Application Note AN2013-26

Using the SEL ICON™ DS1 Interface and DS0 Grooming Capabilities to Aggregate Voice and Data Circuits

Paul Robertson

INTRODUCTION

The T1 or DS1 interface is a standard telecommunications interface that is widely used to transport voice and data circuits between network equipment. This application note describes the DS1 interface and DS0 grooming capabilities of the SEL ICON™ synchronous optical network (SONET) multiplexer and shows application examples of how the ICON can interoperate with T1 multiplexer equipment to transport voice and data circuits.

SEL SOLUTION

The ICON supports dedicated asynchronous and synchronous DS1 interfaces. Each interface is supported by a separate submodule. The DS1 Async Submodule (8057-01) is an asynchronous DS1 interface that provides four DS1 interfaces that can be individually mapped to DS1 ports on DS1 Async Submodules located on other ICON nodes. The DS1 Async Submodule provides the ability to pass a bulk DS1 signal from one DS1 Async Submodule to another. This is shown in Figure 1.

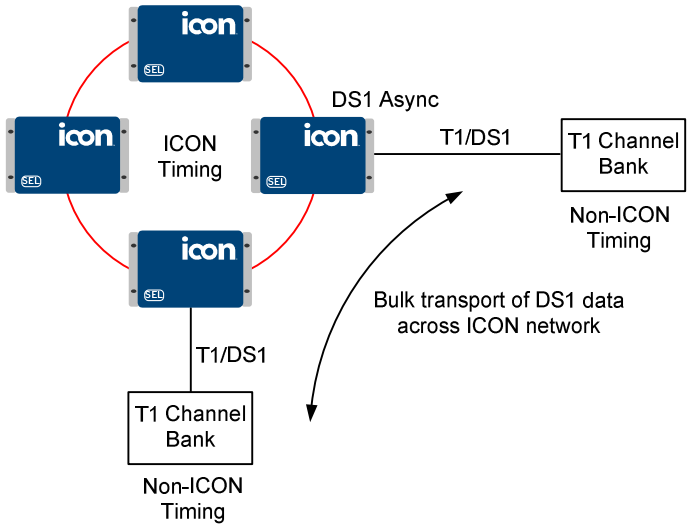

Figure 1 Asynchronous DS1 Operation

The DS1 Sync Submodule (8057-02) provides a synchronous DS1 interface. This allows other non-ICON network equipment to slave time off the ICON network. The DS1 Sync Submodule also supports the transport of circuits from 2-wire FXS VF (8066-01), 2-wire FXO VF (8067-01), 4-wire VF (8065-01), and Nx64F (8051-01) Submodules across the synchronous DS1 interface. This is shown in Figure 2. In addition, the DS1 Sync Submodule in conjunction with the

Protected Line Module (8021-01) supports the ability to groom network traffic at the DS0 level from multiple locations into a single virtual tributary (VT1.5).

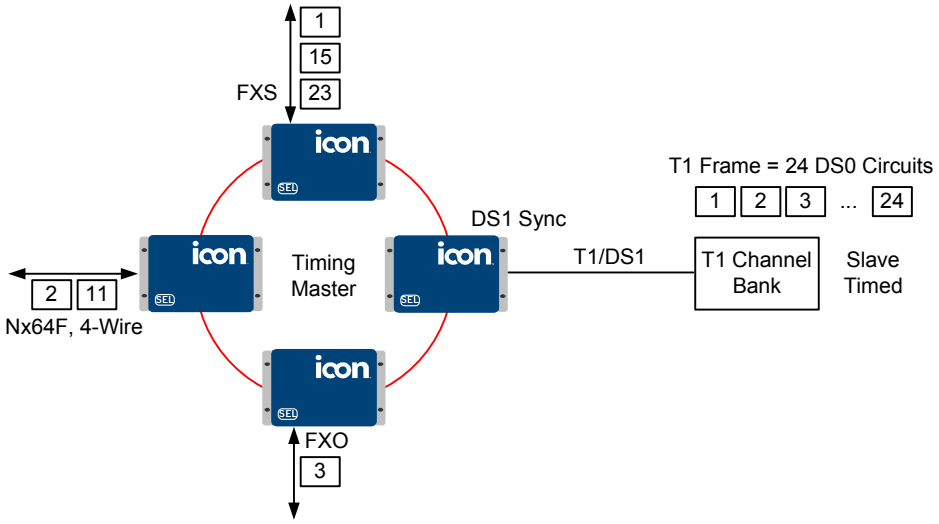

Figure 2 Synchronous DS1 Operation

The DS1 Sync Submodule supports the AMI and B8ZS line-coding formats and both superframe and extended superframe frame formats.

The DS0 grooming capability in the ICON supports the ability to groom DS0 circuits from the SONET line ports and access submodules onto a single VT1.5, thereby increasing the efficiency of the VT bandwidth being used in the network. Figure 3 illustrates this by showing DS0 circuits being cross-connected from line Ports C and D in addition to DS0 circuits being groomed from access submodules onto a single VT on STS 2,1.

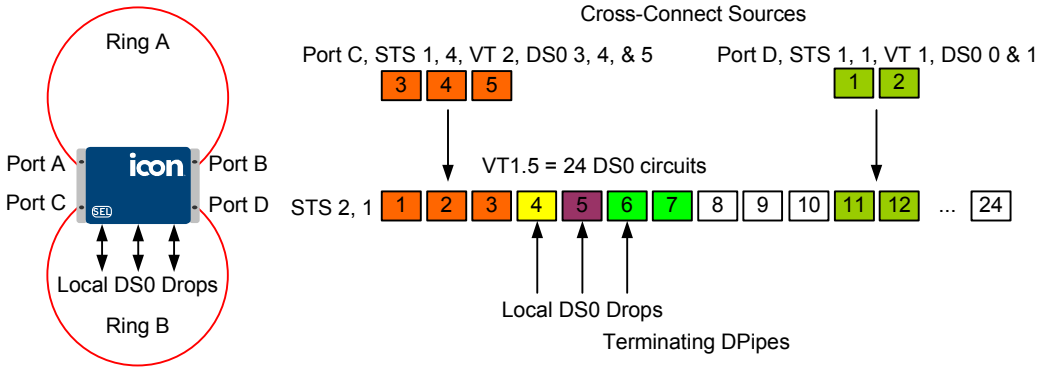

Figure 3 DS0 Grooming

DS0 grooming is supported on the Protected Line Module (8021-01) with Line Module (8020-01) support provided in a future release. VTs that contain DS0 groomed data can be transported across networks that contain a mix of Protected Line Modules and Line Modules. All nodes that contain Line Modules will only be able to act as pass-through nodes for VTs containing DS0 groomed data. All DS0 circuits in STS 1,1 to 4,3 can be groomed for OC-48 and OC-12. For OC-3 STS 1,1 to 1,3 can be groomed.

In the following examples, each application has different circuit type, signaling mode, and signaling mapping settings requirements.

Application 1: 2-Wire VF FXS Aggregation

Figure 4 shows how the ICON can provide aggregation of 2-wire voice circuits onto a single DS1 trunk interface to a private branch exchange (PBX).

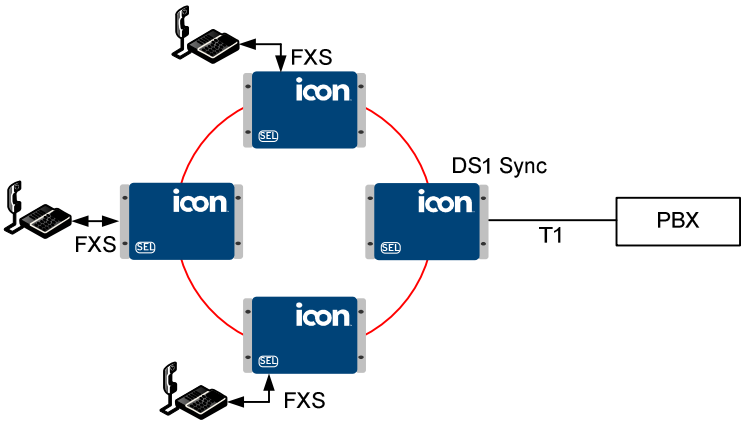

Figure 4 FXS Aggregation

The following settings are required on a DS1 Sync Submodule for FXS circuits:

- Circuit Type = VF.
- Signaling Mode = Robbed Bit Signaling.
- Signaling Mapping = ICON FXS Signaling.

Application 2: 2-Wire VF FXO Aggregation

Figure 5 shows how a telephone connected at a T1 multiplexer (MUX) site can be connected to a PBX at an ICON site without requiring a direct T1 connection.

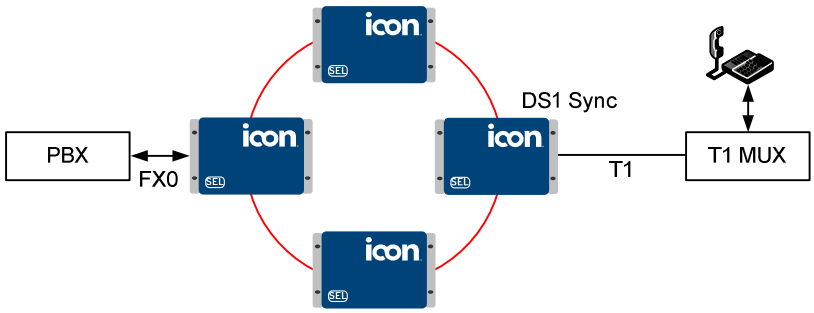

Figure 5 FXO Aggregation

The following settings are required on a DS1 Sync Submodule for FXO circuits:

- Circuit Type = VF.
- Signaling Mode = Robbed Bit Signaling.
- Signaling Mapping = ICON FXO Signaling.

Application 3: 4-Wire VF Aggregation

Figure 6 shows how the ICON can support dedicated point-to-point data circuits that use VF modems to connect circuits between ICON sites and foreign T1 multiplexer sites.

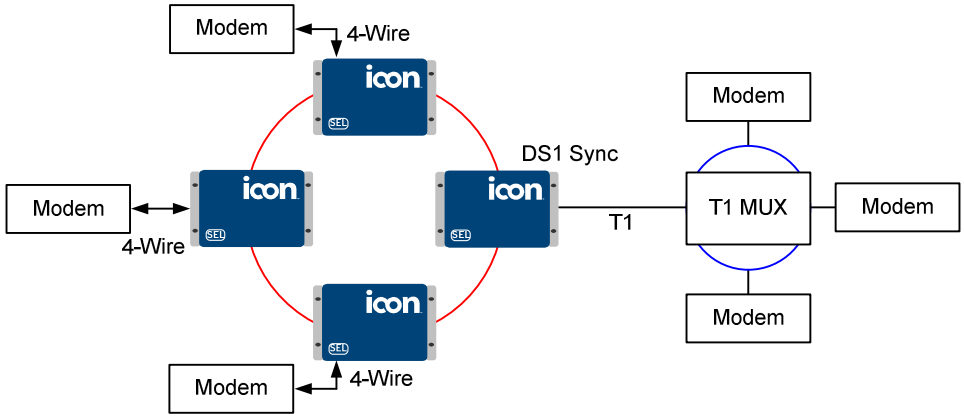

Figure 6 4-Wire VF Aggregation

The following settings are required on a DS1 Sync Submodule for 4-wire circuits:

- Circuit Type = VF.
- Signaling Mode = Clear Channel.
- Signaling Mapping = A/B Signaling.

Application 4: Nx64F Aggregation

Figure 7 shows how the ICON can support dedicated point-to-point data circuits for transporting IEEE C37.94 protection signals between ICON sites and foreign T1 multiplexer sites.

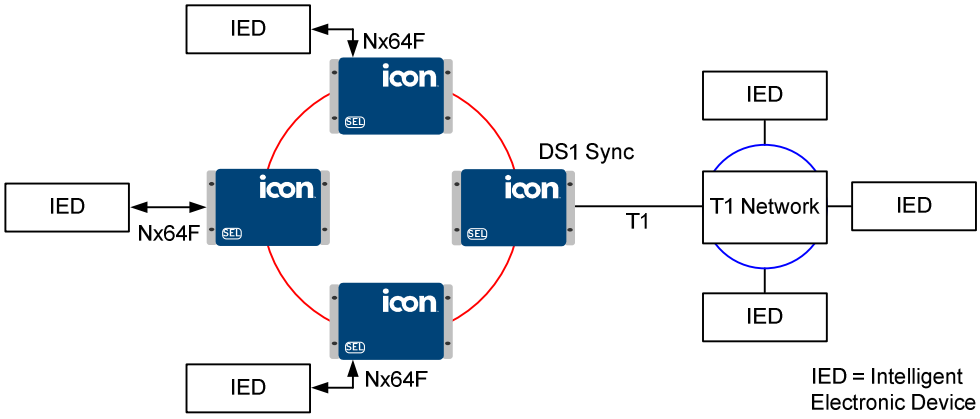

Figure 7 Nx64 Aggregation

The following settings are required on DS1 Sync Submodule for Nx64 circuits:

- Circuit Type = N DS0 Channels. User must assign N + 1 DS0 bytes for every Nx64 data channel (within the ICON network).
- Signaling Mode = N/A.
- Signaling Mapping = N/A.

LAN2013-26

SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE Hopkins Court • Pullman, WA 99163-5603 USA
Tel: +1.509.332.1890 • Fax: +1.509.332.7990
www.selinc.com • info@selinc.com