VoIP with Channel Associated Signaling (CAS)

Document ID: 14078

Contents

Introduction

This document illustrates the configurations necessary for the two routers in the topology here to communicate through VoIP and channel associated signaling (CAS) over a T1.

It is important to note that in the configuration in this document, the two routers are connected back−to−back over an IP segment. In most topologies however, the voice−enabled routers can exist anywhere. Usually, the voice routers are connected through LAN connectivity to other routers that are connected to the WAN. This is important to note because if your voice routers are not connected over a leased line, all WAN connectivity configuration commands are configured on those routers that are connected to the WAN, and not on the voice routers, as they are in the configurations listed here.

This configuration example uses Cisco 3640 and Cisco AS5300 series routers. These configurations can also be used for Cisco 2600 series routers.

Prerequisites

Requirements

Before you configure your Cisco router to use VoIP, it is recommended that you understand the concepts of Quality of Service (QoS) features in Cisco IOS® software. To learn more about QoS features, refer to Queuing, Traffic Shaping, and Filtering and QoS Signaling from the Cisco IOS Quality of Service page on Cisco.com.

Components Used

The information in this document is based on these software and hardware versions:

- Cisco 2600 and 3640 Series Routers

- Cisco AS5300
- Cisco IOS Software Release 12.2(19) running on the routers

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

Related Products

This configuration can be used with Cisco 3600 series routers that have NM–HDV, VWIC–xMFT–T1, and can be interfaced with the PBX switch.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

T1 Signaling: CCS and CAS

Signaling in the Telephony world provides functions such as supervising and advertising line status, alerting devices when a call tries to connect, and routing and addressing information.

There are two different types of signaling information within the T1 world:

- Common channel signaling (CCS)
- CAS

CCS

CCS is the transmission of signaling information out of the information band. The most notable and widely used form of this signaling type is ISDN. One disadvantage of using an ISDN primary rate interface (PRI) is the removal of one DS0, or voice channel, in this case for signaling use. Therefore, one T1 has twenty–three DS0s, or B–channels for user data, and one DS0, or D–channel for signaling. It is possible to control multiple PRIs with a single D–channel each using Non–Facility Associated Signaling (NFAS)., Therefore, you are able to configure the other PRI's in the NFAS group to use all twenty–four DS0s as B–channels. Using PRI signaling ensures the maximum possible connection rates, especially with the advent of 56 K modems. This illustrates the clear channel capability of ISDN.

Another disadvantage of using CCS in the topology above is that the private branch exchange (PBX) needs a digital T1 PRI card. This is more expensive than a recEive and transMit (E&M) signaling card. An E&M signaling card is used in the same topology above if you run CAS between the AS5300 and the PBX.

CAS

CAS is the transmission of signaling information within the information band, or in–band signaling. This means that voice signals travel on the same circuits as line status, address, and alerting signals. As there are twenty–four channels on a full T1 line, CAS interleaves signaling packets within voice packets. Therefore, there are a full twenty–four channels to use for voice.

Various types of CAS signaling are available in the T1 world. The most common forms of CAS signaling are loopstart, groundstart, and E&M signaling. The biggest disadvantage of CAS signaling is that the network uses bits from information IP packets, such as voice packets, to perform signaling functions. CAS signaling is often referred to as robbed–bit signaling.

CAS is not the optimal choice when you try to achieve the highest possible connection rates with modems. Most modems adjust to the signal quality and still provide reliable high–speed connections. However, the use of 56 K modems on CAS lines drops the connection speeds by almost 2 K in the downstream direction of communication, per trunk that uses CAS signaling.
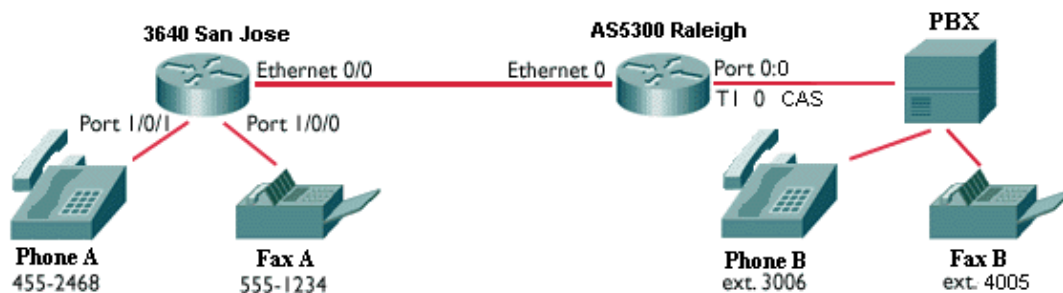
Configure

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

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses the network setup shown in this diagram:

Note: There is no QoS implemented in the configurations here. These configurations are for illustrative purposes. You need to implement QoS features as needed in your network situation.

Configurations

This document uses the configurations shown here:

- Cisco 3640 San Jose
- Cisco AS5300 Raleigh

Cisco 3640 San Jose

```
sanjose3640A#show run
Building configuration...

Current configuration:
!
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname sanjose3640
!
!
no ip subnet-zero
!
!
!
!
voice-port 1/0/0
```

```
!
voice-port 1/0/1
!
dial-peer voice 1 pots
```

!--- This POTS dail-peer configures the dial plan for Phone A.

```
 destination-pattern 4552468
 port 1/0/1
!
dial-peer voice 2 voip
```

!--- This VoIP dial-peer configures the dial plan for the
!--- outbound calls to the PSTN.

```
 destination-pattern 3006
 session target ipv4:10.2.1.2
!
dial-peer voice 3 pots
 destination-pattern 5551234
 port 1/0/0
!
dial-peer voice 4 voip
 destination-pattern 4005
 session target ipv4:10.2.1.2
!
!
interface Ethernet0/0
 ip address 10.2.1.1 255.255.255.0
 no ip directed-broadcast
!
!
ip classless
no ip http server
!
!
end
```

Cisco AS5300 Raleigh

```
AS5300#show run
Building configuration...

Current configuration:
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname AS5300
!
!
!
!
controller T1 0
 framing esf
 clock source line primary
 linecode b8zs
 ds0-group 0 timeslots 1-24 type e&m-fgb dtmf dnis
```

!--- From Cisco IOS Software Release 12.0(5)T and later,
*!--- the command **cas-group** is renamed **ds0-group***

```
!--- on the Cisco AS5300 and  Cisco 2600 series and Cisco 3600 series
!--- routers. Some keyword modifications  are implemented.


!
!
!
dial-peer voice 1 voip
 destination-pattern 4552468
 session target ipv4:10.2.1.1
!
dial-peer voice 2 pots
 destination-pattern 3...
 direct-inward-dial

!--- If this dial-peer is matched, the inbound router is put in DID mode.

 port 0:0
 prefix 3
!
dial-peer voice 3 voip
 destination-pattern 5551234
 session target ipv4:10.2.1.1
!
dial-peer voice 4 pots
 destination-pattern 4...
 direct-inward-dial
 port 0:0
 prefix 4
!
!
voice-port 0:0

!--- Syntax of "voice-port" command when you configure  ds0-group is
!--- voice-port controller-number:ds0-group number.



interface Ethernet0
 ip address 10.2.1.2 255.255.255.0
!
!
!
end
```

Verify

There is currently no verification procedure available for this configuration.

Troubleshoot

This section provides the information to troubleshoot your configuration.

Troubleshoot Commands

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) . This allows you to view an analysis of **show** command output.

Note: Before you issue **debug** commands, refer to Important Information on Debug Commands.

- **debug voip ccapi inout** – Used to trace the execution path through the call control application program interface (API). The API serves as the interface between the call session application and the underlying network–specific software. Use the output from this command to understand how calls are handled by the router.
- **debug vpm all** – Used to enable all of the debug vpm commands: **debug vpm spi**, **debug vpm signal**, and **debug vpm dsp**.

  Note: This debug generates a large amount of output.
- **show call active voice** – Used to display the contents of the active call table. It shows all of the calls currently connected through the router.
- **show call history voice** – Used to display the call history table. The call history table contains a listing of all calls connected through this router in descending time order since VoIP has been enabled. The subsets of the call history table are displayed with the help of specific keywords.
- **show voice port** – Used to display configuration information about a specific voice port.
- **debug vtsp all** – Used to enable these debug vtsp commands: **debug vtsp session**, **debug vtsp error**, and **debug vtsp dsp**.

Related Information

- **Understanding Support for Voice and Data on 2600/3600 Series Routers**
- **Understanding High Density Voice Network Modules**
- **Understanding 1 and 2 Port T1 Multi–Flex Trunk Voice/WAN Interface Cards (VWIC–xMFT–T1)**
- **Understanding How Digital T1 CAS (Robbed Bit Signaling) Works in IOS Gateways**
- **Voice – Understanding Direct–Inward–Dial (DID) on Cisco IOS Digital (T1/E1) Interfaces**
- **Voice Technology Support**
- **Voice and Unified Communications Product Support**
- **Troubleshooting Cisco IP Telephony**
- **Technical Support – Cisco Systems**

Updated: Nov 13, 2006   Document ID: 14078