Lawful Intercept on Cisco 12000 Series Router ISE Line Cards

Part Number OL-8679-01 (Rev. A0) April 1, 2008

Feature History

Release	Modification
12.0(32)S	This feature was introduced on the Cisco 12000 series routers

See the following main sections for information about the Lawful Intercept feature:

Feature Overview

This feature module describes the Lawful Intercept functionality as it is implemented on the Cisco 12000 series routers.

The Feature Overview section contains the following sections:

Lawful Intercept Description

Lawful Intercept is the process by which law enforcement agencies conduct electronic surveillance of circuit and packet-mode communications as authorized by judicial or administrative order.

Service providers worldwide are already legally required to allow government agencies to conduct electronic surveillance on traditional telephone equipment. Lawful Intercept enables government agencies to conduct electronic surveillance on packet networks as well.

Note Network management is the same as without Lawful Intercept. No difference is observable by management stations in the network. This ensures that unauthorized users cannot tell which nodes have Lawful Intercept enabled.

Cisco Lawful Intercept is based on Service Independent Intercept (SII) architecture and Simple Network Management Protocol Version 3 (SNMP V3) provisioning architecture.

Cisco SII architecture supports Lawful Intercept with the following features:

- Standard architecture for all IP networks.
- Intercept control is performed by the mediation device instead of by call control equipment.
- Lawful Intercept control is separated from call control.
- Common interfaces are defined for the mediation device and for call control partners.

The Cisco 12000 series routers support Lawful Intercept under SII architecture with the following features:

- Legal Voice over IP (VoIP) and dial-up intercept provisioning from the mediation device using SNMPv3
- Deliver intercepted voice data and dial-up data to the mediation device
- SNMPv3 Lawful Intercept provisioning interface
- Lawful Intercept MIB: CISCO-TAP-MIB, Version 1
- User Datagram Protocol (UDP) encapsulation to Mediation Device
- Voice over IP (VoIP) call intercept based on media gateway local IP address and UDP port number
- Voice over IP (VoIP) intercept with Media Gateway Control Protocol (MGCP)
- Dial-up call intercept based on account session ID
- Dial-up intercept for PPP, multi-link PPP, and Exec/TCP-clear sessions

SNMPv3 Lawful Intercept Provisioning Interface

SNMPv3 is the provisioning interface for Cisco 12000 series router implementation of Lawful Intercept. SNMPv3 provides data origin authentication and secure connections. The law requires authentication and security so that unauthorized parties cannot observe or forge an intercept target.

Implementation of Lawful Intercept

There are two types of Cisco Lawful Intercepts on the Cisco 12000 series routers:

- Lawful Intercept for Voice over IP (VoIP) calls

- Lawful Intercept for dial-up calls

Lawful Intercept for VoIP

On Cisco 12000 series routers, Lawful Intercept for Voice over IP (VoIP) is done using SII architecture and SNMPv3 provisioning architecture. The mediation device provisions the intercept on the router using SNMPv3. The router intercepts the target Voice over IP (VoIP) calls and sends the intercepted data to the mediation device.

Before provisioning Lawful Intercept for Voice over IP (VoIP) can be done, the Lawful Intercept administrator must perform the following tasks.

1. Provision the target number to be intercepted
2. Register the routers used in the target number's calls
3. Provision DNS on the SS8 mediation device

Lawful Intercept provisioning for Voice over IP (VoIP) on a Cisco 12000 series router is done as follows:

1. The mediation device provisions Lawful Intercept information using SNMPv3.
2. Security and authentication is done as defined by SNMPv3.
3. Network management is done using the CISCO-TAP-MIB.
4. Midcall Lawful Intercept provisioning allows an intercept to be provisioned and enabled or disabled while the call is active.

Voice over IP (VoIP) calls are intercepted as follows:

1. The mediation device uses configuration commands to configure the intercept on the call control entity.
2. The call control entity sends intercept-related information about the target to the mediation device.
3. The mediation device initiates call content intercept requests to the edge router or trunk gateway using SNMPv3.
4. The edge router or trunk gateway intercepts the call content, replicates it, and sends it to the mediation device in UDP format.

Content of intercepted Voice over IP (VoIP) is transmitted using UDP transport.

Lawful Intercept for Dial-up Calls

Cisco implements Lawful Intercept for dial-up calls using SII architecture and SNMP V3 provisioning architecture.

Before provisioning Lawful Intercept for dial-up calls can be done, the Lawful Intercept administrator must perform the following tasks.

- Provision the target number to be intercepted
- Register the routers used in the target number's calls
- Provision DNS on the SS8 mediation device

On Cisco 12000 series routers, Lawful Intercept provisioning for dial-up calls is done as follows:

- The mediation device provisions the Lawful Intercept information using SNMPv3.
- Security and authentication is done as defined by SNMPv3.
- Network Management is done using the CISCO-TAP-MIB.

- Midcall Lawful Intercept provisioning allows an intercept to be provisioned, enabled, or disabled while the call is active.

Dial-up calls are intercepted as follows:

1. A sniffer device is used to sniff all RADIUS messages between the router and the RADIUS server.

Note Cisco provides TopLayer sniffer from SS8.

2. The mediation device uses configuration commands to configure the intercept on the sniffer.
3. The sniffer device sends intercept-related information about the target to the mediation device.
4. The mediation device initiates communication content intercept requests to the edge router using SNMPv3.
5. The edge router intercepts the communication content, replicates it, and sends it to the mediation device in UDP format.

Content of intercepted dial-up calls is transmitted using UDP transport.

Lawful Intercept Topology

Figure 1 shows a Cisco 12000 series router in a Voice over IP (VoIP) network.

Figure 2 shows a Cisco 12000 series router in a dial-up access network.

Figure 1 Cisco 12000 series router in a VoIP Network

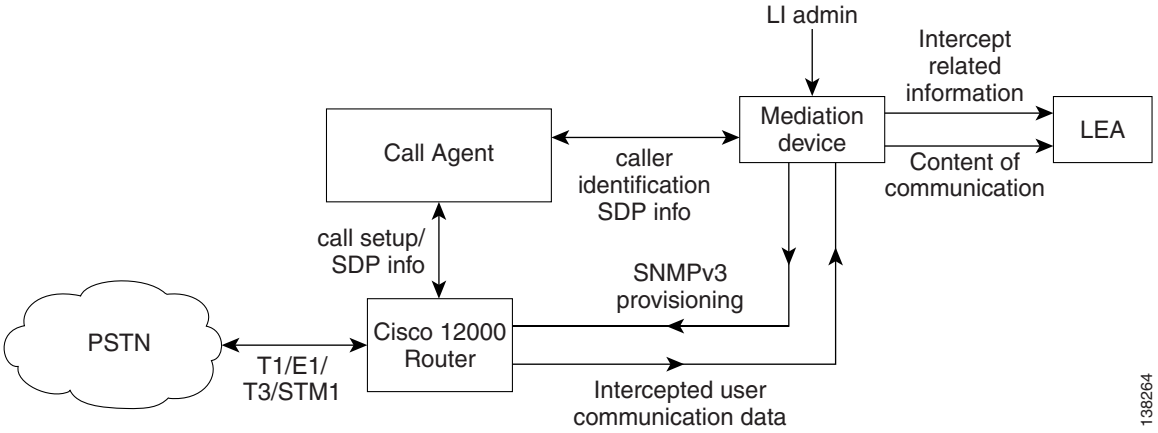
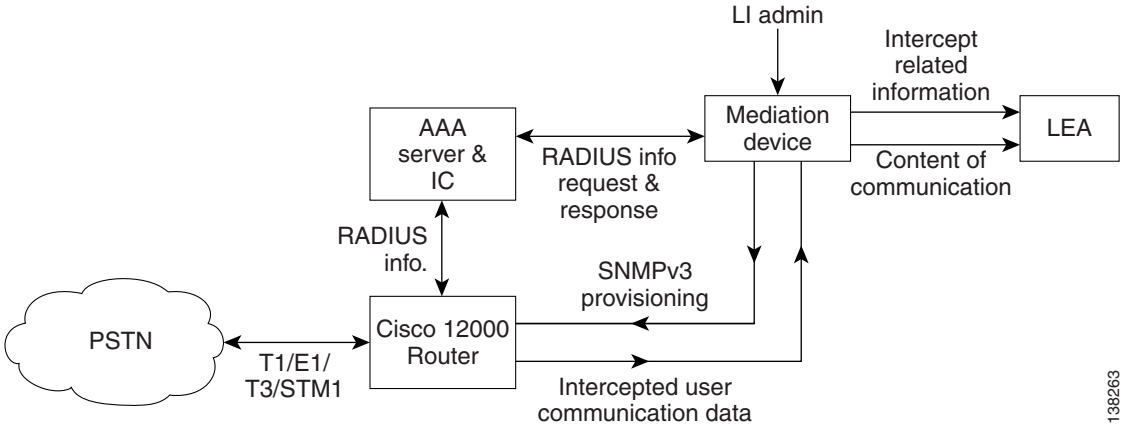


Figure 2 Cisco 12000 Series Router in a Dial-up Access Network



The following components are used in the network topology for a Voice over IP (VoIP) Lawful Intercept solution:

- Media Gateway Control Protocol (MGCP) call agent
- Mediation device, such as SS8 or Verint
- Cisco 12000 series router

When an Media Gateway Control Protocol (MGCP) call agent must support the interface with the mediation device to provide the SDP signaling information. The router must support the mediation device extracts the intercept target's local IP/UDP address from the SDP signaling information to do the SNMPv3 Lawful Intercept provisioning. As long as the mediation device can use CISCO-TAP-MIB to provision an intercept, the router will be able to intercept the call.

Note Currently, PGW and BTS are the only two Media Gateway Control Protocol (MGCP) call agents that are supported.

The following components are used in the network topology for a dial-up access Lawful Intercept solution:

- AAA radius server
- TopLayer sniffer device
- Mediation device (Cisco recommends SS8)
- Cisco 12000 series router

For the dial-up Lawful Intercept solution, the sniffer device software caches the RADIUS server information. The mediation device obtains the Lawful Intercept provisioning information (such as the account session ID) from the sniffer. The mediation device provisions the intercept through the SNMPv3 interface using the CISCO-TAP-MIB.

Benefits

The Lawful Intercept feature provides service provides with the ability to meet law enforcement requirements and gives law enforcement agencies the ability to intercept Voice over IP (VoIP) and data traffic as it passes through edge routers.

Restrictions

When Lawful Intercept is enabled, forwarding performance of non-intercepted packets is degraded by 7 to 8 percent.

Network administrators are not able to observe Lawful Intercept is enabled. No Lawful Intercept program messages or error messages are ever displayed on the console.

Lawful Intercept on Cisco 12000 series routers does *not* provide the following features for Cisco IOS Release 12.0(32)S:

- Support of RTP-NOR encapsulation
- MAC based interception (requires support of MAC-based ACL on Tetra line cards)
- VPN/VRF aware traffic (on tag imposition and tag disposition only)
- Other line cards support
- TAP MIBs version 2
- MPLS traffic
- Multicast traffic
- IPv6 traffic
- Per interface Lawful Intercept configuration

Related Features and Technologies

Lawful Intercept supports the following technologies on the Cisco 12000 series routers:

- IPv4 traffic
- Global Lawful Intercept configuration
- UDP encapsulation
- CISCO-TAP-MIB, Version 1
- Cisco 12000 Series IP Services Engine (ISE)

Related Documents

For general configuration information on the Cisco 12000 series routers, refer to the following documentation:

- Software Configuration Guide for the Cisco 12000 Series Internet Router

For information on how to configure a Cisco Media Gateway Controller (MGC), go to:

http://www.cisco.com/univercd/cc/td/doc/product/access/sc/rel9/swinstl/3ins_cfg.htm#wp1464984

Supported Platforms

Lawful Intercept for Cisco 12000 series routers is supported on Cisco IOS Release 12.0(32)S and is supported on all Cisco 12000 Series IP Services Engine (ISE) line cards.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions.

Supported Standards and MIBs

Lawful Intercept on the Cisco 12000 series router conforms to the following standards and MIBs.

Standards

- Service Independent Intercept (SII) architecture
- Simple Network Management Protocol Version 3 (SNMP V3)

MIBs

- CISCO-TAP-MIB, Version 1

VoIP Lawful Intercept Provisioning TAP-MIB

Voice over IP (VoIP) Lawful Intercept provisioning is based on the local media gateway IP address and the UDP port. The mediation device uses the CISCO-TAP-MIB to provision Voice over IP (VoIP) intercepts. In Voice over IP (VoIP) Lawful Intercept provisioning, an intercept can be enabled or disabled during a voice call.

Dial-up Lawful Intercept Provisioning TAP-MIB

Dial-up Lawful Intercept provisioning does not have fixed IP addresses. The IP addresses are assigned dynamically. The mediation device uses the CISCO-TAP-MIB to provision dial-up intercepts.

Prerequisites

Before you can provision Lawful Intercept on a Cisco 12000 series router, you must have the following components already set up:

- SNMP server with VACM views
- Mediation device

Configuration Tasks

See the following sections for configuration tasks for the Lawful Intercept feature:

- SNMP v3 Access for Lawful Intercept
- Mediation Device Provisioning
- Access Function Provisioning
- Surveillance Function Provisioning
- Collection Function Provisioning
- Call Agent Provisioning

SNMP v3 Access for Lawful Intercept

SNMP v3 Access for Lawful Intercept is configured on the router. The configuration commands to setup the configuration for SNMP v3 access are as follows:

Note The following configuration commands can be saved into NVRAM and do not need to be entered every time the system boots up.

```
router(config)#snmp-server group group3 v3 auth read view3 write view3 notify view3
router(config)#snmp-server view view3 snmp-server view view3 cTapMIB included
router(config)#snmp-server view view3 ciscoUserConnectionTapMIB included
router(config)#snmp-server enable traps tty
```

The following configuration command is not saved in NVRAM and must be entered every time the router boots up:

```
router(config)#snmp-server user SS8user group3 v3 auth md5 cisco
```

In the above example, *group3* is an SNMP v3 group, which can access the three MIBS specified in read/write mode. *SS8user* is a user that belongs to *group3* and can provision the specified MIBS securely. You can change the names, *SS8user* and *group3,* to any value.

Mediation Device Provisioning

Cisco 12000 series router provisioning is done on the mediation device by the mediation device vendor. In this case, the SS8 mediation device is used as an example.

The mediation device

- activates the intercept at the authorized time and remove it when the authorized time period has elapsed.
- periodically audits the elements in the network to ensure that all authorized intercepts are in place and that only authorized intercepts are in place.

The SS8 mediation device vendor must provision the following three functions to complete Lawful Intercept provisioning on the SS8 mediation device for a Cisco 12000 series router:

- Access Function Provisioning
- Surveillance Function Provisioning
- Collection Function Provisioning

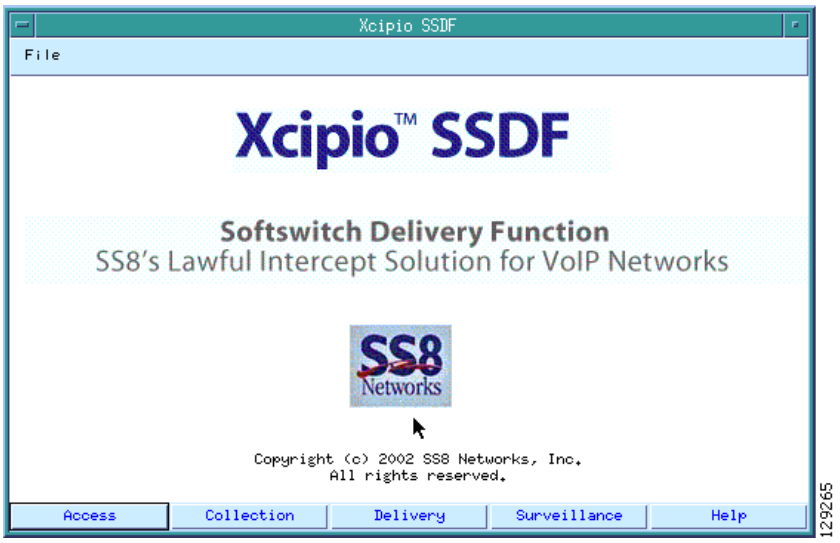
Access Function Provisioning

The SS8 mediation device vendor must verify that the SS8 Access Function Table for Broadband Telephony Softswitch (BTS) is populated with the correct data as shown in the examples in Figure 3:

- Access Function Configuration
- Access Function Provisioning Interface
- Access Function RADIUS Interface
- Access Function BTS10200 Provisioning Interface
- Access Function SNMPv3 Interface

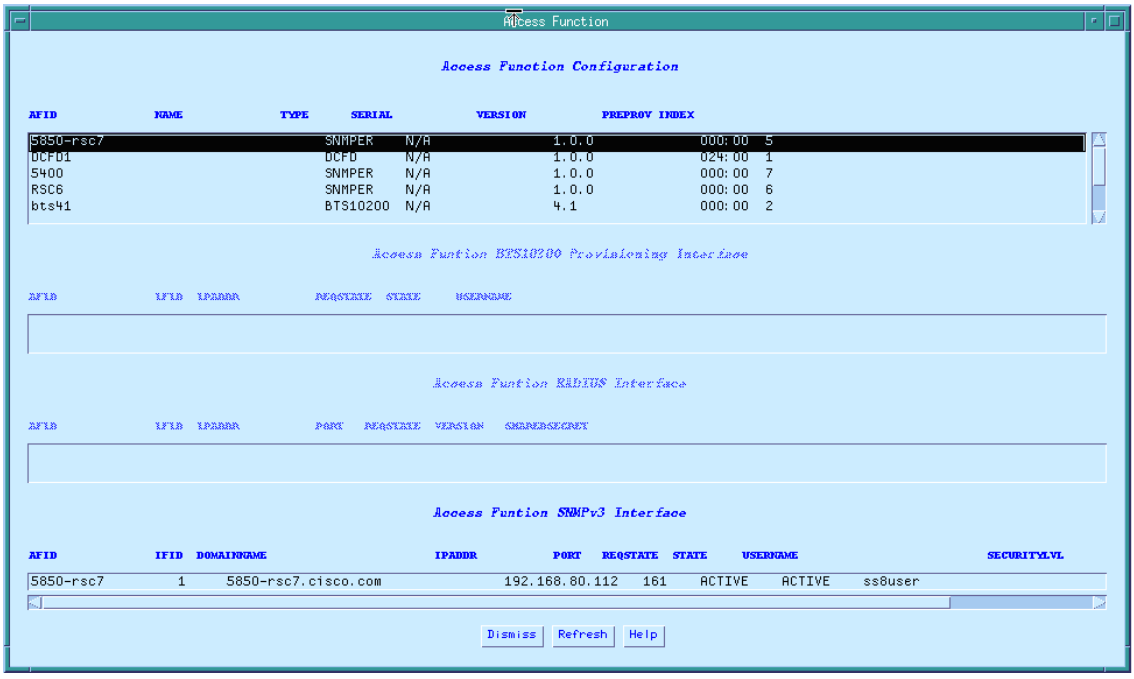
In the SS8 mediation device main window, select the **Access** button as shown in Figure 3.

Figure 3 SS8 Main Window with Access Selected



When you select the **Access** button, the Access Function Configuration table appears as shown in Figure 4.

Figure 4 Access Function Configuration Table



Router Access Function Configuration

In the Access Function Configuration table, manually set the following fields for each router in the surveillance path as shown in the example in Figure 4:

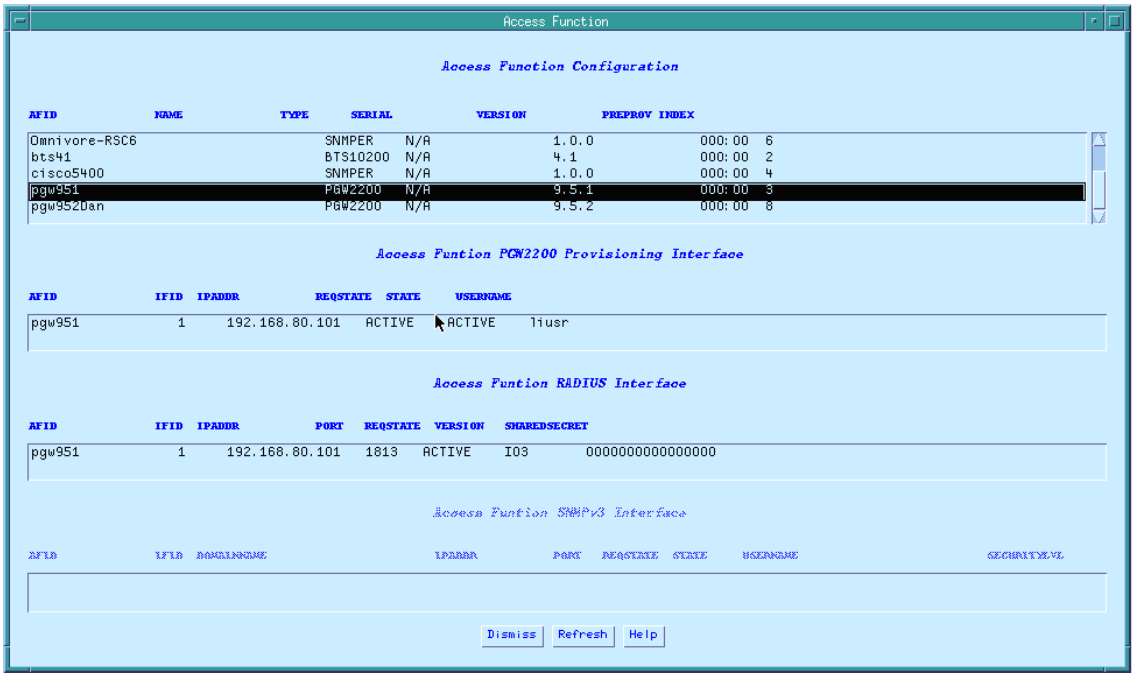
- Router name (AFID)
- IP Address
- Port (always 161 for routers)
- Req State
- State
- Username (same as SNMP username)
- Security Value

Call Agent Access Function Configuration

In the Access Function Configuration table, manually set the following fields for the call agent as show in the example in Figure 5:

- Domain Name
- IP Address
- Port
- Req State
- State
- Username (set username to the PGW name, for example pgw951)
- Security Value

Figure 5 Access Function Configuration Table—PGW Example



Surveillance Function Provisioning

On the SS8 mediation device main window, select the **Surveillance** button as shown in Figure 6.

Figure 6 SS8 Main Window with Surveillance Selected

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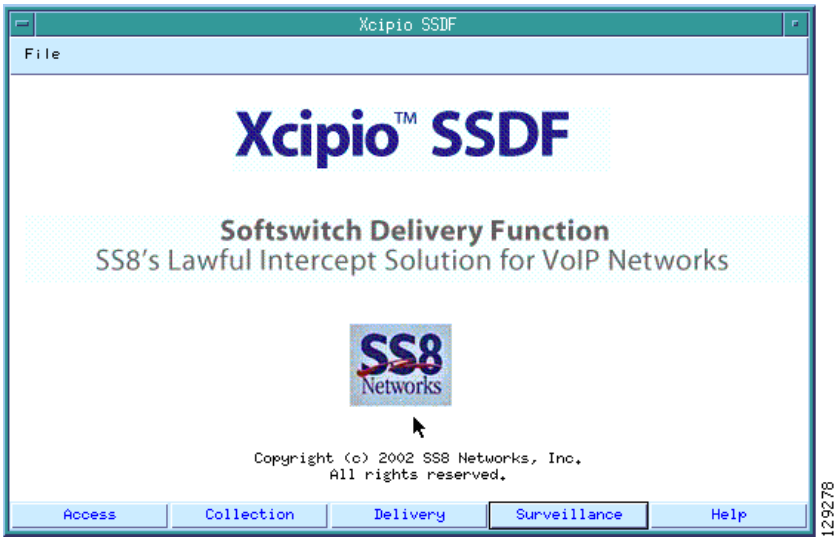
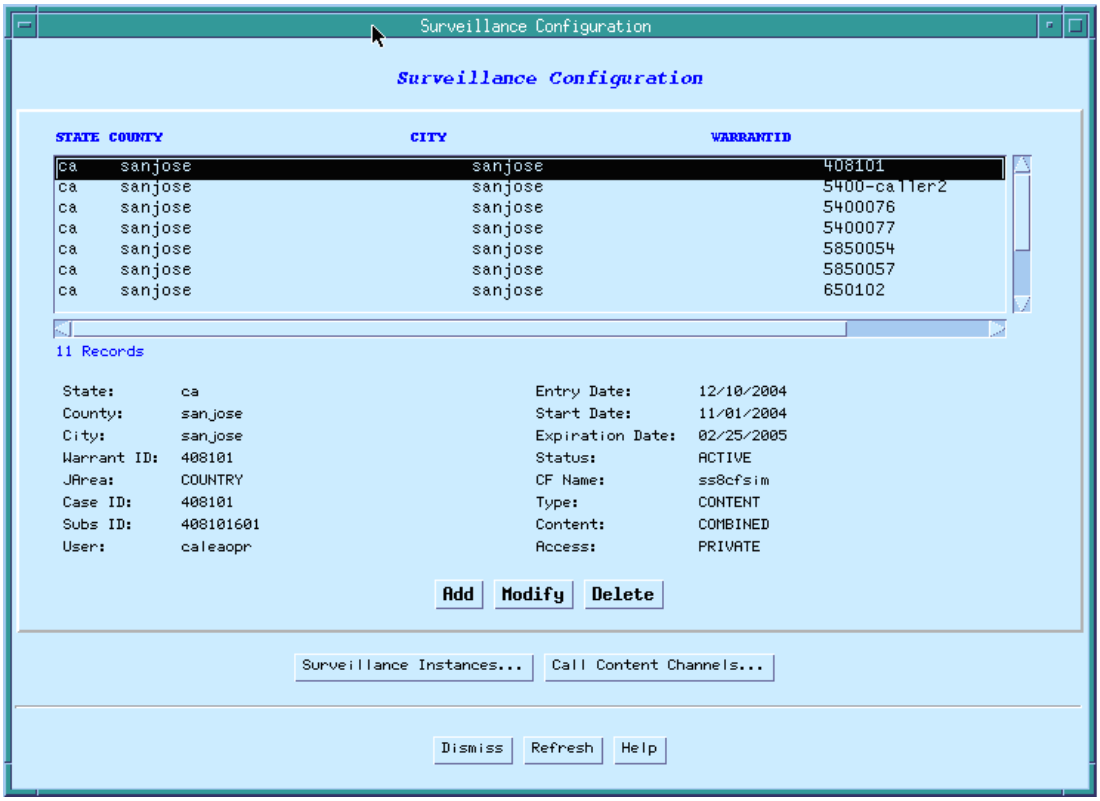


When you select the **Surveillance** button, the Surveillance Configuration Window appears as shown in Figure 7.

Figure 7 Surveillance Configuration Window



From the Surveillance Configuration window, perform the following steps:

Step 1 Select the **Modify** button to set the Subscriber ID and User fields.

Step 2 Set the Subscriber ID as follows:

- For dial-up calls, click the **Add** button to set the subscriber ID to the *username* to be intercepted.
- For Voice over IP (VoIP), click the **Add** button to set the subscriber ID to the *phone number* to be intercepted.

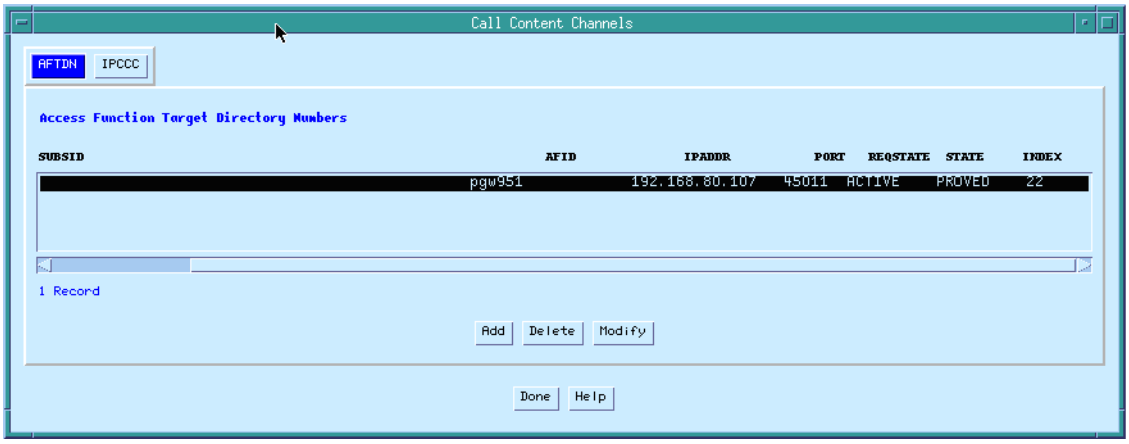
Step 3 Set the user field to **caleaopr** as shown in Figure 7 to grant the user caleaopr privileges.

Step 4 Go back to the the Surveillance Configuration window.

Step 5 Select the **Call Content Channels** button.

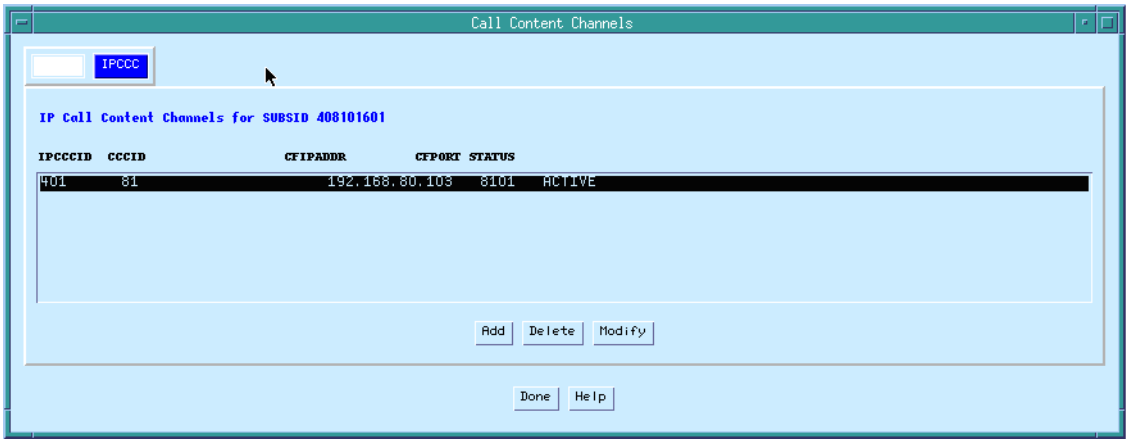
Step 6 Select the AFTDN tab and set the target phone number to be intercepted as shown in the example in Figure 8.

Figure 8 Call Content Channels—AFTDN Tab



Step 7 Select the IPCCC tab and set the IP address and port number of the collection function as shown in Figure 9.

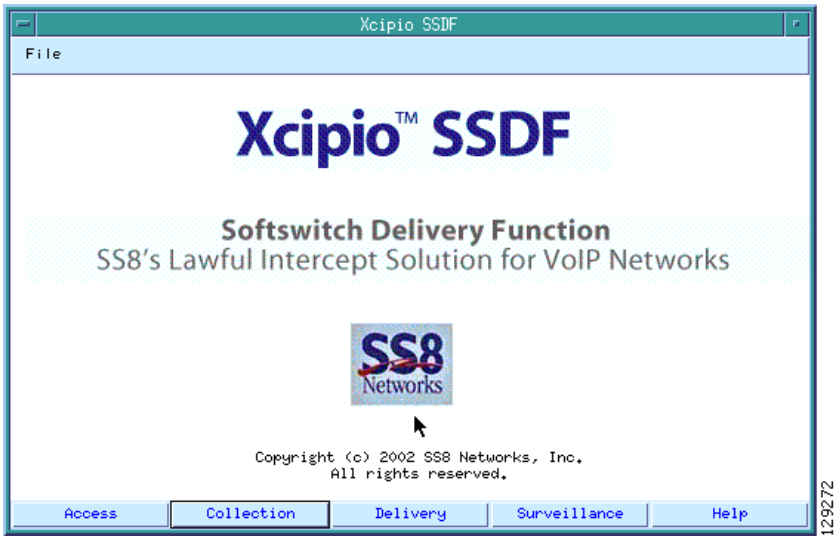
Figure 9 Call Content Channels—IPCCC Tab



Collection Function Provisioning

On the SS8 mediation device main window, select the **Collection** button as shown in Figure 10.

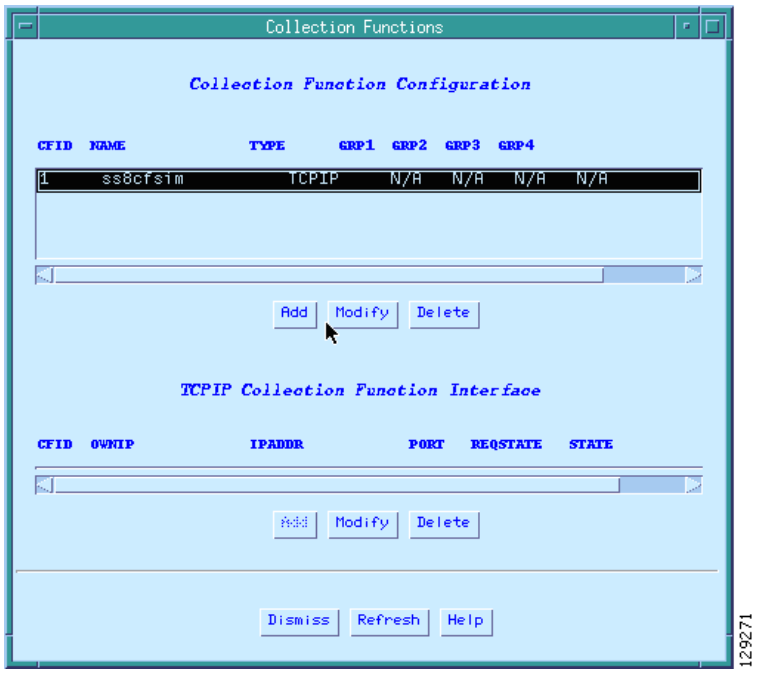
Figure 10 SS8 Main Window with Collection Selected



When you select the **Collection** button, the Collection Functions window appears as shown in Figure 11. In the Collection Functions window, define the collection type.

Figure 11 show TCP/IP as the collection type.

Figure 11 Collection Functions Window



Call Agent Provisioning

In the CLI, register the call agent with the mediation device by entering the following code:

Note In this example, PGW is the call agent.

```
mml>add-af:afid=pgw952Dan,type=PGW2200,version=9.5.2,preprov=000:00;
mml>add-afgi:afid=pgw952Dan,ifid=1,ipaddr=192.168.80.129,username=liusr,passwd=test123;
mml>add-fri:afid=pgw952Dan,ifid=1,ipaddr=192.168.80.129,port=1813,version=I03,sharedsecret
=0000000000000000;
```

Glossary

AAA	Authentication Authorization Accounting
BTS	Broadband Telephony Softswitch, a call agent
Cisco IOS	Cisco Internet Operating System
IP	Internet Protocol
IP-TAP-MIB	Cisco Lawful Intercept Control MIB
ISE	Cisco 12000 Series IP Services Engine (ISE) is a Layer 3 forwarding engine for Cisco 12000 series routers that forms the basis for a best-in-class portfolio of programmable, high-performance, edge-optimized line cards.
Mediation device	A hardware device that receives signaling and voice information from a service provider network and translates it into the national variant protocol.
MG	Media Gateway
MGCP	Media Gateway Control Protocol
MIB	Management Information Base
PGW	PSTN GateWay, a call agent
PPP	Point to Point Protocol
PSTN	Public Switched Telephone Network
RADIUS	Remote Authentication Dial-In User Service
SDP	Session Definition Protocol
SII	Service Independent Intercept
sniffer	A network analyzer used to capture packets transmitted in a network for inspection and problem detection.
SIP	SMDS Interface Protocol
SNMPv3	Simple Network Management Protocol Version 3
TCP	Transmission Control Protocol
TDM	Time Division Multiplexing
ToS	Type of Service
UDP	User Datagram Protocol
VoIP	Voice over Internet Protocol