T1 Unstructured CES with Synchronous Clocking and Soft PVCs

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Introduction

This document provides a sample configuration of the Structured Circuit Emulation Services (CES) with synchronous clocking and soft Permanent Virtual Circuits (PVCs). Structured service, which is also called channelized T1/E1 or cross−connect, is designed to emulate point−to−point Fractional T1/E1 (Nx64k) connections. This allows the T1/E1 to break into multiple Digital Signal Zero (DS0) channels to different destinations. More than one circuit (AAL1) entity shares the same physical T1/E1 interface. In order to provide this service, AAL1 delineates repetitive fixed−size blocks of data. Block size is the integral number of octets, where an octet represents a 64k channel. Synchronous service assumes that synchronized clocks are available on each end. Therefore, no clocking information is transported in the Asynchronous Transfer Mode (ATM) cell. Propagation of the clock source throughout the network is required. Refer to An Introduction to Circuit Emulation Services for more information on CES Services.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Configure

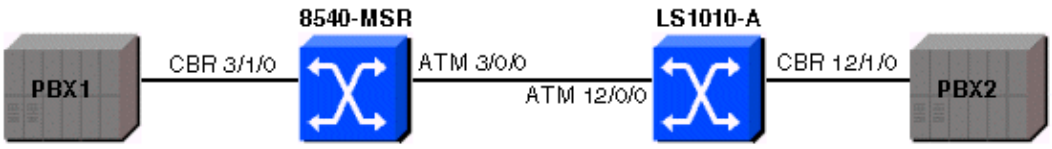
In this section, you are presented with the information to configure the features described in this document.

Note: Use the Command Lookup Tool (registered customers only) in order to find more information on the commands used in this document.

Assumptions

The sample configurations in this document use synchronous clocking and are based on these assumptions:

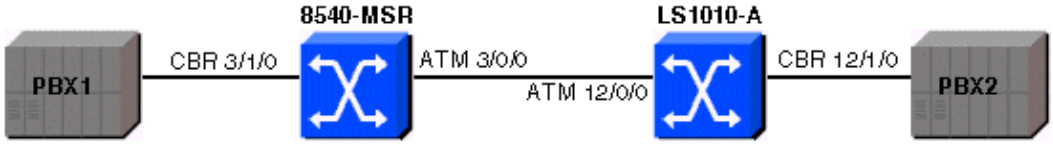
- Each ATM switch derives clocking from its directly−connected Private Branch Exchange (PBX). PBX1 and PBX2 are both clocked from the same service provider. Most PBXs still connect to a telephone network, which provides extremely stable and precise clocks. In many cases, the most stable clocking configuration is to clock ATM switches off of the PBXs and allow the telephone network to distribute an adequate clock source. An alternate configuration is to derive a network clock source from the ATM network. In this case, each ATM switch is configured with a **network−clock−select 1 atm** statement that references the ATM uplink port. This is a diagram of that configuration:



Note: These clocks must be of equal accuracy and must be in phase.
- The frame on both PBXs is Extended Superframe (ESF). The line−code on both PBXs is binary 8−zero substitution (B8ZS). Both of these options are the default on the LightStream 1010, so they do not need to be explicitly configured. But, they are configured in this example for demonstration. The LightStream 1010 is the active side of the soft PVC, while the Cisco 8540−MSR ATM switch is the passive side.
- The distance between the PBX and the ATM switch is less than 110 feet on the CES port adapter module (PAM). This length is the default line build−out (lbo), so it does not need to be explicitly configured. But, it is configured in this example for demonstration.
- The LightStream 1010 is equipped with a feature card per−flow queueing (FC−PFQ), which uses a phase lock loop (PLL) that is able to lock onto and track the selected clock source. This high−quality, locked clock is then fed to the network clock interfaces in order to provide interface timing. The 8540 MSR is equipped with a Network Clock Module (NetClkMod), which offers the added advantage of a Stratum 3 clock source.
- The ATM Pseudo interfaces (ATM−Px/y/z) are created when the circuit is defined. Refer to this related documentation for more information.

Network Diagram

This document uses this network setup:



Configurations

This document uses these configurations:

- 8540−MSR
- LightStream 1010−A

8540−MSR Configuration

8540−MSR

```
8540-MSR#show running-config

Building configuration...

Current configuration:
!
version 12.0no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname 8540-MSR
!
network-clock-select 1 cbr3/1/0
!
boot system flash bootflash:cat8540m-wp-mz.120-1a.W5.7.bin
logging buffered 4096 debugging
!
redundancy
main-cpu
no sync config startup
sync config running
facility-alarm core-temperature major 53
facility-alarm core-temperature minor 45
ip subnet-zero
atm address 47.0091.8100.0000.0090.2144.8401.0090.2144.8401.00
atm router pnni
no aesa embedded-number left-justified
node 1 level 56 lowest
redistribute atm-static
!
interface ATM3/0/0
 no ip address
 no ip directed-broadcast
!
interface ATM3/0/1
 no ip address no
 ip directed-broadcast
!
interface CBR3/1/0
 no ip address no
```

```
 ip directed-broadcast
 ces circuit 0 circuit-name example
 ces dsx1 linecode b8zs
 ces dsx1 framing esf
 ces dsx1 lbo 0_110
!
interface ATM0
 no ip address no
 ip directed-broadcast
 atm maxvp-number 0
!
interface Ethernet0
 no ip directed-broadcast
!
line con 0
transport input none
line aux 0
line vty 0 4
login
!
end
```

Issue the **show ces address** command on the passive side of the soft PVC in order to obtain the address and the virtual path identifier (VPI)/virtual channel identifier (VCI) pair that you need in order to configure the active side of the soft PVC, the LightStream 1010 in this example. Review this sample output:

```
8540-MSR#show ces address

CES-IWF ATM Address(es):47.0091.8100.0000.0090.2144.8401.4000.0c81.9030.10
CBR3/1/0:0 vpi 0 vci 16
```

LightStream 1010-A Configuration

LightStream 1010-A

```
LightStream 1010#show running-config

Building configuration...

Current configuration:
!
version 11.3
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname LightStream 1010
!
!
network-clock-select 1 CBR12/1/0
!
atm address 47.0091.8100.0000.0090.92b8.6401.0090.92b8.6401.00
atm router pnni
no aesa embedded-number left-justified
node 1 level 56 lowest
redistribute atm-static
!
no ip address
!
interface CBR12/1/0
```

```
 no ip address
 ces circuit 0 circuit-name example
 ces dsx1 linecode b8zs
 ces dsx1 framing esf
 ces dsx1 lbo 0_110
 ces pvc 0 dest-address 47.0091.8100.0000.0090.2144.8401.4000.0c81.9030.10
 vpi 0 vci 16
!
interface CBR12/1/1
 no ip address
!
interface CBR12/1/2
 no ip address
!
interface CBR12/1/3
 no ip address
!
interface ATM13/0/0
 no ip address
 atm maxvp-number 0
!
interface Ethernet13/0/0
 ip classless
!
line con 0
line aux 0
line vty 0 4
login
!
end
```

Verify

Use this section in order to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT in order to view an analysis of **show** command output.

In order to verify that the CES circuits are up on both sides, issue the **show ces interface** command. Review this sample output:

```
LightStream 1010#show ces interface cbr 12/1/0

Interface: CBR12/1/0 Port-type:T1-DCU
IF Status: UP Admin Status: UP
Channels in use on this port: 1-24
LineType: ESF LineCoding: B8ZS LoopConfig: NoLoop
SignalMode: NoSignalling XmtClockSrc: network-derived
DataFormat: UnStructured AAL1 Clocking Mode: Synchronous LineLength: 0_110
LineState: NoAlarm
Errors in the Current Interval:
 PCVs 514 LCVs 2 ESs 0 SESs 1 SEFSs 0
 UASs 0 CSSs 0 LESs 0 BESs 0 DMs 0
Errors in the last 24Hrs:
 PCVs 2057 LCVs 10 ESs 0 SESs 4 SEFSs 0
 UASs 19 CSSs 0 LESs 0 BESs 0 DMs 0
Input Counters: 1054405 cells, 49557035 bytes
Output Counters: 1054405 cells, 49557035 bytes
```

In order to verify that the soft PVC is established between the two ATM switches, issue the **show atm vc** command. Review this sample output:

```
8540−MSR#show atm vc interface ATM−P3/1/3

Interface   VPI   VCI   Type   X−Interface   X−VPI   X−VCI   Encap Status

ATM−P3/1/3    0    16   SoftVC    ATM3/0/0       0      39             UP

LightStream 1010#show atm vc interface ATM−P12/1/3

Interface   VPI   VCI   Type   X−Interface   X−VPI   X−VCI   Encap Status

ATM−P12/1/3   0    16   SoftVC   ATM12/0/0       0      39             UP
```

In order to verify that there are no clocking slips, issue the **show ces circuit cbr x/y/z 0** command and see if the underflows or overflows increase. Make sure to use this command on the 8540−MSR side as well. Review this sample output:

```
LightStream 1010#show ces circuit cbr 12/1/0 0

Circuit: Name sil, Circuit−state ADMIN_UP / Interface CBR12/1/0,
Circuit_id 0, Port−Type T1, Port−State UP
Port Clocking network−derived, aal1 Clocking Method CESIWF_AAL1_CLOCK_SYNC
Channel in use on this port: 1−24
Channels used by this circuit: 1−24
Cell−Rate: 4107, Bit−Rate 1544000
cas OFF, cell_header 0x100 (vci = 16)
Configured CDV 2000 usecs, Measured CDV 373 usecs
De−jitter: UnderFlow 1, OverFlow 0
ErrTolerance 8, idleCircuitdetect OFF, onHookIdleCode 0x0
state: VcActive, maxQueueDepth 823, startDequeueDepth 435
Partial Fill: 47, Structured Data Transfer 0
Active SoftVC
Src: atm addr 47.0091.8100.0000.0090.92b8.6401.4000.0c86.1030.10 vpi 0, vci 16
Dst: atm addr 47.0091.8100.0000.0090.2144.8401.4000.0c81.9030.10
```

Related Information

- **An Introduction to Circuit Emulation Services**
- **ATM Switch Router Command Reference**
- **ATM Technology Support Pages**
- **Technical Support & Documentation − Cisco Systems**

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