Research paper on current fiber optic technologies

Technology, Internet

INTRODUCTION

The internet is termed as a revolutionary change in every society because of the technological and societal changes it brings about. The ease of access and exchange of information has become a phenomenon that is replacing old concepts. Companies are outsourcing their services to companies located overseas through the internet. The place and time of working has been greatly impacted by the internet. People work from the comfort of their homes at any time of the day and night possible through improved internet connectivity thanks to technologies such as fiber optics. The paper will review some of the current fiber optic technologies that make it desirable in many applications.

FIBER OPTICS

Fiber optics is simple technologies that make use of waveguides to transport information from one destination to the other in the form of light. Current fiber optic technologies contrast the old copper wire transmission because it is not electrical in nature but offers efficient transmission speeds and is more tolerant to interference.

Current technologies in fiber optics include baseband and broadband video fiber optic transmissions. Broadband fiber optic communication is the latest technology that encompasses applications that utilizes high speed and high bandwidth consumption. Such applications such as fiber optic CCTV transmission and VOSCOM’s fiber optic transmission systems for transmitting multimedia are the latest applications that demand high bandwidth only possible through fiber optics.

COMPONENTS OF FIBER OPTICS

The components of fiber optic networks essentially include transmitting device, optical fiber cable and a receiver which accepts the light signal. If an intended site is already connected to the internet through some kind of broadband connection, it can still accommodate fiber optics. In this respect, optical fiber cables can be installed with the same equipment that was previously used for copper and coaxial cables. The system design process might decide to accommodate installation of additional spare cables to gather for future requirements and expansion.

OPERATION OF FIBER OPTICS

According to fiber optic is made up of transmitters, regenerators, receivers and the fiber optic cable itself. The LED source in the transmitter produces light source which is modulated in a digital system from the electrical transmission system. The fiber optic cable measuring one to one half inch is rubbed in protective coatings. A regenerator serves to regenerate the signal periodically as a result of attenuation and subsequent loosing of shape. The photo detector in the receiver end converts the signal from the fiber into an electrical signal for transmission through non-optical parts of the network.

DEPLOYMENT OF FIBER CABLE

Cable sizes are available in different sizes and types. The selection of the cable type is a factor of the needs of the company as well as the business strategy and bandwidth requirements. Cable sizes are available in 24, 36, 48 and 60 core cables. Inter-city and metropolitan fiber links are recommended to use this quantity because of the marginal costs involved. The provision for

dark cables is necessary for future expansion rather than the need to install another fiber again in the future due to demand surges.

Once the cable is laid in the intended premise, it is split by optical splitters to serve multiple premises in the range of 16 to 128. This technology is known as passive optical network point-to-multipoint and fiber to the premise. A passive optical network is made up of optical line terminal situated at the service provider’s central office and other optical network units which are stationed near the intended premise. Thus, a passive optical network is a fiber optic access network that reduces the number of fiber and central office equipment necessary.

Optical Line Terminal is the central office node in PON made of single or multiple optical; network units. A splitter found between them are referred as the optical distribution network and are used to bridge to a customer premise device through local area networking technologies such as Ethernet over twisted pair. ONU therefore terminates the PON and present the user with customer service interfaces in the form of telephone and data signals.

FIBER CABLE PREMISE ARCHITECTURE

Passive optical networks split the fiber signal and distribute it to the individual premises through the use of beam splitters. Because the splitters cannot provide any form of switching or buffering, and do not require electrical power to operate, it forms a point-to-multipoint link connection.

The optical network terminals on the users end broadcast signals to all users in the network served by a single splitter. To prevent possible signal coalition in the network, wave-division multiplexing and time-division multiplexing are used.

Passive optical components contain components such as WDMs, circulators, filters and isolators. These components have extensive uses in loop feeder, interoffice, SONETs, Fiber in the Loop, and Synchronous Digital Hierarchy among others in optical communication systems.

Inside the premises, indoor Optical Network Terminals ONTs are used to provide broadband fiber connections directly to the LAN users. This technology is termed the next generation in that it replaces the legacy Ethernet equipments and associated copper based CATx wires. Single mode fiber presents more bandwidth capacity, low cost and long term solution for indoor LAN networking.

FIBER TO THE DESKTOP ARCHITECTURE

Fiber to the desktop architecture uses single mode fiber installed on the end IP/Ethernet device. ODN splitters are either installed on the data centre, remote fiber distribution housing or telecom closets depending on the building fiber design strategy. ONT handles the electrical conversion and GPON to Ethernet transition. Generally, ONTs has numerous capabilities then conventional CATVx cables. They provide voice, data and video service in both RF and IP modes. In addition, all enterprise LAN services can be supported over a PON such as building surveillance camera, and wireless access points. Other versions of Fiber to the Desktop are powered over the Ethernet, and almost all versions are easily mounted above the desk or on the wall.

FIBER TO THE HOME ARCHITECTURE

The need for better connectivity is the reason behind the surge in fiber to the home broadband connections. Fiber –to-the-home broadband connections is a fiber cable connection to individual residences. Fiber is the solution to low speed dial up internet connection services. Through FTTH optic-based systems, a multitude of services including, telephone, video, and data are delivered more efficiently as compared to traditional systems for about the same prices. FTTH is dependent on both active and passive optical networks to function and is generally far much easy to manage. According to Broadband Properties, there are over 10 million household connected to fiber broadband services with almost half of this number in Japan and about 1 million in the United States. FTTH technology has a lot of advantages than conventional connection methods. The technology can provide unprecedented bandwidth to handle projected consumer demands of voice, video and data with the same cost. According to FTTH can be achieved in two ways in this scenario; through active and passive optical networks. An active optical network uses electrical powered switching equipments like routers, and switch aggregators to control signal distribution to specific users. The switch opens and closes in various mechanisms to direct signals to a designated place.

CONCLUSION

Fiber optics is the next generation architecture for improved connectivity in the digital world. For instance, a single fiber pair has the capability to relay more than 2. 5 million simultaneous phone calls unlike single copper pair conductors which is limited to six phone calls.

Works Cited

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