

Noise Reduction

Noise Reduction (NR) is a voice enhancement process that improves the quality of incoming speech that has already been corrupted with background noise; for example, a voice conference participant speaking on a cell-phone in a car. NR works best with steady state broadband noises like engine noise but not as well with impulsive noises like nearby chatter.

- Feature Information for Noise Reduction, on page 1
- Restrictions for NR, on page 2
- Information About NR, on page 2
- How to Configure NR, on page 3
- Configuration Examples for the NR feature, on page 8

Feature Information for Noise Reduction

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/. An account on Cisco.com is not required.

Table 1: Feature Information for Noise Reduction

Feature Name	Releases	Feature Information
Noise Reduction	Baseline Functionality	Noise Reduction (NR) is a voice enhancement or restoration process that improves the quality of incoming speech that has already been corrupted with background noise. NR is supported on TDM gateways and on the Cisco UBE. The following commands were introduced or modified: **intensity**, **media profile nr**, **media service**, and **noisefloor**.

Restrictions for NR

- Supported only on PVDM3.
- Supported only on flex codec complexity.
- No support for H.32x video call, complex forking calls, and fax and modem calls.
- No support for Time-Division Multiplexing (TDM) hairpin call.
- Configurations under POTS dial peer has higher priority over VoIP dial peer for NR.
- Configurations under the dial peer has higher priority than configurations at the global level.
- No support for conference calls, IP/SIP phones, and the Skinny Client Control Protocol (SCCP).
- CLI supports enabling NR but not disabling NR.
- No support for dynamically enabling or disabling NR during a call.

Information About NR

Noise Reduction

Noise Reduction (NR) is an adaptive signal processing algorithm on the Digital Signal Processor (DSP) that analyzes incoming audio, extracts a fingerprint of the background noise during talker pauses, and then performs ongoing spectral subtraction of this noise after a short training period (a few seconds). NR constantly adapts to changes in background noises over time.

NR can affect music on hold signals by making the music quieter. NR may disrupt fax/modem/TDD devices, although it is designed to self-disable in those cases. Use modem-relay mode for reliable fax/modem transmission. NR is supported on TDM gateways (TDM-VoIP and TDM-TDM) and on the Cisco Unified Border Element (Cisco UBE).

Some of the best practices for NR are as follows:

- Use default values.
- Do not use NR on dial peers associated with fax machines. Use fax or modem-relay modes for those dial peers.
- NR, when used without dynamic user control of intensity (as is the case with gateways), must be used at a low intensity (default or lower) since it is always on. High intensity is dramatic for demonstrations with loud background noises, but the NR process itself will degrade “normal” calls if NR is run at high intensity.

How to Configure NR

Creating the Media Profile for NR

Perform this task to create a media profile to configure noise reduction parameters.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **media profile nr** *tag*
4. **intensity** *level*
5. **noisefloor** *level*
6. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**media profile nr** *tag* **Example:** `Device(config)# media profile nr 2`	Creates the media profile to configure noise reduction parameters and enters media profile configuration mode. The range for the media profile tag is from 1 to 10000.
Step 4	**intensity** *level* **Example:** `Device(cfg-mediaprofile)# intensity 2`	Configures the intensity level or depth of the noise reduction process. The range is from 0 to 6.
Step 5	**noisefloor** *level* **Example:** `Device(cfg-mediaprofile)# noisefloor -50`	Configures the noise level, in dBm, above which NR will operate. NR will allow noises quieter than this level to pass without processing. The range is from -58 to -20.

	Command or Action	Purpose
Step 6	**end** **Example:** `Device(config)# end`	Returns to the privileged EXEC mode.

Creating the Media Class to Enable NR

After the media profile is created, you must create a media class to enable noise reduction. Perform this task to create a media class.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **media class** *tag*
4. **nr profile** *tag*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**media class** *tag* **Example:** `Device(config)# media class 2`	Creates the media class to enable the noise reduction feature and enters media class configuration mode. The range for the media class tag is from 1 to 10000.
Step 4	**nr profile** *tag* **Example:** `Device(cfg-mediaclass)# nr profile 200`	Applies the media profile to the media class. The range for the media profile NR tag is from 1 to 10000.
Step 5	**end** **Example:**	Returns to privileged EXEC mode.

	Command or Action	Purpose
	`Device(config)# end`	

Configuring the Media Class at a Dial Peer Level for NR

Perform this task to configure the media class for a dial peer.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice** *tag* **pots**
4. **media-class** *tag*
5. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**dial-peer voice** *tag* **pots** **Example:** `Device(config)# dial-peer voice 20 pots`	Defines a particular dial peer and enters the dial-peer voice configuration mode. The range for the dial-peer voice tag is from 1 to 1073741823.
Step 4	**media-class** *tag* **Example:** `Device(config-dial-peer)# media-class 2`	Applies the media class to the specific dial peer. The range for the media class tag number is from 1 to 10000.
Step 5	**end** **Example:** `Device(config-dial-peer)# end`	Returns to the privileged EXEC mode.

Configuring the Media Class Globally for NR

Perform this task to configure a media class globally.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **media service**
4. **enhancement**
5. **tdm** *tag*
6. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**media service** **Example:** `Device(config)# media service`	Enters media service configuration mode.
Step 4	**enhancement** **Example:** `Device(cfg-mediaservice)# enhancement`	Enters the submode enhance of media service.
Step 5	**tdm** *tag* **Example:** `Device(cfg-service-enhance)# tdm 2`	Applies the TDM call globally. The range for the media class tag number is from 1 to 10000.
Step 6	**end** **Example:** `Device(config-dial-peer)# end`	Returns to the privileged EXEC mode.

Verifying NR

Perform this task to verify the voice quality metrics.

SUMMARY STEPS

1. **enable**
2. **show call active voice stats | b pid:**

DETAILED STEPS

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

Step 2 **show call active voice stats | b pid:**

Example:

```
Device# show call active voice stats | b pid:1300

11EC : 5 09:14:25.971 PDT Thu Jul 28 2011.1 +1130 pid:1300 Answer 1300 active dur 00:01:36 tx:17/321
 rx:17/321 dscp:0 media:0
DSP/TX: PK=17, SG=0, NS=1, DU=90570, VO=320
DSP/RX: PK=17, SG=0, CF=1, RX=90570, VO=320, BS=0, BP=0, LP=0, EP=0
….
DSP/DL: RT=0, ED=0
MIC Direction:
DSP/NR: NR=1, ND=0, LV=257, IN=1, PN=0, ON=0
DSP/AS: AE=1, AD=0, AV=0, AM=0, NT=0, DT=0, TT=0, TD=0, LF=0, LD=0
EAR Direction:
DSP/NR: NR=0, ND=0, LV=0, IN=0, PN=0, ON=0
DSP/AS: AE=0, AD=0, AV=0, AM=0, NT=0, DT=0, TT=0, TD=0, LF=0, LD=0
11EC : 6 09:14:25.973 PDT Thu Jul 28 2011.2 +1130 pid:2300 Originate 2300 active dur 00:01:36 tx:17/457
 rx:17/321 dscp:0 media:0
Telephony call-legs: 1
SIP call-legs: 0
H323 call-legs: 1
```

Displays information about digital signal processing (DSP) voice quality metrics.

Troubleshooting Tips

The following commands can help troubleshoot NR:

- **debug voip hpi all**

- **debug voip dsmp all**
- **debug voip dsm all**
- **debug voip vtsp all**
- **debug vpm dsp all**

Configuration Examples for the NR feature

Example: Enabling NR globally

```
media profile nr 1
 intensity 1
!
media profile nr 2
!
media profile nr 3
 intensity 2
!
media profile nr 4
 intensity 3
!
media profile nr 5
 intensity 2
!
media profile nr 7
 intensity 2
!
media profile asp 6
!
media class 1
 nr profile 5
 asp profile 6
!
media service
 enhancement
  tdm 1
```

Example: Enabling NR on a Dial Peer

```
media profile nr 1
 intensity 1
!
media profile nr 2
 intensity 2
!
media profile nr 3
 intensity 2
!
media profile asp 4
!
media class 1
 nr profile 2
```

```
 asp profile 4
!
dial-peer voice 2100 pots
 destination-pattern 2100
 incoming called-number 1100
 media-class 1
 port 0/2/0:1
 forward-digits all

dial-peer voice 1300 voip
 destination-pattern 1300
 session target ipv4:1.2.146.102
 media-class 1
```