

# Voice Busyout Enhancements on the Cisco 2600 and 3600 Series Routers and MC3810 Series Concentrators

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This document describes enhancements introduced in Cisco IOS Release 12.0(7)XK that add additional busyout functions and extend the cross-platform commonality of the busyout feature between the Cisco 2600 and 3600 series routers and the Cisco MC3810 series concentrators.

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## Feature Summary

The local voice busyout feature provides a way to busy out a voice port if a monitored network interface changes state. When a monitored interface changes to a specified state—to out-of-service or in-service—the voice port presents a seized/busyout condition to the attached PBX or other customer premises equipment (CPE). The PBX or other CPE can then attempt to select an alternate route.

Local voice busyout is supported on analog and digital voice ports using channel associated signaling (CAS).

This feature allows you to perform the following tasks:

- Configure individual voice ports to enter the busyout state whenever specified network interfaces go out of service or come into service
- Force individual voice ports into the busyout state
- Define the voice-port actions for the busyout state
- Force one or more DS0 timeslots on a controller into the busyout state

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**Note** This feature is different from busy-back, the signal sent from the network to the calling party to indicate a busy (or congested) state along the route.

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## Benefits

These enhancements to the local voice busyout feature provide the following benefits:

- Local voice busyout is extended to the Cisco 2600 and 3600 series platforms
- Multiple interfaces can be monitored for any voice port
- Configuration commands are simplified

## Restrictions

The following restrictions and limitations apply to the local voice busyout feature:

- The maximum number of network interfaces that can be monitored for a voice port is 32.
- The busyout feature is not activated by the following conditions:
  - No DSP resources are available
  - No bandwidth is available

These two conditions can be addressed by configuring alternate routing.

- This feature is not supported on the BRI Voice Module (BVM).

## Platforms

This feature is supported on the Cisco MC3810, 2600, and 3600 series.

## Prerequisites

The following configuration tasks should be completed before configuring this feature:

- Voice over Frame Relay or Voice over ATM configuration, including the configuration of POTS and network dial peers
- Voice port configuration

## Supported MIBs and RFCs

None.

## Configuration Tasks

Complete the following task to configure a voice port to busyout under specified conditions:

- Configuring a Voice Port to Busyout Under Specified Conditions

Complete the following task to force a voice port into a busyout state:

- Forcing a Voice Port to Busyout

Complete the following task to specify the busyout seize action for a voice port:

- (Optional) Configuring the Busyout Seize Actions for a Voice Port

Complete the following task to force a DS0 timeslot into a busyout state:

- Forcing a DS0 Timeslot to Busyout

The Cisco router or concentrator considers a network trunk down when the data link layer control goes down, even if the physical layer is still up.

## Configuring a Voice Port to Busyout Under Specified Conditions

To configure a voice port to go into the busyout state when one or more interfaces change state, complete the following steps beginning in global configuration mode:

| Step | Command  | Purpose  |
|------|--|--|
| 1    | <p>For Cisco 2600 and 3600 series analog voice ports:</p> <pre>router(config)# voice-port slot/subunit/port</pre> <p>For Cisco 2600 and 3600 series digital voice ports:</p> <pre>router(config)# voice-port slot/port:ds0-group</pre> <p>For Cisco MC3810 series analog voice ports:</p> <pre>router(config)# voice-port slot/port</pre> <p>For Cisco MC3810 series digital voice ports:</p> <pre>router(config)# voice-port slot:ds0-group</pre> | <p>Identify the voice port you want to configure and enter voice-port configuration mode.</p>  |
| 2    | <pre>router(config-voiceport)# busyout monitor interface {serial interface-number   ethernet interface-number} [in-service]</pre>  | <p>Specify an interface to be monitored by this voice port. To configure a voice port to monitor multiple interfaces, reenter the command for each additional interface to be monitored.</p> <p>The default is to busyout when the monitored interface goes out of service. Enter the keyword <b>in-service</b> to configure the voice port for busyout when the monitored interface comes into service.</p> <p>If a voice port is configured to monitor multiple interfaces for out-of-service states, busyout occurs only when <i>all</i> of the interfaces go out of service. If a voice port is configured to monitor multiple interfaces for the in-service state, busyout occurs when <i>any one</i> interface comes into service.</p> |

## Forcing a Voice Port to Busyout

To force a voice port into the busyout state, complete the following steps beginning in global configuration mode:

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**Note** To avoid conflicting CLI commands, do not use this command and the **ds0 busyout** command on the same controller.

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| Step | Command   | Purpose  |
|------|---|--|
| 1    | For Cisco 2600 and 3600 series analog voice ports:<br><code>router(config)# voice-port<br/>slot/subunit/port</code><br>For Cisco 2600 and 3600 series digital voice ports:<br><code>router(config)# voice-port<br/>slot/port:ds0-group</code><br>For Cisco MC3810 series analog voice ports:<br><code>router(config)# voice-port slot/port</code><br>For Cisco MC3810 series digital voice ports:<br><code>router(config)# voice-port slot:ds0-group</code> | Identify the voice port you want to configure and enter voice-port configuration mode.   |
| 2    | <code>router(config-voiceport)# busyout forced</code>   | Place the voice port into the busyout state.<br><br>If you enter <b>no forced busyout</b> , the voice port busyout state will be controlled by the <b>busyout monitor interface</b> command, if that command is entered.<br><br>If the <b>busyout monitor interface</b> command has not been entered, the <b>no forced busyout</b> command will force the voice port out of the busyout state. |
| 3    | <code>router# show voice busyout</code>   | Verify the busyout status.   |

## Configuring the Busyout Seize Actions for a Voice Port

(Optional) To configure the seize actions for a busied-out voice port (FXO and FXS voice ports only), complete the following steps beginning in global configuration mode:

| Step | Command  | Purpose  |
|------|--|--|
| 1    | <p>For Cisco 2600 and 3600 series analog voice ports:</p> <pre>router(config)# voice-port slot/subunit/port</pre> <p>For Cisco 2600 and 3600 series digital voice ports:</p> <pre>router(config)# voice-port slot/port:ds0-group</pre> <p>For Cisco MC3810 series analog voice ports:</p> <pre>router(config)# voice-port slot/port</pre> <p>For Cisco MC3810 series digital voice ports:</p> <pre>router(config)# voice-port slot:ds0-group</pre> | <p>Identify the voice port you want to configure and enter voice-port configuration mode.</p>  |
| 2    | <pre>router(config-voiceport)# busyout seize {ignore repeat}</pre>   | <p>(FXO and FXS only) Configure the busyout seize action for this voice port.</p> <p>For information about the various busyout seize actions and the default actions, see the command reference section.</p> <p><b>Note</b> For E&amp;M voice ports, the busyout action is always to seize the far-end line.</p> <p>You can use the <b>show voice port</b> command to view the configured busyout seize actions for voice ports.</p> |

## Forcing a DS0 Timeslot to Busyout

To force a DS0 timeslot on a T1 or E1 controller into the busyout state, complete the following steps beginning in global configuration mode:

**Note** To avoid conflicting CLI commands, do not use this command and the **busyout forced** command on the same controller.

| Step | Command  | Purpose   |
|------|--|---|
| 1    | <pre>router(config)# controller {t1   e1} {0   1}</pre>        | <p>Identify the controller you want to configure and enter controller configuration mode.</p> |
| 2    | <pre>router(config-controller)# ds0 busyout ds0-timeslot</pre> | <p>Place one or more DS0 timeslots into the busyout state.</p>                                |

## Configuration Examples

The following example forces analog voice port 1/1 on a Cisco MC3810 series concentrator into the busyout state:

```
Router(config)# voice-port 1/1
    Type of VoicePort is FXS
Router(config-voiceport)# busyout forced
Router(config-voiceport)# end
Router# show voice busyout
If following network interfaces are down, voice port will be put into busyout state
The following voice ports are in busyout state

1/1      is forced into busyout state
```

The following example configures digital voice port 0:0.4 on a Cisco MC3810 to go into the busyout state if serial interface 0:0 goes out of service:

```
Router(config)# voice-port 0:0.4
    Type of VoicePort is FXS
Router(config-voiceport)# busyout monitor interface serial 0:0
1/2 is in busyout state
Router(config-voiceport)# end
Router# show voice busyout
If following network interfaces are down, voice port will be put into busyout state
The following voice ports are in busyout state

1/1      is forced into busyout state
1/2      is in busyout state caused by Serial0
```

The following example configures digital voice port 2/1:7 on a Cisco 3600 series router to go into the busyout state if serial interface 0:0 goes out of service:

```
Router(config)# voice-port 2/1:7
    Type of VoicePort is FXS
Router(config-voiceport)# busyout monitor interface serial 0:0
1/2 is in busyout state
Router(config-voiceport)# end
Router# show voice busyout
If following network interfaces are down, voice port will be put into busyout state
The following voice ports are in busyout state

2/1:7   is forced into busyout state
2/1:8   is in busyout state caused by Serial0
```

The following example configures the busyout seize action for analog voice port 0/2/1 on a Cisco 3600 series router to **repeat**:

```
Router(config)# voice-port 0/2/1
    Type of VoicePort is FXO
Router(config-voiceport)# busyout seize repeat
Router(config-voiceport)# end
Router# show voice busyout
If following network interfaces are down, voice port will be put into busyout state
The following voice ports are in busyout state

0/2/1   is forced into busyout state
0/2/2   is in busyout state caused by Serial0
```

The following example forces DS0 timeslots 1 through 12 on controller T1 0 on a Cisco MC3810 series concentrator into the busyout state:

```
Router(config)# controller t1 0  
Router(config-controller)# ds0 busyout 1-12  
Router(config-controller)# end
```

You can use the **show running configuration** command to determine which DS0 timeslots have been forced into the busyout state.

## Command Reference

The following new or revised commands are used to configure the local voice busyout feature:

- **busyout forced**
- **busyout monitor interface**
- **busyout seize**
- **ds0 busyout**
- **show voice busyout**

## busyout forced

To force a voice port into the busyout state, use the **busyout forced** voice-port configuration command. To remove the voice port from busyout state, use the **no** form of this command.

**busyout forced**  
**no busyout forced**

### Syntax Description

This command has no arguments or keywords.

### Defaults

The voice-port is not in the busyout state.

### Command Mode

Voice-port configuration.

### Command History

| Release   | Modification   |
|-----------|--|
| 12.0(3)T  | This command was introduced on the Cisco MC3810.   |
| 12.0(7)XK | This command was first supported on the Cisco 2600 and 3600. On the Cisco MC3810, the <b>voice-port busyout</b> command was eliminated in favor of this command. |

### Usage Guidelines

If a voice port is in the forced busyout state, only the **no busyout forced** command can restore the voice port to service.

To avoid conflicting CLI commands, do not use the **busyout forced** command and the **ds0 busyout** command on the same controller.

### Example

The following example forces analog voice port 1/1 on a Cisco MC3810 into the busyout state:

```
router(config)# voice-port 1/1
router(config-voiceport)# busyout forced
```

The following example forces digital voice port 0:8 on a Cisco MC3810 into the busyout state:

```
router(config)# voice-port 0:8
router(config-voiceport)# busyout forced
```

The following example forces analog voice port 3/1/1 on a Cisco 3600 into the busyout state:

```
router(config)# voice-port 3/1/1
router(config-voiceport)# busyout forced
```

## busyout forced

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The following example forces digital voice port 0/0:12 on a Cisco 3600 into the busyout state:

```
router(config)# voice-port 0/0:12
router(config-voiceport)# busyout forced
```

## Related Commands

| Command                          | Description   |
|----------------------------------|---|
| <b>busyout monitor interface</b> | Configures a voice port to monitor a serial interface for events that would trigger a voice-port busyout. |
| <b>busyout seize</b>             | Changes the busyout seize procedure for a voice port.   |
| <b>show voice busyout</b>        | Displays information about the voice busyout state.   |

## busyout monitor interface

To configure a voice port to monitor an interface for events that would trigger a voice-port busyout, use the **busyout monitor interface** voice-port configuration command. To configure a voice port not to monitor an interface for such events, use the **no** form of this command.

```
busyout monitor interface {serial interface-number | ethernet interface-number} [in-service]
no busyout monitor interface {serial interface-number | ethernet interface-number}
```

### Syntax Description

|                         |   |
|-------------------------|---|
| <b>serial</b>           | Specifies monitoring of a serial interface.<br><b>Note</b> More than one interface can be entered for a voice port.   |
| <b>ethernet</b>         | Specifies monitoring of an ethernet interface.<br><b>Note</b> More than one interface can be entered for a voice port.  |
| <i>interface-number</i> | Identifies an interface to be monitored for the voice-port busyout function.<br>Interface choices can include serial port, serial port subinterface, Ethernet port, and ATM interface.  |
| <b>in-service</b>       | (Optional) Configures the voice port to be busied out when any monitored interface comes into service (state changes to up). If the keyword is not entered, the voice port is busied out when all monitored interfaces go out of service (state changes to down). |

### Defaults

The voice port does not monitor any interfaces.

### Command Mode

Voice-port configuration

### Command History

| Release   | Modification   |
|-----------|--|
| 12.0(3)T  | This command was introduced on the Cisco MC3810.   |
| 12.0(7)XK | This command was first supported on the Cisco 2600 and 3600, and the ability to monitor an Ethernet port was introduced. |

### Usage Guidelines

A voice port can monitor multiple interfaces at the same time. To configure a voice port to monitor multiple interfaces, reenter the command for each additional interface to be monitored.

You can combine in-service and out-of-service monitoring on a voice port. The following rule describes the actions if monitored interfaces change state:

A voice port is busied out if:

- (a) Any interface monitored for coming into service comes up
- (b) All interfaces monitored for going out of service go down

### Example

The following example configures analog voice port 1/1 on a Cisco MC3810 to busyout if serial ports 1 and 0:0 both go out of service:

```
router(config)# voice-port 1/1
router(config-voiceport)# busyout monitor interface serial 0:0
router(config-voiceport)# busyout monitor interface serial 1
```

The following example configures analog voice port 1/2 on a Cisco MC3810 to busyout if serial port 0 comes into service:

```
router(config)# voice-port 1/2
router(config-voiceport)# busyout monitor interface serial 0 in-service
```

The following example configures digital voice port 1/2/2 on a Cisco 3600 to busyout if serial port 0 goes out of service:

```
router(config)# voice-port 1/2/2
router(config-voiceport)# busyout monitor interface serial 0
```

The following example configures digital voice port 0:6 on a Cisco MC3810 to busyout if Ethernet port 0 goes out of service:

```
router(config)# voice-port 0:6
router(config-voiceport)# busyout monitor interface ethernet 0
```

### Related Commands

| Command                   | Description   |
|---------------------------|---|
| <b>busyout forced</b>     | Forces a voice port into the busyout state.           |
| <b>busyout seize</b>      | Changes the busyout seize procedure for a voice port. |
| <b>show voice busyout</b> | Displays information about the voice busyout state.   |

## busyout seize

To change the busyout action for an FXO or FXS voice port, use the **busyout seize** voice-port configuration command. To restore the default busyout action, use the **no** form of this command.

```
busyout seize {ignore | repeat}
no busyout seize
```

### Syntax Description

**ignore** See Table 1 for the **ignore** actions for different voice ports and signaling types.

**repeat** See Table 1 for the **repeat** actions for different voice ports and signaling types.

### Defaults

See Table 1 for the default actions for different voice ports and signaling types.

### Command Mode

Voice-port configuration

### Command History

| Release   | Modification   |
|-----------|--|
| 12.0(3)T  | This command was introduced on the Cisco MC3810.             |
| 12.0(7)XK | This command was first supported on the Cisco 2600 and 3600. |

### Usage Guidelines

This command is valid for both analog and digital voice ports. On digital voice ports, the busyout actions are valid whether the busyout results from a voice-port busyout event or from the **ds0-busyout** command.

The voice port returns to an idle state when the event that triggered the busyout disappears.

Table 1 describes the busyout actions for the **busyout seize** settings on each voice port type.

The busyout action for E&M voice ports is to seize the far end by setting lead busy.

Table 1

| Voice-Port Signaling Type | Procedure Setting (busyout-option command) | Busy Out Actions   |
|---------------------------|--|--|
| FXS Loop Start            | Default                                    | Remove the power from the loop. For analog voice ports, this is equivalent to removing the ground from the tip lead. For digital voice ports, the port will generate the bit pattern equivalent to removing the ground from the tip lead, or will busy out if the bit pattern exists.  |
| FXS Loop Start            | Ignore                                     | Ignore the ground on the ring lead.  |
| FXS Ground Start          | Default                                    | Ground the tip lead and stay at this state.  |
| FXS Ground Start          | Ignore                                     | <ol style="list-style-type: none"> <li>1 Leave the tip lead open.</li> <li>2 Ignore the ground on the ring lead.</li> </ol>  |
| FXS Ground Start          | Repeat                                     | <ol style="list-style-type: none"> <li>1 Ground the tip lead.</li> <li>2 Wait for the far end to close the loop.</li> <li>3 The far end closes the loop.</li> <li>4 If the far end then opens the loop, FXS removes the ground from the tip lead.</li> <li>5 FXS waits for several seconds before returning to Step 1.</li> </ol>                              |
| FXO Loop Start            | Default                                    | Close the loop and stay at this state.   |
| FXO Loop Start            | Ignore                                     | <ol style="list-style-type: none"> <li>1 Leave the loop open.</li> <li>2 Ignore the ringing current on the ring level.</li> </ol>  |
| FXO Loop Start            | Repeat                                     | <ol style="list-style-type: none"> <li>1 Close the loop.</li> <li>2 After the detected far end starts the power denial procedure, FXO opens the loop.</li> <li>3 After the detected far end has completed the power denial procedure, FXO waits for several seconds before returning to Step 1.</li> </ol>   |
| FXO Ground Start          | Default                                    | Ground the tip lead.   |
| FXO Ground Start          | Ignore                                     | <ol style="list-style-type: none"> <li>1 Leave the loop open.</li> <li>2 Ignore the running current on the ring lead, or ground on the tip lead.</li> </ol>  |
| FXO Ground Start          | Repeat                                     | <ol style="list-style-type: none"> <li>1 Ground the ring lead.</li> <li>2 Remove the ground from the ring lead, and close the loop after the detected far end grounds the tip lead.</li> <li>3 When the detected far end removes the ground from tip lead, FXO opens the loop.</li> <li>4 FXO waits for several seconds before returning to Step 1.</li> </ol> |

### Example

The following example configures analog voice port 1/1 to perform the “ignore” actions when busied out:

```
router(config)# voice-port 1/1
router(config-voiceport)# busyout seize ignore
```

The following example configures digital voice port 0:2 to perform the “repeat” actions when busied out:

```
router(config)# voice-port 0:2
router(config-voiceport)# busyout seize repeat
```

## Related Commands

| <b>Command</b>                   | <b>Description</b>  |
|----------------------------------|---|
| <b>busyout forced</b>            | Forces a voice port into the busyout state.   |
| <b>busyout monitor interface</b> | Configures a voice port to monitor an interface for events that would trigger a voice-port busyout. |
| <b>ds0 busyout</b>               | Forces a DS0 timeslot on a controller into the busyout state.                                       |
| <b>show voice busyout</b>        | Displays information about the voice busyout state.   |

## ds0 busyout

To force a DS0 timeslot on a controller into the busyout state, use the **ds0 busyout** controller configuration command. To remove the DS0 timeslot from the busyout state, use the **no** form of this command.

```
ds0 busyout ds0-timeslot  
no ds0 busyout ds0-timeslot
```

### Syntax Description

*ds0-timeslot* DS0 timeslot to be forced into the busyout state. The range is 1 to 24 in any combination.

### Defaults

DS0 timeslots are not in busyout state.

### Command Mode

Controller configuration.

### Command History

| Release   | Modification   |
|-----------|--|
| 12.0(7)XK | This command was introduced on Cisco MC3810 series concentrators and Cisco 2600 and 3600 series routers. |

### Usage Guidelines

This command affects only DS0 timeslots that are configured into a DS0 group and function as part of a digital voice port. If multiple DS0 groups are configured on a controller, you can busy out any combination of DS0 timeslots, as long as each DS0 timeslot to be busied out is part of a DS0 group.

If a DS0 timeslot is in the busyout state, only the **no ds0 busyout** command can restore the DS0 timeslot to service.

To avoid conflicting CLI commands, do not use the **ds0 busyout** command and the **busyout forced** command on the same controller.

### Example

The following example forces DS0 timeslot 6 on controller T1 0 into the busyout state:

```
router(config)# controller t1 0  
router(config-controller)# ds0 busyout 6
```

The following example forces DS0 timeslots 1, 3, 4, 5, 6, and 24 on controller E1 1 into the busyout state:

```
router(config)# controller e1 1
router(config-controller)# ds0 busyout 1,3-6,24
```

## Related Commands

| Command                           | Description  |
|-----------------------------------|--|
| <b>busyout seize</b>              | Changes the busyout seize procedure for a voice port.  |
| <b>show running configuration</b> | You can use this command to determine which DS0 timeslots have been forced into the busyout state. |

## show voice busyout

To display information about the voice busyout state, use the **show voice busyout** privileged EXEC command.

**show voice busyout**

### Syntax Description

This command has no arguments or keywords.

### Command Mode

Privileged EXEC

### Command History

| Release  | Modification                 |
|----------|------------------------------|
| 12.0(3)T | This command was introduced. |

### Usage Guidelines

This command lists the following information:

- Interfaces that are being monitored for busyout events
- Voice ports currently in the busyout state and the reasons

### Example

The following example displays the busyout information:

```
router# show voice busyout

If following network interfaces are down, voice port will be put into busyout state
ATM0
Serial0
The following voice ports are in busyout state

1/1    is forced into busyout state
1/2    is in busyout state caused by network interfaces
1/3    is in busyout state caused by ATM0
1/4    is in busyout state caused by network interfaces
1/5    is in busyout state caused by Serial0
```

### Related Commands

| Command                          | Description   |
|----------------------------------|---|
| <b>busyout forced</b>            | Forces a voice port into the busyout state.   |
| <b>busyout monitor interface</b> | Configures a voice port to monitor an interface for events that would trigger a voice-port busyout. |