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OPTICAL NETWORK SURVIVABILITY – ANOVERVIEW

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ABSTRACT

Survivability plays a vital role in the field of Optical Communication and Networks (OCN). Survivability represent networks self protection and restoration processes to enable the multiple connectivity traffic pattern techniques. In Optical communication bandwidth deploys the Digital Cross Connectivity. It provides robust in nature in terms of SHCDSRT (Span, Hub, Central Office, DXC, Switching Routing techniques). It enhances the optical broadband access in an architectural design. Optical Network algorithms (ONA) represents the effectiveness trade off analysis. In this paper mainly discusses bundling analysis integrates the network adhoc connectivity fairness creativity in an optical Network and the network survivability focuses the throughput in terms of propagation mechanisms within the transmission ranges. The quality of service determines the ONPP (Optical Network Parameters Performance) by propagation through packet delivery and maximum speed techniques have presented.

KEYWORDS: Optical QoS, Network Bandwidth, DCS, Adhoc Network Connectivity, Fairness, ONPP, SHCDSRT.

In long-haul network technology over the past ten years, most notably in fibre capacity, optical switching, and optical reach [1], has shifted the bandwidth and operational bottlenecks from the core network to metro and access networks. However, as advances in wavelength-division multiplexing (WDM) technology propagate closer to the network edge, thereby enabling the proliferation of application switch very high bandwidth and/or stringent performance requirements, core networks eventually will become strained in both capacity and flexibility.

Thus, while the capabilities of today's applications become more tied to the transfer of large amounts of data, the ability to survive multiple concurrent failures will become eessential. It is important that all of these goals be met in a scalable fashion with respect to network cost, equipment size, and power requirements. It is desirable that solutions that are suitable for a range of commercially deployed networks as well as government owned networks be found in order to achieve economies of scale. Furthermore, note that the requirements of the network will be very heterogeneous. For example, while some applications may require format transparency, the bulk of the applications will not. For example, the higher the transport rate of an individual wavelength, the fewer the number of wavelengths that need to be switched, but the more grooming needed to pack the wavelengths efficiently. Various solutions in these three areas are proposed and analyzed from the point of view of overall network technological feasibility. The requirement of rapid reconfigurability poses challenges especially in the area of switching architecture. We discuss several core optical switch architectures, along with their performance tradeoffs. We also consider simplification of the switch technology through the use of more flexible transmit/receive cards. The ability to rapidly reconfigure a network typically requires the pre deployment of some amount of networking equipment that is utilized on an as-needed basis (e.g., in response to a shift in demands).

We proposes architectures that can minimize the impact of pre deployed equipment while maintaining a high degree of flexibility. In looking at the challenges of providing very high capacity and configurability, the trend of optics to scale better than electronics suggests that optics should play a greater role as networks evolve. For example, optical aggregation of subrate traffic at the edge of the network may prove to be a more scalable means of packing wavelengths as compared to conventional electronic multiplexing or grooming. Furthermore, all-optical regeneration may become more cost effective and consume less power than its electronic counterpart when the line rate increases beyond a certain threshold.The role of optics will be discussed more in-depth throughout this paper. Advances in optoelectronic and Photonic integration [3], though also important, will not be discussed in detail. To gain insight into the requirements of nextgeneration core networks, the next section examines various types of applications that can be expected to evolve over the next several years.

APPLICATIONS

The applications that are currently emerging and that will continue to mature over the next several years are the driving force behind the need for advances in the long-haul network. Clearly, it would be impossible to predict the full range of future applications. Rather, the goal of this section is to enumerate a number of these applications,

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both commercial and military, that have very diverse requirements. Growth in capacity requirements will come from both a surge in the number of users with high-speed access and a proliferation of bandwidth-intensive applications. Assuming that service providers follow through with their plansto deploy optical fibre directly to homes or neighbourhoods, in the next few years, access speeds of up to 100 Mb/s will be available to tens of millions of users. Some carriers are even planning for up to 1-Gb/s access speeds. This is substantially faster than current digital subscriber line (DSL) and cable modem speeds, which are typically less than 10 Mb/s. The growth of "triple-play services," i.e., the convergence of high-speed data, video, and telephony over a single pipe, will significantl yincrease network capacity demands, especially due to video traffic. Ondemand video is already a rapidly growing application. In addition it is expected that a large number of video "narrow casters" will spring up, offering a variety of specialized content over the Internet. To complement access infrastructure deployments, advanced protocols are being developed to provide higher quality high bandwidth services. For example, to provide an enterprise Ethernet local area network (LAN)-like environment over a backbone network, the virtual private LAN service (VPLS) standard has been proposed [4]. It combines Ethernet access with multiprotocol label switching (MPLS) core technology to deliver end-to-end quality of service. Virtual all-to-all private networks can be established much more easily than is currently possible, which will encourage carriers to expand their markets and businesses to subscribe to more advanced services. Furthermore, 100-Gb/s Ethernet is likely to emerge in the next five to ten years as both a bandwidth driver at the network edge as well as a transport mechanism in the core. Protocols that depend on the optical layer being reconfigurable are also being developed. For example, the Optical Internetworking Forum user–network interface (UNI) [5] and the generalized MPLSUNI [6] provide a means for higher layer "clients," e.g., the Internet protocol (IP) layer, to request via the control plane the establishment and tear-down of connections in the optical layer. These protocols are designed to enable more optimal resource utilization, greater network resiliency, and advanced services such as end-userinitiated provisioning through automated network configuration. Another growing application is grid computing, which is used as a means of sharing distributed processing and data resources that are not under centralized control in order to achieve very high performance. There are already dozens of grid networks in existence, some with requirements of petabyte data sets and tens of teraflops of computational power [7], [8].To support these massive requirements, large pipes are required to connect the major sites, essentially forming a national-scale optical backplane. For example, the Tera Grid network, which is supported by the National Science Foundation for scientific research, has a 40-Gb/s bit rate between its major sites [9]. While grid computing for the most part has been limited to the academic arena, there has been growing interest from the commercial sector to take advantage of the synergies that can be attained.

As this application expands to businesses, it will be accompanied by a surge in demand for high-bandwidth pipes. The demands of grid computing in supporting research in "escience" areas such as high-energy physics, genomics, and astrophysics are expected to grow to terabyte data sets and petaflop computation over the next decade, requiring terabit link capacity. For example, in some high-energy physics experiments, multi terabyte data files need to be disseminated to multiple locations in a very short period of time. Such applications require on the order of terabit per second capacity, but for relatively short periods of time(minutes to hours).Two critical components of the "network-centric warfare" concept are the "sensor grid" and the "global information grid" (GIG). The sensor grid comprises both active and passive sensors that are deployed in the air, under sea, and on the ground to provide battle space awareness. For example, sensors will be used to monitor troop position, the environment, etc. Sensor data are collected and securely transmitted by the GIG, which is a collection of wireless, satellite, and wired networks that span the globe. The GIG must be capable of rapidly delivering large amounts of data to generate an integrated view of the battle space through real-time data fusion, synchronization, and visualization. An important goal of the GIG is to provide war fighters and planners with ondemand access to this information from any perating point in the world.

NETWORK ARCHITECTURES

While there is no single canonical core network architecture, the deployments of several new commercial and government longhaul net works over the past few years have several common aspects. Before describing the architecture of these networks, we briefly summarize the architecture of legacy networks, as a point of comparison .Legacy backbone networks are typically optical–

electrical– optical (O–E–O) based, with all traffic routed through a node being converted it is expected that a large number of video "narrow casters" will spring up, offering a variety of specialized content over the Internet. To complement access infrastructure deployments, advanced protocols are being developed to provide higher quality high bandwidth services. For example, to provide an enterprise Ethernet local area network (LAN)-like environment over a backbone network, the virtual private LAN service (VPLS) standard has been proposed [4]. It combines Ethernet access with multiprotocol label switching (MPLS) core technology to deliver end-to-end quality of service. Virtual all-to-all private networks can be established much more easily than is currently possible, which will encourage carriers to expand their markets and businesses to subscribe to more advanced services. Furthermore, 100-Gb/s Ethernet is likely to emerge in the next five to ten years as both a bandwidth driver at the network edge as well as a transport mechanism in the core. Protocols that depend on the optical layer being reconfigurable are also being developed. For example, the Optical Internetworking Forum user–network interface (UNI) [5] and the generalized MPLSUNI [6] provide a means for higher layer "clients," e.g., the Internet protocol (IP) layer, to request via the control plane the establishment and tear-down of connections in the optical layer. These protocols are designed to enable more optimal resource utilization, greater network resiliency, and advanced services such as end-userinitiated provisioning through automated network configuration. Another growing application is grid computing, which is used as a means of sharing distributed processing and data resources that are not under centralized control in order to achieve very high performance. There are already dozens of grid networks in existence, some with requirements of petabyte data sets and tens of teraflops of computational power [7], [8].To support these massive requirements, large pipes are required to connect the major sites, essentially forming a national-scale optical backplane. For example, the Tera Grid network, which is supported by the National Science Foundation for scientific research, has a 40-Gb/s bit rate between its major sites [9]. While grid computing for the most part has been limited to the academic arena, there has been growing interest from the commercial sector to take advantage of the synergies that can be attained.

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CONCLUSION

This paper has examined numerous aspects related to the requirements of next-generation core optical networks. The network modelled. Modeling a core optical network with 100- Tb/segregate demand, which is an order of magnitude increase over today's networks, highlighted several areas where research is needed. First, the capacity requirements on a link will be on the order of 16 Tb/s. To reach this goal on a single fiber-pair, the spectral efficiency will need to increase by a factor of 10 over today's networks; this needs to be achieved while maintaining an optical reach of 1500–2000 km. These targets are significantly beyond even current experimental results and will require the development of advanced multilevel modulation formats and detection schemes. This affects the development of other technologies. For example, all-optical regeneration is a technology that will possibly improve the scalability of future networks; however, most current work in this area is compatible with only relatively simple binary modulation schemes that are capable of carrying an analog signal all-optically end to-end in the network. By selecting portions of the spectrum with minimal impairments, increasing the wavelength spacing in these spectral regions, and giving preferential signal-to-noise-ratio treatment to these Wavelengths within the optical amplifiers and switches, true end-toend transparency may be attainable. However, more research is needed to determine the feasibility of this approach.

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