IECs are generated for errors that cause the gateway to release or refuse a call. This section provides procedural and reference information used to troubleshoot gateway-detected errors and resolve problems on the gateway and with other VoIP network entities.

Because fields within the IEC identify which network entity and subsystem originated an error, they can be used to diagnose and isolate failures that can cause call disconnects.

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Troubleshooting Two-Stage Dialing Failures

The following example shows how to troubleshoot a two-stage dialing failure.

Symptom

The Cisco router or gateway rejects a call placed by a PSTN ISDN user after all the digits have been dialed.

Problem Description

The PSTN user enters a destination number that is routed through the PSTN ISDN switch, which sends an ISDN SETUP message to the router. The router tags the incoming call leg and sends back an ISDN CONNECT message. The caller receives second dial tone. The router then enters the digit collection stage to use the collected digits to route the call to the next hop, at which point the router rejects the call.

Troubleshooting Tasks

Perform the following steps to determine the reason for call failure.

1. Use the **voice iec syslog** command to enable displaying of IECs as they are encountered in real-time.

2. Use the **voice iec statistics type iec** command to configure the collection of IEC statistics.

3. Use the **show running-config** command to verify IEC, ISDN, and dial-peer configuration, as shown in the following partial sample output:

```
Router> show running-config
Building configuration...
!
voice rtp send-recv
!
voice service voip
```

The following lines show the IEC configuration:

```
 voice iec syslog
no voice hpi capture buffer
no voice hpi capture destination
voice statistics type iec
!
!
!
```

The following lines show the T1 configuration:

```
controller T1 0
 framing esf
 clock source line primary
 linecode b8zs
 cablelength short 133
 pri-group timeslots 1-24
!
```

The following lines show the ISDN configuration:

```
interface Serial0:23
 no ip address
 no logging event link-status
 isdn switch-type primary-ni
```

```
 isdn incoming-voice modem
 no cdp enable
!
```

The following lines show the dial-peer configuration. Because the dial-peer voice 1 is not configured for direct inward dialing (DID), the inbound call leg is considered to be configured for two-stage dialing, and the router returns a second dial tone.

```
dial-peer voice 1 pots
 incoming called-number .
 port 0:D
!
dial-peer voice 2 voip
 destination-pattern 83101
 session target ipv4:172.69.85.107
 dtmf-relay h245-alphanumeric
 codec g711ulaw
 ip qos dscp cs5 media
!
!end
```

4. Use the **show controller t1** command to display T1 status. Verify that the T1 is UP and that there are no errors.

```
Router> show controller t1 0
T1 0 is up.
  Applique type is Channelized T1
  Cablelength is short 133
  No alarms detected.
  alarm-trigger is not set
  Version info of slot 0:  HW: 1, PLD Rev: 11
  Framer Version: 0x8
!
!
!
Framing is ESF, Line Code is B8ZS, Clock Source is Line Primary.
  Data in current interval (0 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
```

5. Use the **show isdn status** command to display ISDN status. Verify the ISDN Layer 2 status is MULTIPLE_FRAME_ESTABLISHED.

```
Router> show isdn status
Global ISDN Switchtype = primary-ni
ISDN Serial0:23 interface
        dsl 0, interface ISDN Switchtype = primary-ni
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        0 Active Layer 3 Call(s)
    Active dsl 0 CCBs = 0
    The Free Channel Mask:  0x807FFFFF
    Number of L2 Discards = 0, L2 Session ID = 3
    Total Allocated ISDN CCBs = 0
```

6. Use the s**how isdn service** command to display the status of each ISDN channel. Verify that the channels

are IDLE and IN-SERVICE.

```
Router> show isdn service
PRI Channel Statistics:
ISDN Se0:23, Channel [1-24]
  Configured Isdn Interface (dsl) 0
   Channel State (0=Idle 1=Proposed 2=Busy 3=Reserved 4=Restart 5=Maint_Pend)
    Channel :  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
    State   :  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3
   Service State (0=Inservice 1=Maint 2=Outofservice)
    Channel :  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
    State   :  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2
```

7. Use the **show dial-peer voice summary** command to display voice dial peer information. Verify that Admin and Operation status are up and up.

```
Router> show dial-peer voice summary
             AD                                      PRE PASS
TAG    TYPE  MIN  OPER PREFIX    DEST-PATTERN      FER THRU SESS-TARGET   PORT
1      pots  up   up                                0                     0:D
2      voip  up   up             83101              0  syst ipv4:172.69.85.107
```

8. Use the **debug isdn q931** command to display information about call setup and teardown of ISDN network connections. Use the **debug vtsp dsp**, **debug vtsp session**, and **debug voip ccapi inout** commands to get digit collection information, as shown in the following partial output.

```
Router# debug isdn q931
Router# debug vtsp dsp
Router# debug vtsp session
Router# debug voip ccapi inout
Aug 18 23:56:20.125: ISDN Se0:23 Q931: RX <- SETUP pd = 8  callref = 0x0226
        Bearer Capability i = 0x8090A2
                Standard = CCITT
                Transer Capability = Speech
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA98381
                Exclusive, Channel 1
        Calling Party Number i = 0x2181, '40855501124'
                Plan:ISDN, Type:National
        Called Party Number i = 0x80, '83101'
                Plan:Unknown, Type:Unknown
Aug 18 23:56:20.133: VDEV_ALLOCATE: 1/1 is allocated
!
!
!
```

The following lines show the digit collection process, starting with the digit 8:

```
Aug 18 23:56:28.265: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_dsm_digit_begin_cb:
  Digit begin: 8
Aug 18 23:56:28.265: //6/xxxxxxxxxxxx/CCAPI/cc_api_call_digit_begin: (dstVdbPtr=0x0,
  dstCallId=0xFFFFFFFF, srcCallId=0x6,
!
!
!
```

The router collects the next digit, 3, followed by 1, 0 and 2:

```
Aug 18 23:56:30.253: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_dsm_digit_begin_cb:
  Digit begin: 3
Aug 18 23:56:30.253: //6/xxxxxxxxxxxx/CCAPI/cc_api_call_digit_begin: (dstVdbPtr=0x0,
  dstCallId=0xFFFFFFFF, srcCallId=0x6,
    digit=3, digit_begin_flags=0x1, rtp_timestamp=0xFFFFFE70
    rtp_expiration=0x0, dest_mask=0x1)
!
!
!
Aug 18 23:56:30.885: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_dsm_digit_begin_cb:
  Digit begin: 1
Aug 18 23:56:30.885: //6/xxxxxxxxxxxx/CCAPI/cc_api_call_digit_begin: (dstVdbPtr=0x0,
  dstCallId=0xFFFFFFFF, srcCallId=0x6,
    digit=1, digit_begin_flags=0x1, rtp_timestamp=0xFFFFFE70
    rtp_expiration=0x0, dest_mask=0x1)
!
!
!
Aug 18 23:56:31.913: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_dsm_digit_begin_cb:
  Digit begin: 0
Aug 18 23:56:31.913: //6/xxxxxxxxxxxx/CCAPI/cc_api_call_digit_begin: (dstVdbPtr=0x0,
  dstCallId=0xFFFFFFFF, srcCallId=0x6,
    digit=0, digit_begin_flags=0x1, rtp_timestamp=0xFFFFFE70
    rtp_expiration=0x0, dest_mask=0x1)
!
!
!
Aug 18 23:56:33.185: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_dsm_digit_begin_cb:
 Digit begin: 2
Aug 18 23:56:33.185: //6/xxxxxxxxxxxx/CCAPI/cc_api_call_digit_begin: (dstVdbPtr=0x0,
 dstCallId=0xFFFFFFFF, srcCallId=0x6,
    digit=2, digit_begin_flags=0x1, rtp_timestamp=0xFFFFFE70
    rtp_expiration=0x0, dest_mask=0x1)
!
!
!
Aug 18 23:56:33.265: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_report_digit_control:
 digit reporting disabled
Aug 18 23:56:33.265: //6/65F920768011/DSM: 0:D):0:112:4386/
 dsp_stream_mgr_register_disposition: Ev: E_DSM_DSP_DTMF_DIGIT_BEGIN Disp: DSM_DISP_IGNORE
Aug 18 23:56:33.265: //6/65F920768011/DSM:0:D):0:112:4386/
 dsp_stream_mgr_register_disposition: Ev: E_DSM_DSP_DTMF_DIGIT Disp: DSM_DISP_IGNORE
Aug 18 23:56:33.269: //6/xxxxxxxxxxxx/CCAPI/cc_api_call_report_digits_done:
  (vdbPtr=0x639DB450, callID=0x6, disp=0)
Aug 18 23:56:33.269: //6/65F920768011/VTSP:(0:D):0:112:4386/vtsp_get_digit_timeouts:
Inter digit = 10, Initial digit = 10
```

Because the router does not have an outgoing dial peer with destination pattern 83102, the call fails and an IEC is generated.

```
Aug 18 23:56:33.269: %VOICE_IEC-3-GW: AFSAPP: Internal Error (Digit collect failed):
 IEC=1.1.179.10.24.6 on callID 6 GUID=65F92076D10E11D7801100B0640E6622
```

9. Use the **show voice iec description** command to display the IEC definition:

```
Router> show voice iec description 1.1.179.10.24.6
    IEC Version: 1
    Entity:
    Category: 179 (External communication Error)
    Subsystem: 10 (AFSAPP)
    Error: 24 (Digit collect failed)
```

```
    Diagnostic Code: 6
```

IEC field definitions pinpoint the problem. Category code 179 indicates an external communication error, and an error code 24 indicates digit collection failure. For more information on IEC field definitions, see the Internal Error Code Notation.

Troubleshooting Socket Failures

The following example, which describes a TCP session failure, shows how errors detected by the gateway can be used to troubleshoot other devices on the VoIP network.

Symptom

An inbound call from an IP phone to the H.323 gateway fails.

Problem Description

A call is initially routed to the gateway and fails when a TCP session to Cisco CallManager session target cannot be established. The router pings Cisco CallManager, sending a TCP synchronization packet and receiving an ICMP destination unreachable error. Cisco CallManager cannot be pinged because the Cisco CallManager IP address is incorrect. After the IP address for Cisco CallManager is corrected, a second call fails, due to a different socket error. The router tries to establish another TCP session and sends an H225 setup message but Cisco CallManager drops the connection.

Troubleshooting Tasks

Perform the following steps to determine the reasons for both call failures.

1. Use the **voice iec syslog** command to enable display of IECs as they are encountered in real-time.

2. Use the **voice iec statistics type iec** command to configure the collection of IEC statistics.

3. Use the s**how running-config** command to verify IEC, ISDN, and dial-peer configuration, as shown in the following partial sample output:

```
Router> show running-config
Building configuration...
Current configuration : 3466 bytes
!
```

The following lines show the IEC configuration:

```
voice service voip
!
voice iec syslog
no voice hpi capture buffer
no voice hpi capture destination
voice statistics type iec
!
!
```

The following lines show the T1 configuration:

```
controller T1 0
 framing esf
```

```
 clock source line primary
 linecode b8zs
 cablelength short 133
 pri-group timeslots 1-24
!
```

The following lines show the ISDN configuration:

```
interface Serial0:23
 no ip address
 no logging event link-status
 isdn switch-type primary-ni
 isdn incoming-voice modem
 no cdp enable
!
ivoice-port 0:D
!
```

The following lines show the dial-peer configuration, including the destination gateway IP address of Cisco CallManager:

```
dial-peer voice 1 pots
 incoming called-number
 direct-inward-dialed
 port 0:D
!
dial-peer voice 2 voip
 destination-pattern 83101
 session target ipv4:10.1.1.1
 dtmf-relay h245-alphanumeric
 codec g711ulaw
 ip qos dscp cs5 media
!
!
end
```

4. Use the **debug isdn q931** command to display information about call setup and teardown of ISDN network connections.

```
Router# debug isdn q931
Aug 19 01:46:02.886: ISDN Se0:23 Q931: RX <- SETUP pd = 8  callref = 0x022D
        Bearer Capability i = 0x8090A2
                Standard = CCITT
                Transer Capability = Speech
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA98381
                Exclusive, Channel 1
        Calling Party Number i = 0x2181, '4085550111'
                Plan:ISDN, Type:National
        Called Party Number i = 0x80, '83101'
                Plan:Unknown, Type:Unknown
```

The following lines show the IEC and specify a network problem.

```
Aug 19 01:46:03.342: %VOICE_IEC-3-GW: H323: Internal Error (SETUP send sock fail):
   IEC=1.1.186.5.83.0 on callID 14 GUID=B99ACE6ED11D11D7801500B0640E6622
Aug 19 01:46:03.350: ISDN Se0:23 Q931: TX -> CALL_PROC pd = 8  callref = 0x822D
        Channel ID i = 0xA98381
                Exclusive, Channel 1
Aug 19 01:46:03.362: ISDN Se0:23 Q931: TX -> DISCONNECT pd = 8  callref = 0x822D
```

```
        Cause i = 0x80A6 - Network out of order
Aug 19 01:46:03.374: ISDN Se0:23 Q931: RX <- RELEASE pd = 8  callref = 0x022D
        Cause i = 0x82E4 - Invalid information element contents
Aug 19 01:46:03.374: ISDN Se0:23 Q931: TX -> RELEASE_COMP pd = 8  callref = 0x822D
```

5. Use the following commands to further isolate the problem:

- The **show voice iec description** command displays the IEC definition.
- The **debug ip tcp transaction** command displays output for packets the router sends and receives.
- The **debug cch323 h225** command provides the trace of the state transition of the H.225 state machine based on the processed events.

The following partial sample outputs from each command help you to isolate the cause of the network out of order message:

In the following example, the IEC definition indicates a category code of 186, a signaling socket failure, and shows that an error occurred during the SETUP PDU operation. The explanation for the error code 83 states that this error can happen if the remote IP address is a reachable address for pinging but is not a valid H.323 endpoint.

```
Router# show voice iec description 1.1.186.5.83.0
    IEC Version: 1
    Entity: 1
    Category: 186
    Subsystem: 5
    Error: 83
    Diagnostic Code: 0
```

Because the IEC specifies a signaling socket failure as the reason for call failure, you should enable the following **debug** commands to get more information.

```
Router# debug ip tcp transaction
TCP special event debugging is on
Router# debug cch323 h225
H225 State Machine tracing is enabled
Router# terminal monitor
% Console already monitors
Router#
Aug 19 01:46:28.746: ISDN Se0:23 Q931: RX <- SETUP pd = 8  callref = 0x022E
        Bearer Capability i = 0x8090A2
                Standard = CCITT
                Transer Capability = Speech
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA98381
                Exclusive, Channel 1
        Calling Party Number i = 0x2181, '4085551090'
                Plan:ISDN, Type:National
        Called Party Number i = 0x80, '83101'
                Plan:Unknown, Type:Unknown
Aug 19 01:46:29.198: TCB63D2DAC8 created
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_PID (8) 63A2C044
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_NO_DELAY (1) 63A2C048
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_TOS (11) 63A2C070
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_NONBLOCKING_WRITE (10) 63A2C0D0
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_NONBLOCKING_READ (14) 63A2C0D0
Aug 19 01:46:29.198: TCB63D2DAC8 setting property unknown (15) 63A2C0D0
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_NO_DELAY (1) 63A2C08C
Aug 19 01:46:29.198: TCB63D2DAC8 setting property TCP_ALWAYSPUSH (17) 63A2C08C
Aug 19 01:46:29.198: TCB63D2DAC8 bound to 172.16.13.16.11005
```

```
Aug 19 01:46:29.198: TCP: sending SYN, seq 3651477840, ack 0
Aug 19 01:46:29.198: TCP0: Connection to 10.1.1.1:1720, advertising MSS 536
Aug 19 01:46:29.198: TCP0: state was CLOSED -> SYNSENT [11005 -> 10.1.1.1(1720)]
```

The following lines show the 10.1.1.1 CallManager address is unreachable as it is configured, and the network out of order IEC is generated:

```
Aug 19 01:46:29.202: TCP0: ICMP destination unreachable received
!
!
!Aug 19 01:46:29.206: %VOICE_IEC-3-GW: H323: Internal Error (SETUP send sock fail):
   IEC=1.1.186.5.83.0 on callID 16 GUID=C904C18BD11D11D7801600B0640E6622
Aug 19 01:46:29.206: TCB 0x63D2DAC8 destroyed
Aug 19 01:46:29.206: //16/C904C18B8016/H323/run_h225_sm: Received event
  H225_EV_CONN_LOST while at state H225_IDLE
Aug 19 01:46:29.214: ISDN Se0:23 Q931: TX -> CALL_PROC pd = 8  callref = 0x822E
        Channel ID i = 0xA98381
                Exclusive, Channel 1
Aug 19 01:46:29.218: //16/C904C18B8016/H323/run_h225_sm: Received event H225_EV_RELEASE
 while at state H225_IDLE
Aug 19 01:46:29.218: //16/C904C18B8016/H323/cch323_h225_set_new_state:
  Changing from H225_IDLE state to H225_IDLE state
Aug 19 01:46:29.226: ISDN Se0:23 Q931: TX -> DISCONNECT pd = 8  callref = 0x822E
        Cause i = 0x80A6 - Network out of order
!
!
```

6. Use the **show ip route** command to display static routes, then use the **ping** command to check network connectivity to the destination address 10.1.1.1 using the **ping** command.

```
Router> show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is 172.16.13.3 to network 0.0.0.0
     172.16.0.0/27 is subnetted, 1 subnets
C       172.16.13.0 is directly connected, Ethernet0
S*   0.0.0.0/0 [1/0] via 172.16.13.3
```

The following lines show that the reason for Cisco CallManager TCP session failure is the incorrect 10.1.1.1 IP address:

```
Router# ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
..U.U
Success rate is 0 percent (0/5)

Router# ping 10.1.1.1
```

7. Configure the correct IP address for Cisco CallManager and verify the configuration using the **show running-config** command.

```
Router# config term
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
Router(config)# dial-peer voice 2
Router(config-dial-peer)# session target ipv4:172.31.85.107
Router(config-dial-peer)# end
Router# show running-config
!
!
!
dial-peer voice 2 voip
 destination-pattern 83101
 session target ipv4:172.31.85.107
 dtmf-relay h245-alphanumeric
 codec g711ulaw
 ip qos dscp cs5 media
```

8. Use the **show debug** command to display call traces enabled during a second call attempt.

```
Router# show debug
CSM Voice:
  Voice Call Switching Module debugging is on
The following ISDN debugs are enabled on all DSLs:
debug isdn error is             ON.
debug isdn q931 is              ON.   (filter is OFF)
Router#
Aug 19 02:05:36.349: ISDN Se0:23 Q931: RX <- SETUP pd = 8  callref = 0x0237
        Bearer Capability i = 0x8090A2
                Standard = CCITT
                Transer Capability = Speech
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA98381
                Exclusive, Channel 1
        Calling Party Number i = 0x2181, '4085550111'
                Plan:ISDN, Type:National
        Called Party Number i = 0x80, '83101'
                Plan:Unknown, Type:Unknown
Aug 19 02:05:36.353: VDEV_ALLOCATE: 1/2 is allocated
Aug 19 02:05:36.353: csm_vtsp_init_tdm: vdev@ 0x6355AAF4, voice_vdev@ 0x6355AA80
Aug 19 02:05:36.353: csm_vtsp_init_tdm: dsprm_tdm_allocate: tdm slot 1, dspm 1, dsp 2,
 dsp_channel 1
Aug 19 02:05:36.353: csm_vtsp_init_tdm: dsprm_tdm_allocate: tdm stream 4, channel 3,
 bank 2, bp_channel 1, bp_stream 255
Aug 19 02:05:36.357: VDEV_DEALLOCATE: slot 1, port 4 is deallocated
Aug 19 02:05:36.805: ISDN Se0:23 Q931: TX -> CALL_PROC pd = 8  callref = 0x8237
        Channel ID i = 0xA98381
                Exclusive, Channel 1
```

The second call attempt also fails, generating a different IEC:

```
Aug 19 02:05:36.845: %VOICE_IEC-3-GW: H323: Internal Error (Socket error): IEC=1.1.186.5.7.6
  on callID 8 GUID=750AFC91D12011D7800600B0640E6622
Aug 19 02:05:36.865: ISDN Se0:23 Q931: TX -> DISCONNECT pd = 8  callref = 0x8237
        Cause i = 0x80A6 - Network out of order
Aug 19 02:05:36.873: ISDN Se0:23 Q931: RX <- RELEASE pd = 8  callref = 0x0237
        Cause i = 0x82E4 - Invalid information element contents
Aug 19 02:05:36.877: ISDN Se0:23 Q931: TX -> RELEASE_COMP pd = 8  callref = 0x8237
```

The following lines show that the subsequent call failed due to a different socket error. However, in this instance sending a ping to the remote IP address is successful:

```
Router> show voice iec description 1.1.186.5.7.6
    IEC Version: 1
    Entity: 1 (Gateway)
    Category: 186 (Signaling socket failure)
    Subsystem: 5 (H323)
    Error: 7 (Socket error)
    Diagnostic Code: 6
Router> ping 172.69.85.107
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.69.85.107, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

Use the **debug ip tcp transaction**, **show debug**, and **debug cch323 h225** commands again.

```
Router# debug ip tcp transaction
TCP special event debugging is on
Router# show debug
CSM Voice:
  Voice Call Switching Module debugging is on
TCP:
  TCP special event debugging is on
The following ISDN debugs are enabled on all DSLs:
debug isdn error is             ON.
debug isdn q931 is              ON.   (filter is OFF)
Router# debug cch323 h225
H225 State Machine tracing is enabled
Router#
Aug 19 02:06:36.637: ISDN Se0:23 Q931: RX <- SETUP pd = 8  callref = 0x0238
        Bearer Capability i = 0x8090A2
                Standard = CCITT
                Transer Capability = Speech
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA98381
                Exclusive, Channel 1
        Calling Party Number i = 0x2181, '4085550111'
                Plan:ISDN, Type:National
        Called Party Number i = 0x80, '83101'
                Plan:Unknown, Type:Unknown
Aug 19 02:06:36.641: VDEV_ALLOCATE: 1/3 is allocated
Aug 19 02:06:36.641: csm_vtsp_init_tdm: vdev@ 0x6355B240, voice_vdev@ 0x6355B1CC
Aug 19 02:06:36.641: csm_vtsp_init_tdm: dsprm_tdm_allocate: tdm slot 1, dspm 1, dsp 3,
  dsp_channel 1
Aug 19 02:06:36.641: csm_vtsp_init_tdm: dsprm_tdm_allocate: tdm stream 4, channel 5, bank 2,
  bp_channel 2, bp_stream 255
Aug 19 02:06:36.645: VDEV_DEALLOCATE: slot 1, port 8 is deallocated
Aug 19 02:06:37.089: TCB63604218 created
Aug 19 02:06:37.089: TCB63604218 setting property TCP_PID (8) 632036B4
Aug 19 02:06:37.089: TCB63604218 setting property TCP_NO_DELAY (1) 632036B8
Aug 19 02:06:37.089: TCB63604218 setting property TCP_TOS (11) 632036E0
Aug 19 02:06:37.089: TCB63604218 setting property TCP_NONBLOCKING_WRITE (10) 63203740
Aug 19 02:06:37.089: TCB63604218 setting property TCP_NONBLOCKING_READ (14) 63203740
Aug 19 02:06:37.089: TCB63604218 setting property unknown (15) 63203740
Aug 19 02:06:37.089: TCB63604218 setting property TCP_NO_DELAY (1) 632036FC
Aug 19 02:06:37.089: TCB63604218 setting property TCP_ALWAYSPUSH (17) 632036FC
Aug 19 02:06:37.089: TCB63604218 bound to 172.16.13.16.11001
Aug 19 02:06:37.089: TCP: sending SYN, seq 1593750728, ack 0
Aug 19 02:06:37.093: TCP0: Connection to 172.31.85.107:1720, advertising MSS 536
Aug 19 02:06:37.093: TCP0: state was CLOSED -> SYNSENT [11001 -> 172.31.85.107(1720)]
Aug 19 02:06:37.093: TCP0: state was SYNSENT -> ESTAB [11001 -> 172.31.85.107(1720)]
Aug 19 02:06:37.093: TCP0: Connection to 172.31.85.107:1720, received MSS 1460, MSS is 536
```

```
Aug 19 02:06:37.093: //10/98FA43DC8007/H323/run_h225_sm: Received event H225_EV_SETUP
  while at state H225_IDLE
Aug 19 02:06:37.093: //10/98FA43DC8007/H323/check_qos_and_send_setup: Setup ccb 0x635F80E8
Aug 19 02:06:37.093: //10/98FA43DC8007/H323/run_h225_sm: Received event H225_EV_FS_SETUP
  while at state H225_IDLE
Aug 19 02:06:37.093: //10/98FA43DC8007/H323/idle_fsSetup_hdlr: Setup ccb 0x635F80E8
Aug 19 02:06:37.097: //10/98FA43DC8007/H323/generic_send_setup: sending calling IE
Aug 19 02:06:37.097: //10/98FA43DC8007/H323/generic_send_setup: ====== PI = 0
Aug 19 02:06:37.097: //10/98FA43DC8007/H323/generic_send_setup: Send infoXCap=128,
 infoXRate=157, rateMult=89
Aug 19 02:06:37.097: //10/98FA43DC8007/H323/generic_send_setup: src address = 172.16.13.16;
 dest address = 172.31.85.107
Aug 19 02:06:37.097: //10/98FA43DC8007/H323/cch323_h225_set_new_state: Changing from
 H225_IDLE state to H225_REQ_FS_SETUP state
Aug 19 02:06:37.101: TCP0: FIN processed
```

The following lines show that the router was able to initialize the TCP session to Cisco CallManager, and the session went into the established state. After the router sent an H225 SETUP message it received a TCP RESET message to tear down the TCP session, indicating Cisco CallManager dropped the connection.

```
Aug 19 02:06:37.101: TCP0: state was ESTAB -> CLOSEWAIT [11001 -> 172.31.85.107(1720)]
Aug 19 02:06:37.101: TCP0: RST received, Closing connection
Aug 19 02:06:37.101: TCP0: state was CLOSEWAIT -> CLOSED [11001 -> 172.31.85.107(1720)]
Aug 19 02:06:37.105: ISDN Se0:23 Q931: TX -> CALL_PROC pd = 8  callref = 0x8238
        Channel ID i = 0xA98381
                Exclusive, Channel 1
Aug 19 02:06:37.105: %VOICE_IEC-3-GW: H323: Internal Error (Socket error): IEC=1.1.186.5.7.6
 on callID 10 GUID=98FA43DCD12011D7800700B0640E6622
Aug 19 02:06:37.105: TCB 0x63604218 destroyed
Aug 19 02:06:37.105: //10/98FA43DC8007/H323/run_h225_sm: Received event H225_EV_CONN_LOST
 while at state H225_REQ_FS_SETUP
Aug 19 02:06:37.113: //10/98FA43DC8007/H323/run_h225_sm: Received event H225_EV_RELEASE while
 at state H225_REQ_FS_SETUP
Aug 19 02:06:37.113: //10/98FA43DC8007/H323/cch323_h225_set_new_state: Changing from
H225_REQ_FS_SETUP state to H225_IDLE state
Aug 19 02:06:37.121: ISDN Se0:23 Q931: TX -> DISCONNECT pd = 8  callref = 0x8238
        Cause i = 0x80A6 - Network out of order
Aug 19 02:06:37.133: ISDN Se0:23 Q931: RX <- RELEASE pd = 8  callref = 0x0238
        Cause i = 0x82E4 - Invalid information element contents

Aug 19 02:06:37.137: ISDN Se0:23 Q931: TX -> RELEASE_COMP pd = 8  callref = 0x8238
```

9. Verify Cisco CallManager setting for the H.323 gateway to determine if the H.225 session was rejected by Cisco CallManager because the wrong IP address was configured for the H.323 gateway. Configure the correct IP address for the H.323 gateway, 172.16.13.16. For more information on CallManager configuration and IP address configuration, see the Cisco Unified Communications Manager Administration Guide.

10. Use **debug** commands to verify that the next call completes, as shown in the following partial **debug** output:

```
Aug 19 02:10:36.707: ISDN Se0:23 Q931: RX <- SETUP pd = 8  callref = 0x0239
        Bearer Capability i = 0x8090A2
                Standard = CCITT
                Transer Capability = Speech
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA98381
                Exclusive, Channel 1
        Calling Party Number i = 0x2181, '4085550111'
                Plan:ISDN, Type:National
        Called Party Number i = 0x80, '83101'
```

```
                Plan:Unknown, Type:Unknown
Aug 19 02:10:36.711: VDEV_ALLOCATE: 1/2 is allocated
Aug 19 02:10:36.711: csm_vtsp_init_tdm: vdev@ 0x6355B98C, voice_vdev@ 0x6355B918
Aug 19 02:10:36.711: csm_vtsp_init_tdm: dsprm_tdm_allocate: tdm slot 1, dspm 1, dsp 4,
 dsp_channel 1
Aug 19 02:10:36.711: csm_vtsp_init_tdm: dsprm_tdm_allocate: tdm stream 5, channel 1, bank 2,
 bp_channel 3, bp_stream 255
Aug 19 02:10:36.711: VDEV_DEALLOCATE: slot 1, port 12 is deallocated
Aug 19 02:10:37.155: TCB63604A4C created
Aug 19 02:10:37.159: TCP: sending SYN, seq 3088300316, ack 0
Aug 19 02:10:37.159: TCP0: Connection to 172.69.85.107:1720, advertising MSS 536
Aug 19 02:10:37.159: TCP0: state was CLOSED -> SYNSENT [11003 -> 172.69.85.107(1720)]
Aug 19 02:10:37.163: TCP0: state was SYNSENT -> ESTAB [11003 -> 172.69.85.107(1720)]
Aug 19 02:10:37.163: TCP0: Connection to 172.69.85.107:1720, received MSS 1460, MSS is 536
Aug 19 02:10:37.163: //12/281160848008/H323/run_h225_sm: Received event H225_EV_SETUP while at
 state H225_IDLE
Aug 19 02:10:37.163: //12/281160848008/H323/check_qos_and_send_setup: Setup ccb 0x635F80E8
!
!
!
Aug 19 02:10:37.171: ISDN Se0:23 Q931: TX -> CALL_PROC pd = 8  callref = 0x8239
        Channel ID i = 0xA98381
                Exclusive, Channel 1
Aug 19 02:10:38.151: //-1/xxxxxxxxxxxx/H323/cch323_h225_receiver: Received msg of type
 CALLPROCIND_CHOSEN
Aug 19 02:10:38.155: //12/281160848008/H323/callproc_ind: ====== PI = 0
Aug 19 02:10:38.155: //12/281160848008/H323/callproc_ind: Call Manager detected
Aug 19 02:10:38.155: //12/281160848008/H323/cch323_h225_receiver: CALLPROCIND_CHOSEN: src
 address = 172.16.13.16; dest address = 172.69.85.107
Aug 19 02:10:38.155: //12/281160848008/H323/run_h225_sm: Received event
H225_EV_CALLPROC_IND while at state H225_REQ_FS_SETUP
Aug 19 02:10:41.347: TCP0: state was SYNSENT -> ESTAB [11004 -> 172.69.85.107(1778)]
Aug 19 02:10:41.347: TCP0: Connection to 172.69.85.107:1778, received MSS 1460, MSS is 536
Aug 19 02:10:41.699: //12/281160848008/H323/run_h225_sm: Received event H225_EV_H245_SUCCESS
 while at state H225_WAIT_FOR_H245
Aug 19 02:10:41.703: //12/281160848008/H323/cch323_h225_set_new_state: Changing from
H225_WAIT_FOR_H245 state to H225_ACTIVE state
Aug 19 02:10:41.703: //12/281160848008/H323/setup_cfm_notify: status = 4800261B
Aug 19 02:10:41.703: //12/281160848008/H323/generic_setup_cfm_notify: ====== PI = 0;
status = C800261B
```

In the next lines, the call connects and two-way communication is established.

```
Aug 19 02:10:41.711: ISDN Se0:23 Q931: TX -> CONNECT pd = 8  callref = 0x8239
Aug 19 02:10:41.719: ISDN Se0:23 Q931: RX <- CONNECT_ACK pd = 8  callref = 0x0239
```

The following lines show that after a two-minute call, the IP phone user hangs up and the call is disconnected with normal call clearing:

```
Aug 19 02:10:43.635: TCP0: RST received, Closing connection
Aug 19 02:10:43.635: TCP0: state was ESTAB -> CLOSED [11004 -> 172.69.85.107(1778)]
Aug 19 02:10:43.635: TCB 0x6361C070 destroyed
!
!
!
Aug 19 02:10:43.663: TCP0: sending FIN
Aug 19 02:10:43.663: TCP0: state was FINWAIT1 -> FINWAIT2 [11003 -> 172.69.85.107(1720)]
Aug 19 02:10:43.663: TCP0: FIN processed
Aug 19 02:10:43.663: TCP0: state was FINWAIT2 -> TIMEWAIT [11003 -> 172.69.85.107(1720)]
Aug 19 02:10:43.671: ISDN Se0:23 Q931: TX -> DISCONNECT pd = 8  callref = 0x8239
        Cause i = 0x8090 - Normal call clearing
Aug 19 02:10:43.679: ISDN Se0:23 Q931: RX <- RELEASE pd = 8  callref = 0x0239
```

```
Aug 19 02:10:43.683: ISDN Se0:23 Q931: TX -> RELEASE_COMP pd = 8  callref = 0x8239
Router#
Router# undebug all
All possible debugging has been turned off.
```

Gatekeeper-Specific IECs

To enable the enhanced capabilities of the gatekeeper-specific IECs, use the command for the gatekeeper configuration that causes retention of call history and enables you to specify the number of records to be kept in the history table.

In gatekeeper configuration mode, enter:

```
gatekeeper(config)# call-history max-size number
```

The number argument in this syntax can be any number from 0 to 1200. The default is 15. This represents the maximum number of records of old calls to be stored and available for display.

To display the historical information, enter the following command on the gatekeeper:

```
gatekeeper# show gatekeeper calls history
```

The history keyword was added to display call history information along with internal error codes at the gatekeeper. The number of disconnected calls displayed in response to this command is the number value specified in the **call-history max-size** number command. Use of this max-size number helps to reduce excessive CPU usage in the storage and reporting of this information.

Verifying IEC Options

You can use **show** command output to display IEC option configuration, to verify that the feature is working, and to display IEC counter information.

Prerequisites

Before you can display IEC counter information, you must configure voice statistics settings.

SUMMARY STEPS

1. **enable**
2. **voice statistics type iec**
3. **voice statistics max-storage-duration** {**day** *number-of-days* | **hour** *number-of-hours* | **minute** *number-of-minutes*}
4. **voice statistics time-range periodic interval-length** [**start** *hh:mm*] [**end** *hh:mm*] [**days-of-week** *days*]
5. **voice statistics time-range since-reset**

DETAILED STEPS

	Command or Action	Purpose
1.	**enable**	Enables privileged EXEC mode.

	Example: `Router> enable`	• Enter your password if prompted.
2.	**voice statistics type iec** Example: `Router# voice statistics type iec`	(Optional) Configures the collection of IEC statistics.
3.	**voice statistics max-storage-duration** {**day** *number-of-days*| **hour** *number-of-hours* | **minute** *number-of-minutes*} Example: `Router# voice statistics max-storage-duration day 1`	(Optional) Configures how long interval counters are kept for display. • If you want to display counters for past intervals, you must configure a storage duration for expired counters. Otherwise, once the interval has expired, the counters are no longer available.
4.	**voice statistics time-range periodic interval-length** [**start** *hh:mm*] [**end** *hh:mm*] [**days-of-week** *days*] Example: `Router# voice statistics time-range periodic 30minutes`	(Optional) Specifies IEC collection intervals. • The *interval-length* argument takes one of the following values: ♦ 5minutes ♦ 15minutes ♦ 30minutes ♦ 60minutes ♦ 1day • The range for hh:mm is 00:00 to 23:59. The default for the **start** keyword is 00:00. The default for the **end** keyword is 00:00. • The days argument takes one of the following values: ♦ friday-Friday ♦ monday-Monday ♦ saturday-Saturday ♦ sunday-Sunday ♦ thursday-Thursday ♦ tuesday-Tuesday ♦ wednesday-Wednesday ♦ daily-Every day of the week

		♦ weekdays-Monday thru Friday ♦ weekend-Saturday and Sunday The default is **daily**.
5.	**voice statistics time-range since-reset** Example: `Router# voice statistics time-range since-reset`	(Optional) Enables the collection of call statistics information accumulated since the last resetting of IEC counters.

Displaying IEC Options

Perform this task to verify that the Cisco VoIP Internal Error Codes feature is working.

SUMMARY STEPS

1. **enable**
2. **show running-config**
3. **show voice cause-code category-q850**
4. **show voice iec description** *string*
5. **show voice statistics iec** {**interval** *number* | **since-reboot** | **since-reset**}
6. **clear voice statistics iec**

DETAILED STEPS

	Command or Action	Purpose
1.	**enable** Example: `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
2.	**show running-config** Example: `Router# show running-config`	(Optional) Displays the configuration information currently running on the router.
3.	**show voice cause-code category-q850** Example: `Router# show voice cause-code category-q850`	(Optional) Displays Q.850 cause code mapping.
4.	**show voice iec description string** Example: `Router# show voice iec description 1.1.128.1.5.0`	(Optional) Displays an IEC description.
5.	**show voice statistics iec** {*interval number*| **since-reboot**|**since-reset**} Example: `Router# show voice statistics iec interval 15`	(Optional) Displays IEC statistics. • Specify the following displays: statistics by selected time interval, or statistics since the

		last router reboot, or statistics since the last instance when counters were cleared.
6.	**clear voice statistics iec** Example: `Router# clear voice statistics iec`	(Optional) Resets IEC counters.