an existing, operational wiring infrastructure.



Benefits

As you have noticed, the benefits of Long Reach Ethernet are very obvious and clear.

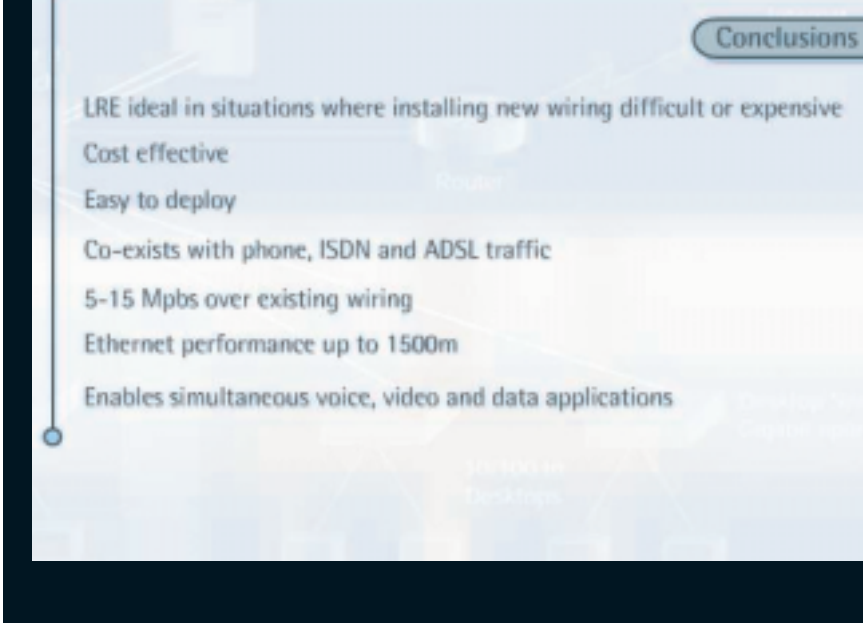
Long Reach Ethernet enables a new service over what you already have: your telephone wiring infrastructure.

The solution is easy to deploy at a very low cost. Because Long Reach Ethernet runs over a building's existing telephone-grade wiring and is based on Ethernet, it is an inexpensive solution that delivers high-speed access without the time, expense and inconvenience of having to rewire the entire facility with Ethernet-grade cabling, that is: Category 5 cabling.

LRE also overcomes the distance limitations of traditional Ethernet by providing Ethernet-performance at distances up to 1500m. There's no need to extend the network, simply because of distance, with additional hubs, bridges or switches.

The LRE solution is also a fully tested, robust technology, with proven scalability and performance.

•Finally, because of the high bandwidth that Long Reach Ethernet delivers to the desktop, broadband services which integrate voice, video and data become possible for its users. For exampleExamples include: high-speed Internet access, video-on-demand, IP telephony, multimedia, secure access to virtual private networks, office productivity applications, and distance learning/training, and more are available..



Conclusions

Let's summarise the most important points.

Traditional networking solutions have always required a modern and high-quality wiring infrastructure. In environments where installing new wiring is difficult or very expensive, Long Reach Ethernet is may provide the answer.

It is a cost-effective, easy-to-deploy technology which can co-exist with phone and ISDN traffic over the same wires and ADSL traffic in the same wire bundle.

Long Reach Ethernet is an end-to-end technology solution, which can deliver 5 to 15 Megabits-per-second bandwidth over existing Category 1, 2 or 3 wiring. With Ethernet-like performance that reaches up to 1500 meters, LRE enables simultaneous voice, video and data applications, such as high-speed Internet access, video streaming and IP telephony.