Executive Overview
Common Channel Signaling System No. 7 (SS7) is a global ITU standard that defines the procedures and protocols by which network elements exchange call information in the Public Switched Telephone Network (PSTN). The SS7 network is an out-of-band digital overlay network using 56/64Kbps DS0 channels for message units.

Recently, the replacement of traditional Class 5 switches with decentralized soft switches and the installation of new switching offices by wireless service providers and competitive carriers have created a dramatic increase in the number of ports being deployed in the SS7 network. In addition, these dynamics have stressed the traditional deployment topologies from a cost, size and management perspective.

Regardless of the service provider type, each and every switch connected to the public network must have an SS7 connection. The SS7 circuits are used to direct calls via outbound trunks and carry information pertaining to call set up and routing. For redundancy purposes, SS7 connections (links) are always engineered in pairs. There are six different link types, Each is defined by the type of connection it supports. (Figure 1) A service provider leasing SS7 service from another provider would use “A” links as its gateway into the SS7 backbone. An SS7 provider would use various link types to interconnect the Signal Transfer Points (STPs) and to connect an STP with a Service Control Point (SCP) within its network. STPs essentially act as message routers, and SCPs contain the central database for the entire region that is served.

Besides the large, well-established providers, SS7 access is also obtained by leasing the service from another carrier. All IXC’s and ILEC’s maintain SS7 networks for their own consumption and, in some cases, for resale. There are also independent switchless SS7 providers who solely provide SS7 access.

APPLICATION NOTE - SS7

- Consolidate Equipment at STP Switching Offices
- Reduce Capital and Operating Costs
- Simplify Remote Equipment Test and Management
- Minimize Space Requirements

Figure 1, SS7 Backbone
Application Overview

SS7 providers interconnect their STPs and SCPs with T1/E1 circuits carrying 56Kbps message links. Because of network resilience requirements, each of the T1/E1 circuits is configured partially filled. On average the DS0 count is eight to ten per T1/E1 circuit. Based on this low utilization number, the SS7 providers have used Digital Cross-connect Systems (DCS) to groom the bandwidth as it enters the switching office prior to being sent to channel banks. Otherwise, they would need a channel bank for every eight DS0 ports. The channel banks are used to convert the groomed T1/E1 circuits into the appropriate DS0 interface to be connected to the STP. (Figure 2)

SS7 providers use one of three DS0 interface types: V.35 synchronous, OCU-DP, or a DS0-DP. Independent switchless providers typically use a V.35 or OCU-DP interface, while the ILECs/traditional providers use the DS0-DP interface because of its simplicity, cost and ease-of-cabling.

DNX Consolidation Solution

Eastern’s DNX family of Multiservice Access Concentrators supports OCU-DP, DS0-DP, and V.35 interfaces, enabling DNX deployment in every type of SS7 provider network. The DNX solution consolidates the channel bank, digital cross-connect switch and T1/E1 CSU functionality into a single, cost-effective and compact, managed device. Common practice requires the use of a DSX field between each device. The combined functionality offered by the DNX reduces this need while also reducing total space requirements and the cost and complexity of additional cabling. (Figure 3)

The DNX-11 can support up to 80 synchronous data interfaces and 8 T1/E1 interfaces in 6 rack units of space. System expansion can be achieved using the DNX-88, and all components within the DNX-11 can be reused. The DNX-88 can provide over 600 ports of synchronous data capacity for terminating T1, E1, T3, E3, STS1 and OC3/STM1, and can be remotely managed as a single device.

Figure 2, STP Switching Office Before DNX

Figure 3, STP Switching Office After DNX