SECTION 5

Configuring PPP and Authentication

In this Section

This section describes how to configure the Cisco AS5300 and AS5800 for PPP and local authentication.

The following sections are provided:

- Task 1. Configuring PPP Authentication for Local AAA
- Task 2. Configuring IPCP Options
- Task 3. Configuring LCP Options
- Task 4. Enabling PPP Autoselect
- Task 5. Testing Asynchronous PPP Connections
- Task 6. Inspecting Active Call States
- Task 7. Confirming the Final Running-Config

In this case study, Maui Onions and THEnet perform these same tasks to configure their network access servers (NAS). Maui Onions uses a Cisco AS5300; THEnet uses a Cisco AS5800. After local authentication if verified, Maui Onions expects to use TACACS+ and a remote authentication server. THEnet expects to use RADIUS.

Task 1. Configuring PPP Authentication for Local AAA

Configure AAA to perform login authentication by using the local username database. The **login** keyword authenticates EXEC terminal shell users. Additionally, configure PPP authentication to use the local database if the session was not already authenticated by **login**.

Step 1 Create a local login username database in global configuration mode. In this example, admin is used for the administrator. In this case study, the remote client's login password is dude.

```
!
username admin password adminpasshere
username dude password dudepasshere
!
```

Warning **This step also prevents you from getting locked out of the NAS. If you get locked out, you must reboot the device and perform password recovery.**

Step 2 Configure local AAA security in global configuration mode. You must enter the **aaa new-model** command before the other two authentication commands.

```
!
aaa new-model
aaa authentication login default local
aaa authentication ppp default if-needed local
!
```

Step 3 Log in with your username and password:

```
5800-NAS#login

This is a secured device.
Unauthorized use is prohibited by law.


User Access Verification
Username:dude
Password:

5800-NAS#
```

Warning **Successfully logging in means that your local username will work on any TTY or VTY line. Do not disconnect your session until you can log in. (If you get locked out, you will need to perform password recovery by rebooting the device.)**

Task 2. Configuring IPCP Options

Create a pool of IP addresses to assign to the PC clients dialing in. As the clients connect, they request IP addresses from the NAS.

Tech Tip Remote ISDN LANs and remote nodes are primarily differentiated by an IP addressing scheme. Remote LANs can appear as remote nodes by using port address translation (PAT).

Step 1 Define the local IP address pool and DNS servers:

```
!
ip local pool addr-pool 172.22.90.2 172.22.90.254
!
async-bootp dns-server 172.30.10.1 172.30.10.2
!
```

For clients using server-assigned addressing (if there are any) you must specify primary and secondary DNS servers. The clients send config-requests to the NAS if the clients are configured to receive NAS assigned WINS and DNS servers.

Note RFC 1877 describes DNS and NBNS servers. The domain name must also be configured on the client.

Step 2 Verify that the IP address pool was created:

```
5800-NAS#show ip local pool
 Pool                    Begin           End             Free  In use
 addr-pool               172.22.90.2     172.22.90.254    253       0
5800-NAS#
```

Task 3. Configuring LCP Options

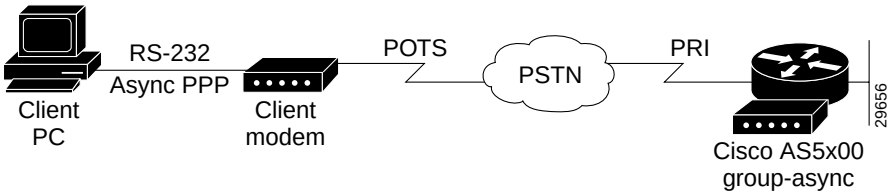
The group-async interface is a template that controls the configuration of all the asynchronous interfaces in the NAS.

Asynchronous interfaces:

- Are lines that can run in PPP mode
- Use the same number as its corresponding line
- Save you time and configuration file size by configuring the asynchronous interfaces as a group-async

The client PPP framing must match the Cisco IOS interface. Figure 5-1 shows this concept.

Figure 5-1 Modem Dialup PPP Framing



The following group-async configuration applies to asynchronous interfaces 1/2/00 through 1/10/143:

```
!
interface Group-Async0
 ip unnumbered FastEthernet0/1/0
 encapsulation ppp
 async mode interactive
 ppp authentication chap pap
 peer default ip address pool addr-pool
 no cdp enable
 no ip directed-broadcast
 group-range 1/2/00 1/10/143
!
```

Table 5-1 describes the previous configuration snippet in more detail:

Table 5-1 Interface Group Async Command Descriptions

Command	Purpose
`ip unnumbered FastEthernet0/1/0`	Conserves IP address space by configuring the asynchronous interfaces as unnumbered.
`encapsulation ppp`	Enables PPP.

Table 5-1 Interface Group Async Command Descriptions (continued)

Command	Purpose
`async mode interactive`	Configures interactive mode on the asynchronous interfaces. Interactive means that users can dial in and get to a shell or PPP session on that line.
`ppp authentication chap pap`	Enables CHAP and PAP authentication on the interface during LCP negotiation. The NAS first requests to authenticate with CHAP. If CHAP is rejected by the remote client (modem), then PAP authentication is requested.
`peer default ip address pool addr-pool`	Assigns dial-in client IP addresses from the pool named addr-pool.
`no cdp enable`	Disables the Cisco discovery protocol.
`no ip directed-broadcast`	Prevents IP directed broadcasts.
`group-range 1/2/00 1/10/143`	Specifies the range of asynchronous interfaces to include in the group, which is usually equal to the number of modems you have in the NAS. (The session may pause for several seconds when you issue this command.)

Task 4. Enabling PPP Autoselect

Enable remote PPP users to dial in, bypass the EXEC facility, and automatically start PPP on the line.

```
!
line 1/2/00 1/10/143
 autoselect during-login
 autoselect ppp
!
```

These two autoselect commands:

- Provide the transparent launching of shell and PPP services on the same lines.
- Circumvent the need to alert the NAS by pressing the return key. Older versions of Cisco IOS did not have this feature and required the peer to hit return before the username was displayed.

Note The **autoselect during-login** command displays the username:password prompt after modems connect.

Task 5. Testing Asynchronous PPP Connections

Before you troubleshoot PPP negotiation or AAA authentication, you need to understand what a successful PPP and AAA debug sequence looks like. In this way, you can save time and effort when comparing a successful debug session against a faulty completed debug sequence.

5.1 Successful PPP Negotiation Debug

The following steps describe how to initiate a PPP test call and interpret a successful debug sequence.

Step 1 Enter the appropriate debug commands:

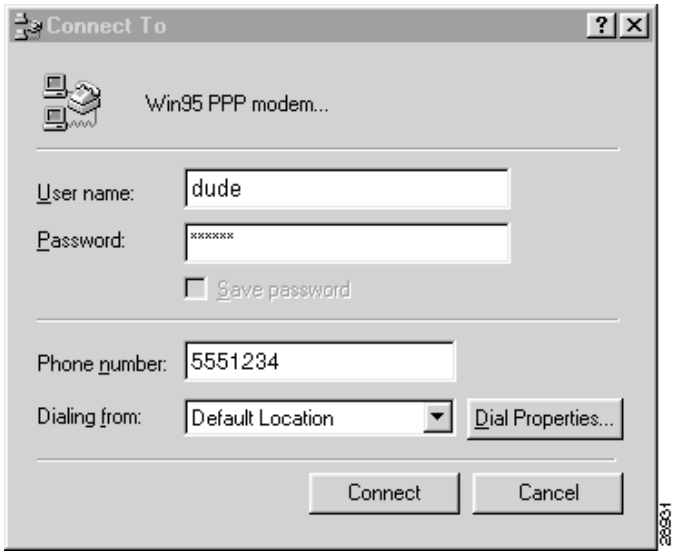
```
5800-NAS#debug ppp authentication
PPP authentication debugging is on
5800-NAS#debug aaa authentication
AAA Authentication debugging is on
5800-NAS#show debug
General OS:
  AAA Authentication debugging is on
PPP:
  PPP authentication debugging is on
```

Step 2 Make sure that your EXEC session receives logging and debug output:

```
5800-NAS#terminal monitor
```

Step 3 From the client, send a test call into the NAS by using Dial-Up Networking. Figure 5-2 shows an example Windows Dial-Up Networking display.

Figure 5-2 Windows Dial-Up Networking



Step 4 Go to the NAS terminal screen to observe and interpret the debug output messages. As the call enters the NAS, debug output is created.

When examining PPP between two remote peers:

a. First check to see if DSR came up.

b. Verify that both sides get through LCP negotiation. If they do, move on to check authentication.

c. After authentication succeeds, check IPCP negotiation.

d. If no debug output appears, troubleshoot ISDN Q.931. Use the **debug isdn q931** command.

Given the debug commands entered in Step 1, the following debug output should be generated by the call:

```
*Sep 24 13:05:49.052: AAA: parse name=tty1/2/09 idb type=10 tty=441
*Sep 24 13:05:49.052: AAA: name=tty1/2/09 flags=0x1D type=4 shelf=0 slot=1 adapter=2
port=9 channel=0
*Sep 24 13:05:49.052: AAA: parse name=Serial1/0/0:4:21 idb type=12 tty=-1
*Sep 24 13:05:49.052: AAA: name=Serial1/0/0:4:21 flags=0x5D type=1 shelf=0 slot=
1 adapter=0 port=4 channel=21
```

In this example, the call enters the NAS on channel 1/0/0:4:21. This channel maps to the 21st DS0 channel of the 4th PRI line of a CT3 card. Eventually the call terminates on modem 441.

```
*Sep 24 13:05:49.052: AAA/MEMORY: create_user (0x63E8FB70) user='' ruser='' port
='tty1/2/09' rem_addr='4089548211/51121' authen_type=ASCII service=LOGIN priv=1
*Sep 24 13:05:49.052: AAA/AUTHEN/START (1586904428): port='tty1/2/09' list='' ac
tion=LOGIN service=LOGIN
*Sep 24 13:05:49.052: AAA/AUTHEN/START (1586904428): using "default" list
*Sep 24 13:05:49.052: AAA/AUTHEN/START (1586904428): Method=LOCAL*Sep 24
13:05:49.052: AAA/AUTHEN (1586904428): status = GETUSER
*Sep 24 13:05:49.072: AAA/AUTHEN/ABORT: (1586904428) because Autoselected.
*Sep 24 13:05:49.072: AAA/MEMORY: free_user (0x63E8FB70) user='' ruser='' port='
```

An authentication start packet is sent by AAA, and it searches the local username database as the default authentication method.

```
tty1/2/09' rem_addr='4089548211/51121' authen_type=ASCII service=LOGIN priv=1
*Sep 24 13:05:51.076: As1/2/09 PPP: Treating connection as a dedicated line
*Sep 24 13:05:55.272: As1/2/09 PPP: Phase is AUTHENTICATING, by this end
*Sep 24 13:05:55.404: As1/2/09 PAP: I AUTH-REQ id 1 len 20 from "dude"
*Sep 24 13:05:55.404: As1/2/09 PAP: Authenticating peer dude
```

PPP is allowed to start on the interface. The client sends an authentication request called *dude*. PAP authentication is used.

```
*Sep 24 13:05:55.404: AAA: parse name=Async1/2/09 idb type=10 tty=441
*Sep 24 13:05:55.404: AAA: name=Async1/2/09 flags=0x1D type=4 shelf=0 slot=1 ada
pter=2 port=9 channel=0
*Sep 24 13:05:55.404: AAA: parse name=Serial1/0/0:4:21 idb type=12 tty=-1
*Sep 24 13:05:55.404: AAA: name=Serial1/0/0:4:21 flags=0x5D type=1 shelf=0 slot=
1 adapter=0 port=4 channel=21
*Sep 24 13:05:55.404: AAA/MEMORY: create_user (0x63E8FB70) user='dude' ruser=''
port='Async1/2/09' rem_addr='4089548211/51121' authen_type=PAP service=PPP priv=1
*Sep 24 13:05:55.404: AAA/AUTHEN/START (693233173): port='Async1/2/09' list=''
action=LOGIN service=PPP
*Sep 24 13:05:55.404: AAA/AUTHEN/START (693233173): using "default" list
*Sep 24 13:05:55.404: AAA/AUTHEN (693233173): status = UNKNOWN
*Sep 24 13:05:55.404: AAA/AUTHEN/START (693233173): Method=LOCAL
*Sep 24 13:05:55.404: AAA/AUTHEN (693233173): status = PASS
*Sep 24 13:05:55.404: As1/2/09 PAP: O AUTH-ACK id 1 len 5
```

The example above shows that local authentication was successful.

5.2 Failed PPP Negotiation Debug and Troubleshooting

Failed authentication is a common occurrence. Misconfigured or mismatched usernames and passwords create error messages in debug output.

The following example shows that the username *maddog* does not have permission to dial into the NAS. The NAS does not have a local username configured for this user. To fix the problem, use the **username** *name* **password** *password* command to add the username to the local AAA database in the NAS:

```
*Sep 24 13:11:28.964: AAA/MEMORY: create_user (0x63E43558) user='maddog' ruser='
' port='Async1/2/10' rem_addr='4089548211/51121' authen_type=PAP service=PPP priv=1
*Sep 24 13:11:28.964: AAA/AUTHEN/START (3281080218): port='Async1/2/10' list=''
action=LOGIN service=PPP
*Sep 24 13:11:28.964: AAA/AUTHEN/START (3281080218): using "default" list
*Sep 24 13:11:28.964: AAA/AUTHEN (3281080218): status = UNKNOWN
*Sep 24 13:11:28.964: AAA/AUTHEN/START (3281080218): Method=LOCAL
*Sep 24 13:11:28.964: AAA/AUTHEN (3281080218): User not found, end of method list
*Sep 24 13:11:28.964: AAA/AUTHEN (3281080218): status = FAIL
*Sep 24 13:11:28.964: As1/2/10 PAP: O AUTH-NAK id 1 len 32 msg is "Password
validation failure"
*Sep 24 13:11:28.964: AAA/MEMORY: free_user (0x63E43558) user='maddog' ruser=''
port='Async1/2/10' rem_addr='4089548211/51121' authen_type=PAP service=PPP priv=1
```

The following example shows an invalid password. Notice that the same error messages are used for username failure—"Password validation failure."

```
*Sep 24 13:13:59.032: AAA/MEMORY: create_user (0x63E9846C) user='dude' ruser=''
port='Async1/2/11' rem_addr='4089548211/51121' authen_type=PAP service=PPP priv=
1
*Sep 24 13:13:59.032: AAA/AUTHEN/START (3032205297): port='Async1/2/11' list=''
action=LOGIN service=PPP
*Sep 24 13:13:59.032: AAA/AUTHEN/START (3032205297): using "default" list
*Sep 24 13:13:59.032: AAA/AUTHEN (3032205297): status = UNKNOWN
*Sep 24 13:13:59.032: AAA/AUTHEN/START (3032205297): Method=LOCAL
*Sep 24 13:13:59.032: AAA/AUTHEN (3032205297): status = FAIL
*Sep 24 13:13:59.032: As1/2/11 PAP: O AUTH-NAK id 1 len 32 msg is "Password vali
dation failure"
*Sep 24 13:13:59.036: AAA/MEMORY: free_user (0x63E9846C) user='dude' ruser='' po
rt='Async1/2/11' rem_addr='4089548211/51121' authen_type=PAP service=PPP priv=1
```

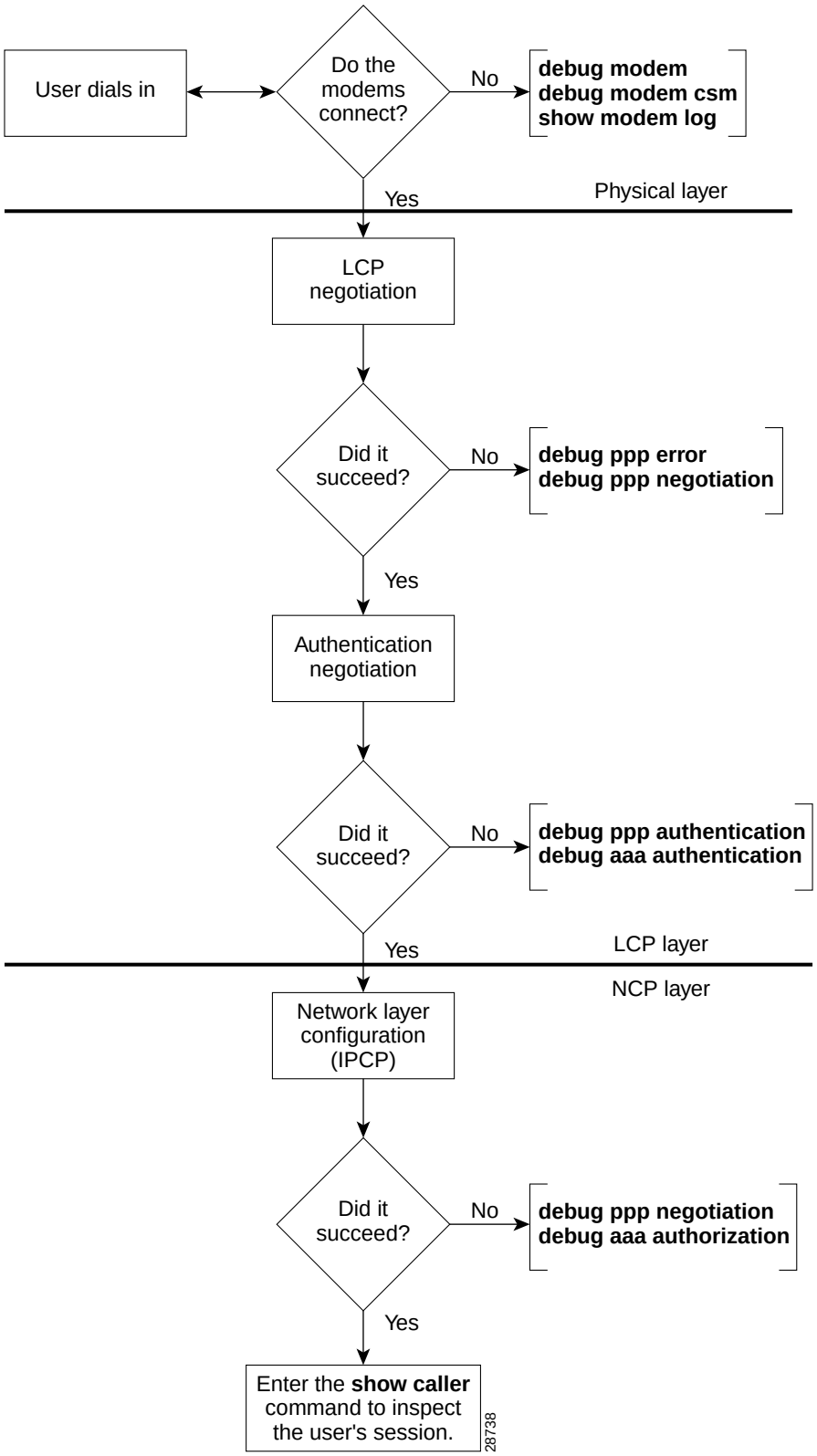
Snip

5.3 Troubleshooting Flow Diagrams

Figure 5-3 provides a flowchart for troubleshooting the following three PPP layers:

- The physical layer
- The Link Control Protocol (LCP) and authentication layer
- The Network Control Protocol (NCP) layer

Figure 5-3 Troubleshooting Flow Chart for PPP and Authentication



LCP negotiation is a series of LCP packets exchanged between PPP peers to negotiate a set of options and option values when sending data. The LCP negotiation is actually two separate dialogs between two PPP peers (Peer1 and Peer 2):

Peer 1 and Peer 2 do not have to use the same set of LCP options. When a PPP peer sends its initial Configure-Request, the response is any of the following:

- A Configure-Nack because one or more options have unacceptable values.
- A Configure-Reject because one or more of the options are unknown or not negotiable.
- A Configure-Ack because all of the options have acceptable values.

When a PPP peer receives a Configure-Nack or Configure-Reject in response to its Configure-Request, it sends a new Configure-Request with modified options or option values. When a Configure-Ack is received, the PPP peer is ready to send data.

Figure 5-4 shows an example LCP negotiation process for Peer 1 using the fictional options W, X, Y, Z. Additionally, Figure 5-4 shows Peer 1 sending data to Peer 2 only. Separate LCP negotiation must be configured so that Peer 2 can send data back to Peer 1. Very often, the LCP packets for both Peer 1 and Peer 2 are intermixed during the connection process (that is, Peer 1 is configuring the way it sends data at the same time as Peer 2.).

Figure 5-4 LCP Layer Negotiations

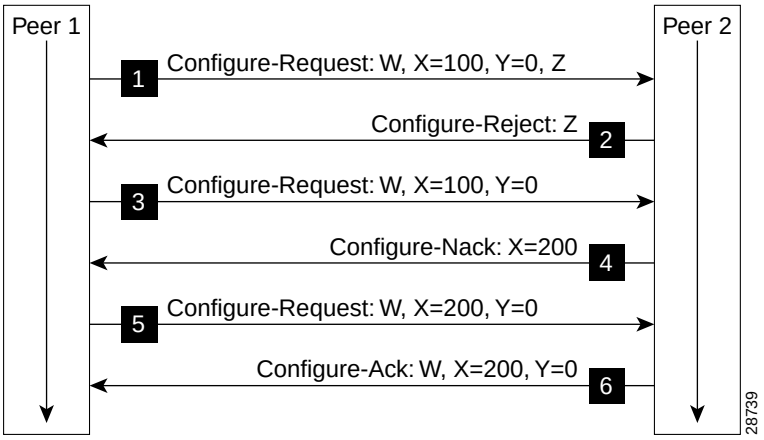


Figure 5-4 shows that:

1. Peer 1 sends a Configure-Request requesting option W, option X set to 100, option Y set to 0, and option Z. (Options W and Z are flag options.)
2. Peer 2 does not understand option Z so it sends a Configure-Reject containing option Z.
3. Peer 1 sends a new Configure-Request packet requesting option W, option X set to 100, and option Y set to 0.
4. Peer 2 prefers that option X be set to 200 so it sends a Configure-Nack containing option X and its preferred value.
5. Peer 1 sends a new Configure-Request packet requesting option W, option X set to 200, and option Y set to 0.
6. Peer 2 sends a Configure-Ack.

Each time Peer 1 sends a new Configure-Request, it changes the Identifier value in the LCP header so that Configure-Requests can be matched with their responses.

Task 6. Inspecting Active Call States

After a basic PPP modem call comes into the NAS, you should use some **show** commands to inspect several active call statistics. If you try to use the client's web browser after the modems connect, you will test DNS, IP, and other functions. If your test fails, try pinging the DNS server from the device that dialed in.

6.1 Show Caller Statistics

The **show caller** command is used to:

- View individual users and consumed resources on the NAS.
- Inspect active call statistics for large pools of connections. (Debug commands produce too much output and tax the CPU too heavily.)
- Display the absolute and idle times for each user. The current values for both of these settings are displayed on the TTY line and the asynchronous interface. Users that have been idle for unacceptably long periods of time can be easily identified. By using this information, you can define timeout policies and multiple grades of services for different users.

The **show caller** command has many options:

```
5800-NAS#show caller ?
  full       Provide expanded caller information
  interface  Provide information on one interface
  ip         Display IP information
  line       Provide information on one line
  timeouts   Display session and idle limits and disconnect time
  user       Display information for a particular user
  |          Output modifiers
  <cr>

5800-NAS#show caller
                                                 Active    Idle
  Line         User              Service         Time      Time
  vty 0        admin             VTY             00:54:39  00:00:00
  tty 441      dude              Async           00:00:15  00:00:00
  As1/2/09     dude              PPP             00:00:08  00:00:00

5800-NAS#show caller user dude

  User: dude, line tty 441, service Async
        Active time 00:01:24, Idle time 00:01:05
  Timeouts:            Absolute  Idle      Idle
                                 Session   Exec
      Limits:          -         -         00:10:00
      Disconnect in:   -         -         -
  TTY: Line 1/2/09, running PPP on As1/2/09
  Location: PPP: 192.168.10.4
  DS0: (slot/unit/channel)=0/4/21
  Status: Ready, Active, No Exit Banner, Async Interface Active
          HW PPP Support Active, Modem Detected
  Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out
                Modem Callout, Modem RI is CD,
                Line usable as async interface, Modem Autoconfigure
  Modem State: Ready, Modem Configured

  User: dude, line As1/2/09, service PPP
        Active time 00:01:17, Idle time 00:01:05
```

```
Timeouts:            Absolute  Idle
    Limits:          -         -
    Disconnect in:   -         -
PPP: LCP Open, PAP (<- AAA), IPCP
IP: Local 172.22.66.23, remote 172.22.90.2
Counts: 30 packets input, 1640 bytes, 0 no buffer
        1 input errors, 1 CRC, 0 frame, 0 overrun
        14 packets output, 290 bytes, 0 underruns
        0 output errors, 0 collisions, 0 interface resets
```

In the previous example, notice that one call uses the following system resources:

- TTY line 441
- Asynchronous interface 1/2/09 (shelf/slot/port)
- DS0 channel number 0/4/21
- Modem 1/2/09

Note Different data is presented at each layer of the connection. Understanding the roles of the layers is very useful for troubleshooting purposes. The **show caller user dude detailed** command displays detailed LCP negotiated parameters.

Table 5-2 describes some of the significant display output fields of the **show caller user** command:

Table 5-2 Show Caller User Command Descriptions

Field	Description
`User: dude, line tty 441, service Async`	Active user on line TTY 441. The output fields are very similar to the **show line** command.
`DS0: (slot/unit/channel)=0/4/21`	The DS0 channel used by the call.
`User: admin, line As1/2/09, service PPP`	Active user on asynchronous interface 1/2/09. The timeouts working on the PPP layer are displayed, which are different from the TTY line timeouts.
`PPP: LCP Open, CHAP (<- AAA), IPCP`	Superficial information about what is open in PPP. The field "(<- AAA)" is somewhat misleading. Local authentication is also from AAA. For more detailed IPCP information, enter the **show caller user dude detail** command.
`IP: Local 172.22.66.23, remote 172.22.90.2`	The IP addresses on each end of the link. These values are only displayed on the output for the asynchronous interface.
`Counts:`	Counters from the **show interface async 1/2/09** command output.

6.2 Fast Switching and Route Caching Statistics

Inspect fast-switching and route-caching performance statistics for the call. Incoming asynchronous calls can be fast switched. However, some features disable fast switching.

- Inspect the queueing characteristics of the asynchronous interface. Notice that the queueing strategy is first-in-first-out (fifo).

```
5800-NAS#show interface async 1/2/02
Async1/2/02 is up, line protocol is up
modem=1/2/02, vdev_state(0x00000000)=CSM_OC_STATE, bchan_num=(T1 1/0/0:4:6)
vdev_status(0x00000001): VDEV_STATUS_ACTIVE_CALL.

  Hardware is Async Serial
  Interface is unnumbered. Using address of FastEthernet0/1/0 (172.22.66.23)
  MTU 1500 bytes, BW 9 Kbit, DLY 100000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set, keepalive not set
  DTR is pulsed for 5 seconds on reset
  LCP Open
  Open: IPCP
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/10, 0 drops; input queue 1/10, 0 drops
  5 minute input rate 0 bits/sec, 1 packets/sec
  5 minute output rate 0 bits/sec, 1 packets/sec
     1683 packets input, 112764 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     1 input errors, 1 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     1626 packets output, 108235 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

- Inspect the IP settings of the interface. Notice that IP fast switching is disabled, because TCP/IP header compression is enabled. Turn off TCP/IP header compress to enable fast switching. Enter the **no ip tcp header-compression** command on the asynchronous interface.

```
5800-NAS#show ip int async 1/2/02
Async1/2/02 is up, line protocol is up
  Interface is unnumbered. Using address of FastEthernet0/1/0 (172.22.66.23)
  Broadcast address is 255.255.255.255
  Peer address is 172.22.90.2
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is enabled
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is disabled
  IP fast switching on the same interface is disabled
  IP multicast fast switching is enabled
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is enabled and compressing
  RTP/IP header compression is disabled
```

```
  Probe proxy name replies are disabled
  Gateway Discovery is disabled
  Policy routing is disabled
  Network address translation is disabled
5800-NAS#
```

- Look at the fast-switching cache in action. Notice that only packets destined to the Fast Ethernet interface are currently cached.

```
5800-NAS#show ip cache
IP routing cache 3 entries, 560 bytes
   109 adds, 106 invalidates, 3 refcounts
Minimum invalidation interval 2 seconds, maximum interval 5 seconds,
   quiet interval 3 seconds, threshold 0 requests
Invalidation rate 0 in last second, 0 in last 3 seconds
Last full cache invalidation occurred 22:17:01 ago

Prefix/Length         Age       Interface       Next Hop
172.61.0.0/16         15:13:22  FastEthernet0/1 172.22.66.1
172.22.67.67/32       00:06:10  FastEthernet0/1 172.22.67.2
172.22.68.67/32       00:06:09  FastEthernet0/1 172.22.68.3

5800-NAS#show interface async 1/2/02 stat
Async1/2/02
          Switching path    Pkts In   Chars In   Pkts Out  Chars Out
               Processor        909      57050       1022      67918
            Route cache         155      14260          0          0
                  Total        1064      71310       1022      6791
```

Note For more information, refer to the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/switch_r/xrswcmd.htm#xtocid872762

Task 7. Confirming the Final Running-Config

After completing the tasks in this section, the Cisco AS5800's final running configuration looks like the following example:

```
5800-NAS#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname 5800-NAS
!
aaa new-model
aaa authentication login default local
aaa authentication ppp default if-needed local
enable secret 5 $1$LKgL$tgi19XvWn7fld7JGt55p01
!
username dude password 7 045802150C2E
username admin password 7 044E1F050024
!
```

```
!
!
!
!
!
shelf-id 0 router-shelf
shelf-id 1 dial-shelf
!
!
!
resource-pool disable
!
modem-pool Default
 pool-range 1/2/0-1/10/143
!
!
spe 1/2/0 1/10/11
 firmware ios-bundled default
modem recovery action none
ip subnet-zero
no ip source-route
ip host dirt 172.22.100.9
ip domain-name the.net
ip name-server 172.22.11.10
ip name-server 172.22.12.11
!
async-bootp dns-server 172.30.10.1 172.30.10.2
isdn switch-type primary-ni
isdn voice-call-failure 0
!
!
controller T3 1/0/0
 framing m23
 cablelength 0
 t1 4 controller
!
controller T1 1/0/0:4
 framing esf
 pri-group timeslots 1-24
!
!
voice-port 1/0/0:4:D
!
!
process-max-time 200
!
interface Loopback0
 ip address 172.22.99.1 255.255.255.255
 no ip directed-broadcast
!
interface Loopback1
 ip address 172.22.90.1 255.255.255.0
 no ip directed-broadcast
!
interface FastEthernet0/1/0
 ip address 172.22.66.23 255.255.255.0
 no ip directed-broadcast
!
interface Serial1/0/0:4:23
 no ip address
 no ip directed-broadcast
 isdn switch-type primary-ni
 isdn incoming-voice modem
 no cdp enable
```

```
!
interface Group-Async0
 ip unnumbered FastEthernet0/1/0
 no ip directed-broadcast
 encapsulation ppp
 async mode interactive
 peer default ip address pool addr-pool
 no cdp enable
 ppp authentication chap pap
 group-range 1/2/00 1/10/143
!
ip local pool addr-pool 172.22.90.2 172.22.90.254
ip classless
ip route 0.0.0.0 0.0.0.0 172.22.66.1
no ip http server
!
!
banner login ^C
AS5800 Austin
THEnet Dial Access Server
^C
!
line con 0
 transport input none
line aux 0
 transport input telnet
line vty 0 4
line 1/2/00 1/10/143
 autoselect during-login
 autoselect ppp
 modem InOut
 no modem log rs232
!
end
```

What to do Next

Perform the tasks in the section “Modem Management Operations.”