Datatek

Solutions

WAN FACILITY CONSOLIDATION

IN

BNS-2000 NETWORKS

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INTRODUCTION

The telecommunications industry is witnessing a period of profound change, stimulated by the coinciding impacts of innovative new technology and global de-regulation - an environment, which offers unprecedented growth opportunities. One result is that new entrants to the business (part of what has come to be called the “new economy”), who have the advantage of being able to build up their infrastructures “from scratch”, have been able to achieve significant market presence, if not dominance, seemingly overnight. The challenge for established service providers as well as enterprises, therefore, is to find cost-effective ways to migrate their infrastructures and operations so that they too can take full advantage of the productivity benefits offered by the newer technology, without jeopardizing the service their users expect and depend on.

Telecommunications carriers are by their nature widely dispersed operations, as are many large enterprises. This has forced them to deploy Wide-Area Networks (WANs) to connect large numbers of remote sites with centralized work centers, using the best available technology. Today, the popular model for many business operations being conducted over a wide area is the corporate “intranet”, based on the same Internet Protocol (IP) technology that has driven the explosive growth of the worldwide Internet. At the same time, more robust technologies such as Asynchronous Transfer Mode (ATM) and Frame Relay, themselves used in the core of the IP infrastructure, are also available as direct interconnect options. While the new entrants to the business have the luxury of quickly building infrastructures using these technologies, established carriers and enterprises are faced with the requirement to more gradually migrate to them from a base of older technology. These older technologies, although now viewed as limited in terms of scalability and harder to maintain, have nevertheless, in many cases, proven themselves to be highly reliable over long periods of time. Lucent Technologies’ BNS-2000 product family represents one of these proven technologies.

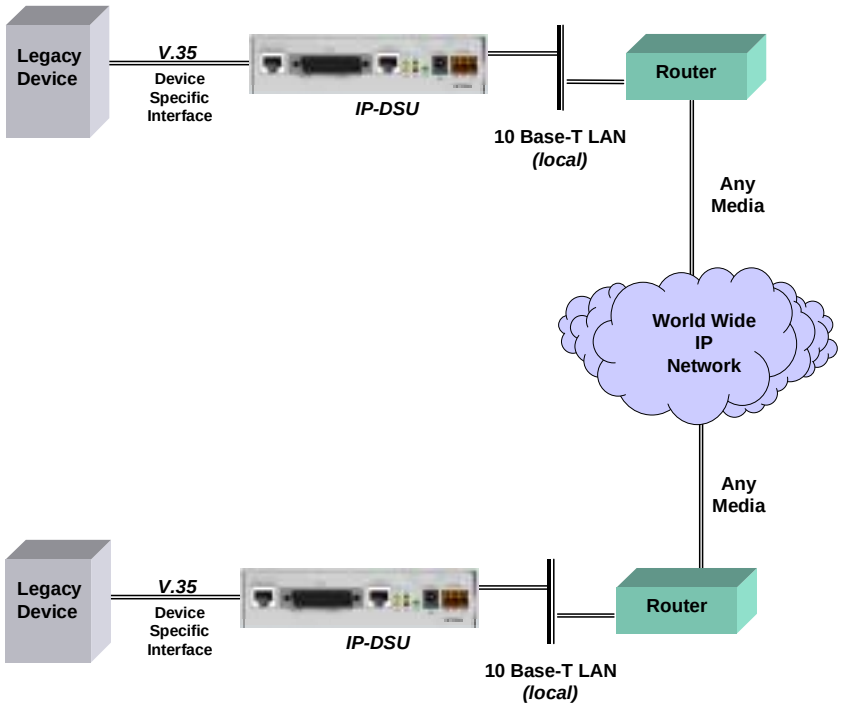
Lucent’s BNS-2000 product family has been successfully utilized as a reliable WAN infrastructure element supporting the internal operations of many carriers and enterprises for more than a decade. Much of its success can be attributed to its flexibility in being able to support a diversity of applications utilizing many different protocols, with

high reliability. In 1998, Datatek Applications was formed for the purpose of developing strategies for BNS-2000 users to move to newer technologies. After consulting with a many large BNS-2000 users to gain a better understanding of their present and future needs, Datatek Applications has developed a portfolio of new products based on the general theme of offering a smooth migration path from BNS-2000 based infrastructures to networks based on the newer technologies mentioned above. Within that context, there are several specific problem areas that can be explored. In this document, some interesting options for consolidating WAN facilities, using an ***overlay*** strategy, will be shown.

Datatek Applications has developed two products that address the goal of eliminating the need for the dedicated WAN facilities now being used to interconnect BNS-2000 nodes or between nodes and remote concentrators/muxes. The **IP-DSU** is a compact, external unit that allows BNS-2000 traffic (or any non-BNS HDLC-based traffic) to be carried over an IP-based Intranet by accessing a co-located LAN segment. An integrated product, the **Universal Trunk Module (UTM)**, which plugs into a slot in a BNS-2000 node (typically as a replacement for an existing trunk module), performs the same function as the **IP-DSU**, and, in addition, allows connectivity over an ATM or Frame Relay WAN service. Using either product, or a combination of both, the existing BNS-2000 network topology is preserved; it is simply **overlaid** onto a newer networking infrastructure. Let's take a closer look at what these products do and explore the benefits of using them.

IP-DSU

The simplest way to eliminate the dedicated private line interconnecting a pair of BNS-2000 entities (i.e., two nodes or node and SAM/MPC) is to replace the conventional DSU at each end of the circuit with a Datatek Applications **IP-DSU**. The only requirement for this solution is co-location with a 10Base-T Local Area Network (LAN) at each end of the connection, through which the remote end can be reached by means of conventional IP inter-networking. This requirement will typically be easily satisfied by the corporate intranet. Existing node (or SAM) to DSU cabling is re-used. This solution supports all BNS-2000 trunk types, and is transparent to the nodal equipment. It provides an option to encrypt the BNS-2000 data stream, which represents a level of security equivalent to the original private-line connection. A typical **IP-DSU** networking configuration is shown in the diagram below



The **IP-DSU** utilizes the standard UDP/IP protocol stack to efficiently carry BNS-2000 traffic over the WAN at speeds up to T1 rate with negligible impact on existing

intranet traffic (assuming inter-location facility bandwidth is not a constraint). It is easily managed, either on a command-line basis via Telnet, its serial RS232-C port, or from StarKeeper® II NMS (all providing configuration, status and diagnostic capabilities), as well as via SNMP. Considering the on-going costs of using dedicated private lines (direct charges as well as labor-intensive activities like monitoring, troubleshooting, etc.), it is easy to see why this solution can pay for itself in a very short time.

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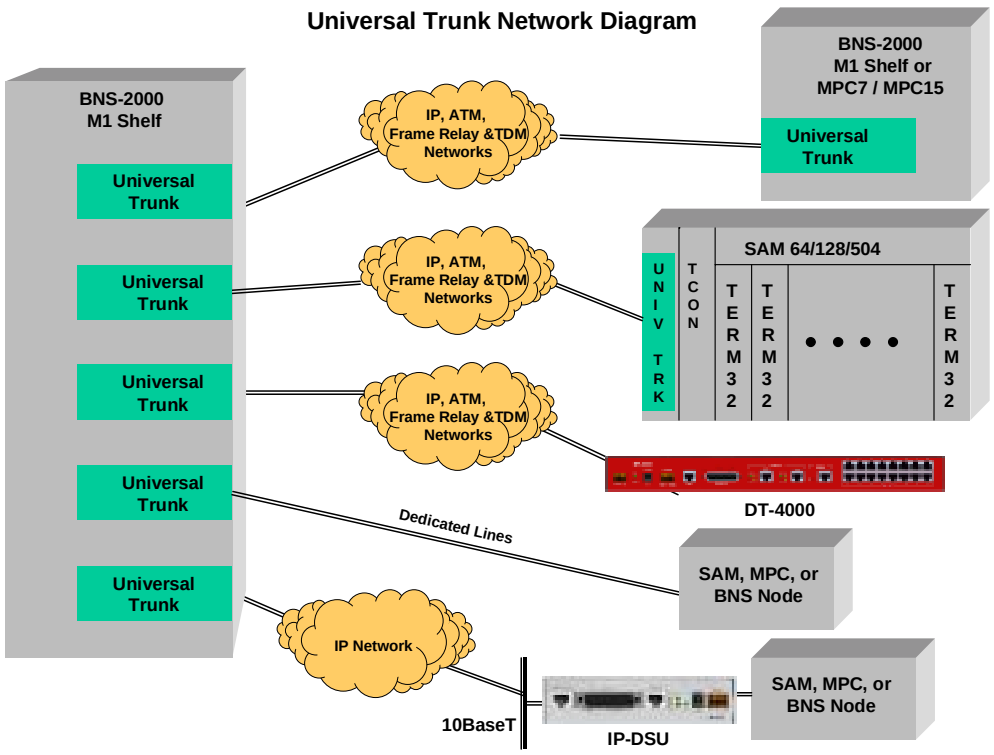
UNIVERSAL TRUNK MODULE (UTM)

The **UTM** adds to the **IP-DSU** capabilities the ability to utilize a Frame Relay or ATM based WAN as a means to interconnect BNS-2000 equipment in separate locations. It plugs into a BNS-2000 node (or SAM/MPC) and operates transparently, i.e., no upgrade of control computer software is necessary. Thus it can be used as a spare for any existing trunk module type (since it also supports legacy private-line connections) as well as offering the option of completely replacing the dedicated private line in favor of an IP, Frame Relay, or ATM-based interconnection scheme. In the case of IP, the use of industry standard protocols allows it to be compatible with the **IP-DSU**. It is therefore possible to mix these devices in a single point-to-point connection. The diagram that follows is intended to illustrate many of the possible application scenarios involving **UTM**s. (The **DT-4000**, another Datatek Applications product included in this diagram for completeness, can in this context be thought of as being equivalent to the SAM/**UTM** combination above it.)



Consider the node-to-SAM/MPC/node connection at the bottom of the previous diagram. Since this connection is being overlaid onto an IP network, the least-cost solution would have been to use an **IP-DSU** at both ends of the connection. Why use a **UTM** in the node on the left-hand side? Since the **UTM** can emulate any legacy BNS-2000 trunk module, configuring it as a Priority Queuing trunk would be a good strategy if congestion in the IP network were anticipated. On the right-hand side, an **IP-DSU** could still be used if significantly less traffic will be flowing back to the left-side node compared to the traffic coming from that node. Although it does not support priority queuing, the **IP-DSU** does have flexible buffering to prevent data loss when there is congestion in the IP network.

The use of **UTMs** to interconnect BNS-2000 nodes via ATM or Frame Relay introduces the possibility of migration of nodal equipment to the edge of a backbone network. Since nodes with **UTMs** can have trunked connections to the point-of-presence of a frame relay or ATM core network (up to E1 rate), they now need only exist where special-service terminations are required, such as in data centers, while SAMs are located mainly in COs.

To maintain the high integrity of data transport through BNS-2000 – based networks, two physical connections from the same **UTM** can be configured so that one provides a protection path for the other. The two circuits can be established via independent core networks (same or different types), one of which must be an IP network. Both paths are continually monitored to quickly detect a fault, and the switchover from the working to the protection path (and back) is fast enough to maintain existing sessions.

Another application of the **UTM** is to provide a connection to a remote CommKit® host via IP. Since this eliminates the need for a node to be co-located with the CommKit host (using a distance-limited fiber connection), it may now be possible to eliminate additional nodes as well as their dedicated private line interconnections.

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CONCLUSIONS

Datatek Applications has developed a family of products that allow existing BNS-2000 networks to be simplified and operated at lower cost. In this paper, it has been shown how the use of either of two products, the **IP-DSU** and the **Universal Trunk Module**, eliminates the need for dedicated WAN facilities, by using an overlay strategy which leverages newer-technology infrastructures typically already in use within the internal corporate network.

Contact your sales representative for more information.