

405/405HD, 420HD, 430HD, 440HD IP Phones

Version 2.2.16



Table of Contents

1	Introduction	19
Configuration Tools.....		21
2	IP Phone User Interface	23
2.1	Accessing the Administration Menu	23
2.2	Changing Display Language.....	24
3	Web Interface.....	25
3.1	Accessing Web Interface	25
3.2	Getting Started with the Web.....	26
3.3	Configuring the Web Interface's Port	27
3.4	Configuring User Login Credentials	27
4	Configuration File.....	29
4.1	Introduction.....	29
4.2	File Syntax	29
4.3	Linking Multiple Files	29
4.4	Downloading the Configuration File from the Phone	30
4.5	Creating Configuration Files using VoIProvision Utility	30
4.5.1	Configuration File Format	30
4.5.2	Global Configuration File	30
4.5.3	VoIProvision Utility Overview	31
4.5.4	CSV File.....	31
4.5.5	Template File	31
4.5.6	Generated Configuration Files	31
4.5.7	Starting the VoIProvision Utility.....	32
4.5.8	Usage	32
4.6	Using the Encryption Tool.....	32
4.6.1	Encrypting Configuration Files	32
4.6.2	Encrypting Passwords in the Configuration File	33
5	Device Manager Pro	35
Automatic Provisioning		37
6	Introduction	39
7	Updating the Configuration File Manually	41
8	Setting up Network for Auto Provisioning	43
9	Obtaining Firmware and Configuration Files.....	45
9.1	Provisioning Hunt Order	45
9.2	Dynamic URL Provisioning	45
9.2.1	Provisioning using DHCP Option 160.....	48
9.2.2	Technician's Digit Key Code	49
9.2.3	Provisioning using DHCP Option 66/67.....	50
9.2.4	Provisioning using DHCP Option 43	50
9.2.5	Provisioning using the User-Class Option	51
9.2.6	SIP SUBSCRIBE and NOTIFY Messages.....	59

9.2.7	Hardcoded Domain Name for Provisioning Server	61
9.2.8	Cached Address of Last Provisioning Server Used	61
9.2.9	Redirect Server	62
9.3	Static URL Provisioning	63
Quick Setup.....		65
10	Quick Setup	67
Networking		69
11	Introduction	71
12	Configuring Date and Time Manually	73
12.1	Configuring Daylight Saving Time.....	74
12.2	Configuring the NTP Server.....	77
12.3	Configuring NTP Server via DHCP	79
13	Configuring IP Network Settings	81
13.1	Configuring Static IP Address.....	81
13.1.1	Configuring Static IP Address on the Phone	81
13.1.2	Configuring IP Network Settings	82
13.2	Configuring Partial DHCP	84
14	Configuring LAN and PC Port Settings	87
15	Configuring VLAN Settings	89
15.1	Configuring Manual or Automatic VLAN Assignment.....	90
15.1.1	Configuring Manual VLAN Assignment to the Phone.....	90
15.1.2	Configuring Automatic VLAN Assignment to the Phone.....	90
15.1.3	Configuring VLAN via DHCP Provisioning Path	90
VoIP Settings		91
16	Configuring SIP Settings	93
16.1	Configuring General SIP Settings.....	93
16.2	Configuring Proxy and Registration	97
16.2.1	Configuring Proxy Redundancy	100
16.2.2	Device Registration Failover/Failback.....	103
16.2.2.1	Failover	103
16.2.2.2	Failback.....	104
16.2.3	Preventing Unregistering after Changing Settings and Reloading.....	104
16.3	Configuring a Line	105
16.4	Configuring Shared Call Appearance.....	106
16.5	Configuring SIP Timers	107
16.6	Configuring SIP QoS	109
16.7	Configuring SIP Reject Code.....	110
17	Configuring Dialing	111
17.1	Configuring Voice Dialing through VocaNOM.....	111
17.2	Configuring General Dialing Parameters	112

17.3	Configuring Auto Redial.....	114
17.4	Configuring Dial Tones	115
17.5	Configuring DTMF	117
17.6	Configuring Digit Maps and Dial Plans.....	118
17.7	Configuring Headset LED to Stay On	120
17.8	Configuring Default Audio Device	121
18	Configuring Ring Tones	123
18.1	Configuring Distinctive Ring Tones.....	123
18.1.1	Example of Configuring a Distinctive Ring.....	124
18.2	Configuring CPT Regional Settings	125
18.3	Uploading Ring Tones	127
18.4	Configuring Beeps to Headsets when a Call Comes in to a Call Center	128
18.5	Configuring the Phone to play Fast Busy Tone if Automatically Disconnected on Remote Side.....	129
19	Configuring Media Settings.....	131
19.1	Configuring Media Streaming	131
19.2	Configuring RTP Port Range and Payload Type.....	132
19.3	Configuring RTP QoS.....	133
19.4	Configuring Codecs.....	134
19.5	Configuring OPUS Management	136
20	Configuring Voice Settings	137
20.1	Configuring Gain Control	137
20.2	Configuring Jitter Buffer	137
20.3	Configuring Silence Compression.....	138
20.4	Configuring Noise Reduction.....	139
20.5	Configuring Echo Cancellation.....	140
21	Configuring Extension Lines.....	141
21.1	On the Phone	141
21.2	Using the Web Interface and Configuration File.....	142
22	Configuring Supplementary Services	145
22.1	Selecting the Application Server.....	145
22.2	Configuring Call Waiting	146
22.3	Configuring Call Forwarding	147
22.4	Configuring a Conference.....	149
22.5	Allowing the Initiator to Drop out of a Conference	149
22.6	Configuring Automatic Dialing	150
22.7	Configuring Automatic Answer.....	151
22.8	Configuring Do Not Disturb (DnD)	153
22.9	Configuring Call Pick Up.....	154
22.10	Configuring Message Waiting Indication.....	155
22.11	Configuring Busy Lamp Field.....	156
22.12	Configuring Advice of Charge.....	158
22.13	Configuring a Tone to Alert to Long Hold.....	158
22.14	Disabling the HOLD Key.....	159

22.15	Configuring Onhook Disconnect when Held.....	159
22.16	Configuring Ringing on the Default Audio Device	160
22.17	Allowing an Incoming Call when the Phone is Locked	161
22.18	Allowing Call Center Agents to Record Welcome Greetings	161
22.19	Enabling the Electronic Hook Switch	162
22.20	Disabling the Hard Mute Key on the Phone	163
22.21	Configuring Attended and Semi-Attended Call Transfer	164
22.22	Configuring Blind Transfer	164
22.23	Creating a Speed Dial File for Configuration File	165
23	Configuring Volume Levels	167
23.1	Configuring Gain Control	167
23.2	Configuring Tone Volume	169
23.3	Configuring Ringer Volume.....	170
23.4	Configuring Speaker Volume.....	171
23.5	Configuring Handset Volume.....	174
23.6	Configuring Headset Volume.....	176
Advanced Phone Settings		179
24	Configuring the Phone Directory	181
24.1	Configuring the Corporate Directory	181
24.1.1	Configuring the LDAP-based Corporate Directory	181
24.1.2	Loading a Text-based Corporate Directory File	183
24.2	Modifying the Local Phone Directory	185
25	Configuring Keys	187
25.1	Configuring Function Keys.....	187
25.1.1	430HD Phone.....	187
25.1.2	440HD Phone.....	188
25.1.3	Configuring Additional Function Keys.....	189
25.2	Configuring Programmable Keys.....	190
25.2.1	430HD and 440HD Phones	190
25.2.1.1	Configuring Multiple Extension Lines	191
25.2.1.2	Configuring a Key Event	193
25.3	Configuring Speed Dials.....	194
25.3.1	420HD and 405/405HD Phone Models	194
25.3.2	Deleting Speed Dials.....	195
25.3.3	Saving Configured Speed Dials	195
25.3.4	Creating a Speed Dial File for the Configuration File.....	196
25.4	Configuring Softkeys	197
25.4.1	Configuring Programmable Softkeys (PSK)	200
25.5	Configuring Navigation Control Button Positions	201
25.5.1	Saving Configured Keys	202
25.5.2	Loading Saved Keys to Phones	202
26	Disabling Hard Keys and Softkeys	203
27	Configuring Paging	205
27.1	Configuring a Key for Paging using the Web Interface.....	205
27.1.1	Configuring Barge-in.....	206

27.2 Configuring Paging Using the Configuration File	207
28 Configuring Feature Key Synchronization.....	209
Security	211
29 Implementing X.509 Authentication.....	213
29.1 Factory-Set Certificates and AudioCodes Trusted Root CA.....	213
29.2 User-Generated Certificates	214
29.3 External Trusted Root CAs	215
30 Loading a Certificate.....	217
30.1 Loading the Trusted Root CA Certificate to the Phone	217
30.1.1 Loading Trusted Root CA Certificate Using Configuration File.....	217
30.2 Loading the Client Certificate to the Phone.....	218
30.2.1 Loading the Client Certificate to the Phone using the Configuration File	218
30.2.2 Enabling Server-side Authentication (Mutual Authentication).....	219
30.3 Generating a Certificate Signing Request.....	220
30.4 Using Previously Loaded Certificates	221
31 Configuring SIP TLS	223
31.1 Configuring TLS	223
31.1.1 Configuring SIP TLS using the Web Interface	223
32 Configuring 802.1x.....	225
32.1 Configuring 802.1x in the Phone Screen	225
32.1.1 Configuring EAP-MD5 Mode.....	226
32.1.2 Configuring EAP-TLS Mode.....	226
32.2 Configuring 802.1x Using Web and Configuration File.....	226
32.2.1 Configuring EAP MD5 Mode.....	226
32.2.2 Configuring EAP TLS Mode.....	227
33 Configuring SRTP	229
34 Configuring HTTP/S	231
35 Logging into a Remote HTTP/S Server from the Phone	233
36 Securing the Web Interface using HTTP/S.....	235
36.1 Provisioning.....	236
37 MAC-Based Authentication	237
Maintenance	239
38 Changing Administrator Login Credentials	241
39 Restarting Phones.....	243
39.1 Restarting from the Phone.....	243
39.2 Restarting the Phone using the Web Interface.....	244
40 Restoring Phone Defaults	245
40.1 Restoring Factory Defaults from the Phone's Screen.....	245

40.2 Restoring Factory Defaults using the Web Interface	246
Status and Monitoring	247
41 Determining Network Status	249
41.1 Determining LAN Status	249
41.2 Determining Port Status	249
41.3 Determining 802.1x Status	249
42 Determining VoIP Status	251
42.1 Determining Phone Status	251
42.2 Determining Line Status	251
42.3 Determining Memory Status	252
42.4 Viewing Current Call Information	253
43 Viewing Call History	255
44 Accessing System Information	257
44.1 Accessing Phone Firmware Version	257
44.1.1 Accessing Firmware Version using the Web Interface	257
44.1.2 Accessing Firmware Version from the Phone's Screen	257
44.2 Viewing Phone Firmware Release Information	258
44.2.1 Viewing Firmware Release Information in the Web Interface	258
44.2.2 Viewing Firmware Release Information on the Phone	259
45 Monitoring Quality of Experience	261
45.1 Configuring Remote Voice Quality Monitoring	261
45.1.1 Configuring RTCP Extended Report	261
45.1.2 Configuring Voice Quality Monitoring	262
Diagnostics and Troubleshooting	263
46 Diagnosing Phone Hardware	265
46.1 Testing Keypad and Hook	266
46.2 Testing Handset	267
46.3 Testing the Headset	267
46.4 Testing Hands Free	267
47 Recovering Firmware	269
48 Configuring System Logging (Syslog)	271
48.1.1 Analyzing and Debugging Traffic using Regular Syslog	271
48.1.2 Analyzing and Debugging Traffic using 'Lightweight Syslog'	273

49	Viewing Error Messages Displayed in the Phone Screen.....	275
50	Debugging using Packet Recording Parameters	277
51	Creating a Crash Dump File	279
52	Configuring Port Mirroring	281
53	Enabling Tracing	283
Appendices		285
A	Configuring Phones in Server-Specific Deployments	287
A.1	BroadSoft's BroadWorks	287
A.1.1	Configuring BLF	288
A.1.2	Configuring Call Forwarding	289
A.1.3	Configuring DnD.....	291
A.1.4	Configuring FKS.....	292
A.1.5	Using SIP Authentication for Xsi Access.....	292
A.1.6	Configuring Phones to Connect to the Xsi Interface using HTTP/S Authentication.....	292
A.1.7	Configuring Shared Call Appearance.....	295
A.1.8	Setting up a Remote Conference.....	298
A.1.9	Loading the Corporate Directory to the Phone	299
A.1.10	Adding a Contact to the Corporate Directory	300
A.1.11	Deleting a Contact from the Corporate Directory	300
A.1.12	Disabling Handset Mode.....	300
A.1.13	Displaying a Message in Agents' Phone Screens.....	301
A.1.14	Changing Phone Screen Backlight Timeout.....	301
A.2	Asterisk, Coral and Metaswitch.....	302
A.2.1	Configuring BLF	302
A.3	Genesys SIP Server for Contact Centers	303
A.3.1	Using DHCP to Auto Provision Phones.....	303
A.3.2	Verifying Firmware Version.....	303
A.3.3	Accessing a Phone's Web Interface.....	303
A.3.4	Configuring Dual Registration to Ensure SIP Business Continuity for Agents	304
A.3.5	Disabling the Web Interface.....	308
A.3.6	Forcing a Reboot on Provisioning	308
A.3.7	Provisioning using TFTP / FTP / HTTP / HTTPS in DHCP Options 66/67	308
A.3.8	Enabling Agents to Sign in with Phone Numbers.....	309
A.3.9	Locking Agents' Phones' Alphabetical Keys	309
A.3.10	Playing a Beep on an Incoming Call	310
A.3.11	Enabling Proactive Mute.....	310
A.3.12	Configuring Automatic Answer	311
A.3.13	Regulating the 'Logged out' Message	311
A.3.14	3PCC (Third Party Call Control).....	312
A.3.15	Disabling Handset Mode.....	313
A.3.16	Changing Phone Screen Backlight Timeout.....	313
A.3.17	Displaying a Message on Agents' Phones	314
A.3.18	Configuring a Redundant (Backup) Genesys Server	314
B	Configuring Automatic Call Distribution (ACD).....	317
B.1	Softkey Display and Command Menu Options.....	321
C	Recovering AudioCodes' IP Phone.....	323
C.1	Identifying that the Phone is in Recovery Mode	323
C.2	Verifying that the Phone is in Recovery Mode	323
C.3	Recovering the Phone	324

C.4	Verifying that the Phone is Downloading the Image File	327
C.4.1	Verifying Using Wireshark.....	327
C.4.2	Verifying Using tftpd64.....	328
C.4.3	Verifying on the Phone	329
D	Deploying AudioCodes IP Phones - Use Case	331
D.1	Preparing Configuration (cfg) Files for the Enterprise Customer.....	331
D.1.1	Saving the Phone's Default Configuration to File.....	331
D.1.2	Preparing a global.cfg Configuration File.....	332
D.1.3	Generating MAC-specific <private>.cfg Configuration Files.....	332
D.2	Preparing the DHCP Server to Automatically Provision Phones	335
D.3	Making Sure Phones are Correctly Provisioned.....	335
E	Supported SIP RFCs and Headers.....	337
E.1	SIP Compliance Tables	339
E.1.1	SIP Methods.....	339
E.1.2	SIP Headers.....	340
F	Specifications.....	343
G	RTCP-XR Parameters.....	347
H	Example SIP - PUBLISH Message.....	349

List of Figures

Figure 2-1: Language	24
Figure 3-1: Web Interface Login	25
Figure 3-2: Web Interface Areas	26
Figure 3-3: User Account	27
Figure 7-1: Configuration File (430HD)	41
Figure 7-2: Load New Configuration File	41
Figure 9-1: Automatic Provisioning – Dynamic URL	45
Figure 9-2: Automatic Provisioning - DHCP Option 160	48
Figure 9-3: Provisioning using DHCP Option 43 in the DHCP Server	51
Figure 9-4: DHCP Options Assigned to IPv4 Addresses	52
Figure 9-5: Defining User Classes	52
Figure 9-6: DHCP User Classes	52
Figure 9-7: New Class	53
Figure 9-8: Packet Bytes Window	53
Figure 9-9: DHCP User Classes	54
Figure 9-10: Set Predefined Options	54
Figure 9-11: Predefined Options and Values	55
Figure 9-12: Option Type – Add AudioCodes 160 Option	55
Figure 9-13: Predefined Options and Values – Add OVOC Server Location	56
Figure 9-14: 'Scope Leased' Folder - Configure Options	56
Figure 9-15: Configure Options 1	57
Figure 9-16: Configure Options 2	57
Figure 9-17: Server Options	58
Figure 9-18: Three Scope Options Created	58
Figure 9-19: Redirect Server Configuration Process	62
Figure 9-20: Automatic Provisioning – Static URL	63
Figure 10-1: Quick Setup	67
Figure 12-1: Date and Time	73
Figure 12-2: NTP & Time Settings	74
Figure 12-3: Daylight Saving Time	74
Figure 12-4: NTP & Time Settings	77
Figure 12-5: NTP and Time Settings	79
Figure 13-1: Network Settings	82
Figure 14-1: Network Settings - Port Mode	87
Figure 15-1: Network Settings - VLAN Settings	89
Figure 16-1: Signaling Protocols- SIP General	93
Figure 16-2: SIP Proxy and Registrar	97
Figure 16-3: Proxy Redundancy	100
Figure 16-4: Line Settings	105
Figure 16-5: Shared Call Appearance	106
Figure 16-6: Signaling Protocols - SIP Timers	107
Figure 16-7: Quality of Service	109
Figure 16-8: General Parameters - Reject Code	110
Figure 17-1: Web Interface - VocaNOM	111
Figure 17-2: Web Interface Dialing	112
Figure 17-3: Automatic Redial On Busy	114
Figure 17-4: Dialing Page - Tones	115
Figure 17-5: Services Page - Tones	115
Figure 17-6: DTMF Transport Mode	117
Figure 17-7: Digit Map and Dial Plan	118
Figure 17-8: Default Audio Device	121
Figure 18-1: Distinctive Ringing	123
Figure 18-2: Distinctive Ringing	124
Figure 18-3: Example of the Alert-Info Header	124
Figure 18-4: Tones - Regional Settings	125
Figure 18-5: Upload Ringing Tone	127
Figure 19-1: Media Streaming	132

Figure 19-2: Quality of Service	133
Figure 19-3: Media Streaming - Codecs	134
Figure 19-4: Media Streaming - Codecs	136
Figure 20-1: Voice – Jitter Buffer	137
Figure 20-2: Voice - Silence Compression.....	138
Figure 20-3: Voice - Noise Reduction	139
Figure 21-1: Line Settings	142
Figure 22-1: Services	145
Figure 22-2: Services - Call Waiting	146
Figure 22-3: Services - Call Forward	147
Figure 22-4: Services - Conference	149
Figure 22-5: Dialing - Automatic Dialing.....	150
Figure 22-6: Services - DnD	153
Figure 22-7: Services - BLF Support - Call Pick Up	154
Figure 22-8: Services - MWI	155
Figure 22-9: Services - BLF.....	156
Figure 22-10: Services – AOC Support.....	158
Figure 22-11: VoIP- Services – General Parameters	162
Figure 23-1: Voice - Gain Control	167
Figure 24-1: LDAP	181
Figure 24-2: Corporate Directory	184
Figure 24-3: Directory - Add Contact	185
Figure 25-1: 430HD Phone Personal Settings - Function Keys	187
Figure 25-2: 440HD Phone Personal Settings - Function Keys	188
Figure 25-3: Programmable Keys (430HD/440HD Phones)	190
Figure 25-4: Line Settings	191
Figure 25-5: Programmable Keys.....	191
Figure 25-6: Personal Settings – Speed Dials (420HD and 405/405HD Phones)	194
Figure 25-7: Softkeys (420HD and 405/405HD Phone).....	198
Figure 25-8: Navigation Keys	201
Figure 25-9: Load and Save	202
Figure 27-1: Services - Enable Paging	205
Figure 27-2: Enable Barge-in	206
Figure 29-1: Certificate.....	215
Figure 30-1: Root CA Certificate.....	217
Figure 30-2: Client Certificate.....	218
Figure 30-3: Certificate Signing Request	220
Figure 31-1: Signaling Protocols - SIP General.....	224
Figure 32-1: Web Interface –801.1X Settings - EAP-MD5.....	226
Figure 32-2: Web Interface –801.1X Settings - EAP-TLS.....	227
Figure 33-1: SRTP	229
Figure 36-1: Securing Web Interface Management with HTTPS	235
Figure 36-2: Automatic Provisioning	236
Figure 38-1: Users – Administrator Account	241
Figure 39-1: Restart System.....	244
Figure 39-2: Confirmation Box.....	244
Figure 40-1: Restore Defaults	246
Figure 40-2: Confirmation to Restore Defaults.....	246
Figure 41-1: LAN Information	249
Figure 41-2: Port Mode Status	249
Figure 41-3: 802.1X Status	249
Figure 42-1: VoIP Status - Phone Status	251
Figure 42-2: Line Status.....	251
Figure 42-3: Memory Status.....	252
Figure 42-4: Memory Status – Linux meminfo Command – Displayed Information	253
Figure 42-5: Web Interface –Line 1 Call Information	253
Figure 43-1: Call History.....	255
Figure 44-1: System Information–Firmware Version	257
Figure 44-2: System Information – Release Information	258

Figure 45-1: Media Streaming - RTCP-XR.....	261
Figure 46-1: Diagnostic Tests Displayed on the Phone.....	265
Figure 46-2: Keypad and Hook Test– On-Hook (e.g., 440HD)	266
Figure 46-3: Keypad Test – Off-Hook (e.g., 440HD)	266
Figure 48-1: Web Interface –System Logging.....	271
Figure 50-1: Recording	277
Figure 51-1: Crash Dump.....	279
Figure 52-1: Web Interface –Port Mirroring.....	281
Figure 53-1: Tracing System Key Behavior.....	283
Figure A-1: BLF Configuration in a BroadSoft Environment	288
Figure A-2: Configuring Call Forwarding using BroadSoft's BroadWorks.....	290
Figure A-3: Configuring DnD in BroadSoft's BroadWorks - Status.....	291
Figure A-4: Configuring DnD in BroadSoft's BroadWorks.....	291
Figure A-5: Services.....	292
Figure A-6: Services - Feature Key Synchronization.....	292
Figure A-7: Shared Call Appearance with Multiple Call Appearance	295
Figure A-8: BroadSoft Server - Assigning Shared Calls Appearance to a User	295
Figure A-9: BroadSoft Server – Shared Call Appearance Add	297
Figure A-10: Line Settings - Shared Line	297
Figure A-11: Services - Conference.....	298
Figure A-12: Directory	299
Figure A-13: Directory – Delete a Contact	300
Figure A-14: BLF Configuration for Application Server Type - Asterisk.....	302
Figure A-15: Signaling Protocol – SIP Proxy and Registrar.....	304
Figure A-16: Signaling Protocol – SIP Proxy and Registrar – Secondary Proxy.....	305
Figure A-17: Registering a Phone on the Redundant Genesys Server	314
Figure B-1: ACD	318
Figure B-2: ACD – Unavailable Reason Code	318
Figure C-1: Identifying Recovery Mode.....	323
Figure C-2: Verifying Recovery Mode in Wireshark.....	324
Figure C-3: Source Ethernet MAC Address in Wireshark Identical to Phone Base's.....	324
Figure C-4: Recovering the Phone - Configure the PC NIC to which the Phone is Connected.....	325
Figure C-5: Verifying with Wireshark that the Phone is Downloading Phone .img File	327
Figure C-6: Verifying .img File Download with Wireshark – Filtering by TFTP	328
Figure C-7: Verifying .img File Download using tftpd64.....	328
Figure C-8: Verifying .img File Download using tftpd64.....	329
Figure C-9: Verifying .img File Download on the Phone.....	329

List of Tables

Table 2-1: Language Display Parameters.....	24
Table 3-1: Port Parameters	27
Table 3-2: User Name and Password Parameters	27
Table 4-1: Example of CSV File	31
Table 5-1: OVOC Server Parameters	35
Table 9-1: DHCP Automatic Provisioning Parameters	46
Table 9-2: Auto Provisioning via DHCP Option 66/67	50
Table 9-3: DHCP User Class Entry for Each AudioCodes Phone Model Deployed.....	54
Table 9-4: Static URL Automatic Provisioning Parameters.....	64
Table 12-1: Date Display Format.....	73
Table 12-2: Daylight Saving Time Parameters.....	74
Table 12-3: NTP Server Parameters	77
Table 12-4: NTP Server and GMT Parameters	80
Table 13-1: Network Settings Parameters	83
Table 13-2: Partial DHCP Parameters	84
Table 14-1: Port Settings.....	87
Table 15-1: VLAN Settings.....	89
Table 16-1: SIP General Parameters.....	94
Table 16-2: Proxy and Registrar Parameters.....	97
Table 16-3: SIP Proxy Server Redundancy Parameters	101
Table 16-4: Device Registration Failover Parameters	103
Table 16-5: Device Registration Failback Parameter	104
Table 16-6: Preventing Unregistering	104
Table 16-7: Line Settings	105
Table 16-8: SIP Timers Parameters	107
Table 16-9: SIP QoS Parameters	109
Table 16-10: Reject Code Parameter	110
Table 17-1: Voice-Dialing Parameter Descriptions.....	111
Table 17-2: Dialing Parameters.....	112
Table 17-3: Automatic Redial On Busy Parameters	114
Table 17-4: Dial Tones Parameters	115
Table 17-5: DTMF Transport Mode	117
Table 17-6: Digit Map and Dial Plan Parameters	118
Table 17-7: Headset LED Parameter.....	120
Table 17-8: Audio Device Parameter.....	121
Table 18-1: Distinctive Ringing Parameters.....	123
Table 18-2: Regional Parameters.....	125
Table 18-3: Ring Tone Parameters.....	128
Table 18-4: Configuring Beeps to be Played to Headsets when Calls Come in	128
Table 18-5: Configuring the Phone to Play a Fast Busy Tone when Automatically Disconnected on Remote Side.....	129
Table 19-1: Media Streaming Parameters	131
Table 19-2: RTP Port Range and Payload Type Parameters	132
Table 19-3: RTP QoS Parameter	133
Table 19-4: Codec Parameters	134
Table 19-5: OPUS Management Parameter	136
Table 20-1: Jitter Buffer Parameters.....	137
Table 20-2: Silence Compression Parameters.....	138
Table 20-3: Noise Reduction Parameters	139
Table 21-1: Line Parameters.....	142
Table 22-1: General Supplementary Services Parameters.....	145
Table 22-2: Call Waiting Parameters.....	146
Table 22-3: Call Forward Parameters.....	147
Table 22-4: Conference Parameters.....	149
Table 22-5: Allowing a Conference Initiator to Drop Out when On-Hooking.....	149
Table 22-6: Automatic Dialing Parameters.....	150

Table 22-7: Automatic Answer Parameters.....	151
Table 22-8: Do Not Disturb Parameters.....	153
Table 22-9: Call Pick Up Parameters.....	154
Table 22-10: MWI Parameters	155
Table 22-11: BLF Parameters	156
Table 22-12: AOC Parameters	158
Table 22-13: Reminder Tone after Long Hold.....	158
Table 22-14: Disabling the HOLD Key.....	159
Table 22-15: Onhook Disconnect when Held.....	159
Table 22-16: Configuring Ringing on the Default Audio Device	160
Table 22-17: Allowing an Incoming Call when the Phone is Locked	161
Table 22-18: Letting Call Center Agents Record Welcome Greetings	161
Table 22-19: EHS Parameter	162
Table 22-20: Disabling the Hard Mute Key on the Phone.....	163
Table 22-21: Configuring a Softkey with Attended and Semi-Attended Call Transfer Functionality ...	164
Table 22-22: Configuring a Softkey with Blind Transfer Functionality	164
Table 23-1: Automatic Gain Control Parameters.....	167
Table 23-2: Tone Volume Parameter.....	169
Table 23-3: Ringer Volume Parameters.....	170
Table 23-4: Speaker Parameters.....	171
Table 23-5: Handset Gain Parameters	174
Table 23-6: Headset Gain Parameters	176
Table 24-1: LDAP Parameters	181
Table 24-2: Provisioning Parameters.....	184
Table 25-1: 430HD Phone Function Keys Parameters.....	188
Table 25-2: 440HD Phone Function Keys Parameters.....	189
Table 25-3: Programmable Keys Parameters (430HD/440HD Phones).....	190
Table 25-4: Configuring a Key Event.....	193
Table 25-5: Speed Dials Parameters.....	195
Table 25-6: Default Softkeys	197
Table 25-7: Softkeys Parameters (420HD/405/405HD Phone).....	198
Table 25-8: SoftKey Parameters	199
Table 26-1: Parameters that can be Configured to Disable Hard Keys / Softkeys.....	203
Table 27-1: Paging Function Key Parameters	205
Table 27-2: Barge-in Parameters	206
Table 27-3: Configuration File Paging Parameters.....	207
Table 28-1: Feature Key Synchronization Parameters.....	209
Table 30-1: Root CA Certificate Parameters.....	217
Table 30-2: Client Certificate Parameters	218
Table 30-3: Server-side Authentication.....	219
Table 31-1: SIP-over-TLS Parameters	223
Table 32-1: EAP MD5 Parameters	227
Table 33-1: SRTP Parameters	229
Table 35-1: HTTP/S Login Authentication.....	233
Table 37-1: Authentication	237
Table 38-1: Username and Password Parameters.....	241
Table 42-1: Memory Status – Linux Commands	252
Table 45-1: RTCP_XR Parameters	262
Table 45-2: Voice Quality Monitoring Parameters.....	262
Table 48-1: Syslog Parameters	271
Table 49-1: Error Messages Displayed in the Phone Screen	275
Table 50-1: Recording Parameters.....	277
Table 51-1: Crash Dump Parameters.....	279
Table 52-1: Port Mirroring Parameters	281
Table 53-1: Tracing Parameters.....	284
Table A-1: Features Supported in a BroadSoft Environment.....	287
Table A-2: Connecting Phones to BroadWorks over HTTP/S – Configuration File Parameters.....	293
Table A-3: BroadSoft Server - Shared Call Appearance – Identity/Device Profile Type	296
Table A-4: BroadSoft Server - Shared Call Appearance Add	297

Table 53-5: Remote Conference Parameters	298
Table A-6: BroadSoft Server - Shared Call Appearance Add	300
Table 53-7: Displaying a Message in Agents' Phone Screens	301
Table 53-8: Backlight Timeout.....	301
Table A-9: SIP Proxy and Registrar Parameters.....	305
Table A-10: Disabling the Web Interface	308
Table A-11: Forcing a Reboot on Provisioning.....	308
Table A-12: Enabling Agents to Sign in with Phone Numbers	309
Table A-13: Locking Agents Phones Alphabetical Keys.....	309
Table A-14: Playing a Beep on an Incoming Call	310
Table A-15: Enabling Proactive Mute	310
Table 53-16: Automatic Answer.....	311
Table A-17: Regulating the 'Logged out' Message	311
Table A-18: 3PCC Parameters.....	312
Table A-19: Enabling 3PCC Calls.....	312
Table A-20: BroadSoft Server - Shared Call Appearance Add	313
Table 53-21: Backlight Timeout.....	313
Table 53-22: Displaying a Message on Agents' Phones.....	314
Table 53-23: Redundant Genesys Server - Parameters.....	315
Table A-24: Retransmission Timer T1 - Parameter	315
Table B-1: ACD Parameters.....	319
Table B-2: BroadSoft-Softkey Display States and Command Menu Options	321
Table 53-3: Configuring tftpd64 Settings.....	325
Table D-1: CSV File Description.....	332
Table E-1: Supported IETF RFCs.....	337
Table E-2: Supported SIP Methods	339
Table E-3: Supported SIP Headers	340
Table F-1: IP Phone Specifications.....	343
Table G-1: RTCP-XR Parameters	347

Notice

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Abbreviations and Conventions

Each abbreviation, unless widely used, is spelled out in full when first used.

Related Documentation

Document Name
440HD IP Phone User's Manual
440HD IP Phone Quick Guide
430HD IP Phone User's Manual
430HD IP Phone Quick Guide
420HD IP Phone User's Manual
420HD IP Phone Quick Guide
405 and 405HD IP Phone User's Manual
405 and 405HD IP Phone Quick Guide
Device Manager Pro Administrator's Manual
One Voice Operations Center (OVOC) IOM Manual
OVOC User's Manual

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11955	SIP SUBSCRIBE and NOTIFY Messages. USB Headsets. VocaNOM. Disable HOLD key. Disable mute key. Disabling Hard Keys and Softkeys. SRTP. Backlight timeout. USB headsets.
11956	PAI on Replay. Automatic Answer: new Note. Tone after long hold. Client Certificate: modified descriptions. Server-side Authentication: modified descriptions. Plantronics link.
1195	Preventing Unregistering. DTMF level. voip/media/srtp/NegotiationMode. SRTCP. Device Manager Pro. USB Headset. Recovery Mode notification. DIGICert. Ribbon/Genband support. Remove the 'lifetime' parameter. OpenSSL. 'provisioning/period/type' description improved.

Documentation Feedback

AudioCodes continually strives to produce high quality documentation. If you have any comments (suggestions or errors) regarding this document, please fill out the Documentation Feedback form on our Web site at <https://online.audiocodes.com/documentation-feedback>.

1 Introduction

This manual is intended for the system administrator responsible for setting up and configuring the 420HD, 430HD, 440HD, 405 and 405HD IP phones.

AudioCodes' IP phones are based on AudioCodes' proprietary High Definition (HD) voice technology, providing clarity and a rich audio experience in Voice-over-IP (VoIP) calls. The phones are fully-featured telephones that provide voice communication over an IP network, allowing you to place and receive phone calls, put calls on hold, transfer calls, make conference calls, and so on.

The phone offers a wide variety of management and configuration tools:

- **Phone screen** - easy-to-use, menu-driven screen providing basic phone configuration and status capabilities
- **Web interface** - provides a user-friendly Web interface that runs on a Web browser (Microsoft® Internet Explorer is the recommended browser).
- **Configuration file** - text-based file (created using any plain text editor such as Microsoft's Notepad) containing configuration parameters and which is loaded to the phone using the Web interface or a TFTP, FTP, HTTP or HTTPS server.
- **Device Manager Pro** (see the *Device Manager Pro Administrator's Manual*).

For a detailed description on hardware installation and for operating the phone's call features, see the *User's Manual*.

**Note:**

- **Boldened** parameters enclosed in square brackets [] in the tables in this document indicate configuration file parameters.
- Web interface parameters are displayed in regular font above their web counterparts.

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Part I

Configuration Tools

2 IP Phone User Interface

The phone provides a Liquid Crystal Display (LCD) based screen, offering an intuitive, menu-driven interface for configuring the phone. The administrative tasks are performed in the phone's Administration menu.



Note: Screenshots of the 440HD are shown in this document. Screenshots of the 420HD and 405/405HD are only shown if they *significantly* differ.

2.1 Accessing the Administration Menu

Here's how to access the Administration menu on the phone.

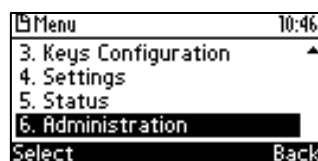


Note:

- The phone is password protected. The default password is 1234. To change the login password, use the phone's Web interface or Configuration file.
- After entering the password, the access session is applied to all the submenus.
- To change the Administration screen's login password, use the phone's Web interface or use the configuration file.

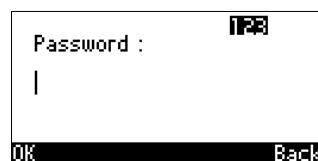
➤ **To access the Administration screen:**

1. Press the MENU key on the phone and navigate down to **Administration**.



Note: Alternatively, after pressing the MENU key you can press an item's number to navigate to the item, for example, press **6** to navigate to **Administration**.

2. Press **Select**; you're prompted for a password.



3. Enter the administration password (Default: **1234**) and then press the **OK** softkey.

2.2 Changing Display Language

Here's how to change the language in the phone screen. Language can be configured using the Web interface or configuration file.

➤ **To choose a language using the Web interface:**

1. Open the Language page (**Configuration** tab > **Personal Settings** menu > **Language**).

Figure 2-1: Language

2. Select the language according to the parameter in the table below, and then click **Submit**; the phone reboots and changes the screen language.

➤ **To choose a language using the configuration file:**

- Use the table below as reference.

Table 2-1: Language Display Parameters

Parameter	Description
Phone Display Language [personal_settings/language]	Determines the screen language. See the <i>Release Notes</i> for the list of languages supported.
[personal_settings/lcd_contrast]	Determines the screen contrast. Configure to a level that is comfortable for the user. Range: 0-35 (430HD / 440HD) and 0-30 (420HD). The default depends on the hardware revision.
[personal_settings/blf_lcd_contrast]	Applies only to 440HD phone. Determines the sidecar BLFs contrast. Configure to a level comfortable for the user. Range: 0-39. Default: 16.

3 Web Interface

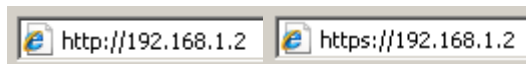
This section describes the phone's Web interface. You can use the Web interface to configure the device.

3.1 Accessing Web Interface

You can use any standard Web browser (such as Microsoft Internet Explorer) to access the phone's Web interface. The IP address used for accessing the Web interface is the phone's IP address, received from a DHCP server or manually configured (static IP address).

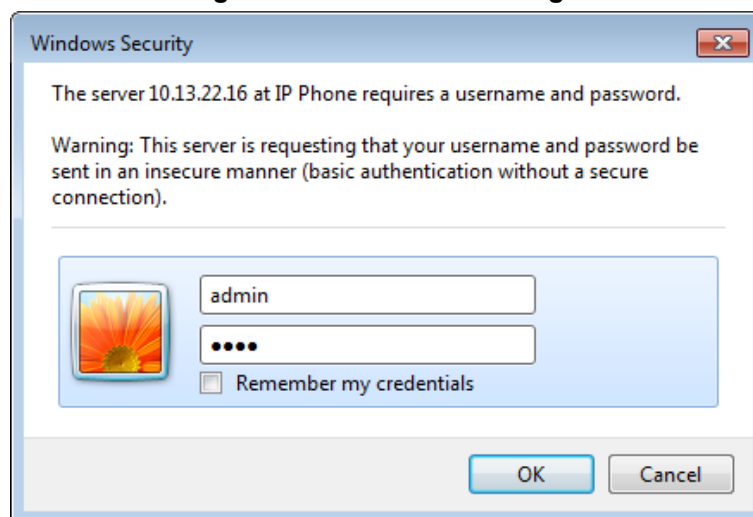
➤ **To access the phone's Web interface:**

1. Connect the LAN port of your phone to the IP network (using the Cable or ADSL modem from your Internet Service Provider).
2. Determine the phone's IP address obtained from the DHCP server.
3. Open a Web browser, and then in the URL address field, enter the phone's IP address (for example, `http://192.168.1.2` or `https://192.168.1.2`), as displayed below:



The Web login window appears:

Figure 3-1: Web Interface Login



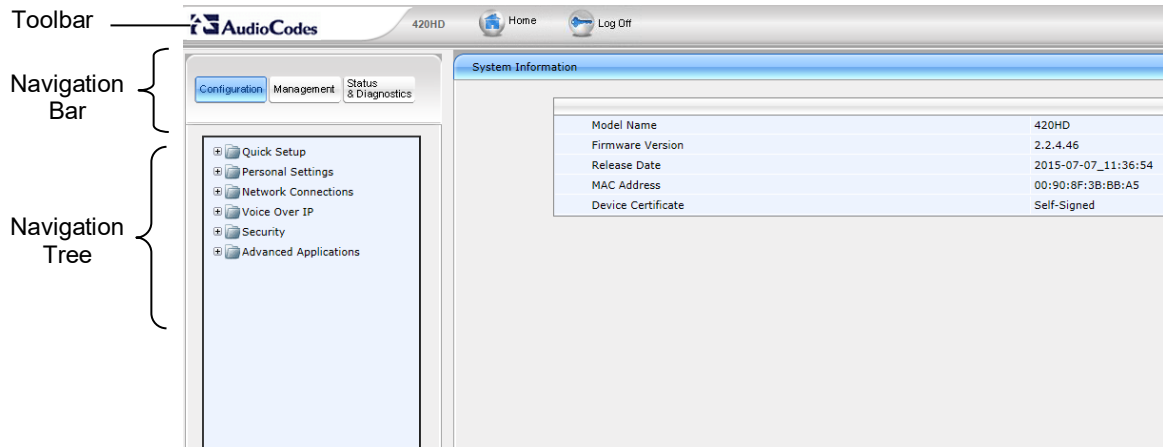
Note: The administrator's default login user name and password are **admin** and **1234** respectively.

4. Alternatively, if your DHCP and DNS servers are synchronized, you can access the phone Web browser by using the following method:
`http://<Phone Model>-<MAC Address>.<Domain Name>`
E.g. `http://440hd-001122334455.corp.YourCompany.com`
5. Enter the **User name** and **Password**, and then click **OK**.



3.2 Getting Started with the Web

The areas of the Web interface are shown below:

Figure 3-2: Web Interface Areas



The Web interface is composed of the following main areas:

- **Toolbar:** displays AudioCodes logo and provides the following buttons:
 -  **Home:** opens the Home page
 -  **Log off:** closes the Web interface
- **Navigation bar:** provides tabs for accessing the configuration menus:
 - **Configuration:** provides menus for configuring the phone.
 - **Management:** provides menus for various management tasks such as firmware upgrade and changing the login username and password.
 - **Status & Diagnostics:** provides menus for displaying information on the status of the phone, such as call history.
- **Navigation tree:** tree-like, hierarchical structure of menus pertaining to the selected tab on the Navigation bar.
- **Configuration pane:** displays the configuration parameters pertaining to a selected menu in the Navigation tree.

3.3 Configuring the Web Interface's Port

Here's how to assign a port number to the Web interface, using the configuration file.

➤ **To configure the Web interface port using the configuration file:**

- Use the table below as reference.

Table 3-1: Port Parameters

Parameter	Description
[system/http_server_port]	Assigns a port number to the Web interface. The HTTP server by default uses port number 80. Range: 0-65535.
[system/https_server_port]	Assigns a port number to the Web interface. The HTTPS server by default uses port number 443. Range: 0-65535.

3.4 Configuring User Login Credentials

Here's how to configure the phone user's name and password.

➤ **To configure the phone user's name and password using the Web interface:**

1. Open the User Account page (**Management** menu > **Administration** > **Users**):

Figure 3-3: User Account

The screenshot shows a web interface titled 'User account'. It contains a table with three rows: 'Username' with the value 'user', 'Password', and 'Confirm Password'. Each row has an empty input field to its right. Below the table is a 'Submit' button with a blue checkmark icon.

2. Configure using the table below as reference, and click **Submit**.

➤ **To configure using the configuration file:**

- Use the table below as reference.

Table 3-2: User Name and Password Parameters

Parameter	Description
Username [system/web_user_name]	The phone user name. Default: admin. Applies only to the Web interface.
Password [system/web_user_password]	The encrypted phone password. Default: 1234. Applies only to the Web interface, and phone screen.

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4 Configuration File

This section describes the configuration file and the parameters you can configure in it.

4.1 Introduction

The configuration file can be loaded to the phone using the automatic provisioning mechanism, or manually from your local computer using the Web interface. The subsections below describe configuration file syntax and linking additional configuration files to a configuration file.

4.2 File Syntax

The configuration file can be created using a standard ASCII, text-based program such as Notepad. The configuration file is a `.cfg` file with the file name being the phone's MAC address: **<phone's MAC address>.cfg**.

The syntax of the configuration file is as follows:

```
<parameter name>=<value>
```

Make sure the configuration file conforms to these guidelines:

- No spaces on either side of the equals (=) sign.
- Each parameter must be on a new line.

Below is an example of part of a configuration file:

```
system/type=440HD
voip/line/0/enabled=1
voip/line/0/id=1234
voip/line/0/description=440HD
voip/line/0/auth_name=1234
voip/line/0/auth_password=4321
```

4.3 Linking Multiple Files

The Configuration file allows you to include links (URL and/or file name) to other Configuration files that provide additional parameter settings. This is especially useful in deployments with multiple phones, where the phones share common configuration but where each phone has some unique settings. In such a scenario, a phone's Configuration file can include unique parameter settings as well as links to additional Configuration files with settings common to all phones.

Linking additional files is achieved by using the **include** function in the phone's Configuration file. For example, the below Configuration file provides links to additional Configuration files (shown in bolded font):

```
system/type=440HD
include 440HD_<MAC>_voip.cfg
include vlan_conf.cfg
include network_conf.cfg
include provisioning_conf.cfg
```

In addition, the Configuration file can provide URL paths (FTP, TFTP, HTTP, or HTTPS) to where the additional files are located, as shown in the example below (shown in bolded font):

```
system/type=440HD
include http://10.10.10.10/440HD_<MAC>_voip.cfg
include https://remote-pc/vlan_conf.cfg
include tftp://10.10.10.10/440HD_<MAC>_network.cfg
include ftp://remote-pc/provisining_conf.cfg
```



Note: If no URL is provided in the Configuration file, the files are retrieved according to the provisioning information (e.g. DHCP Option 160 as well as Option 66/67).

4.4 Downloading the Configuration File from the Phone

For more information, see [Maintenance](#).

4.5 Creating Configuration Files using VolProvision Utility

When installing AudioCodes' phones, the network administrator typically configures each installed phone automatically. Using DHCP options or other methods, the phone can be instructed to download a configuration file. This file is typically unique to each phone, based on the MAC address. This MAC-specific configuration file is generated with phone specific configuration parameters; such as, the extension ID, name and authentication password.

Not all of the iPBX and SoftSwitch vendors (and especially the full solution vendors) include provisioning in their interoperability programs. As an IP phone vendor, AudioCodes is required to provide a standalone provisioning tool that will enable the provisioning of its phones in such environments.

AudioCodes provides a tool that assists in the automatic generation of configuration files. These files can be generated for the initial configuration of the phones and then later regenerated for subsequent configuration updates as required.

4.5.1 Configuration File Format

The detailed format of the phones' configuration files are described in the appendix. The following is an output example of an automatically generated MAC-specific file:

```
system/type=440HD
voip/line/0/enabled=1
voip/line/0/id=56832432
voip/line/0/auth_name=3423fdwer2tre
voip/line/0/auth_password=123456
include global.cfg
```

4.5.2 Global Configuration File

In addition to the MAC-specific files, it is recommended to maintain a single global configuration file, which contains parameters that are common to all phones in the specific site. The MAC-specific files can call the global file (using the 'include' method) as illustrated in the above example. For more information, see 'Linking Additional Files using "Include"' in the Administrator's Manual.

4.5.3 VolProvision Utility Overview

The VolProvision utility is a generic tool that automatically generates multiple MAC-specific configuration files (.*cfg*). The utility generates a separate .*cfg* file for each phone.

To execute the utility, the user needs to prepare a *csv* file and a *template* file. The *csv* file contains the tagged records for each phone and the template file maps these tagged records to a configuration file format, which can be read by the phone.

4.5.4 CSV File

The *csv* file contains a list of tags and a list of the tag's values. The first line in the file contains the list of tags (comma-separated) and each of the other lines contains a list of values, where each line record represents an individual phone.

The *csv* file is usually exported from the customer's IP-PBX or some other database and typically contains the list of phones (e.g. MAC, extension ID, user name and password of each phone).

Table 4-1: Example of CSV File

[mac]	[name]	[id]	[password]
00908F123456	Jonathan	4071	12345
00908F123457	David	4418	12345

When opened as a text file, the *csv* file appears similar to the example below:

```
[mac],[name],[id],[password]
00908F123456,Jonathan,4071,12345
00908F123457,David,4418,12345
```

4.5.5 Template File

The template file defines the format of the generated configuration files, but contains tags instead of actual values. The **VolProvision** utility reads the template file and replaces each tag with actual values from the *csv* file.

Example of a template file:

```
system/type=440HD
voip/line/0/enabled=1
voip/line/0/id=[id]
voip/line/0/auth_name=[name]
voip/line/0/auth_password=[password]
include global.cfg
```

4.5.6 Generated Configuration Files

The generated configuration (.*cfg*) files use a similar format to the template file; however the tags are replaced with the actual values that are read by the VolProvision utility from the *csv* file. One of the tags defined in the *csv* file, should be used as the .*cfg* file name (in order for the VolProvision utility to generate a separate .*cfg* file for each line record in the *csv* file). Typically the tag which defines the MAC address is used as the .*cfg* file name.

4.5.7 Starting the VolProvision Utility

The VolProvision utility can run on both the Linux and Windows platforms. The VolProvision utility initially parses the `csv` file to generate the list of tags. The VolProvision then reads each line record of values in the `csv` file and for each line record, does the following:

- Parses the line record to create a list of values
- Opens the template file
- Generates the `.cfg` file name and create a new `.cfg` file
- Reads the template file, associates the mapped tags with actual values from the `csv` file and writes the result to the `.cfg` file
- Closes the `.cfg` file and template file

4.5.8 Usage

```
USAGE: VoIProvision<csv file><template file><.cfg file>
```

Note the following:

- The first line of the `csv` file contains the list of tags (e.g., [mac],[name],[id]).
- The remainder of the `csv` file contains a line record per `.cfg` file (e.g. 00908f112233,4071,Ethan).
- There is no restriction on the format of the tags (e.g., [tag] or @tag@).
- The template file defines the `.cfg` file format. During VolProvision run-time, the mapped tags in the template file are associated to actual values that are read from the `csv` file.
- Currently only a single tag can be defined per line record in the template file.
- The `.cfg` file name should represent the string of one of the predefined tags in order to generate a separate `.cfg` file per `csv` line record (e.g., [mac].cfg).

4.6 Using the Encryption Tool

AudioCodes' phones use the Triple Data Encryption Standard (3DES) algorithm for encryption. Here's how to use the encryption tool.

4.6.1 Encrypting Configuration Files

Here's how to encrypt the configuration file. For example, you may wish to encrypt the configuration file when it is send over an unsecure network.

➤ To encrypt the configuration file:

- At the command line prompt, specify the following:

```
encryption_tool.exe -f <filename>.cfg
```

where `<file name>.cfg` specifies the name of the Configuration file that you wish to encrypt.

Once the Configuration file is encrypted, it receives the suffix '.cfx' (e.g. Conf.cfx). This is the file that you should specify in the 'Configuration URL' and the 'Dynamic Configuration URL' fields when performing automatic provisioning (see Part II 'Automatic Provisioning').

4.6.2 Encrypting Passwords in the Configuration File

Here's how to encrypt phone passwords used in the configuration process, for example, the 'System' password and the 'SIP Authentication' password.

➤ **To encrypt passwords:**

1. At the command line prompt, specify the following:

```
encryption_tool.exe -s <password_string>
```

where *<password_string>* specifies the string of the password that you wish to encrypt.

Once the password is encrypted, a string is generated with the following syntax:

```
{"<encrypted_string>"}
```

For example:

```
{"0qrNRpSJ6aE="}
```

2. Copy the generated string (including the {" "}) with the syntax specified above to the relevant parameter in the Configuration file.

For example, if you encrypted the SIP authentication password, the following is displayed in the relevant line in the configuration file:

```
voip/line/0/auth_password={"0qrNRpSJ6aE="}
```



Note: It's recommended to encrypt the 'System' password using this procedure. If you choose not to, the 'System' password is by default encrypted using MD5.

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5 Device Manager Pro

Network administrators can provision an enterprise's phones from the server of the One Voice Operations Center (OVOC) module, Device Manager Pro.



Note:

- Device Manager Pro and OVOC share the same server location.
- For more information on using Device Manager Pro to provision phones, see the *Device Manager Pro Administrator's Manual*.

➤ **To configure provisioning phones from the OVOC server using the configuration file:**

1. Open the Configuration File page in the Web interface (**Management** tab > **Manual Update** > **Configuration File**).
2. Configure the OVOC server parameters using the table below as reference.

Table 5-1: OVOC Server Parameters

Parameter	Description
[ems_server/keep_alive_period]	The OVOC server sends a keep alive message at a configured interval to verify that its link with the network is operating. If no reply is received, the link is determined to be down or not working. Default: 60 minutes
[ems_server/provisioning/url]	Defines the URL of the OVOC server, for example, http://10.1.8.23:8081
[ems_server/user_name]	Defines the username of the administrator who'll use the OVOC server for provisioning, for example, John Smith.
[ems_server/user_password]	Defines the password (encrypted) of the network administrator who'll provision the phones from the OVOC server, for example: { "Y6QYmP53BDkoTvulFjEBuQ==" }



Note:

AudioCodes' Device Manager Pro also supports headset management capability in addition to phone management capability. The management interface displays (for example) in the Devices Status page:

- Column 'USB Headset Type' displaying a headset connected to a phone's USB port
- Column 'IPP Model' displaying the USB icon

For more information on the Device Manager Pro, see the *Device Manager Pro Administrator's Manual*.

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Part II

Automatic Provisioning

6 Introduction

By default, the phone is ready for out-of-the-box deployment using its automatic provisioning capabilities.

The phone offers a built-in mechanism for automatically upgrading its software image and updating its configuration. This method is used to upgrade the phone firmware and update its configuration, by remotely downloading an updated software image and configuration file.

The automatic update mechanism helps you keep your software image and configuration up-to-date, by performing routine checks for newer software versions and configuration files, as well as allowing you to perform manual checks.

The automatic update mechanism is as follows:

- Before connecting the phone, verify that the provisioning server is running and that the firmware and configuration files are located in the correct location.
- Connect your phone to the IP network, and then connect the phone to the power outlet.
- During DHCP negotiation, the phone requests for DHCP options 66/67/160 to receive provisioning information. The DHCP server should respond with Option 160 providing the provisioning URL or Options 66 and 67 providing the TFTP IP address and firmware file name respectively.
- The phone then checks whether new firmware is available by checking the firmware file header. If the version is different from the one currently running on the phone, the phone downloads the complete image and burns it to its flash memory.
- If a new firmware is unavailable, the phone then checks whether a new configuration is available. If a configuration file is available on the server, the phone downloads it and updates the phone's configuration after verifying that the configuration file is related to the phone model. When a configuration update is needed, the phone might reboot.



Note:

- In the DHCP Discover message, the phone publishes its model name in Option fields 60 and 77 (e.g. 440HD). If the administrator wants to provide different provisioning information to different phone models, the administrator can set up a policy in the DHCP server according to the phone model name.
- If the phone is powered off for some reason during the firmware upgrade process, the phone will be unusable and the recovery process must be performed.
- You can only use firmware files with an *.img* extension and configuration files with a *.cfg* extension.
- To "force" the firmware or configuration file to be retrieved immediately regardless of the 'Check Period' value, click the **Check Now** button on the relevant page on the Web interface.
- An additional auto-provisioning mechanism is supported if the provisioning environment does not provide all the required information (e.g. DHCP options).



Note: Automatic mass provisioning of phones using DHCP can alternatively be performed from the OVOC's IP Phones Manager Pro module. For more information, see the *Device Manager Pro Administrator's Manual*.

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7 Updating the Configuration File Manually

The phone enables you to view, save, and load its configuration file to backup and restore the current configuration.

➤ **To manually update the configuration file:**

1. Open the Configuration File page (**Management** tab > **Manual Update** menu > **Configuration File**). The current configuration file settings are displayed in the text pane.

Figure 7-1: Configuration File (430HD)

Configuration File

☐ Display modified configuration fields only

```

system/type=430HD
system/user_name=admin
system/watchdog/enabled=1
system/web/enabled=1
system/web_user_name=user
system/web_user_password=$1$FZ6rOGS1$542XSmjh7nod.kXFRyLx70
voip/answer_device=SPEAKER
voip/audio/echo_cancellation/enabled=1
voip/audio/echo_cancellation/extended_nlp/enabled=1
voip/audio/echo_cancellation/handset/HPF_mode=ACOUSTIC_ECHO_CANCELER_1
voip/audio/echo_cancellation/handsfree/HPF_mode=ACOUSTIC_ECHO_CANCELER_1
voip/audio/echo_cancellation/headset/HPF_mode=ACOUSTIC_ECHO_CANCELER_1
voip/audio/echo_cancellation/nlp/max_delay=2
voip/audio/echo_cancellation/nlp/mode=ECHO_CANCELER_NON_LINEAR_PROCES
voip/audio/gain/ringer_signal_level=-6
voip/audio/gain/tone_signal_level=16
voip/audio/jitter_buffer/min_delay=10
  
```

Loading new Configuration File Save Current Configuration File Refresh

2. Click the **Loading new Configuration File** button; the following page appears:

Figure 7-2: Load New Configuration File

Load new Configuration File

File Location: Browse...

Submit

3. Click the **Browse** button and then select the required configuration file located on your local PC; the phone verifies that the configuration file is related to the phone model. The configuration file is then loaded to the phone. Once loaded, the phone reboots (indicated by a message displayed on the phone's screen). The phone is now updated with the new configuration.



Note: The configuration file name must have the extension .cfg.

➤ **To save the configuration file:**

- In the Configuration File page, click the **Saving Current Configuration File** button, and then save the current phone configuration file to a folder on your local PC.



Note: When creating a new configuration file, make sure the **system/type** parameter in the configuration file is set to the correct phone model (e.g., 430HD).

8 Setting up Network for Auto Provisioning

The phone supports dynamic VLAN discovery, dynamic IP addressing (DHCP), and NTP (as client).



Note: For manual configuration of Network Settings, see [Section 13](#).

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9 Obtaining Firmware and Configuration Files

The Web interface allows you to:

- Automatically update firmware and configuration files
- Manually update firmware and configuration files

9.1 Provisioning Hunt Order

The phone always attempts to use the *first* provisioning method listed below (DHCP Option 160). If it cannot use this method, it attempts to use the second method listed below, and so on, until it reaches a successful provisioning method. This is called the provisioning 'hunt order'. The 'hunt order' is:

1. DHCP Option 160 (see Section 9.2.1)
2. DHCP Options 66-67 (see Section 9.2.2)
3. DHCP Options 43 (see Section 9.2.4)
4. SIP SUBSCRIBE and NOTIFY Messages (see Section 9.2.6)
5. Static and Globally Accessible Domain (see Section 9.2.7)
6. Cached Addresses of the Last Provisioning Server Used on Reboots (see Section 9.2.8)
7. AudioCodes Redirect server (see Section 9.2.9)

9.2 Dynamic URL Provisioning

Dynamic Host Configuration Protocol (DHCP) can be used to automatically provision the phone. The DHCP feature can be configured using the Web interface or configuration file.

➤ **To configure DHCP using the Web interface:**

1. Open the Automatic Update page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure 9-1: Automatic Provisioning – Dynamic URL

Automatic Provisioning	
Firmware Version :	2.2.4.46
Provisioning Method :	DHCP Options (Dynamic URL) ▼
Dynamic Firmware URL :	No valid provisioning URL was provided Check Now
Dynamic Configuration URL :	No valid provisioning URL was provided Check Now
DHCP Option Value :	160
Check Period :	Daily ▼
Every day at :	00:00 ▼
Random Provisioning Time :	120 minutes

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ To configure DHCP using the configuration file:

- Use the table below as reference.

Table 9-1: DHCP Automatic Provisioning Parameters

Parameter	Description
Provisioning Method [provisioning/method]	<p>Defines the provisioning method:</p> <ul style="list-style-type: none"> ▪ [Disable] Disable - Automatic update is disabled. The phone attempts to upgrade its firmware and configuration ▪ [Dynamic] DHCP Options (Dynamic URL) (default) - Using DHCP option 160 as well as option 66/67 for provisioning ▪ [Static] Static URL - Using Static URL for provisioning
DHCP Option Value [provisioning/url_option_value]	<p>Determines the DHCP option number to be used for receiving the URL for provisioning. The default value is 160.</p> <p>The phone supports DHCP Option 160 for complete URL as well as Options 66/67 for TFTP usage. Option 160 has the highest priority and if absent, Options 66/67 are used.</p> <p>The following syntax is available for DHCP option 160:</p> <ul style="list-style-type: none"> ▪ <protocol>://<server IP address or host name> ▪ <protocol>://<server IP address or host name>/<firmware file name> ▪ <protocol>://<server IP address or host name>/<firmware file name>;<configuration file name> ▪ <protocol>://<server IP address or host name>;<configuration file name> <p>Where <protocol> can be one of the following: ftp, tftp, http or https.</p> <p>For example:</p> <ul style="list-style-type: none"> ▪ ftp://192.168.2.1 – retrieved firmware file is <i>440HD.img</i> and the configuration file name is <MAC address>.cfg. For example, 001122334455.cfg ▪ tftp://192.168.2.1/different_firmware_name.img - retrieved firmware file is Different_Firmware_Name.img and the configuration file name is <MAC address>.cfg. For example, 001122334455.cfg ▪ http://192.168.2.1/different_firmware_name.img ; <MODEL>_<MAC>_conf.cfg - retrieved firmware file is different_firmware_name.img and the configuration file name is <Model type>_<MAC address>_conf.cfg. For example, 440HD_001122334455_conf.cfg ▪ https://192.168.2.1/<MODEL>_<MAC>_conf.cfg - if the model is 440HD, the retrieved firmware file is 440HD.img and the configuration file name is 440HD_<MAC Address>_conf.cfg.

Parameter	Description
	<p>For example, 440HD_001122334455_conf.cfg</p> <p>The following syntax is available for DHCP Options 66/67:</p> <ul style="list-style-type: none"> Option 66 must be a valid IP address or host name of a TFTP server only. Option 67 must be the firmware name. <p>If Option 67 is absent, the phone requests for the 440HD.img image file. For example:</p> <ul style="list-style-type: none"> Option 66: 192.168.2.1 or myTFTPServer Option 67: 440HD_2.2.2.img <p>Note:</p> <ul style="list-style-type: none"> This parameter is applicable only when method is configured to Dynamic. It is recommended to leave the parameter at its default value to avoid conflict with other DHCP options settings.
Random Provisioning Time [provisioning/random_provisioning_time]	<p>Defines the maximum random number to start the provisioning process.</p> <p>This is used for periodic checking of firmware and configuration files to avoid multiple devices from starting the upgrade process at the same time. When the device is meant to start the upgrade, the device randomly selects a number between 1 and the value set for random_provisioning_time and performs the check only after the random time.</p> <p>The valid range is 0-65535. The default value is 120.</p>
Check Period [provisioning/period/type]	<p>Defines the period type for automatic provisioning:</p> <ul style="list-style-type: none"> [every5minutes] Minimum definable time. Sets the interval at every five minutes. [every15minutes] Sets the interval at every five minutes. [hourly] Hourly - Sets an interval in hours. [daily] Daily (default) - Sets an hour in the day. [weekly] Weekly - Sets a day in the week and an hour in the day. [powerup] Irrespective of what value is defined, the phone always checks on powerup, but if powerup is defined, the phone will check <i>only</i> on powerup.
Every (Check Period = Hourly) [provisioning/period/hourly/hours_interval]	<p>The interval in hours for automatically checking for new firmware and configuration files.</p> <p>The valid range is 1 to 168. The default is 24.</p> <p>Note: This parameter is applicable only when type is configured to hourly.</p>
Every day at [provisioning/period/daily/time]	<p>The hour in the day for automatically checking for new firmware and configuration files.</p> <p>The format of this value is hh:mm, where hh is hour and mm is minutes. For example, 00 : 30 .</p> <p>The default time is 00:00.</p>

Parameter	Description
	Note: This parameter is applicable only when type is configured to daily .
Every (Check Period = Day) [provisioning/period/weekly/day]	<p>The day in the week for automatically checking for new firmware and configuration files.</p> <ul style="list-style-type: none"> ▪ [Sunday] Sunday (default) ▪ [Monday] Monday ▪ [Tuesday] Tuesday ▪ [Wednesday] Wednesday ▪ [Thursday] Thursday ▪ [Friday] Friday ▪ [Saturday] Saturday <p>Note: This parameter is applicable only when type is configured to weekly.</p>
Every (Check Period = Weekly) [provisioning/period/weekly/time]	<p>The hour in the day for automatically checking for new firmware and configuration files.</p> <p>The format of this value is: hh:mm, where hh is hour and mm is minutes. For example: 00 : 30</p> <p>The default time is 00:00.</p> <p>Note: This parameter is applicable only when type is configured to weekly.</p>

9.2.1 Provisioning using DHCP Option 160

Phones can get a provisioning URL from DHCP Option 160, 66/67 or 43. Option 160 has the highest priority, following by Option 66/67, and then Option 43. DHCP Option 160 can be configured using the Web interface.

➤ To configure DHCP Option 160 using the Web interface:

1. Open the Automatic Update page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure 9-2: Automatic Provisioning - DHCP Option 160

The screenshot shows the 'Automatic Provisioning' web interface. It includes the following fields and values:

- Firmware Version :** 2.2.4.46
- Provisioning Method :** DHCP Options (Dynamic URL) (selected from a dropdown)
- Dynamic Firmware URL :** No valid provisioning URL was provided
- Dynamic Configuration URL :** No valid provisioning URL was provided
- DHCP Option Value :** 160
- Check Period :** Daily (selected from a dropdown)
- Every day at :** 00:00 (selected from a dropdown)
- Random Provisioning Time :** 120 minutes

There are two 'Check Now' buttons on the right side of the form.

2. From the 'Provisioning Method' dropdown, select **DHCP Option (Dynamic URL)**.
3. In the 'DHCP Option Value' field, enter **160**.
4. Configure the remaining parameters, and then click **Submit**.
5. After reboot, confirm that the firmware and configuration files have been updated.

9.2.2 Technician's Digit Key Code

Technicians installing phones at customer sites do not need to connect laptops to phones to provision them. After connecting phones to the network, technicians can enter a specific digit key code which changes the phones' provisioning URL to the server's URL. If the code that the technician enters matches, the phones are automatically provisioned from that server.



Note: The feature requires software customization.

9.2.3 Provisioning using DHCP Option 66/67

Phones can get a provisioning URL from DHCP Option 66/67. Option 160 has the highest priority, following by Option 66/67, and then Option 43. The table below shows the behaviors for Option 66/67.

Table 9-2: Auto Provisioning via DHCP Option 66/67

	Option 66	Option 67	Result	Comment
1	Doesn't exist or empty	Any	No URL from Option 66/67	When Option 66 doesn't exist, or it's empty, the phone cannot get a URL from Option 66/67.
2	Server address exists but there is no protocol header such as TFTP, FTP, HTTP, HTTPS. File names do not exist. Example: Audiocodes.com 192.168.0.11	Non-existent	Firmware URL: Tftp://audiocodes.com/<hardware type>.img Configuration file url: Tftp://audiocodes.com/.<mac>.cfg	When protocol is not specified, tftp is added as the default protocol.
		Contains names. Example: abc.img;efg.cfg	Firmware URL: Tftp://audiocodes.com/abc.img Configuration file URL: Tftp://audiocodes.com/efg.cfg	
3	Server address exists File names do not exist. Example: http://Audiocodes.com http://192.168.0.11	Non-existent	Firmware URL: http://audiocodes.com/<hardware type>.img Configuration file URL: http://audiocodes.com/.<mac>.cfg	
		Contains names. Example: abc.img;efg.cfg	Firmware URL: http://audiocodes.com/abc.img Configuration file URL: http://audiocodes.com/efg.cfg	
4	Server address exists. File names exist. Example: http://Audiocodes.com/abc.image;efg.cfg	Any	Firmware URL: http://audiocodes.com/abc.img Configuration file URL: http://audiocodes.com/efg.cfg	If any file name exists in Option 66, the names in Option 67 are ignored.

➤ To operate with DHCP Options 66 and 67:

- Configure DHCP Options 66 and 67 in the DHCP server, instead of configuring Option 160. See the DHCP server related documentation for detailed information.

9.2.4 Provisioning using DHCP Option 43

Phones can get a provisioning URL from DHCP Option 43. Option 160 has the highest priority, following by Option 66/67, and then Option 43.

➤ To operate with DHCP Options 43:

- Configure DHCP Options 43 in the DHCP server. Use the example in the figure below as reference.

Figure 9-3: Provisioning using DHCP Option 43 in the DHCP Server

Data	Binary	ASCII
0000	01 27	.tftp://
0008	2F 31 39 32 2E 31 36 38	/192.168
0010	2E 32 30 32 2E 31 30 33	.202.103
0018	2F 74 65 73 74 2E 69 6D	/test.im
0020	67 3B 74 65 73 74 2E 63	g:test.c
0028	66 67	fg

Note:

- **01** is the sub option
- **27** is the length (in HEX) of the provisioning path string that you configured
- The remainder is the provisioning path, in ASCII code.
Example: **tftp://192.168.202.103/test.img;test.cfg**

9.2.5 Provisioning using the User-Class Option

Provision using the User-Class Option if vendor phones other than those of AudioCodes are deployed in the same enterprise as AudioCodes' phones and a DHCP Option cohabitation issue consequently occurs.

Here's how to configure provisioning of AudioCodes phones using the User-Class Option when other vendor phones in the enterprise point to the same DHCP server and use one of the standard DHCP Options described in the previous sections.

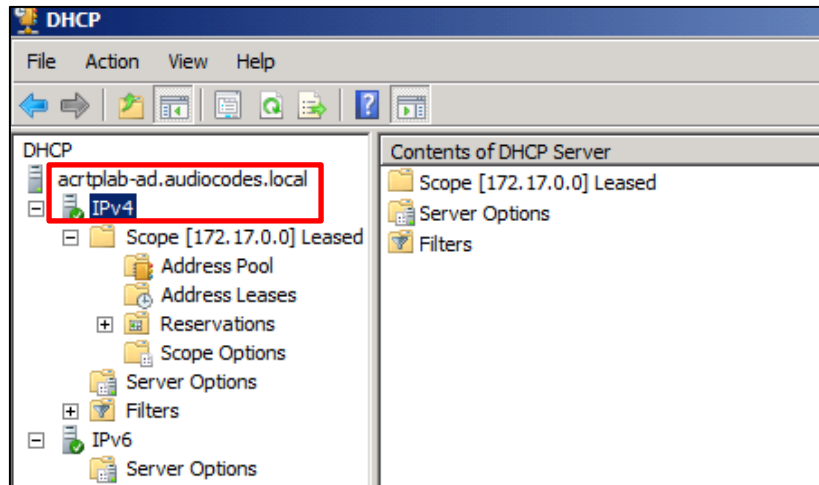
➤ **To configure provisioning of AudioCodes phones using the User-Class Option:**

1. Determine the DHCP server hosting the phones.
2. Determine if DHCP Options are assigned to IPv4 or IPv6 addresses.

Note:

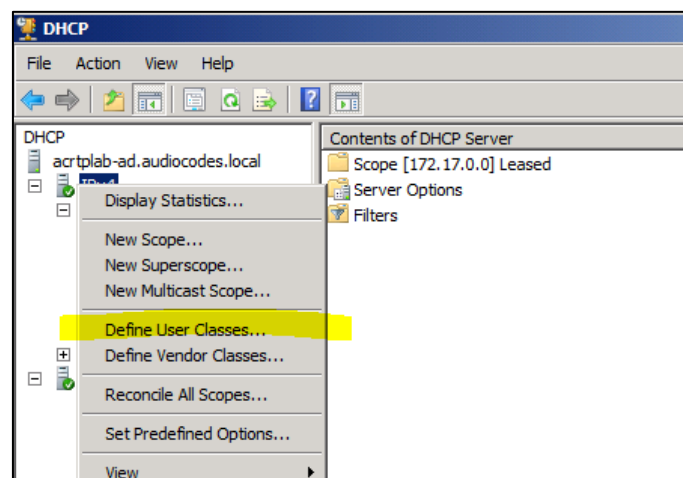
- The examples below show DHCP server **acrtplab-ad.audiocodes.local**
- The examples below show IPv4 addresses

Figure 9-4: DHCP Options Assigned to IPv4 Addresses



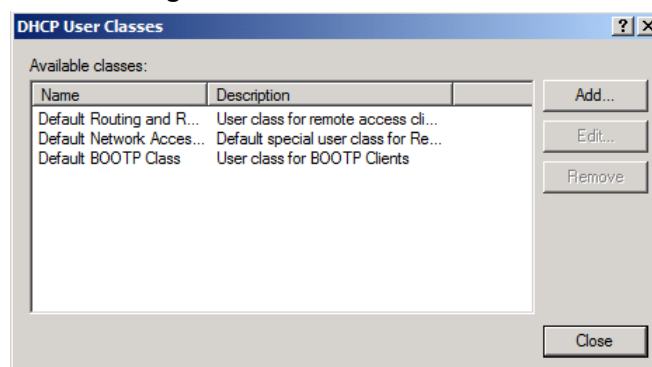
3. Define a separate **User Class** for each AudioCodes phone model deployed (420HD, 430HD and 440HD phone models): Right-click the **IPv4** server icon and from the popup menu, select **Define User Classes...**

Figure 9-5: Defining User Classes



The DHCP User Classes screen opens.

Figure 9-6: DHCP User Classes



4. Click the **Add...** button.

Figure 9-7: New Class

New Class

Display name: 420HD

Description: AudioCodes 420HD IP Phone

ID: 0000 Binary: 34 32 30 48 44 ASCII: 420HD

OK Cancel

5. In the New Class screen, enter **Display name** and **Description** as shown in the figure above, and then in the **ASCII** field, enter the **User Class Phone Type** (see the Packet Bytes window in Wireshark below for an example of the 420HD phone, and see the table below for the other AudioCodes phone models) to be sent from the phone during DHCP Discover via Option 77 (supported by DHCP Server 2008). Do this for each AudioCodes phone model so that a User Class entry for each model deployed will exist when completed.

Figure 9-8: Packet Bytes Window

No.	Time	Source	Destination	DPort	Protocol	Length	Info
140	2015-06-01 15:58:12.413405000	0.0.0.0	255.255.255.255	67	DHCP	590	DHCP Discover - Transaction ID 0x42c58f43
141	2015-06-01 15:58:12.436583000	10.7.14.252	10.7.14.82	68	DHCP	363	DHCP Offer - Transaction ID 0x42c58f43
142	2015-06-01 15:58:12.441290000	10.7.14.251	10.7.14.82	68	DHCP	363	DHCP Offer - Transaction ID 0x42c58f43
143	2015-06-01 15:58:12.473426000	0.0.0.0	255.255.255.255	67	DHCP	590	DHCP Request - Transaction ID 0x42c58f43
144	2015-06-01 15:58:12.485196000	10.7.14.251	10.7.14.82	68	DHCP	363	DHCP ACK - Transaction ID 0x42c58f43
145	2015-06-01 15:58:12.486309000	10.7.14.252	10.7.14.82	68	DHCP	363	DHCP ACK - Transaction ID 0x42c58f43

Host Name: 420HD-00908F3BC566	
Option: (60) Vendor class identifier	Length: 11
Vendor class identifier: CPE-OCPHONE	
Option: (77) User class information	Length: 5
Instance of User Class: [0]	
User Class Length: 52	
[Expert Info (Error/Protocol): User Class Information: malformed option]	
[User Class Information: malformed option]	
[Severity level: Error]	
[Group: Protocol]	
Option: (55) Parameter Request List	

0140	4f 43 50 48 4f 4e 45 d0 05 34 32 30 48 44 3/ 0f	OCPHONEM : 420HD/
0150	01 02 03 04 06 0e 0f 1c 28 29 2a 2b 42 43 a0 ffO*+BC..
0160	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0170	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0180	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0190	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01a0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

6. Make sure one DHCP User Class entry exists for each AudioCodes phone model deployed in the enterprise.

Figure 9-9: DHCP User Classes

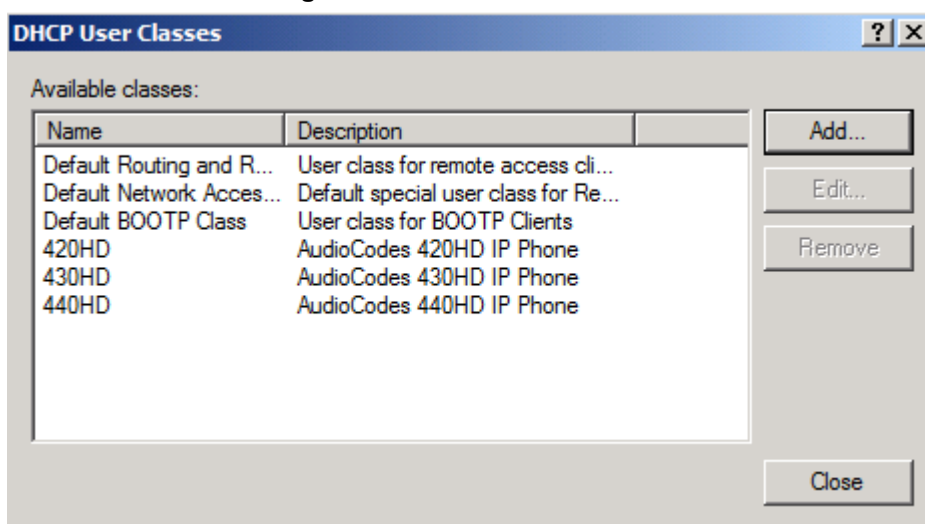
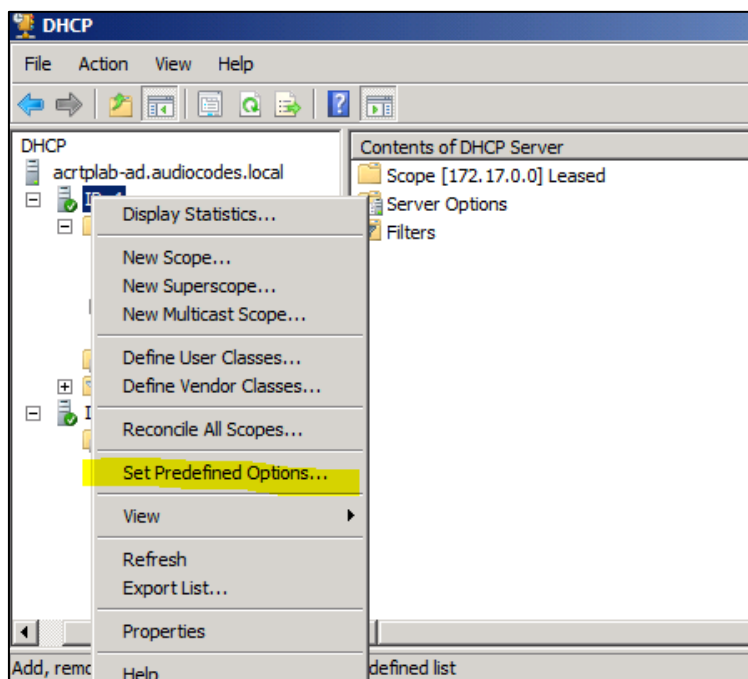


Table 9-3: DHCP User Class Entry for Each AudioCodes Phone Model Deployed

Display Name	Description	ASCII
420HD	AudioCodes 420HD IP Phone	420HD
430HD	AudioCodes 430HD IP Phone	430HD
440HD	AudioCodes 440HD IP Phone	440HD
405	AudioCodes 405 IP Phone	405

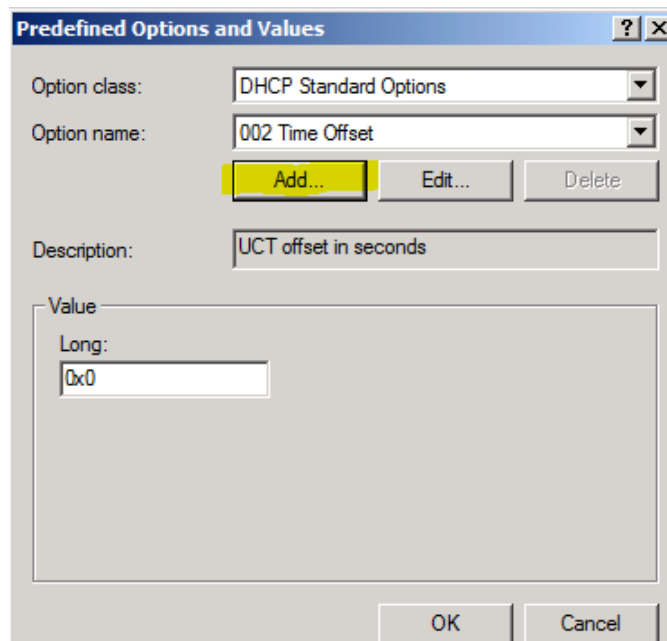
7. Configure Scope Option 160. This is not a *standard* Scope Option, so it needs to be created. To create it on the server, select the IP version (**IPv4**) and select **Set Predefined Options...**

Figure 9-10: Set Predefined Options



8. From the 'Option class' dropdown, select **DHCP Standard Options**, and then click the **Add...** button.

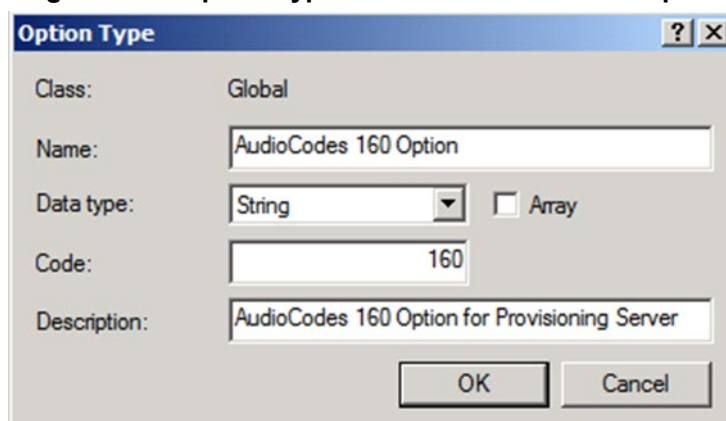
Figure 9-11: Predefined Options and Values



The screenshot shows a dialog box titled "Predefined Options and Values". It has a title bar with a question mark and a close button. Inside, there are two dropdown menus: "Option class:" set to "DHCP Standard Options" and "Option name:" set to "002 Time Offset". Below these are three buttons: "Add..." (highlighted in yellow), "Edit...", and "Delete". A text field for "Description:" contains "UCT offset in seconds". Below that is a section for "Value" with a "Long:" label and a text field containing "0x0". At the bottom are "OK" and "Cancel" buttons.

9. Add the **AudioCodes 160 Option** as shown below, and then click **OK**.

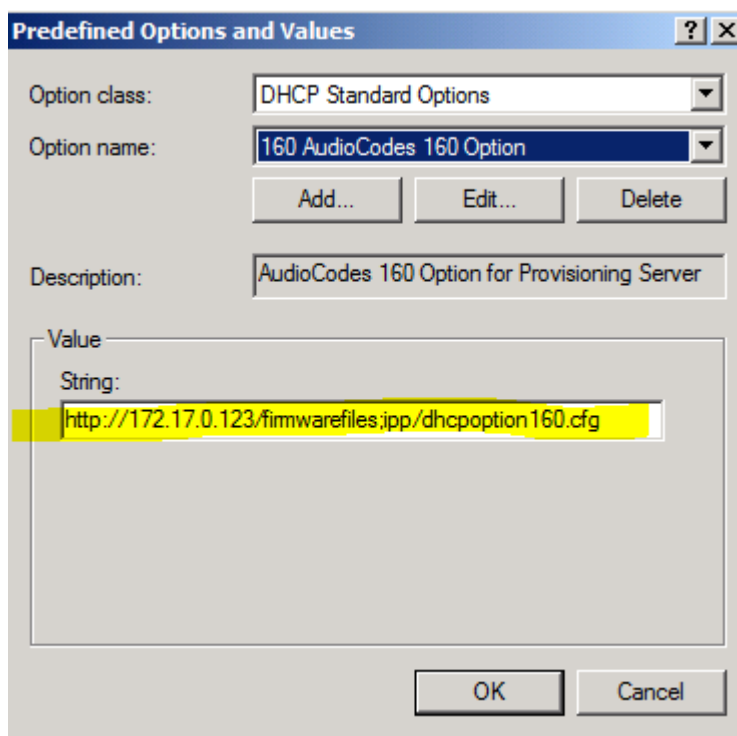
Figure 9-12: Option Type – Add AudioCodes 160 Option



The screenshot shows a dialog box titled "Option Type". It has a title bar with a question mark and a close button. Inside, there are several fields: "Class:" set to "Global", "Name:" containing "AudioCodes 160 Option", "Data type:" set to "String" with an unchecked "Array" checkbox, "Code:" containing "160", and "Description:" containing "AudioCodes 160 Option for Provisioning Server". At the bottom are "OK" and "Cancel" buttons.

10. Add the OVOC server location using HTTP. In the figure below, it's **http://<OVOC server IP address>/firmwarefiles;ipp/dhcptoption160.cfg**. See the *Device Manager Pro Administrator's Manual* for more information.

Figure 9-13: Predefined Options and Values – Add OVOC Server Location



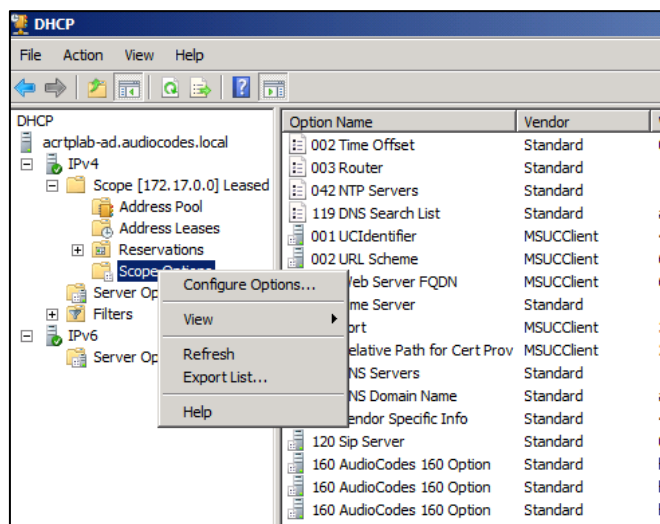
Note: Make sure you defined in the enterprise's DHCP server `http://<OVOC server IP address>/firmwarefiles;ipp/dhcpoption160.cfg` for DHCP Option 160.

11. Decide if the DHCP Scope Option needs to be assigned to phones in a *specific VLAN (Scope)*, or to the *entire server* (acrtplab-ad.audiocodes.local) for IPv4 addresses.

VLAN Scope

12. Assign to a specific VLAN (Scope of IP addresses such as the Scope below 172.17.0.0, or to multiple Scopes, to be performed separately on each Scope).
 - a. If selecting a VLAN, expand the 'Scope Leased' folder, select 'Scope Options', and then select **Configure Options** from the popup menu.

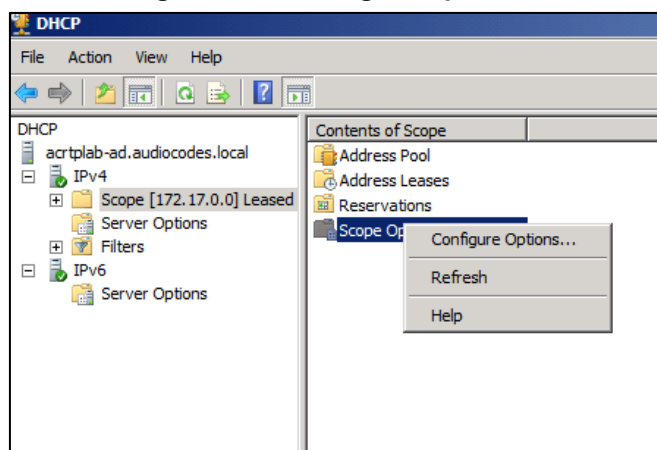
Figure 9-14: 'Scope Leased' Folder - Configure Options



-OR-

- b. Select the collapsed folder 'Scope Leased' and in the main screen, right-click 'Scope Options' and select **Configure Options...**

Figure 9-15: Configure Options 1

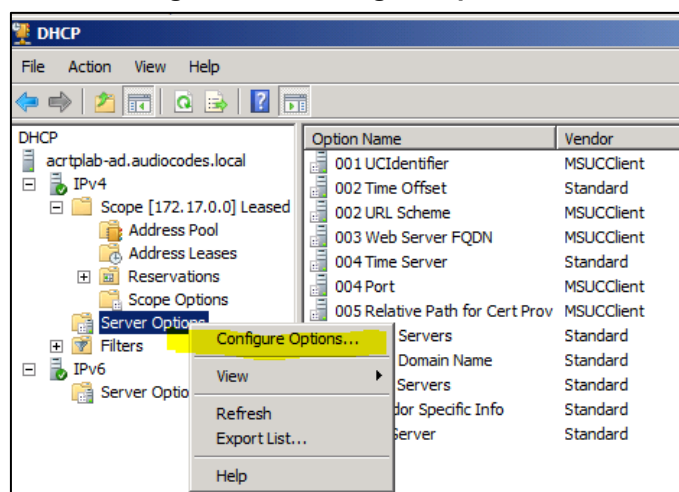


-OR-

Server Option

13. If assigning to the entire server (acrtplab-ad.audiocodes.local), select the 'Server Options' folder under server **IPv4**, right-click 'Server Options' and select **Configure Options...**

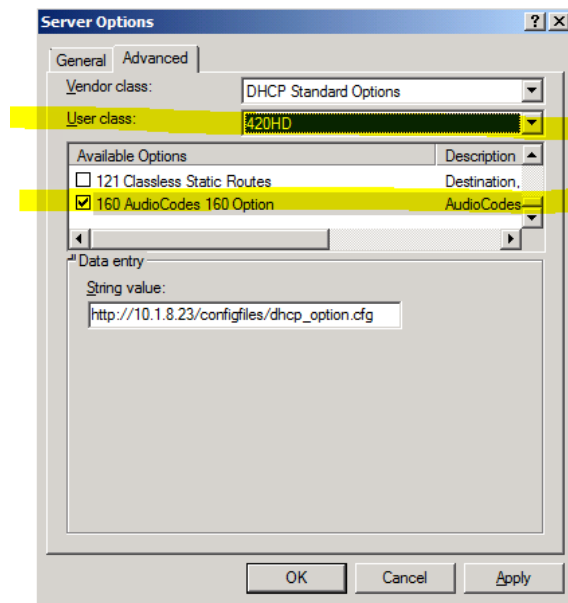
Figure 9-16: Configure Options 2



14. In the Server Options page (or Scope Options page) that opens, select the **Advanced** tab, make sure **DHCP Standard Options** remains selected, and select **420HD User Class** for the first phone model to be defined. Scroll through the Available Options (all are cleared) and select only **160 AudioCodes 160 Option**.

The figure below shows the Server Options page. The Scope Options page is identical. Note that the String value you defined for Scope Option 160 is automatically populated so it's unnecessary to change it. Note also that if additional DHCP Options are required (such as DNS or time server) that are different from the Servers Options for the rest of the Scopes on the server, they can also be selected, but this is typically not needed.

Figure 9-17: Server Options



15. Click **Apply** and then follow the same procedure to add the **430HD** and **440HD** user classes. After adding them, click the **OK** button.

You've successfully created three separate Scope Options that will only allow AudioCodes phones to connect to the Device Manager Pro when they boot up and will prevent other vendor phones from receiving the OVOC as their provisioning server.

Figure 9-18: Three Scope Options Created

DHCP				
File Action View Help				
<div> <div> DHCP acrtplab-ad.audiocodes.local IPv4 Scope [172.17.0.0] Leased Address Pool Address Leases Reservations Scope Options Server Options Filters IPv6 Server Options </div> </div>				
Option Name	Vendor	Value	Class	
001 UCIIdentifier	MSUCCient	4d 53 2d 55 43 2d 43 6c 69 65 6e 74	None	
002 Time Offset	Standard	0xffffc7cd	None	
002 URL Scheme	MSUCCient	68 74 74 70 73	None	
003 Web Server FQDN	MSUCCient	61 63 72 74 70 6c 61 62 2d 66 65 2e...	None	
004 Time Server	Standard	172.17.0.10	None	
004 Port	MSUCCient	34 34 33	None	
005 Relative Path for Cert Prov	MSUCCient	2f 43 65 72 74 50 72 6f 76 2f 43 65 ...	None	
006 DNS Servers	Standard	172.17.0.10	None	
015 DNS Domain Name	Standard	audiocodes.local	None	
042 NTP Servers	Standard	172.17.0.10	None	
043 Vendor Specific Info	Standard	4d 53 2d 55 43 2d 43 4c 49 45 4e 54	None	
120 Sip Server	Standard	00 0b 61 63 72 74 70 6c 61 62 2d 66...	None	
160 AudioCodes 160 Option	Standard	http://10.1.8.23/configfiles/dhcp_o...	430HD	
160 AudioCodes 160 Option	Standard	http://10.1.8.23/configfiles/dhcp_o...	440HD	
160 AudioCodes 160 Option	Standard	http://10.1.8.23/configfiles/dhcp_o...	420HD	

9.2.6 SIP SUBSCRIBE and NOTIFY Messages

If the provisioning information (e.g. Option fields 66/67/160) is not provided by the DHCP server, the phone sends a SIP SUBSCRIBE message to the multicast address **224.0.1.75:5060** as shown below.



Note: If the provisioning server supports using SIP SUBSCRIBE and NOTIFY messages and the device receives the provisioning URL in the NOTIFY message, the automatic provisioning mechanism then periodically tries to retrieve a new firmware/configuration according to the information provided.

```
SUBSCRIBE sip:224.0.1.75:5060 SIP/2.0
From:
<sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-50029-386d
4398-66dc40c-386d4398
To: <sip:224.0.1.75:5060>
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Via: SIP/2.0/UDP
10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-6ad00ca2-7ca3606e
Expires: 0
Event:
ua-profile;profile-type="application";model="440HD";version="2.2.2"
Max-Forwards: 70
Supported: replaces,100rel
Accept: application/url
Contact: <sip:00000001@10.13.2.37:5060>
User-Agent: AUDC-IPPhone/2.2.2
Content-Length: 0
```

The provisioning server or any other entity replies with a 200 OK message to the SUBSCRIBE message (see below) and sends a NOTIFY SIP message with the provisioning URL in the message body as shown below. (The provisioning URL can be in any format as described in the Administrator's Manual).

If no response is received by the provisioning server, the phone resends SUBSCRIBE messages for five seconds.

With the above method, the phone uses its built-in auto-provisioning mechanism while the provisioning information is retrieved through the NOTIFY message.

The following code describes **SIP 200 OK Response on the SUBSCRIBE Message**:

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP
10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-6ad00ca2-7ca3606e
Contact: <sip:10.13.2.37:5060>
To: <sip:224.0.1.75:5060>
From:
<sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-50029-386d
4398-66dc40c-386d4398
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Expires: 0
Content-Length: 0
```

The following code describes **SIP NOTIFY Message with Provisioning Information**.

```
NOTIFY sip:10.13.2.37:5060 SIP/2.0
Via: SIP/2.0/UDP
10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-6ad00ca2-7ca3606e
Max-Forwards: 20
Contact: <sip:10.13.4.121:5060>
To: <sip:224.0.1.75:5060>
From:
<sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-50029-386d
4398-66dc40c-386d4398
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 NOTIFY
Content-Type: application/url
Subscription-State: terminated;reason=timeout
Event:
ua-profile;profile-type="application";model="440HD";version="2.2.2"
Content-Length: 18
tftp://10.13.4.121
```

The following code describes **SIP SUBSCRIBE Message to Obtain Provisioning Information**.

```
SUBSCRIBE sip:224.0.1.75:5060 SIP/2.0
From:
<sip:00000001@10.13.2.37:5060>;tag=87a5a8-25020d0a-13c4-50029-386d
4398-66dc40c-386d4398
To: <sip:224.0.1.75:5060>
Call-ID: 8884c8-25020d0a-13c4-50029-386d4398-3e2bcb8e-386d4398
CSeq: 1 SUBSCRIBE
Via: SIP/2.0/UDP
10.13.2.37:5060;rport;branch=z9hG4bK-386d4398-6ad00ca2-7ca3606e
Expires: 0
Event:
ua-profile;profile-type="application";model="440HD";version="2.2.2"
Max-Forwards: 70
Supported: replaces,100rel
Accept: application/url
Contact: <sip:00000001@10.13.2.37:5060>
User-Agent: AUDC-IPPhone/2.2.2
Content-Length: 0
```

With the above method, the phone uses its built-in auto-provisioning mechanism while the provisioning information is retrieved through the NOTIFY message.

9.2.7 Hardcoded Domain Name for Provisioning Server

If no higher-priority provisioning method applied, the phone automatically searches in the DNS server for the domain named "ProvisioningServer". After the DNS server gives the domain IP address, the phone contacts the provisioning server. The phone tries to retrieve firmware and configuration files using URL **tftp://ProvisioningServer/<Phone Model Name>/**

For example:

- The phone tries to obtain the following firmware file:
tftp://ProvisioningServer/440HD.img
where **440** is optional; if omitted, the phone will try to retrieve the firmware file according to its model name.
- The phone tries to obtain the following configuration file:
tftp://ProvisioningServer/<MAC address>.cfg
where **MAC address** is optional; if omitted, the phone will try to retrieve the configuration file according to its MAC address.
(e.g. tftp://ProvisioningServer/440HD/001122334455.cfg)

The network administrator must configure a DNS entry called "ProvisioningServer" on the DNS server and set it to the TFTP server IP address.



Note: If Generic Domain Name is used, the automatic provisioning mechanism periodically tries to retrieve new firmware/configuration from Provisioning Server domain name.

9.2.8 Cached Address of Last Provisioning Server Used

These are the addresses of the last provisioning servers used, stored in cache memory.

When the device starts up and connects to the provisioning server, it can pull firmware, configuration and private label files from the provisioning server using the cached address of the last provisioning server used.

After the phone creates a successful connection with a provisioning server, this server's address is cached by the phone. The next time the phone is rebooted, if it doesn't receive provisioning details, the device performs provisioning using the cached IP address.

9.2.9 Redirect Server

You can use the AudioCodes Redirect server to direct you to the appropriate Provisioning server URL to download the relevant configuration and firmware files.

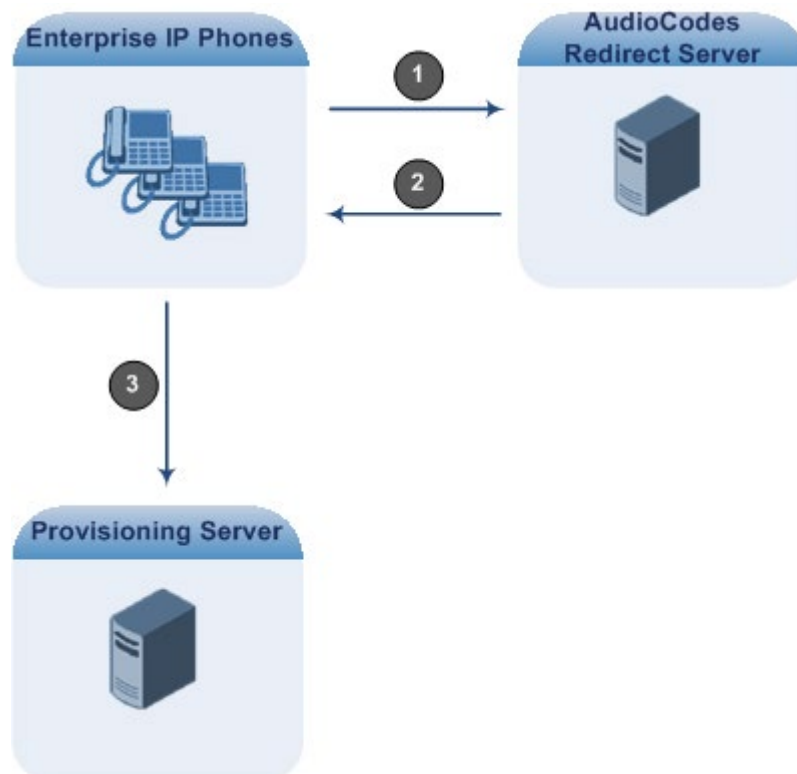
After the phone is powered up and network connectivity is established, it automatically requests provisioning information. If it doesn't get these files according to the regular provisioning hunt order methods, it sends an HTTPS request to the AudioCodes HTTPS Redirect server. The server responds to the phone with an HTTPS Redirect response containing the URL of the provisioning server where the firmware and configuration files are located. After the phone successfully connects to the provisioning server URL, the Automatic Update mechanism commences.



Note:

- The MAC addresses of the phones and the provisioning server's URL are pre-configured on the HTTPS Redirect server. For more information, contact AudioCodes support.
- The default URL of the Redirect server is:
provisioning/redirect_server_url=https://redirect.audiocodes.com
This address can be reconfigured if required.

Figure 9-19: Redirect Server Configuration Process



1. Device sends HTTPS request to AudioCodes HTTPS Redirect server.
2. Redirect server sends HTTPS response with redirect URL of the provisioning server.
3. Phone sends request to redirected URL (i.e., provisioning server).

For security, communication between the phone and the HTTPS Redirect server is encrypted (HTTPS) and uses the pre-installed AudioCodes factory-set certificate to authenticate itself with the HTTPS Redirect server and to verify authenticity of the latter. If the redirect URL (where the configuration file is stored) also uses the HTTPS protocol, the phone can use a regular certificate or the AudioCodes factory-set certificate to authenticate itself and to validate the server's certificate if a trusted root certificate (regular) is configured.



Note: The phone repeats the redirect process whenever it undergoes a reset to factory defaults.

9.3 Static URL Provisioning

Here's how to configure the phone using the Static URL method.

- **To configure static provisioning information using the Web interface:**
1. Open the Automatic Provisioning page (**Management** tab > **Automatic Update** menu > **Automatic Provisioning**).

Figure 9-20: Automatic Provisioning – Static URL

The screenshot shows the 'Automatic Provisioning' web interface. At the top, it says 'Automatic Provisioning'. Below that, there's a table-like structure with the following fields and values:

Firmware Version :	2.2.4.46
Provisioning Method :	Static URL
Firmware URL :	ftp://10.13.2.5/pilot_430.img
Configuration URL :	
Check Period :	Daily
Every day at :	00:00
Random Provisioning Time :	120 minutes

On the right side of the interface, there are two 'Check Now' buttons.

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ To configure static provisioning information using the configuration file:

- Use the table below as reference.

Table 9-4: Static URL Automatic Provisioning Parameters

Parameter	Description
Provisioning Method [provisioning/method]	<p>Defines the provisioning method:</p> <ul style="list-style-type: none"> ▪ [Disable] Disable - Automatic update is disabled. The phone attempts to upgrade its firmware and configuration ▪ [Dynamic] DHCP Options (Dynamic URL) (default) - Using DHCP Option 160 and Options 66/67 for provisioning ▪ [Static] Static URL - Using Static URL for provisioning
Firmware URL [provisioning/firmware/url]	<p>The static URL for checking the firmware file. The URL must be entered using one of the following syntax options:</p> <ul style="list-style-type: none"> ▪ <protocol>://<server IP address or host name> ▪ <protocol>://<server IP address or host name>/<firmware file name> <p>Where<protocol> can be one of the following protocols: ftp, tftp, http or https. For example:</p> <ul style="list-style-type: none"> ▪ tftp://192.168.2.1 – retrieved firmware file is440HD.img ▪ ftp://192.168.2.1/Different_Firmware_Name.img - retrieved firmware file is Different_Firmware_Name.img <p>Note: This parameter is applicable only when 'method' is configured to Static.</p>
Configuration URL [provisioning/configuration/url]	<p>The static URL for checking the configuration file. The URL must be entered using one of the following syntax options:</p> <ul style="list-style-type: none"> ▪ <protocol>://<server IP address or host name> ▪ <protocol>://<server IP address or host name>/<configuration file name> <p>Where<protocol> can be one of the following protocols: "ftp", "tftp", "http" or "https". For example:</p> <ul style="list-style-type: none"> ▪ http://192.168.2.1 - configuration file name is <MAC Address>.cfg, for example, 001122334455.cfg ▪ https://192.168.2.1/440HD_<MAC>_conf.cfg - retrieved configuration file name is 440HD_<MAC Address>_conf.cfg, for example, 440HD_001122334455_conf.cfg <p>Note: This parameter is applicable only when 'method' is configured to Static.</p>



Part III

Quick Setup

10 Quick Setup

The Web interface provides a Quick Setup page that lets you configure basic features to quickly set up your phone to operational level.



Note: For Quick Setup parameters descriptions, see Part IV (Networking) and Part V (VoIP Features).

➤ **To quickly set up your phone:**

1. Open the Quick Setup page (**Configuration** tab > **Quick Setup** menu > **Quick Setup**).

Figure 10-1: Quick Setup

The screenshot displays the 'Quick Setup' web interface. It is organized into three main sections, each with a dropdown arrow on the left:

- LAN Setup:** Contains fields for IP Type (radio buttons for Static IP and Automatic IP (DHCP)), IP Address, Subnet Mask, Default Gateway Address, Primary DNS, and Secondary DNS. All IP-related fields are currently set to 0.0.0.0.
- SIP Proxy and Registrar:** Contains fields for Use SIP Proxy (dropdown set to Enable), Proxy IP Address or Host Name (text field with 10.37.4.204), Proxy Port (text field with 5060), Use SIP Proxy IP and Port for Registration (dropdown set to Enable), and Use SIP Registrar (dropdown set to Disable).
- Line Settings:** Contains fields for Line Number (dropdown set to 1), Line 1 Activate (dropdown set to Enable), Line 1 Display Name (text field with allen), Line 1 User ID (text field with 7000), Line 1 Authentication User Name (text field with 7000), Line 1 Authentication Password (password field with four dots), and Line 1 Mode (dropdown set to Private).

2. For descriptions of parameters on this page:
 - See Section 13.1.2 for descriptions of parameters under the **LAN Setup** group
 - See Section 16.2 for descriptions of parameters under the **SIP Proxy and Registrar** group
 - See Section 21 for descriptions of parameters under the **Line Settings** group

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Part IV

Networking

11 Introduction

Here's how to configure network settings *manually*, if required.



Note: By default, the network settings are set for *automatic provisioning*. However, if you need to change them, you can do so *manually*, as described in this section.

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12 Configuring Date and Time Manually



Note: By default, date and time settings are *automatically provisioned* via the enterprise DHCP server when the phone is connected to the Internet and to the power supply, but you can *manually* change them if required. This section shows how.

The phone automatically retrieves date and time from a Network Time Protocol (NTP) server when connected to the internet. To configure the NTP server for automatic provisioning of date and time, see Section 12.2. NTP is a protocol for distributing Coordinated Universal Time (UTC) by synchronizing the clocks of computer systems over packet-switched, variable-latency data networks. Date/time can also be *manually* configured in the Web interface.

➤ **To manually configure date and time using the Web interface:**

1. Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**).

Figure 12-1: Date and Time

2. Configure the 'Set System Time' parameter.
3. Set the 'Time Display Format' to **24 Hours** or **12 Hours**
4. Set the 'Date Display Format' to **European** or **American**. See the table below.
5. Click **Submit**.

➤ **To configure date and time using the configuration file:**

- Use the table below as reference.

Table 12-1: Date Display Format

Parameter	Description
Date Display Format [system/ntp/date_display_format]	Select either: <ul style="list-style-type: none"> ▪ EUROPEAN (default) ▪ AMERICAN The European date format is DDMMYYYY. The American format is MMDDYYYY.

12.1 Configuring Daylight Saving Time

You can configure Daylight Saving Time using the Web interface or configuration file.

➤ **To configure Daylight Saving Time using the Web interface:**

1. Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**) as described above.
2. Set the 'Active' parameter to **Enable**; the page shown below opens.

Figure 12-2: NTP & Time Settings

▼NTP & Time Settings	
Active :	Enable ▼
Obtain Time Zone from DHCP :	Enable ▼
Primary Server:	ntp.ucsd.edu[US] ▼
Secondary Server:	ntp.cis.strath.ac.uk[UK] ▼
Update Interval:	0 : 12 (Days:Hours)
Time Display Format:	24 Hours ▼
Date Display Format:	European ▼

3. Set the 'Obtain Time Zone from DHCP' parameter to **Disable**; the Daylight Saving Time page shown below opens:

Figure 12-3: Daylight Saving Time

Date And Time	
▼Daylight Saving Time	
Active :	Enable ▼
Date Format :	Fixed ▼
Start Time :	Jan ▼ 1 ▼ 02 : 00
End Time :	Jan ▼ 1 ▼ 02 : 00
Offset :	60 Minutes

4. Configure the settings using the table below as reference.

➤ **To configure Daylight Saving Time using the configuration file:**

- Use the table below as reference.

Table 12-2: Daylight Saving Time Parameters

Parameter	Description
Active [system/daylight_saving/activate]	<p>Determines whether the phone automatically detects the Daylight Saving Time for the selected Time Zone.</p> <ul style="list-style-type: none"> ▪ [DISABLE] Disable (default) ▪ [ENABLE] Enable

Parameter	Description
Start Time [system/daylight_saving/start_date]	<p>This subsection defines the starting day for the daylight saving offset.</p> <ul style="list-style-type: none"> ▪ [month] - defines specific month in year ▪ [day] - defines specific day in month ▪ [hour] - defines specific hour in day ▪ [minute] - defines specific minute in hour <p>Example: To configure the phone to start daylight savings with a specific offset on February 22nd at 14:30, set the following:</p> <p>system/daylight_saving/start_date/month=2 system/daylight_saving/start_date/day=22 system/daylight_saving/start_date/hour=14 system/daylight_saving/start_date/minute=30</p>
Start Time [system/daylight_saving/start_date/month]	<p>The month in a year.</p> <p>The valid range is 1 to 12.</p>
Start Time [system/daylight_saving/start_date/day]	<p>The day in a month.</p> <p>The valid range is 1 to 31.</p>
Start Time [system/daylight_saving/start_date/hour]	<p>The hour in the day.</p> <p>The valid range is 0 to 23.</p>
Start Time [system/daylight_saving/start_date/minute]	<p>The minute in an hour.</p> <p>The valid range is 0 to 59.</p>
End Time [system/daylight_saving/end_date]	<p>This subsection defines the ending day for the daylight saving offset.</p> <ul style="list-style-type: none"> ▪ [month] - defines the specific month in a year ▪ [day] - defines the specific day in a month ▪ [hour] - defines the specific hour in a day ▪ [minute] - defines the specific minute in an hour <p>For example: To configure the phone to end the daylight savings on July 16th at 22:15, set the following:</p> <p>system/ntp/daylight_saving/end_date/month=7 system/ntp/daylight_saving/end_date/day=16 system/ntp/daylight_saving/end_date/hour=22 system/ntp/daylight_saving/end_date/minute=15</p>
End Time [system/daylight_saving/end_date/month]	<p>The month in a year.</p> <p>The valid range is 1 to 12.</p>
End Time [system/daylight_saving/end_date/day]	<p>The day in a month.</p> <p>The valid range is 1 to 31.</p>
End Time [system/daylight_saving/end_date/hour]	<p>The hour in the day</p> <p>The valid range is 0 to 23.</p>
End Time [system/daylight_saving/end_date/minute]	<p>The minute in an hour.</p> <p>The valid range is 0 to 59.</p>

Parameter	Description
Offset [system/daylight_saving/offset]	The offset value for the daylight saving. The valid range is 0 to 180. The default offset is 60.
[system/daylight_saving/mode]	Configures the daylight saving mode. Valid values are [FIXED] = Date is specified as: Month, Day of month. [DayOfWeek] = Date is specified as: Month, Week of month, Day of week.
[system/daylight_saving/start_date/week]	Relevant to 'Day of week' mode: The week of month (values 1-5) for start of daylight saving time.
[system/daylight_saving/start_date/day_of_week]	Relevant to 'Day of week' mode: The day of week for daylight saving time start Valid values : [SUNDAY] [MONDAY] [TUESDAY] [WEDNESDAY] [THURSDAY] [FRIDAY] [SATURDAY]
[system/daylight_saving/end_date/week]	Relevant to 'Day of week' mode: The week of month (values 1-5) for end of daylight saving time.
[system/daylight_saving/end_date/day_of_week]	Relevant to 'Day of week' mode: The day of week for daylight saving time start Valid values : [SUNDAY] [MONDAY] [TUESDAY] [WEDNESDAY] [THURSDAY] [FRIDAY] [SATURDAY]

12.2 Configuring the NTP Server

The Network Time Protocol (NTP) server can be configured using the Web interface or configuration file. When activated, date and time are automatically obtained from the NTP server.

➤ **To configure the NTP server using the Web interface:**

1. Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**).
2. Configure the parameters using the table below as reference, and then click **Submit**.

Figure 12-4: NTP & Time Settings

The screenshot shows the 'Date And Time' configuration page. Under the 'NTP & Time Settings' section, the following values are configured:

- Active :** Enable
- Obtain Time Zone from DHCP :** Enable
- Primary Server:** ntp.ucsd.edu[US]
- Secondary Server:** ntp.cis.strath.ac.uk[UK]
- Update Interval:** 0 : 12 (Days:Hours)
- Time Display Format:** 24 Hours

➤ **To configure the NTP server using the configuration file:**

- Use the table below as reference.

Table 12-3: NTP Server Parameters

Parameter	Description
Active [system/ntp/enabled]	Enables the NTP server from which the phone automatically retrieves the date and time. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable – obtains the time information automatically from a configured NTP server (default)
Primary Server [system/ntp/primary_server_address]	Defines the address of the main NTP server (this can be a domain name, for example, tick.nap.com.ar).
Secondary Server [system/ntp/secondary_server_address]	Defines the address of the secondary NTP server.
Update Interval [system/ntp/sync_time]	This sub-section defines how often the phone must perform an update with the NTP server. <ul style="list-style-type: none"> ▪ [days] -defines the number of days ▪ [hours] - defines the number of hours For example: To configure the phone to perform an update with an NTP server every 1 day and 6 hours, set the following: system/ntp/sync_time/days=1 system/ntp/sync_time/hours=6

Parameter	Description
Update Interval [system/ntp/sync_time/days]	The number of days. The valid range is 0 to 7. The default of days is 0.
Update Interval [system/ntp/sync_time/hours]	The number of hours. The valid range is 0 to 24. The default is 12.
Time Display Format [system/ntp/time_display_format]	The format of the time displayed on the phone screen. <ul style="list-style-type: none"> ▪ [24Hour] (default) ▪ [12Hour]

12.3 Configuring NTP Server via DHCP

If the phone is set to obtain GMT offsets and NTP servers via DHCP (default), it receives the following fields in the DHCP options:

- Primary Server and Secondary Server – (Option 4 or 42).



Note: If both options (4 and 42) are received, priority is given to Option 42.

- Time Zone – (Option 2)

The phone sends an NTP request to the Primary NTP server. If there is no response, the NTP request is sent to the Secondary NTP server.

After obtaining the time from the server, it adds the GMT offset in Option 2. This is the updated system time.

➤ **To manually configure NTP / GMT offset via DHCP using Web interface:**

1. Open the Date and Time page (**Configuration** tab > **Advanced Applications** menu > **Date and Time**).
2. From the 'Obtain Time Zone From DHCP' drop-down list, select **Disable**.

Figure 12-5: NTP and Time Settings

Date And Time	
▼Daylight Saving Time	
Active :	Disable ▼
▼NTP & Time Settings	
Active :	Enable ▼
Obtain Time Zone from DHCP :	Disable ▼
Time Zone :	(GMT 00:00) Greenwich Mean Time: Dublin,Edinburgh,Lisbon,London,Casablanca,Monrovia ▼
Primary Server:	ntp.ucsd.edu[US] ▼
Secondary Server:	ntp.cis.strath.ac.uk[UK] ▼
Update Interval:	0 : 12 (Days:Hours)
Time Display Format:	24 Hours ▼

3. Configure the NTP and Time Settings according to the parameters in the table below, and then click **Submit**.



Note: These values will have no affect if TimeZone is set to be obtained from DHCP. If Time Zone and NTP server are manually set, the phone acts as described above but the values are obtained from the configuration file and not from DHCP.

Table 12-4: NTP Server and GMT Parameters

Parameter	Description
[system/ntp/gmt_offset]	<p>Default: 00:00</p> <p>Enables the NTP server from which the phone retrieves the date and time.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable – obtains the time information from a configured NTP server

13 Configuring IP Network Settings

The following section shows how to configure IP Network Settings including:

- Static IP Address
- Partial DHCP

13.1 Configuring Static IP Address

The static IP address can be configured using the following:

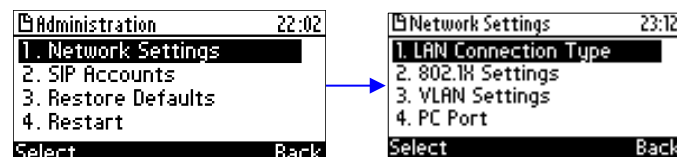
- Phone screen
- Web interface and configuration file

13.1.1 Configuring Static IP Address on the Phone

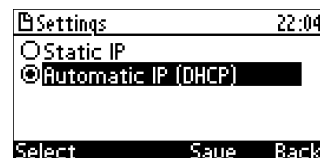
Here's how to configure Static IP Address on the phone on the phone. The LAN connection interface can be manually defined (static IP address) or automatically provisioned using a DHCP server from where the LAN IP address is obtained.

➤ **To configure the phone's LAN connection type:**

1. Access and select the **LAN Connection Type** option (MENU key > **Administration** > **Network Settings**).



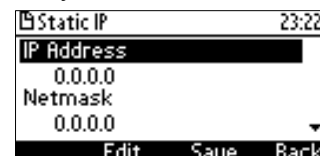
2. Navigate to and select **Static IP** or **Automatic IP (DHCP)** IP addressing scheme.



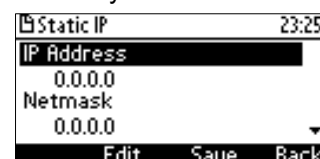
3. If you select **Static IP**, continue with the next step (Step 4); else skip to Step 5.

4. Define a static IP addressing scheme:

- c. Press the **Edit** softkey; the Static IP screen appears:



- d. To configure each required network parameter, i.e., **IP Address**, **Netmask**, **Gateway**, **Primary DNS** and **Secondary DNS**, navigate to and choose the parameter, and then press the **Edit** softkey, for example, navigate to **IP Address** and press the **Edit** softkey:



- e. Enter the new address in dotted-decimal notation, using the following keys:
 - ◆ **Navigation control**: moves the cursor left or right in the IP address

- ◆ **Clear** softkey: deletes the digit to the left of the cursor.
- f. Press the **Save** and then **Apply** softkey.
- 5. Press the **Save** softkey.

13.1.2 Configuring IP Network Settings

Here's how to configure IP Network settings using the Web interface or configuration file.

The phone's LAN configuration includes defining the method for obtaining an IP address. The phone's IP address can be *static* whereby the IP address is manually entered, or *automatic* whereby the IP address is acquired from a DHCP server. For Automatic IP, you can manually define some of the main parameters.

➤ **To define the phone's LAN settings using the Web interface:**

1. Open the LAN Settings page (**Configuration** tab > **Network Connections** menu > **Network Settings**).

Figure 13-1: Network Settings

▼Network Settings		
IP Type:	<input checked="" type="radio"/> Static IP <input type="radio"/> Automatic IP (DHCP)	
Domain Name:	<input type="text"/>	<input checked="" type="checkbox"/> Manual
IP Address:	<input type="text" value="10.13.10.10"/>	<input checked="" type="checkbox"/> Manual
Subnet Mask:	<input type="text" value="255.255.0.0"/>	<input checked="" type="checkbox"/> Manual
Default Gateway Address:	<input type="text" value="10.13.0.1"/>	<input checked="" type="checkbox"/> Manual
Primary DNS:	<input type="text" value="0.0.0.0"/>	<input checked="" type="checkbox"/> Manual
Secondary DNS:	<input type="text" value="0.0.0.0"/>	<input checked="" type="checkbox"/> Manual
MAC Address:	<input type="text" value="00:90:8F:1E:DB:3E"/>	
LAN Port Mode:	<input type="text" value="Auto Negotiation"/> ▼	
PC Port Mode:	<input type="text" value="Auto Negotiation"/> ▼	

2. Configure the LAN parameters using the table below as reference, and then click **Submit**.

➤ To define the phone's LAN settings using the configuration file:

- Use the table below as reference.

Table 13-1: Network Settings Parameters

Parameter	Description
IP Type [network/lan_type]	Defines the IP addressing method: <ul style="list-style-type: none"> ▪ [STATIC] Static IP (default)- Phone's IP address is defined manually ▪ [DHCP] Automatic IP DHCP - Phone's IP address is acquired automatically from a DHCP server
network/lan/fixed_ip	This subsection defines the relevant parameters if 'lan_type' is configured to STATIC or the corresponding 'network/lan/dhcp' parameter is set to 1.
IP Address [network/lan/fixed_ip/ip_address]	The LAN IP address.
Subnet Mask [network/lan/fixed_ip/netmask]	The subnet mask address.
Default Gateway Address [network/lan/fixed_ip/gateway]	The IP address of the default gateway.
Domain Name [network/lan/fixed_ip/domain_name]	The domain name.
Domain Name Server (DNS)	
Primary DNS [network/lan/fixed_ip/primary_dns]	The primary DNS server address.
Secondary DNS [network/lan/fixed_ip/secondary_dns]	The secondary DNS server address. The phone connects to this server if the primary DNS server is unavailable.

13.2 Configuring Partial DHCP

Partial DHCP can be configured with the following parameters:

Table 13-2: Partial DHCP Parameters

Parameter	Description
Partial DHCP	
network/lan/dhcp	This subsection defines the parameters to configure if 'lan_type' is configured to DHCP .
Domain Name - Manual [network/lan/dhcp/domain_name/enabled]	Enables setting the domain name manually. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable Note: If enabled, network/lan/fixed_ip/domain_name must be set.
IP Address - Manual [network/lan/dhcp/ip_address/enabled]	Enables setting the IP address manually. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default) Note: If enabled, network/lan/fixed_ip/ip_address must be set.
Subnet Mask - Manual [network/lan/dhcp/netmask/enabled]	Enables setting the network mask manually. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default) Note: If enabled, network/lan/fixed_ip/netmask must be set.
[network/lan/dhcp/gateway/enabled]	Enables setting the default gateway manually. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default) Note: If enabled, network/lan/fixed_ip/gateway must be set.
Primary DNS - Manual [network/lan/dhcp/primary_dns/enabled]	Enables setting the primary DNS manually. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable Note: If enabled, network/lan/fixed_ip/primary_dns must be set.
Secondary DNS - Manual network/lan/dhcp/secondary_dns/enabled	Enables setting the secondary DNS manually. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable Note: If enabled, network/lan/fixed_ip/secondary_dns must be set.

Parameter	Description
DHCP-Related Parameters	
network/lan/dhcp/ntp/server_list/enabled	Enables prioritization of the NTP server's information received from the DHCP server (Option fields 42 or 4), over the static configuration (system/ntp/primary_server_address and system/ntp/secondary_server_address). <ul style="list-style-type: none">▪ [0] Disable▪ [1] Enable (default)
network/lan/dhcp/ntp/gmt_offset/enabled	Enables prioritization of the NTP GMT offset information received from the DHCP server (Option field 2), over the static configuration (system/ntp/gmt_offset). <ul style="list-style-type: none">▪ [0] Disable▪ [1] Enable (default)

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14 Configuring LAN and PC Port Settings

Port settings can be configured using the Web interface or configuration file.



Note: The optional values of the configuration file parameters are enclosed in square brackets while its corresponding Web values are written outside the square brackets, for example, [1] Enable.

➤ **To configure the phone's port settings using the Web interface:**

1. Open the Network Settings page (**Configuration** tab > **Network Connections** menu > **Network Settings**).

Figure 14-1: Network Settings - Port Mode

LAN Port Mode:	Auto Negotiation ▼
PC Port Mode:	Auto Negotiation ▼

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ **To define the phone's port settings using the configuration file:**

- Use the table below as reference.

Table 14-1: Port Settings

Parameter	Description
LAN Port Mode [network/lan/port_mode]	<p>Sets the LAN port mode.</p> <p>Valid values are:</p> <p>[AUTOMATIC] = Auto negotiation</p> <p>[FULL_10] = 10Mbps + full duplex</p> <p>[FULL_100] = 100Mbps + half duplex</p> <p>[HALF_10] = 10Mbps + full duplex</p> <p>[HALF_100] = 100Mbps + half duplex</p> <p>[FULL_1Gbps] = 1 Gbit/s port + full duplex</p>
PC Port Mode [network/pc/port_mode]	<p>Sets the computer port mode.</p> <p>Valid values are:</p> <p>[AUTOMATIC] = Auto negotiation</p> <p>[FULL_10] = 10Mbps + full duplex</p> <p>[FULL_100] = 100Mbps + half duplex</p> <p>[HALF_10] = 10Mbps + full duplex</p> <p>[HALF_100] = 100Mbps + half duplex</p> <p>[DISABLE] = Disables the PC port mode</p>

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15 Configuring VLAN Settings

You can configure VLAN settings using the Web interface or configuration file.

➤ **To configure the phone's VLAN settings using the Web interface:**

1. In the Web interface access the Network Settings page (**Configuration** tab > **Network Connections** menu > **Network Settings**).

Figure 15-1: Network Settings - VLAN Settings

2. Configure the settings using the table below as reference, and then click **Submit**.

➤ **To configure the phone's VLAN settings using the configuration file:**

- Use the table below as reference.

Table 15-1: VLAN Settings

Parameter	Description
VLAN Discovery Mode [network/lan/vlan/mode]	<p>Determines how VLAN is assigned to your phone, i.e., manually or automatically, and if automatically, according to which protocol.</p> <ul style="list-style-type: none"> ▪ Disable [Disable] ▪ Manual Configuration of VLAN [Manual] - If selected, the screen extends to also display 'VLAN ID' and 'VLAN Priority' (see these settings below) for static configuration of VLAN ID and priority. See Section 15.1 below for a detailed explanation. ▪ Automatic Configuration of VLAN (CDP) [CDP] - VLAN discovery mechanism based on Cisco Discovery Protocol (CDP). See Section 15.1 below for a detailed explanation. ▪ Automatic Configuration of VLAN (LLDP) [LLDP] - VLAN discovery mechanism based on LLDP. See Section 15.1 below for a detailed explanation. ▪ Automatic Configuration of VLAN (CDP+LLDP) [CDP_LLDP] (default) - VLAN discovery mechanism based on LLDP and CDP. LLDP is higher priority. See below for a detailed explanation.
Period [network/lan/vlan/period]	<p>The time period, in seconds, between discovery messages when configured to CDP, LLDP or CDP+LLDP. The default value is 30.</p>

Parameter	Description
VLAN ID [network/lan/vlan/id]	The VLAN ID. The valid range is 0 to 4094. The default is 0.
VLAN Priority [network/lan/vlan/priority]	The priority of traffic pertaining to this VLAN. The valid range is 0 to 7 (where 7 is the highest priority). The default is 0.
PC Port VLAN Activate [network/lan/vlan/pc_port_tagging/enable]	Default = Disable [0] . Change to Enable (1) for the traffic from the PC to the network to be VLAN-tagged.

15.1 Configuring Manual or Automatic VLAN Assignment

You can configure the VLAN to be assigned manually or automatically to your phone. This section shows when to configure what, and why.

15.1.1 Configuring Manual VLAN Assignment to the Phone

Configure manual assignment of the VLAN in order to set up two separate VLANs in your enterprise, one for voice (your phone) and the other for data (your pc). Security considerations may require this. If you configure manual assignment, the switch in your enterprise will assign the VLAN to your phone. See Sections [13.1.1](#) and [13.1.2](#) for details.

15.1.2 Configuring Automatic VLAN Assignment to the Phone

Configure automatic assignment of VLAN if you do not need to separate voice from data, i.e., if there are no security considerations requiring it. In this case, configure either:

- Automatic Configuration of VLAN (CDP) [**CDP**]
Automatic Configuration of VLAN (LLDP) [**LLDP**] -OR-
- Automatic Configuration of VLAN (CDP+LLDP) [**CDP_LLDP**]

What you select depends on whether the switch deployed in your enterprise supports Cisco-proprietary Cisco Discovery Protocol (CDP), or LLDP (Link Layer Discovery Protocol) which is a vendor-neutral protocol used by devices in an IEEE 802 LAN to advertise their identity, capabilities, and neighbors. Not all switches support CDP. If You're unsure, select **CDP+LLDP**. LLDP includes enhanced LLDP for Media Endpoint Devices, i.e., LLDP-MED, to specifically address voice applications.

15.1.3 Configuring VLAN via DHCP Provisioning Path

VLAN can be configured using (1) Link Layer Discovery Protocol (LLDP) (2) Cisco Discovery Protocol (CDP) and (3) manually.

If (1) is unsuccessful, (2) is attempted.

If (2) is unsuccessful, (3) is attempted.

If (3) is unsuccessful, (4) is attempted.

The capability provides an alternative VLAN configuration option.



Part V

VoIP Settings

16 Configuring SIP Settings

You can configure the following SIP settings using the Web interface or configuration file:

- General
- Proxy and Registration
- SIP Timers
- SIP QoS

16.1 Configuring General SIP Settings

The phone's General SIP settings can be configured using the Web interface or configuration file.

➤ **To configure general SIP settings using the Web interface:**

1. Open the Signaling Protocols page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**).

Figure 16-1: Signaling Protocols- SIP General

▼ SIP General	
SIP Transport Protocol:	UDP ▼
SIP Local Port:	5060
Gateway Name:	
PRACK Mode:	Enable ▼
Enable RPORT:	Enable ▼
Include PTIME in SDP:	Disable ▼
Enable Keep Alive using OPTIONS:	Disable ▼
Connect Media on 180 Response:	Disable ▼
Block Caller ID on Outgoing Calls:	Disable ▼
Incoming Anonymous Call Blocking:	Disable ▼

2. Configure the SIP General parameters using [Table 16-1](#) below as reference, and then click **Submit**.

➤ To configure General SIP parameters using the configuration file:

- Use the table below as reference.

Table 16-1: SIP General Parameters

Parameter	Description
SIP Transport Protocol [voip/signalling/sip/transport_protocol]	Determines the transport layer for outgoing SIP calls initiated by the phone. <ul style="list-style-type: none"> ▪ [UDP] UDP (default) ▪ [TCP] TCP ▪ [TLS] TLS
TLS Port [voip/signalling/sip/tls_port]	Defines the local TLS SIP port for SIP messages. The valid range is 1024 to 65535. The default value is 5061.
[voip/signalling/sip/enable_sips]	Relevant for TLS only, if enabled, the request URI prefix will be "sips:" otherwise, the prefix will be "sip:"
[voip/signalling/sip/subs_no_notify_timer]	Indicates the maximum time (in milliseconds) that a subscription waits from receiving 2xx response for a SUBSCRIBE request, until receiving the first NOTIFY request. If the timer expires, the subscription will be terminated.
SIP Local Port [voip/signalling/sip/port]	Defines the local SIP port (UDP or TCP) for SIP messages. The valid range is 1024 to 65535. The default value is 5060.
Gateway Name [voip/signalling/sip/proxy_gateway]	Assigns a name to the phone. The name is used as the host part of the SIP URI in the From header. Note: <ul style="list-style-type: none"> ▪ Ensure that the name you choose is the one with which the Proxy is configured to identify the phone. ▪ If not specified, the phone's IP address is used (default).
PRACK Mode [voip/signalling/sip/prack/enabled]	Determines whether the phone sends PRACK (Provisional Acknowledgment) messages upon receipt of 1xx SIP reliable responses. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)
Enable RPORT [voip/signalling/sip/rport/enabled]	Determines whether the phone adds the 'rport' parameter to the relevant SIP message (in the SIP Via header). <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

Parameter	Description
Include PTIME in SDP [voip/signalling/sip/sdp_include_ptime]	Determines whether the phone adds the PTIME parameter to the SDP message body. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Enable Keep Alive using OPTIONS [voip/signalling/sip/keepalive_options/enabled]	Determines whether keep-alive is performed using SIP OPTIONS messages sent to the Proxy. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Keep Alive Period [voip/signalling/sip/keepalive_options/timeout]	Defines the Proxy keep-alive time interval (in seconds) between Keep-Alive messages. The valid range is 0 to 86400. The default value is 300.
Connect Media on 180 Response [voip/signalling/sip/connect_media_on_180]	Determines whether the media is connected upon receipt of SIP 180, 183, or 200 messages. When the parameter is disabled, media is connected upon receipt of 183 and 200 messages only. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Block Caller ID on Outgoing Calls [voip/signalling/sip/block_callerid_on_outgoing_calls]	Can be configured only if the BroadSoft BroadWorks application server is used. When enabled, the outgoing INVITE message is sent with an anonymous From header and P-Asserted-Identityheader. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable For example: <ul style="list-style-type: none"> ▪ FROMheader contains anonymous URI: <i>From: "Anonymous"</i> <i>sip:anonymous@anonymous.inv</i> <i>alid</i> ▪ P-Asserted-Identityheader: <i>P-Asserted-Identity: "1001"</i> <i>1115551001@proxy.net</i>

Parameter	Description
Incoming Anonymous Call Blocking [voip/signalling/sip/anonymous_calls_blocking]	<p>Can be configured only if the BroadSoft BroadWorks application server is used.</p> <p>When enabled, incoming INVITE messages with anonymous From header are rejected.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>For example: <i>From:"Anonymous"<sip:anonymous@anonymous.invalid></i></p> <p>The phone responds with a SIP 403 "Forbidden" response.</p>
[voip/signalling/sip/auth_retries]	<p>Defines the number of times authenticated register messages are re-sent if 401 or 407 SIP responses with a different "nonce" are received.</p> <p>The valid range is 0 to 100. The default value is 4.</p>
[voip/signalling/sip/display_name_in_registration_msg/enabled]	<p>Sets the Display Name in the 'To' and 'From' fields of the SIP REGISTER message.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
[voip/signalling/sip/semi_transfer_with_no_cancel/enabled]	<p>Determines whether semi-attendant transfer is performed without sending the SIP CANCEL message to the remote side.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>Note:</p> <ul style="list-style-type: none"> ▪ In this flow ("with_no_cancel"), the Transferor's User Agent continues the transfer as an attended transfer even after the Transferor hangs up. This is the recommended flow defined by http://tools.ietf.org/html/draft-ietf-sipping-cc-transfer-03. ▪ Existing / current behavior is retained for backward compatibility (disabled by default)
[voip/signalling/sip/PAI_On_Replay/enable]	<p>Enables the P-Asserted Identity header to be added to "18x" and "200" responses.</p> <ul style="list-style-type: none"> ▪ [0] (Default) PAI header is not added to "18x" and "200" responses ▪ [1] PAI header is added to "18x" and "200" responses

16.2 Configuring Proxy and Registration

Here's how to configure Proxy and Registration settings using the Web interface or configuration file.

➤ **To configure Proxy and Registration using the Web interface:**

1. Open the Signaling Protocol page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**).

Figure 16-2: SIP Proxy and Registrar

Signaling Protocol	
▼SIP Proxy and Registrar	
Use SIP Proxy:	Enable ▼
Proxy IP Address or Host Name:	10.37.4.204
Proxy Port:	5060
Enable Registrar Keep Alive:	Disable ▼
Maximum Number of Authentication Retries:	4
Use SIP Proxy IP and Port for Registration:	Enable ▼
Use SIP Registrar:	Disable ▼
Registration Expires:	3600 Seconds
Registration Failed Expires:	60 Seconds
Use SIP Outbound Proxy:	Disable ▼
Use Redundant Outbound Proxy:	Disable ▼
Redundant Proxy Mode:	Disable ▼

2. Configure Proxy and Registration parameters using the table below as reference, and then click **Submit**.

➤ **To configure Proxy and Registration using the configuration file:**

- Use the table below as reference.

Table 16-2: Proxy and Registrar Parameters

Parameter	Description
Use SIP Proxy [voip/signalling/sip/use_proxy]	Determines whether to use a SIP Proxy server. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
[voip/signalling/sip/proxy_address]	The IP address or host name of the SIP proxy server. Default: 0.0.0.0
Proxy Port [voip/signalling/sip/proxy_port]	The UDP or TCP port of the SIP proxy server. Range: 1024 to 65535. Default: 5060.

Parameter	Description
Enable Registrar Keep Alive [voip/signalling/sip/registrar_ka/enabled]	<p>Determines whether to use the registration keep-alive mechanism based on SIP OPTION messages.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>Note:</p> <ul style="list-style-type: none"> ▪ If there is no response from the server, the timeout for re-registering is automatically reduced to a user-defined value (voip/signalling/sip/registration_failed_timeout) ▪ When the phone re-registers, the keep-alive messages are re-sent periodically.
Registrar Keep Alive Period [voip/signalling/sip/registrar_ka/timeout]	<p>Defines the registration keep-alive time interval (in seconds) between Keep-Alive messages.</p> <p>Range: 40 to 65536. Default: 60.</p>
Maximum Number of Authentication Retries [voip/signalling/sip/proxy_timeout]	<p>The SIP proxy server registration timeout (in seconds).</p> <p>Range: 0 to 86400. Default: 3600.</p>
Use SIP Proxy IP and Port for Registration [voip/signalling/sip/use_proxy_ip_port_for_registrar]	<p>Determines whether to use the SIP proxy's IP address and port for registration. When enabled, there is no need to configure the address of the registrar separately.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Use SIP Registrar [voip/signalling/sip/sip_registrar/enabled]	<p>Determines whether the phone registers to a separate SIP Registrar server.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Registrar IP Address or Host Name [voip/signalling/sip/sip_registrar/addr]	<p>[Only displayed if the 'Use SIP Registrar' parameter is enabled.]</p> <p>The IP address or host name of the Registrar server. Default: 0.0.0.0</p>
Registrar Port [voip/signalling/sip/sip_registrar/port]	<p>[Only displayed if the 'Use SIP Registrar' parameter is enabled.] The UDP or TCP port of the Registrar server.</p> <p>Range: 1024 to 65535. Default: 5060.</p>
Registration Failed Expires [voip/signalling/sip/registration_failed_timeout]	<p>If registration fails, this parameter determines the interval between the register messages periodically sent until successful registration.</p> <p>Range: 1 to 86400. Default: 300.</p>
Use SIP Outbound Proxy [voip/signalling/sip/sip_outbound_proxy/enabled]	<p>Determines whether an outbound SIP proxy server is used (all SIP messages are sent to this server as the first hop).</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

Parameter	Description
Outbound Proxy IP Address or Host Name [voip/signalling/sip/sip_outbound_proxy/addr]	[Only displayed if the 'Use SIP Outbound Proxy' parameter is enabled.] The IP address of the outbound proxy. If this parameter is set, all outgoing messages (including Registration messages) are sent to this Proxy according to the Stack behavior. Default: 0.0.0.0.
Outbound Proxy Port [voip/signalling/sip/sip_outbound_proxy/port]	[Only displayed if the 'Use SIP Outbound Proxy' parameter is enabled.] The port on which the outbound proxy listens. Range: 1024 to 65535. Default: 5060.
[voip/signalling/sip/register_before_expires_percent]	Allows administrators to configure the registration expired time. The registration expired time is that time that lapses before the refresh registration message is sent. Default: 15%. Non-percentage values are 5-85. These represent the time that must lapse before the new registration message is sent, for example, 15% means that if the expiration time is 100 seconds, the registration refresh message will be sent after 85% of the registration expiring timeout. In releases before version 2.2.12, it was 33%.
Redundant Proxy Mode [voip/signalling/sip/redundant_proxy/mode]	See the next section.



Note: It's recommended to use DNS queries to complete FQDN for a redundant outbound proxy.

16.2.1 Configuring Proxy Redundancy

The Redundant Proxy feature allows the configuration of a backup SIP proxy server to increase QoS stability. After the feature is enabled, the phone identifies cases where the primary proxy does not respond to SIP signaling messages. In these scenarios, the phone registers to the redundant proxy and the phone seamlessly continues normal functionality, without the user noticing any connectivity failure or malfunction with the primary proxy.

The Redundant Proxy feature can operate in one of the following modes:

- **Asymmetric mode:** The primary proxy is assigned a higher priority for registration than the redundant proxy. Once the phone is registered to the primary proxy, it sends keep-alive messages (using SIP OPTIONS messages) to the primary proxy. If the primary proxy does not respond, the phone registers to the redundant proxy, but continues sending keep-alive messages to the primary proxy. **If the primary proxy responds to these keep-alive messages, the phone re-registers to the primary proxy.**
- **Symmetric mode:** Both proxies are assigned the same priority for registration. Once the phone is registered to a proxy, it sends keep-alive messages to this proxy. The phone switches proxies only once the proxy to which it has registered, does not respond.

For more information see the [\[voip/signalling/sip/redundant_proxy/symmetric_mode\]](#) description in the SIP Proxy Server Redundancy Parameters table below.

Proxy Redundancy can be configured using the Web interface or Configuration file.

➤ To configure Proxy Redundancy using the Web interface:

1. Open the Signaling Protocol page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**).

Figure 16-3: Proxy Redundancy

▼SIP Proxy and Registrar	
Use SIP Proxy:	Disable ▼
Use SIP Registrar:	Disable ▼
Use SIP Outbound Proxy:	Disable ▼
Use Redundant Outbound Proxy:	Disable ▼
Redundant Proxy Mode:	Primary-Fallback ▼
Redundant Proxy Address:	0.0.0.0
Redundant Proxy Port:	5060
Redundant Proxy Keep Alive Period:	60
<input checked="" type="checkbox"/> Switch back to Primary SIP proxy when available	

2. Configure the Proxy Redundancy parameters using the table below as reference, and then click **Submit**.

➤ To configure Proxy Redundancy using the configuration file:

- Use the table below as reference.

Table 16-3: SIP Proxy Server Redundancy Parameters

Parameter	Description
[voip/signaling/sip/redundant_proxy/enabled]	Mandatory for the phone to operate in redundancy. Commands the phone to operate with the other voip/signalling/sip/redundant_proxy parameters.
Redundant Proxy Mode [voip/signalling/sip/redundant_proxy/mode]	Mandatory for the phone to operate in redundancy. Defines the two proxies' mode of operation: Primary-Fallback or Simultaneous. Defines a backup SIP proxy server to increase QoS stability. Enable the parameter if you want to operate with a proxy server that will serve as a backup if the first goes down. <ul style="list-style-type: none"> ▪ Disable = (Default) Phone doesn't use redundant proxy. If set to Disable in the Web interface, it will set the previously described ini file parameter redundant_proxy/enabled as well. ▪ Primary-Fallback = Phone registered to redundant proxy if the primary proxy does not respond to SIP signaling messages. ▪ Simultaneous = Applies only in some environments. If selected, dual registration is performed; the phone registers simultaneously to both servers. .
Redundant Proxy Address [voip/signalling/sip/redundant_proxy/address]	[Only displayed if the 'Redundant Proxy Mode' parameter is enabled (Primary-Fallback)] Defines the IP address of the backup proxy server. Default: 0.0.0.0
Redundant Proxy Keep Alive Period voip/signalling/sip/redundant_proxy/keepalive_period	[Only displayed if the 'Redundant Proxy Mode' parameter is enabled (Primary-Fallback)] Defines how often a keep alive message is sent by the phone to the proxy server. Range: 0 to 300. Default: Every 60 seconds.
Redundant Outbound Proxy Port voip/signalling/sip/redundant_proxy/port	[Only displayed if the 'Redundant Proxy Mode' parameter is enabled (Primary-Fallback)] Defines the UDP or TCP port of the backup redundant proxy server. If occupied by other enterprise devices, you can configure another. Range: 1024 to 65535. Default = 5060.

Parameter	Description
Switch back to Primary SIP proxy when available [voip/signalling/sip/redundant_proxy/symmetric_mode]	<p>[Only displayed if the 'Redundant Proxy Mode' parameter is enabled (Primary-Fallback)]</p> <p>The phone identifies cases where the primary proxy does not respond to SIP signaling messages. In these scenarios, the phone registers to the redundant proxy and the phone seamlessly continues normal functionality, without the user noticing any connectivity failure or malfunction with the primary proxy.</p> <p>[0] = Asymmetric (default). In this mode, the primary proxy is assigned a higher priority for registration than the redundant proxy. Once the phone is registered to the primary proxy, it sends keep-alive messages (using SIP OPTIONS messages) to the primary proxy. If the primary proxy does not respond, the phone registers to the redundant proxy, but continues sending keep-alive messages to the primary proxy. If the primary proxy responds to these keep-alive messages, the phone re-registers to the primary proxy. Therefore, the phone assigns the primary proxy a higher priority for registration. If asymmetric mode is configured and the primary server goes down, an attempt will be made to revert to the primary server.</p> <p>[1] = Symmetric. In this mode, both proxies are assigned the same priority for registration. Once the phone is registered to a proxy, it sends keep-alive messages to this proxy. The phone switches proxies only once the proxy to whom it has registered does not respond. Therefore, the phone assigns both proxies the same priority for registration. If symmetric mode is configured and the primary server goes down, you'll operate with the redundant proxy without ever reverting to the primary unless the redundant proxy also goes down.</p> <p>In both modes, the following applies:</p> <p>If the phone is not registered (i.e., if the proxy server – redundant or primary – to which the phone currently tries to register does not respond), the phone attempts to register to an alternative proxy. These attempts continue until the phone successfully registers.</p> <p>If this feature is enabled and the user reboots the phone, the phone registers to the last proxy to which it was trying to register, and not necessarily to the primary proxy.</p>

16.2.2 Device Registration Failover/Failback

16.2.2.1 Failover

This feature enables a secondary server to take over the functions of the primary server on the enterprise network, if SIP communication between the SIP access device and the primary proxy server is blocked or delayed or the primary server isn't available.

No phone functionality is lost when the secondary server takes over.



Note:

- For failover to function, the Proxy DNS server must be configured with a list of the names of the proxies, in order and priority, i.e, SRV record. Before the phone tries to register, it performs an NAPTR / SRV query (see the table below for an explanation of these). The DNS server send a prioritized list. The phone sends a Registration request to the first SIP server; if it isn't responsive in *n* time retries (i.e., 'outgoing_request_no_response_timeout' parameter), it goes to the second, etc., until it gets a response.
- SIP Proxy/Outbound Proxy must be configured as the host name.

➤ **To configure failover using the configuration file:**

- Use the table below as reference.

Table 16-4: Device Registration Failover Parameters

Parameter	Description
SIP Transport Protocol [voip/signalling/sip/transport_protocol]	Either: <ul style="list-style-type: none"> ▪ UDP (default) ▪ TCP ▪ TLS encryption In the SIP protocol, Name Authority Pointers (NAPTRs) are used to map servers and user addresses. Combined with Service Records (SRVs), they enable determining the service types available for a name, the name to use for an SRV lookup, and the port and 'A' DNS records to use to find the IP for the service.
[voip/signalling/sip/outgoing_request_no_response_timeout_ms]	This is the timeout, in milliseconds, that lapses until the phone failovers to the secondary proxy. Default: 32000
Outbound Proxy IP Address or Host Name	Configure this parameter as an SRV host name.
Outbound Proxy Port [voip/signalling/sip/sip_outbound_proxy/port]	Configure a value of 65535 for this parameter. Configure the parameter when you're using an Outbound Proxy. Either configure <i>this</i> parameter <i>or</i> the parameter 'Proxy Port'.

Parameter	Description
Proxy IP Address or Host Name	Configure this parameter as an SRV host name.
Proxy Port [voip/signalling/sip/proxy_port]	Configure a value of 65535 for this parameter. Configure the parameter when you're using a regular Proxy server. Either configure <i>this</i> parameter <i>or</i> the parameter 'Outbound Proxy Port'.
Registrar Port [voip/signalling/sip/sip_registrar/port]	Configure this parameter when you're using a regular Proxy server.

16.2.2.2 Failback

- To configure failback using the configuration file:
 - Use the table below as reference.

Table 16-5: Device Registration Failback Parameter

Parameter	Description
[voip/signalling/sip/failback_retry_timeout]	<p>[Only applies to BroadSoft]. Applies only if you're operating with the DNS mode of failover, i.e., with a DNS server.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) – it'll never try to access back to the first one. ▪ [n] Time, in seconds, that must lapse before failback is performed.

16.2.3 Preventing Unregistering after Changing Settings and Reloading

An unregistration message is *by default* sent after making a change to the VoIP application configuration and reloading.

The VoIP application *by default* sends a SIP Registration message with **Expires:0** (unregister).

The network administrator can change the default and prevent unregistering.

- To prevent unregistering:
 - Use the table below as reference.

Table 16-6: Preventing Unregistering

Parameter	Description
[voip/signalling/sip/unregister_on_voip_reload]	<p>Either:</p> <ul style="list-style-type: none"> ▪ [0] (Default) SIP Registration message with Expires:0 (unregister) is sent. ▪ [1] SIP Registration message with Expires:0 (unregister) is <i>not</i> sent.

16.3 Configuring a Line

Here's how to configure a line.



Note: The Web interface page of the 440HD / 430HD phone are shown here. The Web pages of the 420HD / 405/405HD phones are identical, except:

- on the 420HD/405/405HD phones, 'Line Mode' is not supported
- on the 420HD/405/405HD phones, 'Label' is supported
- on the 420HD/405/405HD phones, two lines can be configured; on the 430HD/440HD phones, six lines can be configured.

➤ **To configure a line using the Web interface:**

1. Open the Line Settings page (**Configuration > Voice Over IP > Line Settings**):

Figure 16-4: Line Settings



2. Configure Line Mode using the table below as reference, and then click **Submit**.

➤ **To configure line mode using the configuration file:**

- Use the table below as reference.

Table 16-7: Line Settings

Parameter	Description
Line Display Name [voip/line/0/description]	Defines the SIP User ID which is sent in "INVITE" packets to the called party in the "From" field, and should appear to the called party as "Caller ID". Default: 400HD
Line Activate [voip/line/0/enabled]	Activates or deactivates the line. See also Section. 25.2.1.1. [0] = Disabled (this is the default for the second line and higher in the configuration file) [1] = Enabled (this is the default for the first line voip/line/0/ in the configuration file).
Line User ID [voip/line/0/id]	Defines the SIP User ID provided by the SIP server which the phone attempts to associate itself with during the registration process. This is also the default ID sent in the "INVITE" if the Line Display Name above is left blank. Default: 0

Parameter	Description
Line Authentication User Name [voip/line/0/auth_name]	Defines the SIP username credential used in the registration process when attempting to associate with the above Line ID. Default: 0
Line Authentication Password [voip/line/0/auth_password]	Defines the SIP password associated with the above Line ID identifier during the registration process. Default: 0
Line Mode [voip/line/0-5/line_mode]	Applies only to the 430HD and 440HD phones. Determines the line mode: PRIVATE (default) or SHARED. PRIVATE line - only presented with private call appearances. SHARED line – lets users share an extension number and manage a call as a group. When an employee places a call on a SHARED line on hold, the call can be resumed from any other employee sharing the line. A SHARED line is a line that is only presented with shared call appearances. Icons displayed in the phone's screen indicate if lines are configured in a Shared Call Appearance group, or as private lines. A hollow icon  indicates a phone configured in an SCA group. A solid icon  indicates a phone configured as private.
Line Label [voip/line/0/extension_display]	Supported only on the 430HD/440HD phones. Defines the label displayed in the phone screen. To meet requirements for users with the 405/405HD and 420HD phones, use the parameter 'voip/line/0/description' (see Table 16-7 for more information).

16.4 Configuring Shared Call Appearance

Figure 16-5: Shared Call Appearance

Parameter	Description
[voip/line/0/shared_call_appearance/call_info_expiration_timeout]	Default: 3600
[voip/line/0/shared_call_appearance/call_info_subscription_failed_timeout]	Default: 60
[voip/line/0/shared_call_appearance/line_seize_expiration_timeout]	Default: 15
[voip/line/0/shared_call_appearance/speed_dial_delay]	Default: 2
[voip/line/0/shared_call_appearance/waiting_to_line_seize_tone]	Default: SILENCE

16.5 Configuring SIP Timers

SIP Timers can be configured using the Web interface or configuration file.

➤ **To configure SIP timer settings using the Web interface:**

1. Open the Signaling Protocol page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**).

Figure 16-6: Signaling Protocols - SIP Timers

SIP Timers	
Retransmission Timer T1:	<input type="text" value="500"/>
Retransmission Timer T2:	<input type="text" value="4000"/>
Retransmission Timer T4:	<input type="text" value="5000"/>
INVITE Timer:	<input type="text" value="32000"/>
Session-Expires:	<input type="text" value="1800"/>
Min-SE:	<input type="text" value="90"/>

2. Configure the SIP Timers parameters using the table below as reference, and then click **Submit**.

➤ **To configure SIP timer settings using the configuration file:**

- Use the table below as reference.

Table 16-8: SIP Timers Parameters

Parameter	Description
Retransmission Timer T1 [voip/signalling/sip/sip_t1]	<p>The time interval (in msec) between the first transmission of a SIP message and the first retransmission of the same message (according to RFC 3261).</p> <p>The valid range is 100 to 60000. The default value is 500.</p> <p>Note: The time interval between subsequent retransmissions of the same SIP message starts with SipT1Rtx and is multiplied by two until SipT2Rtx. For example (assuming that SipT1Rtx = 500 and SipT2Rtx = 4000):</p> <ul style="list-style-type: none"> ▪ The first retransmission is sent after 500 msec. ▪ The second retransmission is sent after 1000 (2*500) msec. ▪ The third retransmission is sent after 2000 (2*1000) msec. ▪ The fourth retransmission and subsequent retransmissions until SIPMaxRtx are sent after 4000 (2*2000) msec. <p>Note also:</p> <p>If dual registration / redundant Genesys server is configured and the configuration file parameter 'voip/signalling/sip/redundant_proxy/dual_reg/t1' is then configured, its value will override 'Retransmission Timer T1'. See also Section A.3.18 and Section A.3.18.1.</p>

Parameter	Description
[voip/signalling/sip/redundant_proxy/dual_reg/t1]	Only relevant if dual registration / redundancy server is configured. Allows quicker retransmission of SIP messages than the Web interface parameter 'Transmission Timer T1' and overrides it if configured. Default: 20 milliseconds. Range: 20-200.
Retransmission Timer T2 [voip/signalling/sip/sip_t2]	The maximum interval (in msec) between retransmissions of SIP messages (according to RFC 3261). The valid range is 4000 to 60000. The default value is 4000. Note: The time interval between subsequent retransmissions of the same SIP message starts with SipT1Rtx and is multiplied by two until SipT2Rtx.
Retransmission Timer T4 [voip/signalling/sip/sip_t4]	The SIP T4 retransmission timer according to RFC 3261. The valid range is 5000 to 60000. The default value is 5000.
INVITE Timer [voip/signalling/sip/sip_invite_timer]	The SIP INVITE timer according to RFC 3261. The valid range is 0 to 65535. The default value is 32000.
Session-Expires [voip/signalling/sip/session_timer]	The time (in seconds) at which an element considers the call timed out if no successful INVITE transaction occurs beforehand. This value is inserted into every INVITE in the Session-Expires header unless it is configured to 0. If the timer option tag is not part of the supported list, the sessionExpires value is ignored. The valid range is 0 to 65535. The default value is 1800.
Min-SE [voip/signalling/sip/min_session_interval]	The minimum value for the session interval that the application is willing to accept. The valid range is 0 to 65535. The default value is 90.
[voip/signalling/sip/unregister_on_voip_reload]	If the VoIP application needs to be reloaded, the application by default sends a SIP Registration message with Expires:0 , which means unregister. By setting this parameter to 1 , the application will not send the unregistration message when its reloaded.

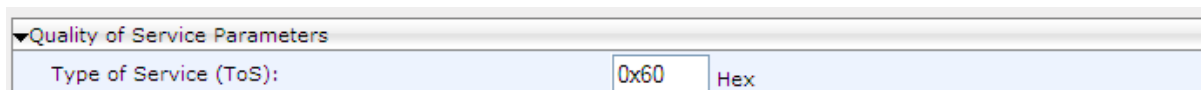
16.6 Configuring SIP QoS

SIP Quality of Service (QoS) can be configured using the Web interface or configuration file.

➤ **To configure SIP QoS using the Web interface:**

1. Open the Signaling Protocol page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**).

Figure 16-7: Quality of Service



▼Quality of Service Parameters

Type of Service (ToS): ☒ Hex

2. Configure the SIP QoS parameters using the table below as reference, and then click **Submit**.

➤ **To configure SIP QoS using the configuration file:**

- Use the table below as reference.

Table 16-9: SIP QoS Parameters

Parameter	Description
Type of Service (ToS) [voip/signalling/sip/tos]	QoS in hexadecimal format. This is a part of the IP header that defines the type of routing service to tag outgoing signalling packets originated from the phone. It informs routers that this packet must receive a specific QoS. The default value is 0x60. Values can be set in decimal (e.g. 96) or hexadecimal (e.g. 0x60).

For information on configuring RTP QoS, see Section [19.3](#).

16.7 Configuring SIP Reject Code

Reject Code can be configured using the Web interface or configuration file.

➤ **To configure Reject Code using the Web Interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services** > **General Parameters**).

Figure 16-8: General Parameters - Reject Code

Reject Code:	603 ▼
--------------	-------

2. Configure 'Reject Code' using the table below as reference, and then click **Submit**.

➤ **To configure Reject Code using the configuration file:**

- Use the table below as reference.

Table 16-10: Reject Code Parameter

Parameter	Description
Reject Code [voip/services/reject_code]	Configures the reject code that the phone sends when the Reject softkey is pressed or while DND is activated. Valid values are: [CODE_603] [CODE_486]

17 Configuring Dialing

Dialing parameters can be configured using the Web interface or configuration file.

17.1 Configuring Voice Dialing through VocaNOM

AudioCodes' phones are directly integrated with AudioCodes' VocaNOM service to allow voice dialing. The network administrator can configure voice dialing capabilities on phones, allowing users to voice dial any other user in the same corporate directory.

➤ **To configure voice dialing using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**) and scroll down until the VocaNOM section.

Figure 17-1: Web Interface - VocaNOM

▼VocaNOM	
VocaNom Number:	<input type="text"/>
VocaNOM Label:	<input type="text" value="VocaNOM"/>
Use VocaNOM server directly:	<input type="button" value="Disable"/>

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ **To enable the service using the configuration file:**

- Use the table below as reference.

Table 17-1: Voice-Dialing Parameter Descriptions

Parameter	Description
VocaNOM Number [voip/services/vocanom/number]	Defines the number that the phone dials to access the VocaNOM server, either directly, or indirectly, via the Skype for Business server. Example: 7777
VocaNOM Label [voip/services/vocanom/label]	Defines the name that will be displayed in phone screens after users press their configured VocaNOM key to voice-dial another party using the VocaNOM service. Default: VocaNOM
Use VocaNOM server directly [voip/services/vocanom_server/enabled]	Can be enabled or disabled. The user's experience remains the same whether enabled (direct voice dialing) or disabled (indirect voice dialing). Direct or indirect voice dialing occurs in the background, so user experience is unaffected. When enabled (direct voice dialing), the call is forwarded directly to the server. When disabled (indirect voice dialing), the call is forwarded via the Skype for Business server. The VocaNOM server can be on premises or in the cloud. <ul style="list-style-type: none"> ▪ [0] Access to the VocaNOM server is indirect via the Skype for Business server [default] ▪ [1] Access to the VocaNOM server is direct
Server IP Address [voip/services/vocanom_server/ip_address]	Only displayed in the Web interface if the previous parameter (above) is enabled. Defines the VocaNOM server's IP address. The server can be either in the AWS cloud (Amazon Web Services) or on premises. Default: 0.0.0.0

Parameter	Description
[voip/services/vocanom_server/port]	Defines the port number on the VocaNOM server. Its value must match Transport Mode. <ul style="list-style-type: none"> 5060 [for UDP, TCP] 5061 [default] [for TLS]
[voip/services/vocanom/transport_mode]	Defines the Transport Mode for sending SIP messages. <ul style="list-style-type: none"> TLS [Default] UDP TCP

17.2 Configuring General Dialing Parameters

General dialing parameters can be configured using the Web interface or configuration file.

- To configure dialing using the Web interface:
- 3. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**).

Figure 17-2: Web Interface Dialing

- 4. Configure the parameters using the table below as reference, and then click **Submit**.
- To configure dialing using the configuration file:
 - Use the table below as reference.

Table 17-2: Dialing Parameters

Parameter	Description
Dialing Timeout [voip/dialing/timeout]	The duration (in seconds) of allowed inactivity between dialled digits. When you work with a proxy, the number you have dialled before the dialing process has timed out is sent to the proxy as the user ID to be called. This is useful for calling a remote party without creating a speed dial entry (assuming the remote party is registered with the proxy). Range is 0 to 10. Default = 5.
Interdigit Short Timeout [voip/dialing/interdigit_short_timeout]	Shorter than 'Dialing Timeout' (see above). Default: 3 seconds. Implemented as 0S for the Dial Map. If a user wants to make an international call by dialing 00 and wants to dial the secretary/operator by dialing 0 , the user can do both by adding 0S to the Dial Map. For example, if the digit map string= *xx[2-9]11 0S [2-9]xxxxxxxx 1xxx[2-9]xxxxxx, it has 0S in it. When the user dials 0 , 0 will match 0S and will therefore start the 'Interdigit Short Timeout' timer. After this timeout, 0 is dialed out. User can dial 00 or 0123 within the 'Interdigit Short Timeout'. After the 'Dialing Timeout', the

Parameter	Description
	string is dialed out.
Phone Number Length [voip/dialing/phone_number_max_size]	The maximum length of shortcut numbers that you can enter and the maximum number of digits that you can dial. Range is 3 to 32. Default = 32.
Enable Dialing Complete Key [voip/dialing/dial_complete_key/enabled]	<p>Enables the feature for defining a key to indicate that dialing has completed. Pressing the Dialing Complete key (defined below) forces the phone to make a call to the dialled digits even if there is no match in the dial plan or digit map.</p> <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default) <p>Note: This parameter is available only if the parameter 'voip/dialing/dial_complete_key/enabled' is set to 1.</p>
Dialing Complete Key [voip/dialing/dial_complete_key/key]	Defines the Dialing Complete key. The valid value is a single character. The default value is the pound (#) key.
No Answer Call Timeout [voip/dialing/unanswered_call_timeout]	Timeout before the phone automatically sends a Cancel message. When the phone makes a call and the other side doesn't answer, the phone sends a Cancel after this timeout. Range: 1 to 300. Default = 60.
[voip/dialing/on_hook_dialing]	<p>Defines the dialing mode when phone is on hook and no audio device is selected (when user enters digits on idle state). Valid values are:</p> <p>[Disable] = Ignore digits press. To initiate a call, users will have to select audio device by pressing speaker or headset keys or by picking headset.</p> <p>[Open_default_audio_device] = default behavior – start dialing via default audio device (usually speaker) activated.</p> <p>[Off_line_dialing] = don't activate the default audio device until pressing 'dial', DTMF tones will not be heard and dialing related features (such as 'dialing timeout', 'dial complete key', and more) will be disabled.</p>
[voip/dialing/allow_calling_self_extension]	<p>If disabled (default), calling the self-number (user ID) will be blocked.</p> <p>If enabled, the phone will send the invite although it is for its own extension. (In some proxies this is how you access voice mail).</p>

17.3 Configuring Auto Redial

The administrator is responsible for enabling/disabling the auto-redial feature. If enabled and a called party is unavailable because they're busy (for example), the caller's phone's SCREEN prompts **Extension Busy. Activate auto redial on busy?**

If the caller then activates auto-redial by pressing **Yes**, the busy extension is automatically redialed every *n* seconds.

The administrator is also responsible for configuring this frequency.

➤ **To configure auto redial using the Web interface:**

1. In the Dialing page, scroll down until the Automatic Redial On Busy section (**VoIP > Dialing > Automatic Redial On Busy**).

Figure 17-3: Automatic Redial On Busy

▼Automatic Redial On Busy	
Activate:	Enable ▾
Timeout:	120 Seconds

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ **To configure dialing using the configuration file:**

- Use the table below as reference.

Table 17-3: Automatic Redial On Busy Parameters

Parameter	Description
Activate [voip/dialing/automatic_redial_on_busy/enabled]	Allows the administrator disable/enable the feature. [0]=Disabled [1]=Enabled Default: 0
Timeout [voip/dialing/automatic_redial_on_busy/retry_timer]	Visible only if the feature is enabled. Range: 3-120. Default: 30. If the feature is activated and the timer lapses, an outgoing call to the busy destination is established. If the feature is activated, a countdown screen is displayed: Dialing <ext> within <x>s (Line <n>) The screen shows the timer, the remote extension and the line number.

17.4 Configuring Dial Tones

Dial Tones settings can be configured using the Web interface or configuration file.

➤ **To configure Dial Tones using the Web interface:**

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**).

Figure 17-4: Dialing Page - Tones

Dial Tone Timeout:	<input type="text" value="30"/>	Seconds
Reorder Tone Timeout:	<input type="text" value="40"/>	Seconds
No Answer Call Timeout:	<input type="text" value="60"/>	Seconds
Howler Tone Timeout:	<input type="text" value="120"/>	Seconds
Secondary Dial Tone:	<input type="text" value="Enable"/>	
Secondary Dial Tone Key:	<input type="text" value="9"/>	
DTMF Transport Mode:	<input type="text" value="RFC 2833"/>	
Digit Map:	<input type="text"/>	
Dial Plan:	<input type="text"/>	

2. Configure the tones parameters using the table below as reference, and then click **Submit**.
3. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**) and scroll down to the General Parameters.

Figure 17-5: Services Page - Tones

Stutter Tone Duration:	<input type="text" value="2500"/>	msec
Out of Service Behavior:	<input type="text" value="Reorder Tone"/>	
Automatic Disconnect:	<input type="text" value="Enable"/>	

4. Configure the tones parameters using the table below as reference.

➤ **To configure Dial Tones using the configuration file:**

- Use the table below as reference.

Table 17-4: Dial Tones Parameters

Parameter	Description
Dial Tone Timeout [voip/dialing/dialtone_timeout]	Defines the maximum duration of the dial tone (in seconds) after which the dial tone stops and a reorder tone is played. Range:1 to 300. Default: 30.
Reorder Tone Timeout [voip/dialing/warning_tone_timeout]	Defines the maximum duration of the reorder tone (in seconds) after which the reorder tone stops and a howler tone is played. Range:1 to 300. Default: 40.
Howler Tone Timeout [voip/dialing/offhook_tone_timeout]	Defines the duration (in seconds) of the howler tone. If the limit is exceeded, the howler tone stops. The howler tone indicates that the phone has been left in an off-hook state. Range:1 to 300. Default: 120.

Parameter	Description
Secondary Dial Tone [voip/dialing/secondary_dial_tone/enabled]	Enables the secondary dial tone. <ul style="list-style-type: none"> ▪ [0] Disable (default) - Phone doesn't use secondary dial tone. ▪ [1] Enable - Phone plays secondary dial tone if the secondary dial tone key is pressed (first digit). For example, when pressing 9 to get an external dial tone, a different dial tone (not configurable) is played as the second dial tone.
Secondary Dial Tone Key [voip/dialing/secondary_dial_tone/key_sequence]	Defines the secondary dial tone is played if this is the first key pressed. Range: 0 to 9. Default: 9. Note: This parameter is available only if the parameter 'voip/dialing/secondary_dial_tone/enabled' is set to 1 .
Out of Service Behavior [voip/services/out_of_service_behavior]	Determines whether a reorder tone is played instead of a dial tone if you configured a Registrar IP address and the registration failed. <ul style="list-style-type: none"> ▪ [NONE] No Tone ▪ [REORDER_TONE] Reorder Tone (default)
Stutter Tone Duration [voip/services/msg_waiting/stutter_tone_duration]	Defines the duration for which a stutter tone is played when you have unheard messages. Range: 1000 to 60000. Default: 2500.
Automatic Disconnect [voip/dialing/automatic_disconnect]	Determines whether the phone automatically goes idle (i.e. on-hook) when the last remaining call is disconnected. This is only relevant when the speaker or headset is used. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)

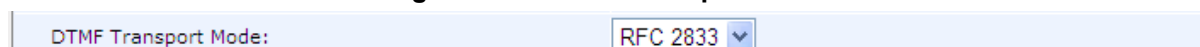
17.5 Configuring DTMF

Dual-Tone Multi-Frequency (DTMF) signaling can be configured using the Web interface or configuration file.

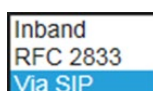
➤ **To configure DTMF using the Web interface:**

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**).

Figure 17-6: DTMF Transport Mode



2. You can choose one of three available DTMF transport methods:



3. The Web interface allows selecting **Inband**, **RFC 2833**, or **Via SIP** as the DTMF transport type.
4. Configure the parameter using the table below as reference, and then click **Submit**.

➤ **To configure DTMF using the configuration file:**

- Use the table below as reference.

Table 17-5: DTMF Transport Mode

Parameter	Description
DTMF Transport Mode [voip/media/out_of_band_dtmf]	DTMF transport mode. <ul style="list-style-type: none"> ▪ [INBAND] Inband ▪ [RFC2833] RFC 2833 (default) ▪ [VIA_SIP] Via SIP
[voip/media/dtmf_via_sip_force_flag]	Must be set to 1 to enable Via SIP as DTMF transport type.
/voip/audio/gain/dtmf_rtp_event_signal_level	Allows the network administrator to control the DTMF tones level. <ul style="list-style-type: none"> ▪ 0 db (Minimum) ▪ 31 db (Maximum)



Note:

- The Web interface parameter 'DTMF Transport Mode' and the cfg file parameter 'voip/media/out_of_band_dtmf' are related; changing one changes the other.
- If the cfg file parameter 'voip/media/dtmf_via_sip_force_flag' is enabled, a SIP message is sent in addition to the RTP message. If it is disabled, only one message is sent, according to the selected DTMF transport type.

17.6 Configuring Digit Maps and Dial Plans

Digit maps and Dial plans can be configured using the Web interface or configuration file.

➤ **To configure digit map and dial plan using the Web interface:**

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**).

Figure 17-7: Digit Map and Dial Plan

Digit Map:	<input type="text"/>
Dial Plan:	<input type="text"/>

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ **To configure digit map and dial plan using the configuration file:**

- Use the table below as reference.



Note: Invalid Tokens will be ignored by the application.

Table 17-6: Digit Map and Dial Plan Parameters

Parameter	Description
Digit Map [voip/signalling/sip/digit_map]	<p>Enables the administrator to predefine possible formats (or patterns) for the dialed number. A match to one of the defined patterns terminates the dialed number.</p> <p>The valid value can be up to 256 characters.</p> <p>There are two main formats for the digit map configuration. The formats are distinguished by the separator ';' or ' '.</p> <ul style="list-style-type: none"> ▪ Using ' ' separator: The following constructs can be used in each numbering scheme: <ul style="list-style-type: none"> ✓ Digit: A digit from 0 to 9. ✓ DTMF: A digit, or one of the symbols A, B, C, D, #, or *. Extensions may be defined. ✓ Wildcard: The symbol x which matches any digit (0 to 9). ✓ Range: One or more DTMF symbols enclosed between square brackets ([and]). ✓ Sub range: Two digits separated by hyphen (-) which matches any digit between and including the two. The subrange construct can only be used inside a range construct, i.e., between [and]. ✓ Position: A period (.) which matches an arbitrary number, including zero, of occurrences of the preceding construct. <p>For example: [2-9]11 0 100 101 011xxx. 9011xxx. 1[2-9]xxxxxxxxx 91[2-9]xxxxxxxxx 9[2-9]xxxxxx *xx [8]xxxx [2-7]xxx This example includes the following rules:</p> <ul style="list-style-type: none"> ✓ [2-9]11: 911 rule: 211, 311, 411, 511, 611, 711, 811, 911 are dialed immediately ✓ 0: Local operator rule: After dialing 0 the phone waits T seconds and then completes the call automatically

Parameter	Description
	<ul style="list-style-type: none"> ✓ 100: Auto-attendant default extension ✓ 101: Voicemail default extension ✓ 011xxx.: International rule without prefix ✓ 9011xxx.: International rule with prefix ✓ 1[2-9]xxxxxxxx: LD rule without prefix ✓ 91[2-9]xxxxxxxx: LD rule with prefix ✓ 9[2-9]xxxxxx: Local call with prefix ✓ *xx: 2-digit star codes ✓ [1-7]xx: A regular 3 digit extension that does not start with 9 or 8 is dialed immediately ✓ [2-7]xx: A regular 3 digit extension that does not start with 9 or 8 or 1 is dialed immediately ✓ [2-7]xxx: A regular 4 digit extension that does not start with 9 or 8 or 1 is dialed immediately ✓ [8]xxx: A 3 digit extension prefixed with an 8 (routes calls directly to voicemail of extension xxx) ✓ [8]xxxx: A 4 digit extension prefixed with an 8 (routes calls directly to voicemail of extension xxxx) ✓ T: Refers to the Dialing Timeout. ▪ Using ';' separator: An 'x' in the pattern indicates any digit. ';' separates between patterns. For example: '10x;05xxxxxxxx;4xxx'. In this example, three patterns are defined. A number that starts with 10 is terminated after the third digit, and so on. If the user dials a number that does not match any pattern, the number is terminated using the timeout or when the user presses the pound ('#') key.
Dial Plan voip/signalling/sip/number_rules	<p>This parameter works in conjunction with the parameter voip/signalling/sip/digit_map and enables translation of specific patterns to specific SIP destination addresses. An 'x' represents any dialed digit. Each backslash at the right side of the '=' represents one of the dialed digits. Rules are separated by the character ';'.</p> <p>The valid value can be up to 256 characters.</p> <p>For example: '4xxx=Line_\\@10.1.2.3'</p> <p>This rule issues a call to 10.1.2.3 with the SIP ID of Line_ followed by the last three digits of the dialed number.</p>

17.7 Configuring Headset LED to Stay On

IT administrators can configure the headset LED to stay on when the phone is on standby *and* when it is in conversation mode.



Note: Headset must be configured as the default audio device for the feature to function (see Section 17.8).

➤ **To configure the headset LED to stay on:**

- Use the table below as reference.

Table 17-7: Headset LED Parameter

Parameter	Description
[voip/highlight_audio_device]	<p>Allows the headset LED to stay on when the phone is on standby <i>and</i> when it is in conversation mode.</p> <p>Functions only when headset is configured as the default audio device.</p> <p>Configure either:</p> <ul style="list-style-type: none"> ▪ [NONE] (Default) Headset LED illuminates only when the phone is in conversation mode. ▪ [HEADSET] = Headset LED illuminates when the phone is on standby <i>and</i> when it is in conversation mode

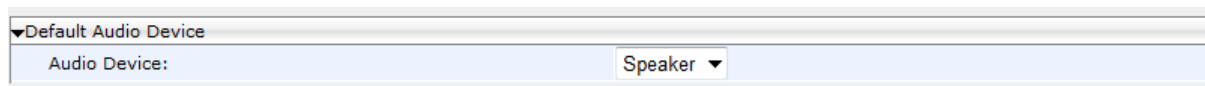
17.8 Configuring Default Audio Device

The default audio device (speaker or headset) can be configured using the Web interface or configuration file.

➤ **To configure default audio device using the Web interface:**

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**) and scroll down to Default Audio Device.

Figure 17-8: Default Audio Device



▼Default Audio Device

Audio Device: Speaker ▼

2. Configure the parameter using the table below as reference and then click **Submit**.

➤ **To configure default Audio Device using the configuration file:**

- Use the table below as reference.

Table 17-8: Audio Device Parameter

Parameter	Description
Audio Device [voip/answer_device]	<p>Sets the default audio device to answer or initiate a new call when no explicit audio device is set.</p> <p>For example:</p> <ul style="list-style-type: none">▪ When pressing the Answer softkey.▪ When initiating a call by speed dial key, call history or phone directory.▪ Answering talk event or auto-answer.▪ When starting to dial in 'on hook' mode. <p>Valid values are:</p> <ul style="list-style-type: none">▪ [SPEAKER]▪ [HEADSET]

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18 Configuring Ring Tones

Here's how to configure and upload ring tones to the phone.

18.1 Configuring Distinctive Ring Tones

You can configure a phone to ring in a distinct tone per caller, thus facilitating caller recognition and saving others from unnecessary disruptions to their activities if the phone is shared.

➤ **To configure a distinctive ring tone using the Web interface:**

1. Open the Tones page (**Configuration** tab > **Personal Settings** menu > **Tones**) and scroll down until 'Distinctive Ringing Setting'.

Figure 18-1: Distinctive Ringing

Distinctive Ringing Setting				
ID	Ringing Tone Types			Ringing Tone Name
1				Ring01 ▼
2				Ring02 ▼
3				Ring03 ▼
4				Ring04 ▼
5				Ring05 ▼

2. Configure using the table below as a reference.

➤ **To configure a distinctive ring using the configuration file:**

- Use the table below as a reference.

Table 18-1: Distinctive Ringing Parameters

Parameter	Description
Ringing Tone Name [voip/distinctive_ringing/0-4/ringtone]	A name to assign to a distinctive ring tone. The default ring tone names are Ring01 – Ring11. (Optionally, you can select and <i>manually upload</i> a customized ring tone – see Section 18.3). If you do not enter a name, the phone assigns the tone's filename (without the .wav file extension) as the name of the tone.
Ringing Tone Types [voip/distinctive_ringing/0-4/type]	This is the 'Alert-Info' header's content in the INVITE message. It should be configured in the SIP proxy or application server. Used to distinguish between different calls.

18.1.1 Example of Configuring a Distinctive Ring

Here's how to configure a ring tone whose name is **Ring05** to ring when the Alert-Info Header received in the INVITE message contains **external_call1**.

- **Example using the configuration file:**
 - Configure parameter 'voip/distinctive_ringing/4/ringtone' to **Ring05**
 - Configure parameter 'voip/distinctive_ringing/4/type' to **external_call1**
- **Example using the Web interface:**

Figure 18-2: Distinctive Ringing

Distinctive Ringing Setting			
ID	Ringing Tone Types		Ringing Tone Name
1			Ring01 ▾
2			Ring02 ▾
3			Ring03 ▾
4			Ring04 ▾
5		external_call1	Ring05 ▾

The Alert-Info header must contain **external_call1**, as shown below. This is the INVITE the phone receives from the proxy / application server.

Figure 18-3: Example of the Alert-Info Header

Filter: sip						
No.	Time	Source	Destination	Protocol	Length	Info
455	12:30:59.527476000	10.16.2.12	10.16.2.107	SIP/SDP	736	Request: INVITE sip:7777@10.16.2.107;user=phone
470	12:30:59.576796000	10.16.2.107	10.16.2.12	SIP	598	Status: 180 Ringing
<div> <div>Frame 455: 736 bytes on wire (5888 bits), 736 bytes captured (5888 bits) on interface 0</div> <div>Ethernet II, Src: Critical_9d:7f:81 (00:90:9e:9d:7f:81), Dst: AudioCod_48:ac:96 (00:90:8f:48:ac:96)</div> <div>Internet Protocol Version 4, Src: 10.16.2.12 (10.16.2.12), Dst: 10.16.2.107 (10.16.2.107)</div> <div>User Datagram Protocol, Src Port: 5060 (5060), Dst Port: 5060 (5060)</div> <div>Session Initiation Protocol (INVITE) <div>Request-line: INVITE sip:7777@10.16.2.107;user=phone SIP/2.0</div> <div>Message Header <div>Via: SIP/2.0/UDP 10.16.2.12;branch=ERGAUACCCCTDLGGPQ000X</div> <div>From: <sip:8888@10.16.2.12;user=phone>;tag=XDNDQYIDSVRPNOAGVIBB</div> <div>To: <sip:7777@10.16.2.107;user=phone></div> <div>Call-ID: ULRJJBRHJBDWXANSAYNH@10.16.2.12</div> <div>CSeq: 1 INVITE</div> <div>Contact: <sip:8888@10.16.2.12></div> <div>Supported: em,100rel,timer,replaces</div> <div>Allow: REGISTER,OPTIONS,INVITE,ACK,CANCEL,BYE,NOTIFY,PRACK,REFER,INFO,SUBSCRIBE</div> <div>User-Agent: SIP Message Generator V1.0</div> <div>Alert-Info: external_call1</div> <div>Content-Type: application/sdp</div> <div>Content-Length: 155</div> </div> </div> <div>Message Body</div> </div>						

The phone will play **ring tone 5** irrespective of the selected line ring tone.

18.2 Configuring CPT Regional Settings

It's important to match your phone's Call Progress Tones (CPT) to the country in which your phone is located. Here's how to configure it.

➤ **To configure your region using the Web interface:**

1. Open the Tones page (Configuration tab > Personal Settings > Tones).

Figure 18-4: Tones - Regional Settings

Regional Settings

Current Location: USA

Attention

- Changing the regional settings parameters requires a reboot

Submit

2. From the 'Current Location' drop-down list, select the country in which your phone is located. Use the table below as reference.
3. Click **Submit**.

➤ **To configure regional location using the configuration file:**

- Use the table below as reference.

Table 18-2: Regional Parameters

Parameter	Description
Current Location [voip/regional_settings/selected_country]	<p>Defines the country in which your phone is located. The behavior and parameters of analog telephones lines vary between countries. CPTs are country-specific. The phone automatically selects the correct regional settings according to this parameter. Supported countries are:</p> <ul style="list-style-type: none"> ▪ [Israel] Israel ▪ [China] China ▪ [France] France ▪ [Germany] Germany ▪ [Netherlands] Netherlands ▪ [UK] UK ▪ [Brazil] Brazil ▪ [Italy] Italy ▪ [Argentina] Argentina ▪ [Portugal] Portugal ▪ [Russia] Russia ▪ [Australia] Australia ▪ [USA] USA (Default) ▪ [India] India

Parameter	Description
[voip/regional_settings/use_config_file_values]	Enables the user-defined CPT. When this parameter is enabled, the 'selected_country' parameter is not relevant and the CPT values below can be determined by the user. <ul style="list-style-type: none"> ▪ [0] - Disable (default) ▪ [1] - Enable
Call Progress Tones (CPT) Note: Up to 10 CPTs can be configured (voip/regional_settings/call_progress_tones/0...9).	
[voip/regional_settings/call_progress_tones/%d/enabled]	Enables the specific CPT. <ul style="list-style-type: none"> ▪ [0] - Disable ▪ [1] - Enable
[voip/regional_settings/call_progress_tones/%d/name]	Defines the name of the CPT.
[voip/regional_settings/call_progress_tones/%d/cadence]	Defines the cadence type of the tone. <ul style="list-style-type: none"> ▪ [0] - Continuous signal ▪ [1] - Cadence signal ▪ [2] - Burst signal
[voip/regional_settings/call_progress_tones/%d/frequency_a]	Defines the low frequency (in Hz) of the tone. Range:300 - 1980 Hz, in steps of 1 Hz. Unused frequencies must be set to zero.
[voip/regional_settings/call_progress_tones/%d/frequency_b]	Defines the high frequency (in Hz) of the tone. Range:300 - 3000 Hz, in steps of 1 Hz. Unused frequencies must be set to zero.
[voip/regional_settings/call_progress_tones/%d/frequency_a_level]	Output level of the low frequency tone (in -dBm) in Call Progress generation. Range: 0 - 63, where 63 is mute.
[voip/regional_settings/call_progress_tones/%d/frequency_b_level]	Output level of the low frequency tone (in -dBm) in Call Progress generation. Range:0 - 63, where 63 is mute.
[voip/regional_settings/call_progress_tones/2/name]	Default: busy_tone The calling party hears a busy tone if the called party's line is busy. The busy tone complies with international telcom standards in traditional non-VOIP telephony systems.
[voip/regional_settings/call_progress_tones/%d/tone_on_0]	tone_on_0 to tone_on_3. If the signal is Cadence or Burst, then this value represents the on duration. If a Continuous tone, then this value represents the minimum detection time. In units of 10 msec. Range:0 - 10000.
[voip/regional_settings/call_progress_tones/%d/tone_off_0]	tone_off_0 to tone_on_3. If the signal is Cadence, then this value represents the off duration, in units of 10 msec. If not used, then set it to zero. If the signal is Burst, only tone_off 0 is relevant. It represents the off time that is required from the end of the signal to the detection time. Range:0 - 10000.

18.3 Uploading Ring Tones

New Ring Tones can be uploaded using the Web interface or configuration file.



Note:

- The ring tone file must be in WAV file format (A/Mu-Law, 8-kHz audio sample rate and 8-bit audio sample size or PCM 16-kHz audio sample rate and 16-bit audio sample size, Intel PCM encoding).
- For the phone to use an uploaded ring tone, select it on the phone (see the phone's *User's Manual*).

➤ **To upload a ring tone using the Web interface:**

1. Open the Tones page (**Configuration** tab > **Personal Settings** menu > **Tones**).

Figure 18-5: Upload Ringing Tone

Upload Ringing Tone (Available space for Additional Ringing Tone WAV Files: 1300KB)		
Ringing Tone Name: <input type="text"/>		
File Location:	<input type="text"/>	<input type="button" value="Browse..."/>
		<input type="button" value="Submit"/>
ID	Ringing Tone Name	Delete
		<input type="button" value="Submit"/>
Distinctive Ringing Setting		
ID	Ringing Tone Types	Ringing Tone Name
1	<input type="text"/>	Ring01 ▾
2	<input type="text"/>	Ring02 ▾
3	<input type="text"/>	Ring03 ▾
4	<input type="text"/>	Ring04 ▾
5	<input type="text"/>	Ring05 ▾

2. In the 'Ringing Tone Name' field, enter the name of the ring tone file to upload. If you do not enter a name, the phone assigns the tone's file name (without the .wav file extension) as the name of the tone.
 3. Click the **Browse** button, navigate to the folder in which the ring tone file is located, select the file, and then click **Open**; the file name and path is displayed in the 'File Location' field.
 4. Click **Submit**; the file is loaded to the phone and displayed in the Ring Tone Name list.
- **To delete Ring Tones using the Web interface:**
- Select the 'Delete' check boxes corresponding to the ring tone that you want to delete, and then click **Submit**.
- **To upload Ring Tones using the configuration file:**
- Use Table 18-3 below as reference.

Table 18-3: Ring Tone Parameters

Parameter	Description
Ringing Tone Name File Location [provisioning/ring_tone_uri]	The URI for retrieving the ring tones file. The ring tones can be compressed to zip or tgz files and provided to the phone during provisioning. For example: provisioning/ring_tone_uri=tones.tgz Note: <ul style="list-style-type: none"> The ringtone file is downloaded only after boot up, and not periodically. If the tones file is new, the phone updates the information, but does not reboot. For the feature to function, the file must first be compressed to zip / tgz format. The phone won't accept a simple .wav file format.
[personal_settings/lines/0/ring_tone] - [personal_settings/lines/3/ring_tone]	Lets administrators set a ring tone for each line extension (up to four line extensions). Administrators can choose any one of the eleven ring tones available: Ring01 - Ring11

18.4 Configuring Beeps to Headsets when a Call Comes in to a Call Center

You can configure a beep instead of ringing to be played to agents' headsets when a call comes in to a Call Center. The beep is heard even if 'Auto answer' is configured to **0**.

➤ To play beeps to headsets instead of ringing:

- Use the table below as reference.

Table 18-4: Configuring Beeps to be Played to Headsets when Calls Come in

Parameter	Description
[voip/beep_to_ringing_device/enabled]	Enables/disables beeping the device. <ul style="list-style-type: none"> [0] Disable (default) [1] Enable
[voip/beep_to_ringing_device/number_of_beeps]	If the feature is enabled, the number of beeps must be configured. Default: 3.

18.5 Configuring the Phone to play Fast Busy Tone if Automatically Disconnected on Remote Side

You can configure the phone to play a fast busy tone if it is automatically disconnected on the remote side. You can also configure for how long this fast busy tone is played. When the phone plays the tone, it also displays a 'Disconnected' message for the same length of time.

➤ **To configure this feature:**

- Use the table below as reference.

Table 18-5: Configuring the Phone to Play a Fast Busy Tone when Automatically Disconnected on Remote Side

Parameter	Description
[enable_remote_disconnect_warningTone]	Allows you to enable or disable playing a fast busy tone if the phone is automatically disconnected on the remote side. <ul style="list-style-type: none">▪ [0] (default) If the phone accepts an incoming call and the remote side automatically ends it (disconnects), the phone does not play any tone and no message is displayed.▪ [1] If the phone accepts an incoming call and the remote side automatically ends (disconnects) it, the phone plays a fast busy tone and displays a Disconnected message (see the parameter description below).
[voip/dialing/automatic_disconnect_delay_timer]	Defines for how long the fast busy tone is played and for how long the 'Disconnected' message is displayed if the warningTone parameter above is enabled and the phone is automatically disconnected on the remote side. Default: 3000 ms.

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19 Configuring Media Settings

Here's how to configure media settings.

19.1 Configuring Media Streaming

The Configuring Media Streaming feature can be configured using the configuration file. Configure the parameters using the table below as reference.

Table 19-1: Media Streaming Parameters

Parameter	Description
[voip/media/rtp_mute_on_hold]	Mute sending RTP packets to remote in HOLD state. <ul style="list-style-type: none">▪ [0] - Disabled. RTP packets are sent to remote end when in HOLD state.▪ [1] - Enabled (default). RTP packets are not sent to remote end when in HOLD state.
[voip/media/allow_multiple_rtp]	Defines whether to allow multiple RTP streams from different remote ends to be played toward the phone in a single call. <ul style="list-style-type: none">▪ [0] Disable (default)▪ [1] Enable
[voip/media/ignore_rfc_2833_packets]	Defines whether to ignore playing DTMF when RFC2833 arrives from the network. <ul style="list-style-type: none">▪ [0] Disable▪ [1] Enable (default)
[voip/media/broken_connection_detection]	If enabled an active call will be automatically disconnected if no RTP packet is received within pre-defined time. <ul style="list-style-type: none">▪ [0] Disable (default)▪ [1] Enable
[voip/media/broken_connection_timeout]	If no RTP packet arrives for an active call within this timeout (in seconds), the connection will be considered broken and the call will be disconnected. Default: 10.

19.2 Configuring RTP Port Range and Payload Type

RTP Port Range and Payload Type can be configured using the Web interface or configuration file.

➤ **To configure RTP Port Range and Payload Type using the Web interface:**

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**).

Figure 19-1: Media Streaming

Media Streaming Parameters	
RTP Port Range - Contiguous Series of 4 Ports Starting From:	<input type="text" value="4000"/>
DTMF Relay RFC 2833 Payload Type:	<input type="text" value="101"/>

2. Configure 'RTP Port Range' and 'Payload Type' parameters using the table below as reference, and then click **Submit**.

➤ **To configure RTP Port Range and Payload Type using the configuration file:**

- Use the table below as reference.

Table 19-2: RTP Port Range and Payload Type Parameters

Parameter	Description
DTMF Relay RFC 2833 Payload Type [voip/media/dtmf_payload]	Defines the RTP payload type used for RFC 2833 DTMF relay packets. Range: 96 - 127. Default: 101.
RTP Port Range [voip/media/media_port]	Defines the base port for the range of Real Time Protocol (RTP) voice transport ports which the enterprise IT administrator must open on the network's firewall. Default: 4000. Valid possible ports (if the default is selected as base port): 4000-4126. If, for example, 5000 is selected as the base port, the valid possible ports will be 5000-5126.

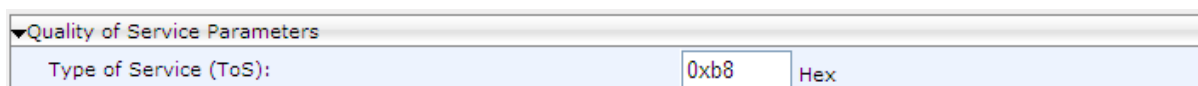
19.3 Configuring RTP QoS

RTP QoS can be configured using the Web interface or configuration file.

➤ **To configure RTP QoS using the Web interface:**

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**).

Figure 19-2: Quality of Service



▼Quality of Service Parameters

Type of Service (ToS): ☒ Hex

2. Configure the QoS parameter using the table below as reference, and then click **Submit**.

➤ **To configure RTP QoS using the configuration file:**

- Use the table below as reference.

Table 19-3: RTP QoS Parameter

Parameter	Description
Type of Service (ToS) [voip/media/media_tos]	QoS in hexadecimal format. This is a part of the IP header that defines the type of routing service to tag outgoing voice packets originated from the phone. It informs routers that this packet must receive a specific QoS. The default value is 0xb8 . Values can be set in decimal (e.g., 184) or hexadecimal (e.g., 0xb8). Default: 184.

19.4 Configuring Codecs

Codecs can be configured using the Web interface or configuration file.

➤ **To define the Codecs using the Web interface:**

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**).

Figure 19-3: Media Streaming - Codecs

▼Codecs		
Codec Priority	Codec Type	Packetization Time (milliseconds)
1st Codec	G.722/16000 ▼	20 ▼
2nd Codec	G.711, 64 Kbps, u-Law ▼	20 ▼
3rd Codec	G.711, 64 Kbps, A-Law ▼	20 ▼
4th Codec	G.729, 8 Kbps ▼	20 ▼
5th Codec	G.722/16000 ▼	20 ▼

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ **To define the Codecs using the configuration file:**

- Use the table below as reference.

Table 19-4: Codec Parameters

Parameter	Description
[voip/codec/codec_info/%d/enabled]	<p>Determines the codecs that you want to implement and their priority. Up to five codecs can be configured, where the first codec (i.e., voip/codec/0/...) has the highest priority. To make a call, at least one codec must be configured. In addition, for best performance it is recommended to select as many codecs as possible.</p> <p>When you start a call to a remote party, your available codecs are compared with the remote party's to determine the codec to use. If there is no codec that both parties have made available, the call attempt fails. Note that if more than one codec is common to both parties, you cannot force which of the common codecs are used by the remote party's client. To force the use of a specific codec, configure the list with only that specific codec.</p> <p>The %d variable stands for the priority:</p> <ul style="list-style-type: none"> ▪ [0] - Disabled ▪ [1] (default) - Enabled

Parameter	Description
Codec Type [voip/codec/codec_info /%d/name]	<p>Name of the codec. The variable <i>%d</i> depicts the index number of the codec entry and its priority, where the first codec (i.e. voip/codec/codec_info/0/name=...) has the highest priority. The valid codec parameters are:</p> <ul style="list-style-type: none"> ▪ [G722] G.722 (default) ▪ [PCMA] G.711 A-Law ▪ [PCMU] G.711 Mu-Law ▪ [G729] G.729 ▪ OPUS <p>For example, voip/codec/codec_info/0/name=G722.</p> <p>Note:</p> <ul style="list-style-type: none"> ▪ If OPUS is selected from the list of codecs on a phone that doesn't support the OPUS codec, a warning pops up: 'The hardware doesn't support the OPUS codec' (see the figure below). ▪ If a call starts with the OPUS codec and the user makes a conference call, the phone switches from the OPUS codec to G.711 for the conference call. ▪ To enable OPUS management for enhanced voice quality, see Section 19.5.
[voip/media/opus_payload]	Allows the network administrator to configure the OPUS dynamic payload type. Default: 111.
Packetization Time [voip/codec/codec_info /%d/ptime]	<p>Packetization time - length of the digital voice segment that each packet holds.</p> <p>The default is 20 millisecond packets, excluding G.723 which is 30 millisecond packets.</p>
G.723 Bitrate [voip/codec/g723_bitrate]	<p>Low or high bit rate for G.723.</p> <ul style="list-style-type: none"> ▪ [LOW] Low ▪ [HIGH] High (default)
[voip/codec/g722_bitrate]	<p>G.722 bit rate.</p> <ul style="list-style-type: none"> ▪ [G722_64K] (default) ▪ [G722_56K] ▪ [G722_48K] <p>Note: Currently, only 64bps is supported.</p>
OPUS Jitter Buffer Minimum Delay [voip/codec/opus/jitter_buffer/min_delay]	<p>The initial and minimum delay of the OPUS adaptive Jitter Buffer mechanism, which compensates for network impairments. The value should be set according to the expected average jitter in the network (in milliseconds). Range: 30-500. Default: 30.</p>
[system/activation_keys/amr_coder]	Activation key (string) required to unlock AMR coder (relevant for supporting firmware only).

Figure 19-4: Media Streaming - Codecs

Media Streaming

Media Streaming Parameters

RTP Port Range - Contiguous Series of 4 Ports Starting From:

4000

DTMF Relay RFC 2833 Payload Type:

101

Quality of Service Parameters

Type of Service (ToS):

0xb8

Hex

Warning! This hardware doesn't support the OPUS codec.

Codecs

Codec Priority	Codec Type	Packetization Time (milliseconds)
1st Codec	G.722/16000	20
2nd Codec	G.711, 64 Kbps, u-Law	20
3rd Codec	G.711, 64 Kbps, A-Law	20
4th Codec	OPUS/48000	20
5th Codec	G.729, 8 Kbps	20

19.5 Configuring OPUS Management

OPUS management for enhanced voice quality allows the OPUS audio codec's configuration to be changed on the fly when impairments are detected in the network. The OPUS functions at a lower channel bit rate and consumes less bandwidth, delivering better voice quality despite the poor network conditions. OPUS management can be configured using configuration file.

- To configure OPUS management using the configuration file:
 - Use the table below as reference.

Table 19-5: OPUS Management Parameter

Parameter	Description
[voip/voice_quality/mode]	Enables OPUS management for enhanced voice quality. <ul style="list-style-type: none"> ▪ [DISABLE] Disable (default) ▪ [ENABLE_RTCP_FEEDBACK] Enable

20 Configuring Voice Settings

Here's how to configure voice settings.

20.1 Configuring Gain Control

See Section 23.1 for detailed information.

20.2 Configuring Jitter Buffer

Jitter Buffer can be configured using the Web interface or configuration file.

➤ **To define Jitter Buffer using the Web interface:**

1. Open the Voice page (**Configuration** tab > **Voice Over IP** menu > **Voice**) and then scroll down to Jitter Buffer.

Figure 20-1: Voice – Jitter Buffer

▼Jitter Buffer	
Minimum Delay (10 to 250 milliseconds):	<input type="text" value="10"/> msec
Optimization Factor (1 to 13):	<input type="text" value="10"/> ▼

2. Configure the Jitter Buffer parameters using the table below as reference, and then click **Submit**.

➤ **To define Jitter Buffer using the configuration file:**

- Use the table below as reference.

Table 20-1: Jitter Buffer Parameters

Parameter	Description
Minimum Delay [voip/audio/jitter_buffer/min_delay]	The initial and minimal delay of the adaptive jitter buffer mechanism, which compensates for network problems. The value should be set according to the expected average jitter in the network (in milliseconds). Range: 10 to 150. Default: 10.
Optimization Factor [voip/audio/jitter_buffer/optimization_factor]	The adaptation rate of the jitter buffer mechanism. Higher values cause the jitter buffer to respond faster to increased network jitter. Range: 0 to 13. Default: 10.

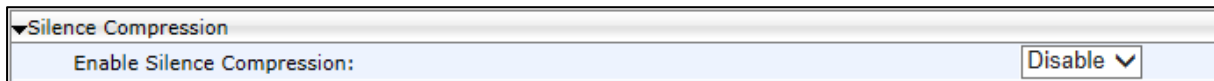
20.3 Configuring Silence Compression

The Silence Compression feature can be configured using the Web interface or configuration file.

➤ **To configure Silence Compression using the Web interface:**

1. Open the Voice page (**Configuration** tab > **Voice Over IP** menu > **Voice**) and then scroll down to Silence Compression.

Figure 20-2: Voice - Silence Compression



▼Silence Compression

Enable Silence Compression: ☒ Disable ▼

2. Configure the parameter using the table below as reference, and then click **Submit**.

➤ **To configure Silence Compression using the configuration file:**

- Use the table below as reference.

Table 20-2: Silence Compression Parameters

Parameter	Description
Enable Silence Compression [voip/audio/silence_compression/enabled]	Enables silence compression for reducing network bandwidth consumption. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

20.4 Configuring Noise Reduction

The Noise Reduction feature can be configured using the Web interface.



Note: It's strongly advisable *not* to change the default values without consulting AudioCodes.

➤ **To configure Noise Reduction using the Web interface:**

1. Open the Voice page (**Configuration** tab > **Voice Over IP** menu > **Voice**) and then scroll down to Noise Reduction.

Figure 20-3: Voice - Noise Reduction

▼Noise Reduction	
Enable Noise Reduction:	Enable ▼
Enable Noise Reduction Suppression:	Enable ▼
Enable Noise Reduction Post Gain:	Disable ▼
Stationary Level:(0-3):	2 ▼
Maximal Attenuation:(0-15):	2

2. Configure the parameters referring to the table below, and then click **Submit**.

Table 20-3: Noise Reduction Parameters

Parameter	Description
Enable Noise Reduction	Efficiently suppresses stationary background noise (e.g. office noise) and enhances speech by improving SNR (Signal to Noise Ratio) and emphasizing the important features of the desired speech signal. On the phones, an additive noise is captured due to environmental settings, such as office noise, air conditioning, etc. <ul style="list-style-type: none"> ▪ Disable ▪ Enable (default)
Enable Noise Reduction Suppression	Enables NRS. <ul style="list-style-type: none"> ▪ Disable ▪ Enable (default)
Enable Noise Reduction Post Gain	Enables the noise reduction post gain. The post gain is additional attenuation of the signal which is performed after the noise reduction operation. It is needed if the noise is highly non-stationary or of low SNR. Note that the post gain attenuates also the speech signal. <ul style="list-style-type: none"> ▪ Disable (default) ▪ Enable
Stationary Level:(0-3)	Configures the noise reduction sensitivity to stationary noise. 0 = sensitive to stationary noise only. 3 = sensitive to highly non-stationary noise. Default: 2
Maximal Attenuation:(0-15)	Defines the maximal noise attenuation during noise-only periods. Default: 2 .

20.5 Configuring Echo Cancellation



Note:

- It is strongly advisable to leave the echo cancellation parameters at their defaults and *not* to configure different values.
- Contact your AudioCodes representative if you encounter an echo cancellation related issue.

You can view the following echo cancellation related parameters in the configuration file (**Management** tab > **Manual Update** > **Configuration File**).

- voip/audio/echo_cancellation/enabled
- voip/audio/echo_cancellation/extended_nlp/enabled
- voip/audio/echo_cancellation/handset/HPF_mode
- voip/audio/echo_cancellation/handsfree/HPF_mode
- voip/audio/echo_cancellation/headset/HPF_mode
- voip/audio/echo_cancellation/nlp/max_delay
- voip/audio/echo_cancellation/nlp/mode

21 Configuring Extension Lines

21.1 On the Phone

Before you can make a call, you must configure an extension line (SIP account). Here's how to configure an extension line on the phone.

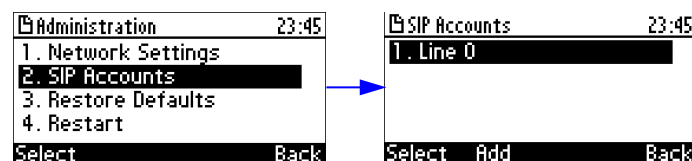


Note:

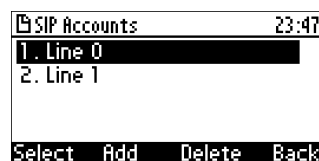
- 440HD / 430HD phone screens are shown here.
- 420HD / 405 / 405HD phone screens are virtually identical.

➤ **To configure an extension line on the phone:**

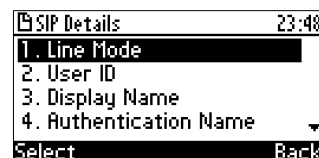
1. Open the SIP Accounts screen (MENU key > **Administration** > **SIP Accounts**).



2. To add a new line extension (SIP account), press the **Add** softkey (or skip to Step 3 to define an existing line extension (SIP account)).



3. Navigate to the added line and then press the **Select** softkey; the SIP Details screen appears.



4. Choose the required SIP parameter, and then press the **Select** softkey to define it:
 - Line Mode (applies only to the 440HD/ 430HD phones)
 - User ID
 - Display Name
 - Authentication Name
 - Authentication Password
 - SIP Proxy Address
5. After each parameter setting, press the **Save** softkey to save the setting.
6. After completing configuring SIP account settings, press the **Back** softkey until you're prompted that the phone is rebooting. The screen indicates a warning message: 'Phone is rebooting to apply new settings'.

Phone is rebooting
to apply new settings...

21.2 Using the Web Interface and Configuration File

Here's how to configure an extension line (SIP account) using the Web interface and configuration file.



Note: The Web interface page of the 440HD / 430HD phone are shown here. The Web pages of the 420HD / 405/405HD phones are identical, except that on the 420HD/405/405HD phones:

- 'Line Label' is displayed instead of 'Line Mode'
- Two lines can be configured instead of six as on the 430HD/440HD phones

➤ **To configure an extension line (SIP account) using the Web interface:**

1. Open the Line Settings page (**Configuration** tab > **Voice Over IP** menu > **Line Settings**).

Figure 21-1: Line Settings

▼Line Settings	
Line Number:	1 ▼
Line 1 Activate:	Enable ▼
Line 1 Display Name:	440HD
Line 1 User ID:	4263
Line 1 Authentication User Name:	4263
Line 1 Authentication Password:	••••••••
Line 1 Label:	
Line 1 Mode:	Private ▼

2. Configure the Line Settings using the table below as reference, and then click **Submit**.

➤ **To configure an extension line (SIP account) using the configuration file:**

- Use the table below as reference. %d refers to the line number.

Table 21-1: Line Parameters

Parameter	Description
Line Activate [voip/line/%d/enabled]	Activates or deactivates the line. See also Section. 25.2.1.1. [0] = Disabled (this is the default for the second line and higher in the configuration file) [1] = Enabled (this is the default for the first line voip/line/0/ in the configuration file).
Line User ID [voip/line/%d/id]	Lines VoIP user's ID for identification to initiate and accept calls. The user's ID can be up to 30 characters.
Line Display Name [voip/line/%d/description]	Arbitrary name to intuitively identify the line and that is displayed to remote parties as your caller ID.

Parameter	Description
Line Authentication User Name [voip/line/%d/auth_name]	User name provided to you from the VoIP service provider. This is used when sending a response to Unauthorized or Proxy Authentication Requested (401/407). The authentication name can be up to 35 characters.
Line Authentication Password [voip/line/%d/auth_password]	Password provided to you from the VoIP Service Provider. This is used when sending a response to Unauthorized or Proxy Authentication Requested (401/407). The authentication password can be up to 35 characters.
Line Label [voip/line/%d/extension_display]	[Only applies to the 420HD and 405/405HD phones] Set the string that will be displayed in the phone screen for local extension. If not set, the local extension displayed will be the user ID (self-number).
Line Mode [voip/line/%d/line_mode]	[Only applies to 430HD/440HD phones] Determines the line mode: PRIVATE (default) or SHARED. SHARED allows enterprise employees to share an extension number and manage a call as a group. When an employee places a call on a SHARED line on hold, the call can be resumed from any other employee sharing the line.



Note: You can activate DnD per phone line (see Section [22.8](#)).

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22 Configuring Supplementary Services

You can configure various supplementary services supported by your phone such as Call Waiting, Call Forwarding, Three-way Conferencing, and Message Waiting Indication (MWI).

22.1 Selecting the Application Server

By default, the phone is set for a generic application server. However, you can select a specific third-party application server as described below.



Note: Configuration of specific supplementary services depends on the third-party application server used in your organization.

➤ **To select the application server using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-1: Services

2. Select the application server and then click **Submit**. Use the table below as reference.

➤ **To select the application server using the configuration file:**

- Use the table below as reference.

Table 22-1: General Supplementary Services Parameters

Parameter	Description
Type [voip/services/application_server_type]	<p>Defines the type of the application server to which the device is registered.</p> <ul style="list-style-type: none"> ▪ [Generic] Generic (default) ▪ [Asterisk] Asterisk ▪ [BSFT] BroadSoft ▪ [Coral] Coral ▪ [Metaswitch] Metaswitch ▪ [FreeSWITCH] FreeSWITCH ▪ [GENBAND] Kandy Business Solutions softswitch solution, provided by Ribbon Communications. <p>Note:</p> <ul style="list-style-type: none"> ▪ Parameters unique to the selected application server become applicable in addition to this page's parameters. ▪ For more information about Ribbon Communications' KBS environment, see Ribbon Communications' <i>Kandy Business</i>

Parameter	Description
	<i>Solutions Feature Description Guide.</i>
Presence [system/current_user_presence_status/enabled]	Only displayed if the application server selected [FreeSWITCH] supports it. Enables the presence feature. The DND softkey on the phone is replaced by Status ; the phone shows and publishes the presence status.
Feature Key Synchronization	Only displayed if BSFT is selected.

22.2 Configuring Call Waiting

Call Waiting can be configured using the Web interface or configuration file.

➤ **To configure call waiting using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-2: Services - Call Waiting

▼ Call Waiting	
Activate:	Enable ▼
Call Waiting SIP Reply:	Queued ▼
Generate Tone:	Enable ▼

2. Configure the Call Waiting parameters using the table below as reference, and then click **Submit**.

➤ **To configure call waiting using the configuration file:**

- Use the table below as reference.

Table 22-2: Call Waiting Parameters

Parameter	Description
Activate [voip/services/call_waiting/enabled]	Enables the Call Waiting feature. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)
Call Waiting SIP Reply [voip/services/call_waiting/sip_reply]	Determines the SIP response that is sent when another call arrives while a call is in progress: <ul style="list-style-type: none"> ▪ [RINGING]Ringing - 180 Ringing ▪ [QUEUED]Queued (default) - 182 Queued
Generate Tone [/voip/services/call_waiting/generate_tone/enabled]	Determines whether the phone plays a call waiting tone: <ul style="list-style-type: none"> ▪ [0] The phone doesn't play a call waiting tone. ▪ [1] The phone plays a call waiting tone (default).

22.3 Configuring Call Forwarding

Call Forwarding can be configured using the Web interface, configuration file, or phone screen. In a BroadSoft environment, Call Forwarding can be configured in the BroadSoft BroadWorks application server (see under Appendix A for detailed information).

➤ **To configure call forwarding using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-3: Services - Call Forward

▼ Call Forward	
Enable:	Enable ▼
Activate:	Enable ▼
Call Forward Type:	No Reply ▼
Forward on No Reply Timeout:	6 Seconds
Forward Destination:	

2. Configure the Call Forwarding parameters using the table below as reference, and then click **Submit**.

➤ **To configure call forwarding using the configuration file:**

- Use the table below as reference.

Table 22-3: Call Forward Parameters

Parameter	Description
Enable [voip/line/%d/call_forward/enabled]	Enables the Call Forward feature. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)
Activate [voip/line/%d/call_forward/active]	Activates call forwarding, if it was enabled with the parameter above. <ul style="list-style-type: none"> ▪ [0] (default) - Disable ▪ [1] Enable Note: Call Forwarding is typically activated on the phone screen (see the <i>User's Manual</i>).
Call Forward Type [voip/line/%d/call_forward/type]	Determines the condition on which incoming calls are forwarded to another destination: <ul style="list-style-type: none"> ▪ [Unconditional] Unconditional - incoming calls are forwarded independently of the status of the line. ▪ [Busy] Busy- incoming calls are forwarded only if the phone is busy. ▪ [No_Reply] No Reply (default) - incoming calls are forwarded only if the phone does not answer before a user-defined timeout.
Forward on No Reply Timeout [voip/line/%d/call_forward/timeout]	If calls are forwarded when the condition is No-Reply, then this parameter defines the time (in seconds) after which incoming calls are forwarded when this is no reply. Range:0 - 7200. Default: 6.
Forward Destination [voip/line/%d/call_forward/destination]	The destination to which the call is directed when call forward is activated.

- **To configure call forwarding using the phone's screen:**
 - See the *User's Manual* for detailed information.

22.4 Configuring a Conference

Three-way conferencing can be configured using the Web interface or configuration file.

➤ **To configure three-way conferencing using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-4: Services - Conference

The screenshot shows a web interface for configuring conference services. It has a title bar '▼Conference'. Below it, there are two fields: 'Mode:' with a dropdown menu currently showing 'Remote', and 'Remote Conference Media Server:' with a text input field containing '0.0.0.0'.

2. Configure the conferencing parameters using the table below as reference, and then click **Submit**.

➤ **To configure three-way conferencing using the configuration file:**

- Use the table below as reference.

Table 22-4: Conference Parameters

Parameter	Description
Mode [/ voip/services/conference/mode]	Sets the conference mode (when establishing 3-Way Conference). [LOCAL] = phone will establish the conference by itself. [REMOTE] = phone will use remote media server to establish the conference.
Remote Conference Media Server [/ voip/services/conference/conf_ms_addr]	Relevant only if 'Mode'(above) is REMOTE . Defines the media server for establishing remote conference.

For more information on this feature, see RFC 4579, Session Initiation Protocol (SIP) - Call Control - Conferencing for User Agents.

22.5 Allowing the Initiator to Drop out of a Conference

The phone can be configured to allow the initiator of a 3-way conference to drop out the conference when they on-hook the phone.

➤ **To configure the capability using the configuration file:**

- Use the table below as reference.

Table 22-5: Allowing a Conference Initiator to Drop Out when On-Hooking

Parameter	Description
[/ voip/drop_from_3wc_when_on_hook]	Allows the initiator of a 3-way conference to drop out of the conference when they on-hook the phone. [0] = The initiator won't drop out of the conference when they on-hook the phone. [1] = The initiator will drop out of the conference when they on-hook the phone.

22.6 Configuring Automatic Dialing

Automatic Dialing can be configured using the Web interface or configuration file.

➤ **To define Automatic Dialing using the Web interface:**

1. Open the Dialing page (**Configuration** tab > **Voice Over IP** menu > **Dialing**).

Figure 22-5: Dialing - Automatic Dialing

▼Automatic Dialing	
Activate:	Enable ▾
Timeout:	15 Seconds
Destination Phone Number:	0

2. Configure dialing options according to the parameters in the table below, and then click **Submit**.

➤ **To define Automatic Dialing using the configuration file:**

- Use the table below as reference.

Table 22-6: Automatic Dialing Parameters

Parameter	Description
Activate [voip/dialing/auto_dialing/enabled]	Determines whether automatic dialing is enabled (i.e., phone number is automatically dialed when you off-hook the phone). <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Timeout [voip/dialing/auto_dialing/timeout]	Timeout (in seconds) before automatic dialing occurs after the phone is off-hooked. When set to 0, automatic dialing is performed immediately. The valid range is 0 to 120. The default value is 15.
Destination Phone Number [voip/dialing/auto_dialing/destination]	The number that is automatically dialed when the phone is off-hooked. The valid value can be up to 32 characters.

22.7 Configuring Automatic Answer

The Automatic Answer feature is configured using the configuration file. Use the table below as reference.

Table 22-7: Automatic Answer Parameters

Parameter	Description
[voip/auto_answer/enabled]	<p>Enables the Automatic Answering feature.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>When this parameter is enabled and an incoming SIP INVITE message is received containing information that informs the phone to automatically answer the call, the phone answers the call immediately or after a timeout, depending on the auto-answer type specified in the INVITE message:</p> <ul style="list-style-type: none"> ▪ Phone answers after a timeout: The phone automatically answers the call after a timeout if the INVITE message includes a SIP Call-Info header with a tag value, answer-after= set to a number representing the timeout. During the timeout interval, the phone rings normally. If the call is answered or rejected during this interval, then the automatic answering mechanism is not used. However, if the phone is left to ring throughout the timeout interval, it automatically answers the call once this timeout expires. ▪ Phone answers immediately: The phone answers the call immediately in any of the following cases: <ul style="list-style-type: none"> ▪ If the SIP Alert-Info header contains the tag value ring answer. ▪ If the SIP Alert-Info header contains the tag value info=alert-autoanswer. <p>Note:</p> <ul style="list-style-type: none"> ▪ If the SIP Call-Info header includes all the above answer types or any two different types (i.e., answer-after=, ring answer, and alert-autoanswer), the answer-after= type takes precedence. ▪ If there is an existing call when an INVITE message for automatic answer is received, the existing call is automatically put on hold.
[voip/talk_event/enabled]	<p>Enables the 'talk' event feature.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>The phone automatically answers an incoming call if it receives a SIP NOTIFY message with the 'talk' event. If a call is already in progress, the call is put on hold and the incoming call is answered.</p>
[voip/advanced_auto_answer/timeout]	<p>The timeout before the call is answered (in seconds). Range: 0 – 60 (seconds)</p>

Parameter	Description
	<ul style="list-style-type: none"> ▪ [5] = 5 seconds (default) ▪ [0] = immediately
[voip/advanced_auto_answer/type]	<ul style="list-style-type: none"> ▪ SIP_Header (default) = identical to the parameter 'voip/auto_answer/enabled' described above ▪ Manual = the phone automatically answers incoming calls according to the timeout configured in the 'voip/advanced_auto_answer/timeout' parameter
voip/auto_answer_use_180/enabled=0	<p>Determines whether or not the phone will ring before auto answer, or if auto answer will occur immediately, before the phone rings.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) = No ringing occurs before auto answer; auto answer occurs immediately ▪ [1] Enable – Ringing occurs before auto answer



Note:

- The configuration file parameter 'voip/auto_answer/enabled' must be set to **1** to support the following:
 - ✓ voip/advanced_auto_answer/timeout
 - ✓ voip/advanced_auto_answer/type
 - ✓ voip/auto_answer_use_180/enabled

22.8 Configuring Do Not Disturb (DnD)

The Do not Disturb (DnD) feature can be configured using the Web interface or configuration file. It can also be configured in BroadSoft's BroadWorks (see under Appendix A.1.3).

➤ **To configure DnD using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-6: Services - DnD

▼DND (Do Not Disturb)	
Enable:	Enable ▼
Activate:	Disable ▼

2. Configure using the table below as reference, and then click **Submit**.

➤ **To configure DnD using the configuration file:**

- Use the table below as reference.

Table 22-8: Do Not Disturb Parameters

Parameter	Description
Enable [voip/services/do_not_disturb/enabled]	Enables the DnD feature. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)
Activate [voip/line/%d/do_not_disturb/activated]	Activates the DnD feature per phone line, if the parameter 'voip/services/do_not_disturb/enabled' is enabled. <ul style="list-style-type: none"> ▪ [0] – Deactivate (default) ▪ [1] - Activate <p>Three DnD configurations are possible in phones' idle screens: (1) If DnD is disabled, no notification will be displayed (2) If DnD is enabled for one line extension, one notification is displayed (3) If DnD is configured for two line extensions, two notifications are displayed.</p> <p>Note: DnD can also be activated in the phone's screen (more common).</p>

➤ **To configure DnD on the phone:**

- See the phone's *User's Manual* for detailed information.

22.9 Configuring Call Pick Up



Note: Call Pick Up only applies to the 430HD and 440HD phones.

Since the Call Pick Up feature is relevant only when Busy Lamp Field (BLF) is activated, the call pickup parameters appear as BLF related parameters.

➤ **To configure Call Pick Up using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-7: Services - BLF Support - Call Pick Up

▼BLF Support	
Activate:	Enable ▾
Call Pick Up:	Enable ▾
Access code:	**
BLF Subscription Period:	3600 Seconds

2. Under the BLF Support section, set the 'Activate' field to **Enable**.
3. Configure Call Pick Up according to the parameters in the table below, and then click **Submit**.

Table 22-9: Call Pick Up Parameters

Parameter	Description
Call Pick Up [voip/services/call_pickup/enabled]	Allows call pickup by pressing on the relevant BLF key when the remote phone's state is 'ringing'. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable
Access code [voip/services/call_pickup/access_code]	Allows a user to answer another's call by pressing a user-defined sequence of phone keys. The default sequence is **. The user dials the sequence + the other user's phone number; the incoming call from the other phone is forwarded to the user's phone. For example, to pick up a call for extension 5000, dial **5000 .

22.10 Configuring Message Waiting Indication

The Message Waiting Indication (MWI) feature can be configured using the Web interface or configuration file.

➤ **To configure MWI using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** > **Services**).

Figure 22-8: Services - MWI

▼Message Waiting Indication (MWI)	
Voice Mail Number:	<input type="text"/>
Activate:	Enable ▼
Subscribe To MWI:	Enable ▼
MWI Server IP Address or Host Name:	0.0.0.0
MWI Server Port:	5060
MWI Subscribe Expiry Time:	3600 Seconds

2. Configure using the table below as reference, and then click **Submit**.

➤ **To configure MWI using the configuration file:**

- Use the table below as reference.

Table 22-10: MWI Parameters

Parameter	Description
Voice Mail Number [voip/services/msg_waiting_ind/voice_mail_number]	Defines the extension number for accessing your voice mail messages. <ul style="list-style-type: none"> ▪ The valid value is up to 64 characters.
Activate [voip/services/msg_waiting_ind/enabled]	Enables the MWI feature. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)
Subscribe To MWI [voip/services/msg_waiting_ind/subscribe]	Determines whether the phone registers to an MWI server. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
MWI Server IP Address or Host Name [voip/services/msg_waiting_ind/subscribe_address]	The IP address or host name of the MWI server. Default: 0.0.0.0
MWI Server Port [voip/services/msg_waiting_ind/subscribe_port]	The port number of the MWI server. Range: 1024-65535. Default: 5060.
MWI Subscribe Expiry Time [voip/services/msg_waiting_ind/expiration_timeout]	The interval between the MWI Subscribe messages. Range: 0-86400. Default: 3600
[voip/services/msg_waiting_ind/always_send_port]	If the SIP port is the default port (i.e. 5060), then remove it from the Request-URI of the MWI SUBSCRIBE. <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)

22.11 Configuring Busy Lamp Field

The Busy Lamp Field (BLF) feature can be configured using the Web interface or configuration file.



Note: BLF only applies to the 430HD and 440HD phones.

➤ **To configure BLF using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure 22-9: Services - BLF

▼BLF Support	
Activate:	Enable ▾
Call Pick Up:	Enable ▾
Access code:	**
BLF Subscription Period:	3600 Seconds

2. Configure using the table below as reference, and then click **Submit**.

➤ **To configure BLF using the configuration file:**

- Use the table below as reference.

Table 22-11: BLF Parameters

Parameter	Description
Activate [voip/services/busy_lamp_field/enabled]	Enables the BLF feature: <ul style="list-style-type: none"> ▪ [0] Disable ▪ [1] Enable (default)
Call Pick Up	See Section 22.9.
Access code	See Section 22.9.
BLF Subscription Period [voip/services/busy_lamp_field/subscription_period]	The interval between BLF and SIP SUBSCRIBE messages. Range: 0 to 86400. Default: 3600.
User Resource List [voip/services/busy_lamp_field/uri]	[Only displayed if 'Type' is set to BSFT]. The user resource list. This must be the username (not the domain name). For example, if the URI resource list is mylist@server.com , then only the value mylist must be entered. The valid value is up to 64 characters.
Use Registrar as Application Server Address [voip/services/busy_lamp_field/application_server/use_registrar]	[Only displayed if 'Type' is set to BSFT]. Determines whether to use the registrar as the application server address. When enabled, there is no need to configure the application server address or domain name separately. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

Parameter	Description
Use Registrar as Application Server Address [voip/services/busy_lamp_field/application_server/addr]	[Only displayed if 'Type' is set to BSFT and the 'voip/services/busy_lamp_field/application_server/use_registrar' parameter is set to 0 .] Defines the IP address or host name of the application server. The valid value is up to 64 characters. Default: 0.0.0.0

22.12 Configuring Advice of Charge

The Advice of Charge (AOC) feature can be configured using the Web interface or configuration file. The feature permits an accurate estimate of the size of the bill which will eventually be charged to be displayed.

➤ **To configure AOC using the Web interface:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**) and then scroll down to AOC Support.

Figure 22-10: Services – AOC Support

▼AOC Support	
Enabled:	<input type="button" value="Enable"/>
Currency:	<input type="text" value="usd"/>
Ratio:	<input type="text" value="1"/>

2. Configure the parameters using the table below as reference, and then click **Submit**.

➤ **To configure AOC using the configuration file:**

- Use the table below as reference.

Table 22-12: AOC Parameters

Parameter	Description
Enable [system/aoc/enabled]	Enables the 'advice of charge' feature. [0] Disable [1] Enable
Currency [system/aoc/currency]	Sets the required currency for AOC display. The string represents the currency name (e.g., USD, EUR, NIS, etc.)
Ratio [system/aoc/ratio]	Sets the conversion ratio from the local currency. The string represents the ratio between the base currency to the set currency with a decimal point, e.g., : 3.8, 4.95, 1.

22.13 Configuring a Tone to Alert to Long Hold

Network administrators can configure an audible indication to be played after a call has been on hold for a long time. After a call has been on hold for a long time (the time is configurable), a reminder tone will be played every 10 seconds until the call is taken off hold. To configure the feature using the configuration file, use the table below as reference.

Table 22-13: Reminder Tone after Long Hold

Parameter	Description
[voip/lhcwrr_enabled]	Enables the feature. [1] (Default) Enabled. After the length of time configured for configuration file parameter <i>voip/lhcwrr_wait_time</i> lapses (see the parameter below), a reminder tone (beep) is played every 10 seconds until the call is taken off hold. [0] Disabled. No reminder tone (beep) is played, regardless of how long the call is on hold.
[voip/lhcwrr_wait_time]	Defines the length of time that must lapse before a reminder tone (beep) is played. The tone will then be played every 10 seconds until the call is taken off hold. Default: 120 seconds.

22.14 Disabling the HOLD Key

The network administrator can disable hard keys and softkeys on phones using the configuration file. The feature is motivated by the requirement on the part of some enterprises to control settings remotely to comply with company policy.

Here's how to disable the HOLD key on the phone's keypad.

➤ **To disable the HOLD key using the configuration file:**

- Use the table below as reference.

Table 22-14: Disabling the HOLD Key

Parameter	Description
[system/disable_hold_button]	Disables the HOLD key on the phone's keypad. The HOLD key is used to place a call on hold, or to resume a held call.

Besides the HOLD key, other hard keys that can be disabled include speaker, headset, voicemail, REDIAL, CONTACTS, MENU, TRANSFER, VOL and mute.

For more information, see Section 26.

22.15 Configuring Onhook Disconnect when Held



Note: Only applies to AudioCodes' SIP-100 and SIP-200 devices.

Here's how to configure whether the device automatically goes idle (i.e., on-hook) when the last remaining call is disconnected.

➤ **To configure onhook disconnect when held, using the configuration file:**

- Use the table below as reference.

Table 22-15: Onhook Disconnect when Held

Parameter	Description
[voip/onhook_disconnect_when_held/enabled]	Choose either: <ul style="list-style-type: none">▪ [0] Disable (default) - If the receiver is placed on-hook after a call is put on hold, the call is put on speaker rather; it isn't disconnected.▪ [1] Enable - If the receiver is placed on-hook after a call is put on hold, the call is disconnected.

22.16 Configuring Ringing on the Default Audio Device

Here's how to configure whether ringing is heard on the default audio device.

- To configure whether ringing is heard on the default audio device, using the configuration file:
 - Use the table below as reference.

Table 22-16: Configuring Ringing on the Default Audio Device

Parameter	Description
[voip/called_ringing_device]	<p>Determines which device rings when a call comes in. Configure either:</p> <ul style="list-style-type: none"> ▪ SPEAKER (default) ▪ HEADSET ▪ BOTH ▪ NO_RING <p>In call centers in which agents typically work close to one another wearing headsets, the administrator can configure HEADSET to prevent incoming calls ringing on speakers which creates a noisy environment.</p> <p>The parameter is bundled with the two parameters below ('hands_free_mode' and 'supervisor_listen_in') to maximize flexibility for call center administrators, who can - for example - disable ringing on the speaker yet enable hands-free mode (talking and listening using the speaker).</p>
[voip/hands_free_mode/enabled]	<p>When disabled [0]:</p> <ul style="list-style-type: none"> ▪ hands-free mode becomes unavailable ▪ pressing the speaker key does not have any effect ▪ when answering a call, the headset is the default audio <p>Configure:</p> <ul style="list-style-type: none"> ▪ [1] = Enabled (default) ▪ [0] = Disabled
[voip/services/supervisor_listen_in/enabled]	<p>If enabled, a call center supervisor can pick up an agent's handset and listen in on the conversation that the agent is conducting on headphones with the customer, without the customer at the other end sensing that the supervisor is listening in (because the supervisor is in effect muted).</p> <p>Configure:</p> <ul style="list-style-type: none"> ▪ [1] = Enabled ▪ [0] = Disabled (default)

22.17 Allowing an Incoming Call when the Phone is Locked

Here's how to allow or not allow an incoming call when the phone is locked.

- **To allow an incoming call when the phone is locked, using the configuration file:**
 - Use the table below as reference.

Table 22-17: Allowing an Incoming Call when the Phone is Locked

Parameter	Description
[system/lock/2-5/allow_incoming_calls]	Allows incoming calls when the phone is locked (default). <ul style="list-style-type: none">▪ If allowed, the user will need to enter an unlock password to answer an incoming call.▪ If not allowed, the incoming call will be automatically rejected by the phone.
[system/lock/2-5/enabled]	Enables the phone's lock feature. Relevant for supporting servers only.

22.18 Allowing Call Center Agents to Record Welcome Greetings

Here's how to let Call Center agents record welcome greetings.

- **To let Call Center agents record welcome greetings, using the configuration file:**
 - Use the table below as reference.

Table 22-18: Letting Call Center Agents Record Welcome Greetings

Parameter	Description
[voip/services/greeting/beep/enabled]	Enables a beep to be heard by the agent when the recorded welcome greeting finishes playing. <ul style="list-style-type: none">▪ [1] = Enabled (default)▪ [0] = Disabled
[voip/services/greeting/enabled]	Lets agents in a call center record directly on their phones personal voice greetings which play automatically when callers call in, to welcome callers to the service they're seeking. Configure: <ul style="list-style-type: none">▪ [1] = Enabled▪ [0] = Disabled (default)

22.19 Enabling the Electronic Hook Switch

The phone supports the Electronic Hook Switch (EHS) DHSG feature. Calls can be answered and volume level can be changed with EHS-capable headsets. The feature is supported on the following headsets:

- Jabra® PRO 920
- Jabra® PRO 9450

The headset's base unit connects to the phone's headphone port. The Audio connector connects to the headphone's port. The management connector connects to the Auxiliary port using a DHSG cable which can be ordered from AudioCodes.

The feature can be enabled using the Web interface or configuration file. The feature allows users to handle calls, i.e., answer calls and change volume level, with EHS-capable wireless headsets at a distance from the phone.

➤ To enable the EHS using the Web interface:

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**) and scroll down to the General Parameters section.

Figure 22-11: VoIP- Services – General Parameters

General Parameters	
Stutter Tone Duration:	2500 msec
Out of Service Behavior:	Reorder Tone ▼
Automatic Disconnect:	Enable ▼
Electronic Hook Switch:	Disable ▼
Reject Code:	603 ▼

2. Configure the 'Electronic Hook Switch' parameter using the table below as reference, and then click **Submit**.

➤ To enable EHS using the configuration file:

- Configure the EHS parameter using the table below as reference, and then click **Submit**.

Table 22-19: EHS Parameter

Parameter	Description
Electronic Hook Switch [voip/services/electronic_hook_switch/enabled]	<p>Enables the EHS DHSG-standard feature.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>DHSG (Drahtlose Hör-Sprechgarnitur) is the protocol used to convert a wireless headset's internal control signals to a commonly supported standard, and which uses the special AUX port.</p> <p>Supported wireless headsets can be connected to the AUX port (in addition to the regular headset port). This allows the user to connect and disconnect calls by pressing the button on the headset.</p>

The base unit of the headset connects to the phone's headset port, i.e., to the same port that all headsets' base units connect to. The Audio connector must be connected to the headphones port. The management connector must be connected to the Auxiliary port using a DHSG-standard cable which can be ordered from AudioCodes.

22.20 Disabling the Hard Mute Key on the Phone

The network administrator can disable the mute hard key on phones using the configuration file. The feature is motivated by the requirement on the part of some enterprises to control the key remotely to comply with company policy.

➤ **To disable the hard mute key on the phone using the configuration file:**

- Use the table below as reference.

Table 22-20: Disabling the Hard Mute Key on the Phone

Parameter	Description
[voip/block_mute_key]	<p>Allows network administrators to configure enabling or disabling the hard mute key on the phone.</p> <ul style="list-style-type: none">▪ [0] (default) Allows the hard mute key on the phone to function regularly.▪ [1] Disables the hard mute key on the phone.

In addition to the mute key, hard keys that can be disabled include speaker, headset, voicemail, REDIAL, CONTACTS, MENU, TRANSFER, HOLD, and VOL. See also [Section 26](#) for information about disabling these keys.

22.21 Configuring Attended and Semi-Attended Call Transfer

Here's how to configure a softkey with attended and semi-attended call transfer functionality, using the configuration file.

- To configure a softkey with attended / semi-attended call transfer functionality:

Use the table below as reference:

Table 22-21: Configuring a Softkey with Attended and Semi-Attended Call Transfer Functionality

Parameter	Description
[personal_settings/soft_keys/ongoing_call/0/key_function]	Default: Hold (all phone models except 405HD). Change it to TRANSFER to configure the softkey with attended / semi-attended call transfer functionality.

22.22 Configuring Blind Transfer

You can configure a softkey with blind transfer functionality using the configuration file.

- To configure a softkey with blind transfer functionality:

- Use the table below as reference:

Table 22-22: Configuring a Softkey with Blind Transfer Functionality

Parameter	Description
[personal_settings/soft_keys/ongoing_call/0/key_function]	<p>If you configure BLIND_TRANSFER, a softkey with blind transfer functionality will be displayed in the phone screen:</p> <ul style="list-style-type: none"> ▪ On the 405/405HD phone (exclusively), the softkey displayed will be BXfer. The 405/405HD phone does not feature a hard TRANSFER key like the other phones. This softkey enables that functionality. ▪ On the other phones (besides the 405/405HD), the softkey displayed is HOLD.

22.23 Creating a Speed Dial File for Configuration File

The configuration file can include a link to a user-defined Speed Dial file, using the 'provisioning/speed_dial_uri' parameter. This allows you to upload speed dial settings to the phone.

The Speed Dial file must include a list of speed dial configurations. The file must be a simple text file that can be created using an Excel document and saved as a CSV file.

The syntax of the speed dial file is as follows:

```
<memory key>,<speed dial phone number>,<type>
```

where:

<memory key> is the speed dial memory key on the phone.

<speed dial phone number> is the phone number that is automatically dialed, when the user presses the speed dial key.

<type> denotes the Speed Dial feature and must be set to "0".

Below is an example of a Speed Dial file:

```
1,4418,0
2,4403,0
3,039764432,0
4,4391,0
12,1234,0
```

This page is intentionally left blank.

23 Configuring Volume Levels

Here's how to configure volume levels.

23.1 Configuring Gain Control

Automatic Gain Control can be configured using the Web interface or configuration file.



Note: It's strongly advisable *not* to change the default values.

➤ To configure Automatic Gain Control using the Web interface:

1. Open the Voice page (**Configuration** tab > **Voice Over IP** menu > **Voice**).

Figure 23-1: Voice - Gain Control

The screenshot shows the 'Voice' configuration page with a 'Gain Control' section. The settings are as follows:

- Gain Control:**
 - Max Gain: 15 dB
 - Fast Adaptation Gain Slope: 3.50 dB/sec
 - Fast Adaptation Duration (0 - 65535): 1500 msec
- Hands Free:**
- Narrow Band:**
 - Slow Adaptation Gain Slope: 1.00 dB/sec
 - Automatic Gain Control Direction: For Remote User
 - Enable Automatic Gain Control: Disable
 - Target Energy: -19 dBm
- Wide Band:**
 - Slow Adaptation Gain Slope: 1.00 dB/sec
 - Automatic Gain Control Direction: For Remote User
 - Enable Automatic Gain Control: Disable
 - Target Energy: -19 dBm
- Handset:**
- Narrow Band:**
 - Slow Adaptation Gain Slope: 1.00 dB/sec
 - Automatic Gain Control Direction: For Remote User

2. Configure the settings according to the parameters in the table below, and then click **Submit**.

➤ To configure Automatic Gain Control using the configuration file:

- Use the table below as reference.

Table 23-1: Automatic Gain Control Parameters

Parameter	Description
Max Gain	The index of the maximal gain. Default: 15 dB. The index runs from 0 (0 dB) to 18 (18 dB).

Parameter	Description
Fast Adaptation Gain Slope	The rate of changes in Automatic Gain Control gain during Fast Adaptation Mode. Default: 19 (10dB/sec). 0.25-70.00 10dB/sec.
Fast Adaptation Duration (0 - 65535)	The duration of the Fast Adaptation Mode, in msec. Default: 1500 msec.
Slow Adaptation Gain Slope	The rate of changes in Automatic Gain Control gain during Slow Adaptation Mode. Default: 19 (10dB/sec). 0.25-70.00 10dB/sec.
Enable Automatic Gain Control [voip/audio/gain/automatic_gain_control/enabled]	Enables the AGC. AGC automatically adjusts the phone's voice volume to compensate for weak or loud signals. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Automatic Gain Control Direction [voip/audio/gain/automatic_gain_control/direction]	Determines whether AGC is located before the encoder input (CTL_LOCAL) or after the decoder output (CTL_REMOTE). <ul style="list-style-type: none"> ▪ [CTL_REMOTE] For Remote User (default) - AGC is located after the Decoder output ▪ [CTL_LOCAL] For Local User - AGC is located before the Encoder input
Target Energy [voip/audio/gain/automatic_gain_control/target_energy]	The required output energy (in dBm) of the AGC. The valid range is -31 to 0 (dB). The default value is -19.
[voip/audio/gain/automatic_gain_control/NB/handset_target_energy]	Default = -16
[voip/audio/gain/automatic_gain_control/NB/headset_target_energy]	The valid range is -31 to 0 Default = -16
[voip/audio/gain/automatic_gain_control/WB/handset_target_energy]	Default = -16
[voip/audio/gain/automatic_gain_control/WB/headset_target_energy]	The valid range is -31 to 0 Default = -16
[voip/audio/gain/automatic_gain_control/fast_adap_gain_slope]	Default = 3_50 Valid values: [REBOOT], [0_25], [0_50], [0_75], [1_00], [1_25], [1_50], [1_75], [2_00], [2_50], [3_00], [3_50], [4_00], [4_50], [5_00], [5_50], [6_00], [7_00], [8_00], [9_00], [10_00], [11_00], [12_00], [13_00], [14_00], [15_00], [20_00], [25_00], [30_00], [35_00], [40_00], [50_00], [70_00]
[voip/audio/gain/automatic_gain_control/max_gain]	Default = 15 The valid range is 0 to 18

23.2 Configuring Tone Volume

Tone volume can be configured using the configuration file.



Note: It's strongly advisable *not* to change the default values.

➤ **To configure tone volume using the configuration file:**

- Use the table below as reference.

Table 23-2: Tone Volume Parameter

Parameter	Description
Tone Volume [voip/audio/gain/tone_signal_level]	Call Progress Tone volume. This volume can be modified on-the-fly by pressing the phone's VOLUME key in certain scenarios. The valid range is 1 to 31 (-dB). The default value is 10 (-10dB).

23.3 Configuring Ringer Volume

The ringer volume can be configured using the configuration file.



Note: It's strongly advisable *not* to change the default values.

➤ To configure the ringer volume using the configuration file:

- Use the table below as reference.

Table 23-3: Ringer Volume Parameters

Parameter	Description
Ringer Volume voip/audio/gain/ringer_signal_level	Ringing tone volume. This volume can be modified on-the-fly by pressing the phone's VOLUME key when the phone is in idle state. The valid range is [-31] to [31] dB

23.4 Configuring Speaker Volume

The speaker volume can be configured using the configuration file.



Note: It's strongly advisable *not* to change the default values.

➤ To configure speaker volume using the configuration file:

- Use the table below as reference.

Table 23-4: Speaker Parameters

Parameter	Description
Hands-free Gain Parameters Note: Values are in decibels (dB) ▪ Decimal places: Use underscore instead of period (e.g., plus19_5db).	
[voip/audio/gain/NB/handsfree_digital_input_gain]	Digital input gain (in dB) – Narrow Band. Default = 6. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/NB/handsfree_digital_output_gain]	Digital output gain (in dB) – Narrow Band. Default = 5. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/WB/handsfree_digital_input_gain]	Digital input gain (in dB) – Wide Band. Default = 6. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/WB/handsfree_digital_output_gain]	Digital output gain (in dB) – Wide Band. Default = 5. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/NB/handsfree_analog_output_gain]	Analog output gain (in dB) – Narrow Band. Valid values: [0db] , [minus1_5db] , [minus3db] , [minus4_5db] , [minus6db] , [minus7_5db] , [minus9db] , [minus10_5db] , [minus12db] , [minus13_5db] , [minus15db] , [minus16_5db] , [minus18db] , [minus19_5db] , [minus21db] , [minus22_5db] , [minus24db] , [minus25_5db] , [minus27db] , [minus28_5db] , [minus30db] , [minus31_5db] , [minus33db] , [minus34_5db] , [minus36db] , [minus37_5db] , [minus39db] , [minus42db] , [minus48db] , [minus54db] , [MUTE]

Parameter	Description
[voip/audio/gain/WB/handsfree_analog_output_gain]	<p>Analog output gain (in dB) – Wide Band.</p> <p>Valid values:</p> <p>[0db] (default), [minus1_5db], [minus3db], [minus4_5db], [minus6db], [minus7_5db], [minus9db], [minus10_5db], [minus12db], [minus13_5db], [minus15db], [minus16_5db], [minus18db], [minus19_5db], [minus21db], [minus22_5db], [minus24db], [minus25_5db], [minus27db], [minus28_5db], [minus30db], [minus31_5db], [minus33db], [minus34_5db], [minus36db], [minus37_5db], [minus39db], [minus39db], [minus42db], [minus48db], [minus54db], [MUTE]</p>
[voip/audio/gain/NB/handsfree_analog_input_gain]	<p>Analog input gain (in dB) – Narrow Band</p> <p>Valid values: [0db], [plus1_5db], [plus3db], [plus4_5db], [plus6db], [plus7_5db], [plus9db], [plus10_5db], [plus12db], [plus13_5db], [plus15db], [plus16_5db], [plus18db], [plus19_5db], [plus21db], [plus22_5db], [plus24db], [plus25_5db], [plus27db], [plus28_5db], [plus30db], [plus31_5db], [plus33db], [plus34_5db], [plus36db], [plus37_5db], [plus39db], [plus40_5db], [PLUS42DB] (default), [plus48db], [plus54db], [MUTE]</p>
[voip/audio/gain/WB/handsfree_analog_input_gain]	<p>Analog input gain (in dB) – Wide Band.</p> <p>Valid values: [0db], [plus1_5db], [plus3db], [plus4_5db], [plus6db], [plus7_5db], [plus9db], [plus10_5db], [plus12db], [plus13_5db], [plus15db], [plus16_5db], [plus18db], [plus19_5db], [plus21db], [plus22_5db], [plus24db], [plus25_5db], [plus27db], [plus28_5db], [plus30db], [plus31_5db], [plus33db], [plus34_5db], [plus36db], [plus37_5db], [plus39db], [plus40_5db], [PLUS42DB] (default), [plus48db], [plus54db], [MUTE]</p>
[voip/audio/gain/NB/additional_speaker_gain]	<p>Additional parameter for speaker gain configuration, for Narrow Band.</p> <p>Valid values:</p> <ul style="list-style-type: none"> ▪ [0] 0dB ▪ [1] 1dB ▪ [2] 2dB ▪ [3] 3Db (default)

Parameter	Description
[voip/audio/gain/WB/additional_speaker_gain]	<p>Additional parameter for speaker gain configuration, for Wide Band.</p> <p>Valid values:</p> <ul style="list-style-type: none">▪ [0] 0dB▪ [1] 1dB▪ [2] 2dB▪ [3] 3dB (default)

23.5 Configuring Handset Volume

The handset volume can be configured using the configuration file.



Note: It's strongly advisable *not* to change the default values.

➤ To configure handset volume using the configuration file:

- Use the table below as reference.

Table 23-5: Handset Gain Parameters

Parameter	Description
Handset Gain Parameters Note: Values are in decibels (dB)	
[voip/audio/gain/NB/handset_digital_output_gain]	Digital output gain (in dB) – Narrow Band. Default = 2. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/NB/handset_digital_input_gain]	Digital input gain (in dB) – Narrow Band. Default = 0. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/WB/handset_digital_input_gain]	Digital input gain (in dB) – Wide Band. Default = 0. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/WB/handset_digital_output_gain]	Digital output gain (in dB) – Wide Band. Default = 2. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/NB/handset_analog_output_gain]	Analog output gain (in dB), for Narrow Band. Valid values: [0DB] (default), [minus1_5db] , [minus3db] , [minus4_5db] , [minus6db] , [minus7_5db] , [minus9db] , [minus10_5db] , [minus12db] , [minus13_5db] , [minus15db] , [minus16_5db] , [minus18db] , [minus19_5db] , [minus21db] , [minus22_5db] , [minus24db] , [minus25_5db] , [minus27db] , [minus28_5db] , [minus30db] , [minus31_5db] , [minus33db] , [minus34_5db] , [minus36db] , [minus37_5db] , [minus39db] , [minus39db] , [minus42db] , [minus48db] , [minus54db] , [MUTE]

Parameter	Description
[voip/audio/gain/WB/handset_analog_output_gain]	Analog output gain (in dB), for Wide Band. Valid values: [0dB] (default), [minus1_5db], [minus3db], [minus4_5db], [minus6db], [minus7_5db], [minus9db], [minus10_5db], [minus12db], [minus13_5db], [minus15db], [minus16_5db], [minus18db], [minus19_5db], [minus21db], [minus22_5db], [minus24db], [minus25_5db], [minus27db], [minus28_5db], [minus30db], [minus31_5db], [minus33db], [minus34_5db], [minus36db], [minus37_5db], [minus39db], [minus39db], [minus42db], [minus48db], [minus54db], [MUTE]
[voip/audio/gain/NB/handset_analog_input_gain]	Analog input gain (in dB), for Narrow Band. Default: PLUS30DB Valid values: [0dB], [plus1_5dB], [plus3dB], [plus4_5dB], [plus6dB], [plus7_5dB], [plus9dB], [plus10_5dB], [plus12dB], [plus13_5dB], [plus15dB], [plus16_5dB], [plus18dB], [plus19_5dB], [plus21dB], [plus22_5dB], [plus24dB], [plus25_5dB], [plus27dB], [plus28_5dB], [plus30dB], [plus31_5dB], [plus33dB], [plus34_5dB], [plus36dB], [plus37_5dB], [plus39dB], [plus40_5dB], [plus42dB], [plus48dB], [plus54dB], [MUTE]
[voip/audio/gain/WB/handset_analog_input_gain]	Analog input gain (in dB), for Wide Band. Default: PLUS30DB Valid values: [0dB], [plus1_5dB], [plus3dB], [plus4_5dB], [plus6dB], [plus7_5dB], [plus9dB], [plus10_5dB], [plus12dB], [plus13_5dB], [plus15dB], [plus16_5dB], [plus18dB], [plus19_5dB], [plus21dB], [plus22_5dB], [plus24dB], [plus25_5dB], [plus27dB], [plus28_5dB], [plus30dB], [plus31_5dB], [plus33dB], [plus34_5dB], [plus36dB], [plus37_5dB], [plus39dB], [plus40_5dB], [plus42dB], [plus48dB], [plus54dB], [MUTE]
[voip/audio/gain/handset_analog_sidetone_gain]	Analog side tone gain (in db). Valid values: [minus9db], [MINUS21DB] (default), [minus15db], [minus18db], [minus21db], [minus24db], [minus27db], [MUTE]

23.6 Configuring Headset Volume

Headset volume can be configured using the configuration file.



Note: It's strongly advisable *not* to change the default values.

➤ To configure headset volume using the configuration file:

- Use the table below as reference.

Table 23-6: Headset Gain Parameters

Parameter	Description
Headset Gain Parameters Note: Values are in decibels (dB) ▪ Decimal places: Use underscore instead of period (e.g., plus19_5db).	
[voip/audio/gain/NB/headset_digital_output_gain]	Digital output gain (in dB) – Narrow Band. Default = 4. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/NB/headset_digital_input_gain]	Digital input gain (in dB) – Narrow Band. Default = 0. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/WB/headset_digital_output_gain]	Digital output gain (in dB) – Wide Band. Default = -4. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/WB/headset_digital_input_gain]	Digital input gain (in dB) – Wide Band. Default = 0. The valid range is (-32) to 31 (dB), where -32 is mute.
[voip/audio/gain/NB/headset_analog_output_gain]	Analog output gain (in dB), for Narrow Band. Valid values: [0DB] (default), [minus1_5db] , [minus3db] , [minus4_5db] , [minus6db] , [minus7_5db] , [minus9db] , [minus10_5db] , [minus12db] , [minus13_5db] , [minus15db] , [minus16_5db] , [minus18db] , [minus19_5db] , [minus21db] , [minus22_5db] , [minus24db] , [minus25_5db] , [minus27db] , [minus28_5db] , [minus30db] , [minus31_5db] , [minus33db] , [minus34_5db] , [minus36db] , [minus37_5db] , [minus39db] , [minus39db] , [minus42db] , [minus48db] , [minus54db] , [MUTE]
[voip/audio/gain/WB/headset_analog_output_gain]	As above, but for Wide Band.

Parameter	Description
[voip/audio/gain/NB/headset_analog_input_gain]	Analog input gain (in dB). Valid values: [PLUS31_5DB] (default), [plus1_5db] , [plus3db] , [plus4_5db] , [plus6db] , [plus7_5db] , [plus9db] , [plus10_5db] , [plus12db] , [plus13_5db] , [plus15db] , [plus16_5db] , [plus18db] , [plus19_5db] , [plus21db] , [plus22_5db] , [plus24db] , [plus25_5db] , [plus27db] , [plus28_5db] , [plus30db] , [plus31_5db] , [plus33db] , [plus34_5db] , [plus36db] , [plus37_5db] , [plus39db] , [plus40_5db] , [plus42db] , [plus48db] , [plus54db] , [MUTE]
[voip/audio/gain/WB/headset_analog_input_gain]	Analog input gain (in dB). Valid values: [0db] , [plus1_5db] , [plus3db] , [plus4_5db] , [plus6db] , [plus7_5db] , [plus9db] , [plus10_5db] , [plus12db] , [plus13_5db] , [plus15db] , [plus16_5db] , [plus18db] , [PLUS31_5DB] (default), [plus21db] , [plus22_5db] , [plus24db] , [plus25_5db] , [plus27db] , [plus28_5db] , [plus30db] , [plus31_5db] , [plus33db] , [plus34_5db] , [plus36db] , [plus37_5db] , [plus39db] , [plus40_5db] , [plus42db] , [plus48db] , [plus54db] , [MUTE]
[voip/audio/gain/headset_analog_sidetone_gain]	Analog side tone gain (in db). Valid values: [minus9db] , [MINUS12DB] (default), [minus15db] , [minus18db] , [minus21db] , [minus24db] , [minus27db] , [MUTE]

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Part VI

Advanced Phone Settings

24 Configuring the Phone Directory

Here's how to configure the phone directory.

24.1 Configuring the Corporate Directory

The Corporate Directory can be configured using the Web interface or configuration file.

24.1.1 Configuring the LDAP-based Corporate Directory

Here's how to configure Lightweight Directory Access Protocol (LDAP), which is an application protocol for accessing and maintaining distributed directory information services over an IP network. It is fully described under RFC 4510.

➤ **To configure LDAP using the Web interface:**

1. Open the LDAP page (**Configuration** tab > **Advanced Applications** > **LDAP**). If LDAP is set to **Enable**, extended configuration parameters are displayed.

Figure 24-1: LDAP

Active:	Enable
Server Address:	
Port:	389
User Name:	
Password:	
Base:	
Name Filter:	((sn=%)(givenname=%)(displayname=
Name Attributes:	sn givenname displayName
Number Filter:	((telephoneNumber=%)(Mobile=%)(ho
Number Attributes:	telephoneNumber Mobile homePhone
Display Name:	%displayName
Max Hits:	50 (1~1000)
Country Code:	
Area Code:	
Sort Result:	Enable
Search Timeout:	5 seconds
Call Lookup:	Enable

3. Configure the LDAP settings according to the parameters in the table below, and then click **Submit**.

➤ **To configure LDAP using the configuration file:**

- Use the table below as reference.

Table 24-1: LDAP Parameters

Parameter Name	Description
Active [system/ldap/enabled]	Enables or disable LDAP.
Server Address [system/ldap/server_address]	Defines the IP address or URL of the LDAP server.

Parameter Name	Description
Port [system/ldap/port]	Defines the LDAP service port.
User Name [system/ldap/user_name]	Defines the user name used for the LDAP search request.
Password [system/ldap/password]	Defines the password of the search requester.
Base [system/ldap/base]	Defines the access point on the LDAP tree.
Name Filter [system/ldap/name_filter]	<p>Specifies your search pattern for name look ups. For example:</p> <p>When you type in the following field: <code>(&(telephoneNumber=*)(sn=%))</code>, the search result includes all LDAP records, which have the 'telephoneNumber' field set and the '("sn"-->surname)' field starting with the entered prefix.</p> <p>When you type in the following field: <code>(!(cn=%)(sn=%))</code>, the search result includes all LDAP records which have the '("cn"-->CommonName)' OR '("sn"-->Surname)' field starting with the entered prefix.</p> <p>When you type in the following field: <code>(!(cn=%))</code>, the search result includes all LDAP records which "do not" have the "cn" field starting with the entered prefix.</p>
Name Attribute [system/ldap/name_attrs]	<p>Specifies the LDAP name attributes setting, which can be used to specify the "name" attributes of each record which is returned in the LDAP search results.</p> <p>When you type in the following field, for example, <code>cn sn displayName</code>, this requires you to specify 'cn-->commonName'. This is the Full name of the user, sn-->Surname, last name or family name and "displayName" fields for each LDAP record.</p>
Number Filter [system/ldap/number_filter]	<p>Specifies your search pattern for number look ups.</p> <p>When you type in the following field, for example, <code>(!(telephoneNumber=%)(Mobile=%)(ipPhone=%))</code>, the search result is all LDAP records which have the "telephoneNumber" OR "Mobile" OR "ipPhone" field match the number being searched.</p> <p>When you type in the following field: <code>(&(telephoneNumber=%)(sn=*))</code>, the search result is all LDAP records which have the "sn" field set and the "telephoneNumber" match the number being searched.</p>

Parameter Name	Description
Number Attribute [system/ldap/number_attrs]	Specifies the LDAP number attributes setting, which can be used to specify the “number” attributes of each record which is returned in the LDAP search results. When you type in the following field, for example, <i>Mobile telephoneNumber iPhone</i> , you must specify 'Mobile', 'telephoneNumber' and 'iPhone' fields for each LDAP record.
Display Name [system/ldap/display_name]	Specifies the format in which the “name, e.g. “Mike Black” of each returned search result is displayed on the IPPHONE. When you type in the following field, foreexample: %sn, %givenName , the displayed result returned should be “Black, Mike”.
Max Hits [system/ldap/max_hits]	Specifies the maximum number of entries expected to be sent by the LDAP server (this parameter is sent to the LDAP server).
Sort Result [system/ldap/sorting_result]	Sorts the search result by display name on the client side.
system/ldap/predict_text	This parameter appears in the configuration file; however, it is currently not supported.
Search Timeout [system/ldap/search_timeout]	The time out value for LDAP search (this parameter is sent to the LDAP server).
system/ldap/ui/use_right_arrow_active_search	This parameter appears in the configuration file; however, it is currently not supported.
system/ldap/lookup_incoming_call	This parameter appears in the configuration file; however, it is currently not supported.
Call Lookup [system/ldap/call_lookup]	Performs an LDAP search during call (search the display name for a number).
Country Code [system/ldap/country_code]	Defines the country code prefix added for number search.
Area Code [system/ldap/area_code]	Defines the area code prefix added for number search.
system/ldap/minimal_name_search_length	Starts to perform an LDAP search after x characters are input.
system/ldap/send_queries_while_typing	Sends an LDAP search each time the user presses a key (all keys with both number and letters).

24.1.2 Loading a Text-based Corporate Directory File

The Configuration file can include a link to a user-defined Corporate Directory file, using the 'provisioning/corporate_directory_uri' parameter. This allows you to upload a corporate directory to the phone.

Three types of corporate directory files are supported: txt, cfg, and xml

The corporate directory file includes a list of contacts and their phone numbers.

The syntax of the corporate directory file must be as follows:

```
<full name>,<office>,<home>,<mobile>
```

For example:

```
John Smith,1234,98765432,574685746
```

If not all phone numbers are required, the relevant field must be left empty. For example, in the directory entry below, the home and user-defined numbers are absent:

```
John Smith,1234,,574685746
```

➤ **To configure the Corporate Directory using the Web interface:**

1. Prepare the file as explained above.
2. Open the Directory page (**Configuration** tab > **Personal Settings** menu > **Directory**).
3. Click **Browse** and select the file to upload.
4. Click Load Corporate Directory.

Figure 24-2: Corporate Directory

5. Configure the Corporate Directory settings according to the parameters in the table below, and then click **Submit**.

➤ **To configure the Corporate Directory using the configuration file:**

- Use the table below as reference.

Table 24-2: Provisioning Parameters

Parameter	Description
provisioning/corporate_directory_uri	<p>The URI for retrieving the corporate directory. The corporate directory must be included in a separate file to be loaded to the phone during provisioning.</p> <p>For example: provisioning/corporate_directory_uri=corporate_dir.txt</p> <p>Note:</p> <ul style="list-style-type: none"> ▪ The corporate directory file is loaded after boot up and after that, periodically. ▪ If the corporate directory file is new, the phone updates the information and does not reboot.

24.2 Modifying the Local Phone Directory

You can add, edit, or delete directory contacts. A contact's address can be a telephone number, IP address, or domain name. You can also download or upload a personal directory file through the Web interface.

➤ **To add a contact to the phone's directory:**

1. Open the Directory page (**Configuration** tab > **Personal Settings** menu > **Directory**).

Figure 24-3: Directory - Add Contact

No.	name	Office	Home	Mobile	Select
1	Łk	23222			<input type="checkbox"/>

2. Under the **Add Contact** group, define the contact:
3. In the 'Name' field, enter the name of the contact.
4. In the 'Office', 'Home' and/or 'Mobile' fields, enter the contact's telephone numbers. The contact's number can be defined with an IP address or domain name (e.g. <number>@<IP address or domain name>).
5. Click **Submit**; the contact appears in the Directory list at the bottom of the page.

➤ **To edit a contact:**

1. If the contact does not appear in the displayed Directory list, then from the 'Directory Page' drop-down list, select the page in the directory that you want displayed.
2. In the Directory list, click the number that appears in the 'No.' column corresponding to the contact you want to edit; the contact's attributes appear in the **Edit Phone** group above.
3. Edit the contact as required, and then click **Submit**; the contact's new attributes are updated in the Directory list.

➤ **To delete a contact:**

1. In the Directory list, mark the 'Select' check box corresponding to the contact you want to delete.
2. Click **Delete**. (To delete all contacts, click the **Delete All** button).

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25 Configuring Keys

Here's how to configure keys.

The following keys can be configured:

- Function Keys (see Section 25.1) – applies to the 430HD and 440HD phones
- Programmable Keys (see Section 25.2) - applies to the 430HD and 440HD phones
- Speed Dials (see Section 25.3) – applies to the 420HD and 405/405HD phones
- Softkeys (see Section 25.4) – applies to the 420HD and 405/405HD phones
- Navigation Keys (see Section 25.5) – applies to all phones

25.1 Configuring Function Keys

Here's how to configure Function Keys.



Note: Applies only to the 430HD and 440HD phone models.

25.1.1 430HD Phone

Up to 12 Function Keys can be configured as Speed Dials+BLFs and for Multicast Paging (for configuring Multicast Paging, see Section 26). On the phone, the 12 Function Keys are located on the right side. The label panes, next to the BLFs, are covered. You can use the Web interface or configuration file to configure Function Keys.

➤ **To configure a Function Key as a Speed Dial using the Web interface:**

1. In the Web interface, open the Function Keys page (**Configuration** tab > **Personal Settings** > **Function Keys**).

Figure 25-1: 430HD Phone Personal Settings - Function Keys

Key	Type	Number	Delete
1	Speed Dial+BLF ▼		<input type="checkbox"/>
2	Speed Dial+BLF ▼		<input type="checkbox"/>
3	Speed Dial+BLF ▼		<input type="checkbox"/>
4	Speed Dial+BLF ▼		<input type="checkbox"/>
5	Speed Dial+BLF ▼		<input type="checkbox"/>
6	Speed Dial+BLF ▼		<input type="checkbox"/>
7	Speed Dial+BLF ▼		<input type="checkbox"/>
8	Speed Dial+BLF ▼		<input type="checkbox"/>
9	Speed Dial+BLF ▼		<input type="checkbox"/>
10	Speed Dial+BLF ▼		<input type="checkbox"/>
11	Speed Dial+BLF ▼		<input type="checkbox"/>
12	Speed Dial+BLF ▼		<input type="checkbox"/>

Load and Save

- Configure a Function Key using the table below as reference.

Table 25-1: 430HD Phone Function Keys Parameters

Parameter Name	Description
Key [personal_settings/functional_key/0-11/key_label]	Used to define a label for a key.
Type [personal_settings/functional_key/0-11/type]	Choose either: SPEED_DIAL (default) -or- SPEED_DIAL_BLF The speed-dial feature helps users quickly dial numbers that are often used or hard to remember. PAGING When the Paging feature is enabled, you can define Paging Groups (see Section 26).
Number [personal_settings/functional_key/0-11/speed_dial_number]	The telephone number which the speed dial dials. The speed-dial feature helps users quickly dial numbers that are frequently used or that are hard to remember.

25.1.2 440HD Phone

A total of 33 Function Keys can be configured on the 440HD phone. Of these, you can configure up to 12 Function Keys as Speed Dials+BLFs. When more than 12 Function Keys are configured, these keys can only be assigned as regular Speed Dials or for Multicast Paging (see Section 26). You can scroll to additional pages to define these keys.

➤ To configure Function Keys as Speed Dials+BLFs in the Web interface:

- Open the Function Keys page (**Configuration** tab > **Personal Settings** menu > **Function Keys**).

Figure 25-2: 440HD Phone Personal Settings - Function Keys

Page: 1

Key	Type	Number	Label	Delete
1	Speed Dial+BLF			<input type="checkbox"/>
2	Speed Dial+BLF			<input type="checkbox"/>
3	Speed Dial+BLF			<input type="checkbox"/>
4	Speed Dial+BLF			<input type="checkbox"/>
5	Speed Dial+BLF			<input type="checkbox"/>
6	Speed Dial+BLF			<input type="checkbox"/>
7	Speed Dial+BLF			<input type="checkbox"/>
8	Speed Dial+BLF			<input type="checkbox"/>
9	Speed Dial+BLF			<input type="checkbox"/>
10	Speed Dial+BLF			<input type="checkbox"/>
11	Speed Dial+BLF			<input type="checkbox"/>

Load and Save

Save Function Keys

Browse...

Load Function Keys

Submit

Delete All

Reset

- Configure Function Keys using Table 25-2 as reference.

Table 25-2: 440HD Phone Function Keys Parameters

Parameter Name	Description
Key [personal_settings/functional_key/n-n/key_label]	Used to define a label for a key.
Type [personal_settings/functional_key/n-n/type]	Choose either SPEED_DIAL (default) -or- SPEED_DIAL_BLF . The speed-dial feature helps users quickly dial numbers that are often used or hard to remember. PAGING When the Paging feature is enabled, you can define Paging Groups (see Section 26).
Number [personal_settings/functional_key/n-n/speed_dial_number]	The telephone number which the speed dial dials. The speed-dial feature helps users quickly dial numbers that are frequently used or that are hard to remember.



Note: The first Web page shows Function Keys 1-12 (0-11 in the configuration file). The second Web page shows 18-27 (17-27 in the configuration file). The third Web page shows 28-38 (27-37 in the configuration file).

25.1.3 Configuring Additional Function Keys



Note: Applies only to the 440HD phone model.

You can configure more than 12 Function Keys using the Web interface or the configuration file.

Note the following when configuring *more than 12* Function Keys:

- In a BroadSoft environment, a total of 33 Speed Dials+BLFs can be configured. The 33 SDs+BLFs are configured on pages 1, 2 and 3 of the phone's BLF sidecar. Users define 12 SDs+BLFs and then when defining the 13th, the 12th SD+BLF shows **Next** and the name in the 12th moves to the 13th.
- In all other environments, pages 2 and 3 can be configured as SDs only, without BLF functionality. Only page 1 allows SD+BLF.
- In the Web interface, the 'Page' dropdown lets you navigate to page 2 and 3.

25.2 Configuring Programmable Keys



Note: Applies to the 430HD and 440HD phone models.

25.2.1 430HD and 440HD Phones

Six programmable keys are located adjacent to the screen. There are three on each side. They're labeled 1-6 in the Web interface and 12-17 in the configuration file.

You can configure them as

- Extension lines (SIP accounts) (see the next section)
- Speed Dials / Speed Dials+BLFs (see Section 25.2.1.1)
- Key Events such as MISSED_CALLS (see Section 25.2.1.2)

➤ **To access the Programmable Keys in the Web interface:**

1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**).

Figure 25-3: Programmable Keys (430HD/440HD Phones)

2. Use the table below as reference when configuring the 430HD/440HD phones.

Table 25-3: Programmable Keys Parameters (430HD/440HD Phones)

Parameter Name	Description
Line Key	Select 1-6 . Network administrators can configure these six Programmable Keys; see the next parameter 'Key Type'. The keys are located on either side of the screen, three on either side. The uppermost left is 1; the lowermost right is 6. Users are disabled from configuring them as Line Keys (SIP Accounts). The first two are by default set to lines. The other four are by default empty.
Key Type	The six Programmable Keys can be configured as: <ul style="list-style-type: none"> ■ SIP Account (Extension Line) ■ SPEED DIAL ■ SPEED DIAL+BLF ■ Key Event
Key Label	Enter a Label for the key reflecting the event, for example, enter Dialed in the 'Key Label' field if you're programming a Dialed Calls Key Event. The label will appear in the screen.
Paging Group Name	The name of the Paging Group. All phone extensions assigned to this group are paged when a message is multicast from an extension in the group.
Paging Multicast	The IP address via which multicast messages traverse. When a user

Parameter Name	Description
Address	announces or receives a multicast message, the message traverses this IP address. You should assign a different IP address for each group. This enables the multicasting of paged messages to different groups simultaneously.
Paging Multicast Port	The port via which multicast messages traverse. When a user announces or receives a multicast message, the message traverses this port. This port number does not need to be unique for each Paging Group.

25.2.1.1 Configuring Multiple Extension Lines

The administrator can configure a phone's six Programmable Keys as extension lines (SIP accounts).

➤ **To configure multiple extension lines:**

1. Open the Line Settings page (**Configuration > Voice Over IP > Line settings**).

Figure 25-4: Line Settings

2. Configure Line Settings for each Line Number. See Table 21-1 for detailed information about the Line Settings. You can use the figure above as a reference example.
3. Open the Programmable Keys page (**Configuration > Personal Settings > Programmable Keys**).

Figure 25-5: Programmable Keys

4. Configure a Programmable Key for each Line Key you configured in Step 2.
5. Associate each Line Key (i.e., Programmable Key) with a SIP Account (i.e., Line

Number). You can alternatively perform the association using the configuration file. Use the table below as reference:

Table 25-4: Associating Line Keys with SIP Accounts using the configuration file

Parameter Name	Description
[voip/line_key/0/line]	Default: 0 . Indicates that this is the first Programmable Key, located in the upper left corner of the screen. Leave the setting at its default.
[voip/line_key/1/line]	Default: 0 . Indicates that the second Programmable Key is assigned to line 0 by default. Change it to 1 to assign the Programmable Key to line 1 .
[voip/line_key/2-5/line]	Defaults: 2-5 . Indicates the third through to the sixth Programmable Key.
[personal_settings/functional_key/12-17/key_label]	These are the labels displayed in the screen next to Programmable Keys 0-5 . Define the string of characters you want displayed (name, extension, etc.).
[personal_settings/functional_key/12-17/type]	Default: SIP_ACCOUNT . Can be set to perform other functions such as Speed Dial or Key Event. Do not change these for keys you want to assign to SIP lines.

25.2.1.2 Configuring a Key Event

You can set as Key Events the six keys flanking the screen, as well as sidecar key **13** and up.

➤ **To configure a Key Event:**

1. Enable the **key_event** parameter:
 - Set **personal_settings/functional_key/12/type** to **KEY_EVENT**
(Default = **SIP_ACCOUNT**)
 - Set **personal_settings/functional_key/13-17/type** to **KEY_EVENT**
(Default = empty)



Note:

- **personal_settings/functional_key/12/type** = the uppermost left key flanking the screen
- **personal_settings/functional_key/13-17/type** = the other five keys flanking the screen

2. Set **voip/line_key/0/key_event** to the event you require - use the table below as reference.

Table 25-4: Configuring a Key Event

Parameter Name	Description
[voip/line_key/0-5/key_event]	<p>Defines an event to allocate to each of the six keys flanking the screen.</p> <p>Only becomes operative if the type parameter is set to KEY_EVENT as shown above.</p> <p>Default: MISSED_CALLS.</p> <p>You can change the default to:</p> <ul style="list-style-type: none">▪ DIALED_CALLS▪ RECEIVED_CALLS▪ FORWARD_ALL▪ DND

25.3 Configuring Speed Dials



Note: This section applies to the 420HD and 405/405HD phone models.

25.3.1 420HD and 405/405HD Phone Models

Up to nine dialpad keys can be configured as Speed Dials. You can configure them in the Web interface or using the configuration file.

➤ **To configure a dialpad key as a Speed Dial in the Web interface:**

1. In the Web interface, open the Function Keys page (**Configuration** tab > **Personal Settings** > **Function Keys**).

Figure 25-6: Personal Settings – Speed Dials (420HD and 405/405HD Phones)

Function Keys

Key	Type	Number	Delete
1	Speed Dial ▼		<input type="checkbox"/>
2	Speed Dial ▼		<input type="checkbox"/>
3	Speed Dial ▼		<input type="checkbox"/>
4	Speed Dial ▼		<input type="checkbox"/>
5	Speed Dial ▼		<input type="checkbox"/>
6	Speed Dial ▼		<input type="checkbox"/>
7	Speed Dial ▼		<input type="checkbox"/>
8	Speed Dial ▼		<input type="checkbox"/>
9	Speed Dial ▼		<input type="checkbox"/>

Load and Save

Browse... Save Function Keys Load Function Keys

Submit Delete All Reset

2. In the 'Number' field, enter the phone number to which to assign the Speed Dial. Keys 1-9 correspond to the 1-9 keys on the device's dial pad.
3. After configuring a Speed Dial, click **Submit** for the setting to take effect on the phone.
4. Alternatively, you can use the **Save Function Keys** button to save the configuration in a file, which you can then browse to and load to the phone using the **Load Function Keys** button.
5. You can select one or more configured Speed Dials under the 'Delete' column, and then click the **Delete All** button.

- **To configure a key as a Speed Dial using the configuration file:**
- Open the Configuration File page (**Management** tab > **Manual Update** > **Configuration File**) and locate the Function Key parameters. Use the table below as reference when configuring the parameters.

Table 25-5: Speed Dials Parameters

Parameter Name	Description
[personal_settings/functional_key/0-8/speed_dial_extension]	Used to define a label for a Speed Dial.
[personal_settings/functional_key/0/speed_dial_number]	The telephone number which the speed dial dials. The speed-dial feature helps users quickly dial numbers that are frequently used or that are hard to remember.
[personal_settings/functional_key/0/type=SPEED_DIAL]	The feature helps users quickly dial numbers that are often used or that are hard to remember.

25.3.2 Deleting Speed Dials

You can delete configured Speed Dials.

- **To delete Speed Dials:**
 - Check the 'Delete' box corresponding to the Speed Dial that you want to delete, and then click **Submit**
-or-
 - Click the **Delete All** button, and then at the prompt, click **OK**
- **To clear (unselect) all selected 'Delete' check boxes:**
 - Click the **Reset** button.

25.3.3 Saving Configured Speed Dials

After configuring Speed Dials in the Web interface, you can save the configuration in a .cfg file on your computer and then load it to other phones.

- **To save Speed Dials in a .cfg file:**
- 1. Open the Function Keys page (**Configuration** tab > **Personal Settings** menu > **Function Keys**).
- 2. Click **Save Function Keys**; the configuration is saved in a .cfg file.

25.3.4 Creating a Speed Dial File for the Configuration File

The configuration file parameter 'provisioning/speed_dial_uri' can be configured to point to a user-defined Speed Dial file, for speed dial settings to be uploaded to the phone when the cfg file is uploaded.

The Speed Dial file must include a list of speed dial configurations. The file must be a simple text file that can be created using an Excel document and saved as a CSV file.

The syntax of the speed dial file is as follows:

```
<memory key>,<speed dial phone number>,<type>
```

where:

- <memory key> denotes the speed dial memory key on the phone.
- <speed dial phone number> denotes the phone number that is automatically dialed when the user presses the speed dial key.
- <type> denotes the Speed Dial feature and must be set to **0**.

Below is an example of a Speed Dial file:

```
1,4418,0
2,4403,0
3,039764432,0
4,4391,0
12,1234,0
```

25.4 Configuring Softkeys

**Note:**

- The section applies to the 420HD and 405/405HD phone models.
- When Genesys' ACD is enabled, the **Soft Keys** item in the Keys Configuration menu is not displayed.

This section describes how to configure softkeys. Four softkeys, located below the screen, can be configured. Their functionality is context sensitive according to the phone's state. Here's how to configure softkeys that are activated when the phone is in idle state and when it is in call state.

Following are the four default (preconfigured) softkeys (0-3), when the phone is in idle state and when it is in call state.

Table 25-6: Default Softkeys

Key	Idle State	Call State
0	Directory	Hold
1	Missed	Conf
2	Forward	New Call
3	Do Not Disturb (Status)	End

When more than four softkeys are configured, users can scroll to additional pages, where on each configured page, the fourth key becomes the **More** softkey.

- Up to 20 (0-19) softkey functions can be configured for when the phone is in idle call state.
- Up to 20 (0-19) softkey functions can be configured for when the phone is in call state.
- Up to 12 (0-11) programmable softkey (PSKs) functions can be configured to either a call state softkey or an idle state softkey.

➤ To program the softkeys in the Web interface:

1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**).

Figure 25-7: Softkeys (420HD and 405/405HD Phone)

Key	Function	Number	Label	Delete
1	Directory			<input type="checkbox"/>
2	Missed Calls			<input type="checkbox"/>
3	Forward All			<input type="checkbox"/>
4	Dnd All			<input type="checkbox"/>

Key	Function	Delete
Navigation Control Up	None	<input type="checkbox"/>
Navigation Control Down	None	<input type="checkbox"/>
Navigation Control Left	None	<input type="checkbox"/>
Navigation Control Right	None	<input type="checkbox"/>
Ok Button	None	<input type="checkbox"/>

Load and Save

Browse...

Save Programmable Keys

Load Programmable Keys

Submit Delete All

2. Configure the softkey parameters using the table below as reference.

Table 25-7: Softkeys Parameters (420HD/405/405HD Phone)

Parameter Name	Description
Key 1-4	<p>From any of the 1-4 softkeys dropdown menus, you can select one of the following:</p> <ul style="list-style-type: none"> ▪ None ▪ Missed Calls ▪ Received Calls ▪ Dialed Calls ▪ All Calls ▪ Directory ▪ DnD All ▪ Forward All ▪ SPEED DIAL ▪ SPEED DIAL+BLF ▪ SIP Account

➤ **To configure softkeys using configuration file**

Use the table below as reference:

Table 25-8: SoftKey Parameters

Parameter Name	Description
Softkey [personal_settings/soft_key/n-n] (Idle Call State) [personal_settings/soft_keys/ongoing_call/n-n] (Ongoing call state)	Indicates the softkey number. Where <n-n> defines the softkey number. Possible values: 0-19
Function (Idle call state): [personal_settings/soft_key/n-n/key_function]	Select one of the following key function types for the Idle call state: <ul style="list-style-type: none"> ▪ Missed_calls ▪ Received_calls ▪ Dialed_calls ▪ All_calls ▪ Directory ▪ Dnd_all ▪ Forward_all ▪ Speed dial ▪ Speed dial + blf ▪ PSK
Function (Ongoing call state): [personal_settings/soft_keys/ongoing_call/n-n/key_function]	Select one of the following key function types for the Ongoing call state (configuration file only): <ul style="list-style-type: none"> ▪ Rec_call ▪ Transfer ▪ Blind_transfer ▪ Hold ▪ Conf ▪ New_call • End ▪ PSK
Number personal_settings/soft_key/n-n/speed_dial_number=<number> Where <number> is the telephone number which the speed dial dials.	Define the telephone number which the speed dial dials. The speed-dial feature helps users quickly dial numbers that are frequently used or that are hard to remember.
[personal_settings/soft_keys/n-n/psk_index] (Idle call state) [personal_settings/soft_keys/ongoing_call/n-n/psk_index] (Ongoing call state) Where n-n is the softkey number.	Defines the PSK index. This index identifies the PSK which is assigned to the softkey. You can define up to 11 PSKs (0-11). Default=12 (non-valid value) Note that there are separate index number series for the Idle and Ongoing call states. However, each index number represents unique functionality. For example, if you configure psk_index 1 to activate an intercom (an Idle state function), you cannot use the same index (psk_index 1) to connect to a Voicemail server (Ongoing Call state function).

Parameter Name	Description
personal_settings/soft_keys/psk/n-n/is_dial_required=0 (Idle and Ongoing call states) Where n-n is the PSK index number.	Determines whether a personal dialing code is required for the PSK. When this parameter is enabled, the user is prompted on the phone to enter a personal code to activate this event. For example, to connect to a Voicemail server. This parameter is only applicable when 'Programmable SK' is set as the key_function.
[personal_settings/soft_keys/psk/n-n/PSKlabel] (Idle and Ongoing Call states) Where n-n is the PSK index number.	Defines the PSK label which is displayed on the phone's screen for the configured PSK. This parameter is only applicable when 'PSK' is set as the key_function.
[personal_settings/soft_keys/psk/n-n/prefix] (Idle and Ongoing Call states) Where n-n is the PSK index number.	Defines the prefix which sends a SIP INVITE to the softswitch to activate this feature (event). For example *70. This parameter is only applicable when 'Programmable SK' is set as the key_function. Up to 128 characters (any characters).

25.4.1 Configuring Programmable Softkeys (PSK)

You can configure a programmable key function and assign it to a softkey (Programmable Softkey-PSK) for either idle state or call state. The PSK can be used for performing actions such as connecting to a Voicemail (Ongoing Call state) server, returning the details of the last call (Idle state), connecting to the Conference server (Idle state) and activate an intercom (Idle state). When these softkeys are configured with such functionality, and the user presses these softkeys, the Enterprise's server (softswitch or application server) is instructed to perform these actions. The instructions to the softswitch or application server are applied using a prefix in the SIP INVITE message. An additional feature enables the user to enter a personal code before the softkey functionality can be activated.

For example, the user wishes to activate their Voice Mail to hear messages whenever the softkey configured for this feature is pressed. In this case, the user dials a prefix, for example *70, and then is prompted to enter a personal code to access their voice mail i.e not configured on the phone, only entered e.g. '1234'. Once this code is entered, the user is connected to the Enterprise's Voice Mail server and can listen to their messages.

The following example shows the configuration of softkey 0 for connecting to a Voicemail server. Note that in this example, psk index-1 is assigned to function key-0.

```
personal_settings/soft_key/0/key_function=PSK
personal_settings/soft_key/0/psk_index=1
personal_settings/soft_keys/psk/1/is_dial_required=1
personal_settings/soft_keys/psk/1/label=Voicemail
personal_settings/soft_keys/psk/1/prefix=*70
```



Note:

- You can configure the PSK to perform any action that is supported by your enterprises's softswitch or application server. AudioCodes provides the ability to configure a calling prefix and a dialing code and to include these in the SIP INVITE.
- The PSK can only be configured using the configuration file.

25.5 Configuring Navigation Control Button Positions



Note: This section applies to all phone models.

Each of the four positions of the navigation control button on the phone, i.e., Up, Down, Left, and Right, as well as its **OK** button, can be configured to perform a one of five functions:

- None (default)
- Missed Calls
- Received Calls
- Dialed Calls
- All Calls
- Directory

For example, from the 'Navigation Control Up' key dropdown in the Navigation Keys section of the page (see the figure below), select **Missed Calls**, and then click the **Submit** button; the user will be able to press the upper rim of the navigation control button on their phone to display the Missed Calls on the phone screen.

The **OK** button can also be configured to perform one of these five functions. A **Delete** option adjacent to each Navigation Control key and adjacent to 'Ok Button' can be selected to remove the function from the key/button.

➤ **To configure navigation control button positions in the Web interface:**

1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**) and locate the Navigation Keys section.

Figure 25-8: Navigation Keys

▼Navigation Keys			
Key	Function		Delete
Navigation Control Up	None ▼		<input type="checkbox"/>
Navigation Control Down	None ▼		<input type="checkbox"/>
Navigation Control Left	None ▼		<input type="checkbox"/>
Navigation Control Right	None ▼		<input type="checkbox"/>
Ok Button	None ▼		<input type="checkbox"/>

2. From the 'Navigation Control Up' key dropdown, select (for example) **Missed Calls**, and then click the **Submit** button; the user will be able to press the upper rim of the navigation control button on their phone to display the Missed Calls in the phone screen.
3. [Optionally] Select the **Delete** option next to a key to remove the function.

25.5.1 Saving Configured Keys



Note: This section applies to all phone models.

After configuring softkeys, the configuration can be saved in a cfg file on a computer and then loaded to other phones.

➤ **To save the configured softkeys in a cfg file:**

1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**) and locate the Load and Save section.

Figure 25-9: Load and Save

The screenshot shows a web interface titled 'Load and Save'. It contains a 'Browse...' button for selecting a file. To the right of the file input area are two buttons: 'Save Programmable Keys' and 'Load Programmable Keys'. At the bottom of the section are two buttons: 'Submit' and 'Delete All'.

2. Click **Save Programmable Keys**; the configured keys are saved in a cfg file.

25.5.2 Loading Saved Keys to Phones



Note: This section applies to all phone models.

After configuring softkeys, the configuration can be saved in a cfg file on a computer and then loaded to other phones.

➤ **To load the saved keys to other phones:**

1. Open the Programmable Keys page (**Configuration** tab > **Personal Settings** menu > **Programmable Keys**).
2. Click **Browse....** to select the cfg file.
3. Click **Open**; the selected cfg filename and path appear on the Web interface alongside the **Browse...** button.
4. Click **Load Programmable Key**; the file is uploaded to the phone.

26 Disabling Hard Keys and Softkeys

The network administrator can disable hard keys and softkeys on phones using the configuration file. The feature is motivated by the requirement on the part of some enterprises to control the setting remotely to comply with company policy.

Hard keys that can be disabled include speaker, headset, voicemail, REDIAL, CONTACTS, MENU, TRANSFER, HOLD, VOL and mute.

Example 1: To disable the phone's REDIAL hard key, the configuration file parameter *personal_settings/key/redial/enabled* can be set to **0**.

Example 2: To disable the option to restart the phone, the configuration file parameter *personal_settings/menu/restart/enabled* can be set to **0**.

Configuration file parameters that can be configured to disable hard keys and softkeys also include these in the table below.

Table 26-1: Parameters that can be Configured to Disable Hard Keys / Softkeys

Configuration File Parameters
personal_settings/soft_keys/display_idle_screen_keys_when_dialing/enabled
personal_settings/key/speaker_device/enabled
personal_settings/key/headset_device/enabled
personal_settings/key/voice_mail/enabled
personal_settings/key/redial/enabled
personal_settings/key/contacts/enabled
personal_settings/key/menu/enabled
personal_settings/key/hold/enabled
personal_settings/key/volume/enabled
personal_settings/key/mute/enabled
personal_settings/menu/call_log/enabled
personal_settings/menu/directory/enabled
personal_settings/menu/keys_configuration/enabled
personal_settings/menu/keys_configuration/speed_dial_keys/enabled
personal_settings/menu/keys_configuration/soft_keys/enabled
personal_settings/menu/keys_configuration/navigation_keys/enabled
personal_settings/menu/settings/enabled
personal_settings/menu/language/enabled
personal_settings/menu/ring_tone/enabled
personal_settings/menu/callwaiting/enabled
personal_settings/menu/date_and_time/enabled
personal_settings/menu/lcd_contrast/enabled
personal_settings/menu/backlight_timeout/enabled
personal_settings/menu/answer_device/enabled
personal_settings/menu/restart/enabled
personal_settings/menu/status/enabled

Configuration File Parameters
personal_settings/menu/administration/enabled
personal_settings/menu/languages/english/enabled
personal_settings/menu/languages/spanish/enabled
personal_settings/menu/languages/russian/enabled
personal_settings/menu/languages/portuguese/enabled
personal_settings/menu/languages/portuguesebrazilian/enabled
personal_settings/menu/languages/german/enabled
personal_settings/menu/languages/ukrainian/enabled
personal_settings/menu/languages/french/enabled
personal_settings/menu/languages/frenchcanadian/enabled
personal_settings/menu/languages/italian/enabled
personal_settings/menu/languages/hebrew/enabled
personal_settings/menu/languages/polish/enabled
personal_settings/menu/languages/korean/enabled
personal_settings/menu/languages/finnish/enabled
personal_settings/menu/languages/chinese/enabled
personal_settings/menu/languages/chinesetraditional/enabled
personal_settings/menu/languages/turkish/enabled
personal_settings/menu/languages/japanese/enabled
personal_settings/menu/languages/slovak/enabled
personal_settings/menu/languages/czech/enabled
personal_settings/speed_dial_programming/enabled
personal_settings/new_call_screen/call_log_soft_key/enabled
personal_settings/new_call_screen/directory_soft_key/enabled
personal_settings/soft_keys/incoming_call/sk_reject/enable
personal_settings/key/transfer/enabled
personal_settings/key/reject/enabled

27 Configuring Paging

Live announcements can be made (paged) from a phone to a group of phones to notify a team (for example) that a meeting is about to commence. The paged announcement is multicast via a designated group IP address, in real time, on all idle phones in the group, without requiring listeners to pick up their receivers. The name of the group is displayed on phone screens when the paging call comes in.

A key for paging a group can be configured using the Web interface, configuration file or on the phone itself (see the *User's Manual*).

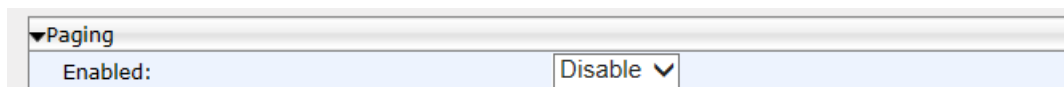
27.1 Configuring a Key for Paging using the Web Interface

A key can be configured for paging using the Web Interface.

➤ **To configure a key for paging using the Web interface:**

1. Open the Services page (**Configuration > Voice Over IP > Services**) and enable the paging feature.

Figure 27-1: Services - Enable Paging



The screenshot shows a web interface for configuring paging. Under the 'Paging' section, there is a label 'Enabled:' followed by a dropdown menu currently showing 'Disable'. To the right of the dropdown is a button labeled 'Disable'.

2. In the Paging page, from the 'Enabled' dropdown, select **Enable**.
3. Configure the Multicast Paging Group; open the Function Keys page (**Configuration menu > Voice Over IP > Personal Settings > Function Keys**).
4. Choose the Function Key for paging and then from 'Type List' select **Paging**.
5. Configure the Paging Group to assign to the phone, according to the configuration parameters described in the table below.
6. Repeat the above procedure for each Paging Group you want to configure (assigning a separate Function key for each additional Paging Group).

Table 27-1: Paging Function Key Parameters

Parameter	Description
Paging Group Name	The name of the Paging Group. All phone extensions assigned to this group are paged whenever one of the extensions in the group multicasts a message.
Paging Multicast Address	The IP address via which multicast messages traverse. When a user announces or receives a multicast message, the message traverses this IP address. You should assign a different IP address for each group. This enables the multicasting of paged messages to different groups simultaneously.
Paging Multicast Port	The port via which multicast messages traverse. When a user announces or receives a multicast message, the message traverses this port. This port number does not need to be unique for each Paging Group.

27.1.1 Configuring Barge-in

When barge-in is disabled (default), users who're in regular calls when a paging call comes in are prompted in their phone screens to accept or reject the paging call. If they *accept*, the regular call is put on hold and the paging call is heard. If they *reject*, the regular call is continued and the paging call goes unheard.



Note: The prompt to accept or reject a paged call is only relevant to users who're in regular calls. If they're *not* in regular calls, the prompt is displayed irrespective of whether barge-in is disabled or enabled.

When barge-in is enabled, paging calls interrupt (barge in on) regular calls in progress, *without* prompting users with an option to accept or reject the paging call.

➤ To enable barge-in using the Web interface:

1. Open the Services page (**Configuration > Voice Over IP > Services**) and under Paging, select **Enable**; the 'Barge-in' dropdown is displayed.
2. From the 'Barge-in' dropdown, select **Enable**.

Figure 27-2: Enable Barge-in

▼Paging	
Enabled:	Enable ▼
Barge-in:	Enable ▼

➤ To enable barge-in using the configuration file:

- Use the table below as reference.

Table 27-2: Barge-in Parameters

Parameter	Description
[voip/services/allow_barge_in/enabled]	<p>Enables paging to interrupt (i.e., barge into) regular calls currently in progress.</p> <ul style="list-style-type: none"> ▪ [0] Disabled (default) ▪ [1] Enabled



Note: See the phone's *User's Manual* for examples.

27.2 Configuring Paging Using the Configuration File

Here's how to configure the paging feature using the configuration file.

➤ **To configure paging using the configuration file:**

- Use the table below as reference.

Table 27-3: Configuration File Paging Parameters

Parameter	Description
[voip/services/group_paging/enabled]	Enables group paging. <ul style="list-style-type: none"> ▪ [0] Disabled (default) ▪ [1] Enabled
[voip/services/group_paging/group/0-11/activated]	Defines the group to page to. Default: Group 0
[voip/services/group_paging/group/0-11/multicast_addr]	Defines the multicast address for group 0-11 to page to. Default: 224.0.1.0
[voip/services/group_paging/group/0-11/name]	Defines the paging group name to display in the screen.
[voip/services/group_paging/group/0-11/port]	Defines the multicast port for group 0 to page to. Default: 8888
[voip/services/group_paging/codec]	The codec of the paging RTP. Since the phones have many DSP versions and different DSPs support different codecs, the codec of the paging call can be configured. Available options are: <ul style="list-style-type: none"> ▪ PCMU, PCMA ▪ G729 ▪ G722 ▪ G726 ▪ RTA ▪ RTA_WB ▪ G722_8000 Note: Phones that are in the same paging group must use the same codec.
[voip/services/group_paging/end_income_paging_timeout]	Defines the timeout that begins after the phone detects that it is not receiving RTP. The phone ends the incoming paging call when the timeout expires. Default: 800 milliseconds. Optionally, you can configure 800~ milliseconds to 100000 milliseconds.

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28 Configuring Feature Key Synchronization

Here's how to configure Feature Key synchronization.

- **To configure Feature Key synchronization using the configuration file:**
 - Use the table below as reference.

Table 28-1: Feature Key Synchronization Parameters

Parameter	Description
[system/feature_key_synchronization/enabled]	Disables/enables Feature Key synchronization.
[system/feature_key_synchronization/forward/0-3/destination]	Forward destination. The number of the telephone to which the call is made.
[system/feature_key_synchronization/status/0-3/fks_status]	The status of the Feature Key synchronization. Select: <ul style="list-style-type: none">▪ [FKS_NONE] (Default)▪ FKS_DND]▪ [FKS_CFA]▪ [FKS_CFB] -or-▪ [FKS_CFNA]

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Part VII

Security

29 Implementing X.509 Authentication

X.509 certificates can be used to authenticate a connection with a remote server or HTTP/S client browser. The certificates may be implemented in one of or a combination of the following SSL handshake negotiation scenarios:

- The phone is a client who needs to authenticate the remote server e.g. provisioning server to which it is attempting to connect.
In this case, the phone needs to load the certificate and Trusted CA used by the remote server.
- The remote server needs to authenticate the incoming connection request from the phone client.
In this case, the remote server needs to load the certificate and Trusted CA used by the phone.
- The phone is a server who needs to authenticate an incoming connection request from a remote HTTP client browser.
In this case, the phone needs to load the certificate and Trusted CA used by the remote HTTP client browser.
- The remote HTTP client browser needs to authenticate the phone to which it is attempting to connect.
In this case, the remote HTTP client browser needs to load the certificate and Trusted CA used by the phone.

The following types of certificates can be used to authenticate the connections described in the above scenarios:

- **Factory-set Certificates** (see Section 29.1):
Certificates that are loaded to the AudioCodes IP Phone using an AudioCodes certificate and AudioCodes Trusted Root CA.
- **User-Generated Certificates** (see Section 29.2):
Certificates that are generated by the user that may use the AudioCodes Trusted Root CA or an external CA.

29.1 Factory-Set Certificates and AudioCodes Trusted Root CA

AudioCodes IP phones are loaded with factory-set preinstalled certificate files: private key file, certificate file and a Trusted Root CA file that is signed by AudioCodes (including DIGICert).



Note:

- The Web interface provides visual indication that factory certificates are installed:
 - ✓ The System Information page displays 'MAC Address' and 'Device Certificate' parameters.
 - ✓ The values for the 'Device Certificate' parameter can be **Installed**, **Self-Signed**, or **Not Installed**.
- The phone's screen visually indicates that factory certificates are installed.
 - ✓ The Release Information menu (**MENU** button > **Status**) displays the 'Device Certificate' parameter.
 - ✓ The values of the 'Device Certificate' parameter can be **Installed**, **Self-Signed**, or **Not Installed**.

Whenever the phone authenticates with a remote server, it can be authenticated using these certificate files. Each phone receives a uniquely generated private key certificate file based on its MAC address.



Note:

- If the remote server is configured to authenticate the client and AudioCodes factory-set certificates are used for authentication, then the AudioCodes Certificate and AudioCodes Trusted Root CA must be downloaded to the remote server. These files can be downloaded from the AudioCodes Web site. For more information, contact your local AudioCodes sales representative.
- If you use the AudioCodes Redirect server to obtain firmware and configuration files, then the factory-set certificates are used to authenticate the connection with this server.

29.2 User-Generated Certificates

If an organizational certificate Infrastructure (PKI) is used, you may wish to instead use certificates provided by your security administrator. You can define up to five additional user-generated certificates, which can be configured to secure different types of connections and paired with external Trusted Root CAs. The following remote server connection types can be configured with user-generated certificates:

- 802.1x RADIUS server
- SIP TLS server
- HTTP/S Provisioning server

When user-generated certificates are loaded to the device to authenticate a specific connection type, then this certificate is used to secure the connection with the assigned connection type. For example, if you load Certificate A for connecting to an HTTPS Provisioning server, then whenever there is an attempt by the phone to connect to a Provisioning server, then the connection is authenticated using Certificate A.



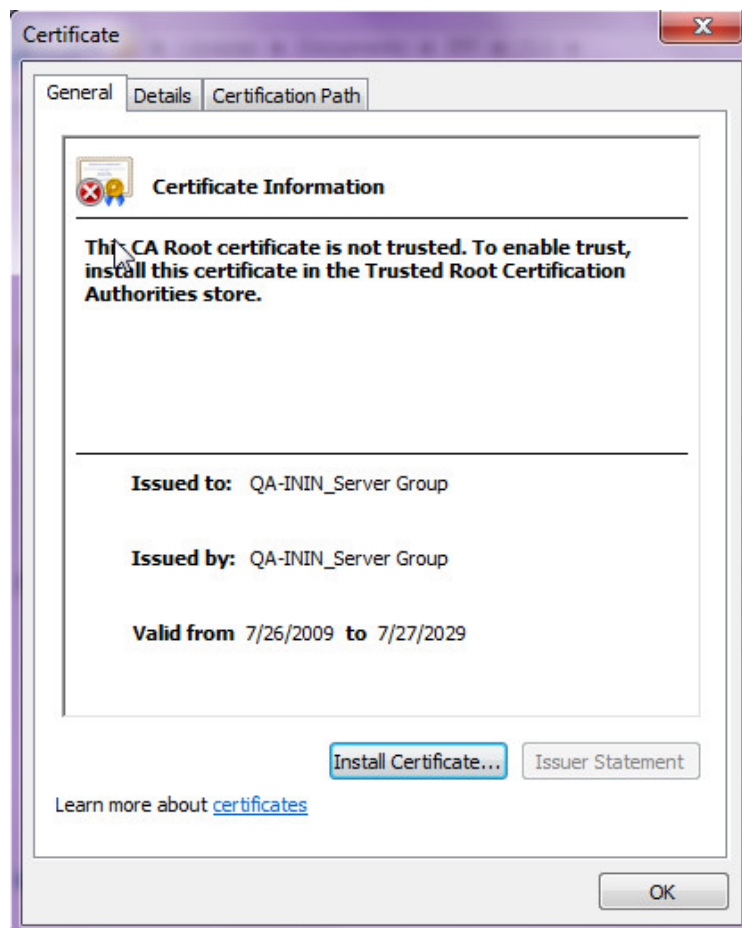
Note:

- You can load one certificate for each connection type.
- If you do not load a certificate to support a specific connection type, then the factory-set certificate is used to authenticate the connection. For example if you load user-generated certificates to support Automatic Updates (Provisioning server) and SIP TLS server connections, and there is an attempt by the phone to connect to a RADIUS server, then this connection is authenticated using the AudioCodes factory-set installed certificate.
- You can use the AudioCodes Trusted Root CA with a user-generated certificate.
- You can use the same certificate for different server connection types.

29.3 External Trusted Root CAs

The Certificate Authority is a body that certifies ownership of a certificate by the name subject of the certificate.

Figure 29-1: Certificate



You can define up to five external Trusted Root CAs, which may be configured to secure different types of connections and paired with the loaded user-generated certificates (see Section 29.2).



Note: If you do not load any Trusted Root CAs to the phone, then when there is an attempt to connect to a remote server or an attempt by a browser to open the Web interface using HTTPS, the AudioCodes Trusted Root CA is used to authenticate the connection.

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30 Loading a Certificate

Here's how to:

- Load the Trusted Root CA Certificate to the Phone (see below).
- Load the Client Certificate to the Phone (see Section 30.2).
- Generate a Certificate Signing Request (CSR) (see Section 30.3).

30.1 Loading the Trusted Root CA Certificate to the Phone

Here's how to load the Trusted Root CA certificate to the phone.

➤ To load the trusted root CA certificate to the phone:

1. Open the Root CA Certificate page (**Configuration** tab > **Security** menu > **Root CA Certificate**).

Figure 30-1: Root CA Certificate

2. Click **Browse** to navigate to the certificate file, and then click the **Load** button to upload it to the phone.

You can load a maximum of five certificates to the phone. Click the **Del** button to delete a load if necessary. Click the **Display** button to display the certificate if you wish to view it.

30.1.1 Loading Trusted Root CA Certificate Using Configuration File

Here's how to load a Trusted Root CA certificate using the configuration file.



Note: Using this method, Trusted Root CA certificates files are loaded to the phone when it is powered up.

➤ To load a Trusted Root CA certificate file using the configuration file:

- Use the table below as reference.

Table 30-1: Root CA Certificate Parameters

Parameter	Description
Root CA 1 [security/ca_certificate/0/uri]	The first root CA certificate loaded to the phone.
Root CA 2 [security/ca_certificate/1/uri]	The second root CA certificate loaded to the phone.
Root CA 3 [security/ca_certificate/2/uri]	The third root CA certificate loaded to the phone.

Parameter	Description
Root CA 4 [security/ca_certificate/3/uri]	The fourth root CA certificate loaded to the phone.
Root CA 5 [security/ca_certificate/4/uri]	The fifth root CA certificate loaded to the phone.

30.2 Loading the Client Certificate to the Phone

The section shows how to load the Client Certificate to the phone.

➤ To load the Client Certificate to the phone:

1. Open the Client Certificate page (**Configuration** tab > **Security** menu > **Client Certificate**).

Figure 30-2: Client Certificate

30.2.1 Loading the Client Certificate to the Phone using the Configuration File

Here's how to load a Client Certificate file to the phone using the configuration file.



Note: Using this method, client certificates files are loaded to the phone when it is powered up.

➤ To load a client certificate file using the configuration file:

- Use the table below as reference.

Table 30-2: Client Certificate Parameters

Parameter	Description
Certificate [security/sip_certificate_uri]	Downloads from this URI to the phone a Client Certificate for SIP TLS (SIP calls with Transport Layer Security).
Private Key [security/sip_private_key_uri]	Downloads from this URI to the phone a Client Private Key for SIP TLS (SIP calls with Transport Layer Security).
Certificate [security/ieee802_1x_certificate_uri]	Downloads from this URI to the phone a Client Certificate for 802.1X Authentication.

Parameter	Description
Private Key [security/ieee802_1x_private_key_uri]	Downloads from this URI to the phone a Client Private Key for 802.1X authentication.
Certificate [security/autoupdate_certificate_uri]	Downloads from this URI to the phone an external certificate that is used to secure the connection with the automatic provisioning server. Identical to downloading the Automatic Updates certificate from the Client Certificates page in the phone's Web interface.
Private Key [security/autoupdate_private_key_uri]	Downloads from this URI to the phone a private key that is used to secure the connection with the automatic provisioning server. Identical to downloading the Automatic Updates certificate from the Client Certificates page in the phone's Web interface.

30.2.2 Enabling Server-side Authentication (Mutual Authentication)

You can enable server-side authentication of a connection with the RADIUS and Provisioning server.



Note: OpenSSL 1.0.2p is supported. This open source version supports SHA2 algorithms.

Table 30-3: Server-side Authentication

Parameter	Description
Verify RADIUS remote server certificate [security/ieee802_1x/verify_server_certificate]	Configures the phone to verify received server certificates over a secure EAP-TLS connection.
Verify Provisioning server certificate [security/provisioning/verify_server_certificate]	Configures the phone to verify received server certificates over a secure HTTPS connection with a provisioning server.

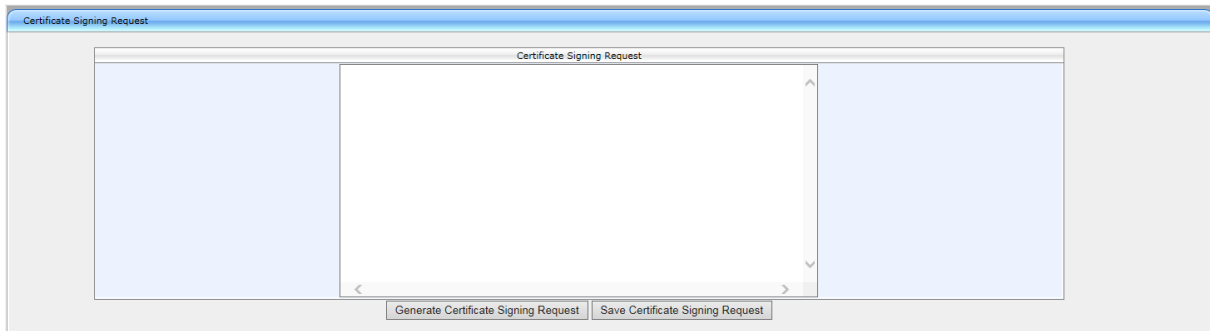
30.3 Generating a Certificate Signing Request

The section shows how to generate a certificate signing request (CSR) to send to the Certificate Authority (CA) for the CA to sign the Client Certificate.

➤ **To generate a CSR:**

1. Open the Certificate Signing Request page (**Configuration** tab > **Security** menu > **Certificate Signing Request**).

Figure 30-3: Certificate Signing Request



2. Press the **Generate Certificate Signing Request** button; the phone creates a CSR file.
3. Press the **Save Certificate Signing Request** button and download the CSR file to your PC.
4. Send the CSR file to the Certificate Authority to sign the Client Certificate.
5. You can load the Client Certificate to the phone for 802.1X Authentication or SIP TLS.

30.4 Using Previously Loaded Certificates

If you have upgraded to this version and your phones have pre-installed certificates, then the CA configuration parameter values from previous versions are translated to version 2.2.2 parameter values as described below.



Note: It is **highly recommended** to change the CA configuration by using the methods described in the above sections.

■ Certificate file settings for versions prior to version 2.2.2:

```
security/ca_certificate_uri= xxx
security/certificate_uri=zzz
security/private_key_uri=yyy
```

where:

xxx is the uri of the root CA

zzz is the uri of the certificate file

yyy is the uri of the private key file

■ Certificate file settings translated to version 2.2.2:

```
security/autoupdate_certificate_uri=zzz
security/autoupdate_private_key_uri= yyy
security/ca_certificate/0/uri=xxx
security/ca_certificate/1/uri=
security/ca_certificate/2/uri=
security/ca_certificate/3/uri=
security/ca_certificate/4/uri=
security/ieee802_1x_certificate_uri=zzz
security/ieee802_1x_private_key_uri= yyy
security/sip_certificate_uri= zzz
security/sip_private_key_uri= yyy
```



Note: The CA configuration parameters prior to version 2.2.2 are no longer used on the phone.

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31 Configuring SIP TLS

Here's how to manage Transport Layer Security (TLS) and certificates. TLS is a cryptographic protocol which provides communication security over the transport layer (TCP). TLS is used to secure the phone's SIP signaling connections, Web interface, and Telnet server over TCP/IP. Typically, TLS protocol uses Private and Public keys for authentication. A Certification Authority (CA) performs authentication. Full protocol specification is updated in RFC 5246.



Note: Before you can connect to a TLS server, you need to make sure the same certificate and Trusted Root CA are loaded to the phone *and* to the TLS server.

31.1 Configuring TLS

Here's how to configure TLS for the SIP connection between the phone and a TLS server.

➤ **To configure TLS using the configuration file:**

- Use the table below as reference.

Table 31-1: SIP-over-TLS Parameters

Parameter	Description
SIP Transport Protocol [voip/signalling/sip/transport_protocol]	Specifies the SIP Transport protocol. <ul style="list-style-type: none">• If using the 'sip' prefix, set to 'TLS'• If using the 'sips' prefix, set to 'TCP'
TLS Port [voip/signalling/sip/tls_port]	Defines the local TLS SIP port for SIP messages. Range:1024 - 65535. Default:5061.
/voip/signalling/sip/enable_sips	If signaling protocol is set to TCP and we want to activate TLS, this parameter should be enabled. In this case we will use 'sips' prefix instead of "sip:"

31.1.1 Configuring SIP TLS using the Web Interface

Here's how to configure SIP TLS using the Web interface.



Note: This procedure is typically used for evaluation purposes only.

➤ **To configure TLS using the Web interface:**

1. Open the Signaling Protocols page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**) and scroll down to the SIP General screen section.
2. From the 'SIP Transport Protocol' drop-down list, select **TLS**.
3. In the 'TLS Port' field, enter **5061**.
4. Configure the other parameters using [Table 16-1](#) as reference.

Figure 31-1: Signaling Protocols - SIP General

▼ SIP General	
SIP Transport Protocol:	TLS ▼
TLS Port:	5061
SIP Local Port:	5060
Gateway Name:	
PRACK Mode:	Enable ▼
Enable RPORT:	Enable ▼
Include PTIME in SDP:	Disable ▼
Enable Keep Alive using OPTIONS:	Disable ▼
Connect Media on 180 Response:	Disable ▼
Block Caller ID on Outgoing Calls:	Disable ▼
Incoming Anonymous Call Blocking:	Disable ▼

5. Click **Submit**.

32 Configuring 802.1x

802.1X is an IEEE Standard for Port-based Network Access Control (PNAC). It's part of the IEEE 802.1 group of networking protocols. It provides an authentication mechanism for devices wishing to connect to a LAN or WLAN.

The employee's PC negotiates 802.1X. Messages are sent transparent to the enterprise switch. The phone is uninvolved in the negotiation; however, if an employee's PC is disconnected, their phone notifies the switch. If an employee's PC is disconnected from the phone, a PROXY-EAP-LOGOFF mechanism lets the phone immediately log off the port from the authentication server to prevent anyone else from connecting to it.

The phone performs like this:

- Phone and PC connected to phone's PC port successfully perform 802.1X authentication. The authentication server records the phone and PC as authorized.
- If the PC is disconnected from the phone's PC port, the phone sends an EAPoL-Logoff message for the PC. The authentication server then records the PC as unauthorized.
- If the PC reconnects to the phone's PC port, the authentication server requests the PC to perform 802.1X authentication again.



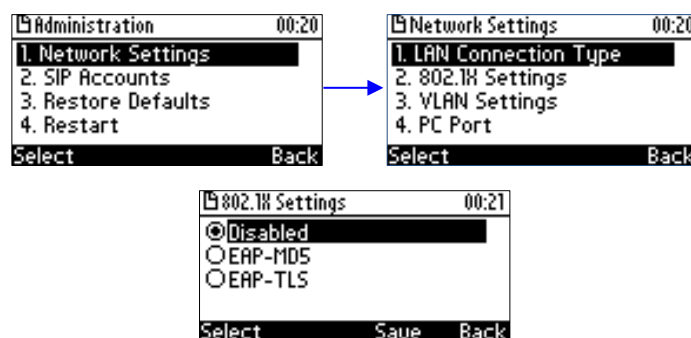
Note: Before you can connect to a 802.1x server, you need to make sure the same certificate and Trusted Root CA are loaded to the phone *and* to the 802.1x.

32.1 Configuring 802.1x in the Phone Screen

Here's how to configure 802.1x in the phone screen.

➤ **To configure 802.1x in the phone screen:**

1. On the phone, open the 802.1x Settings screen (MENU key > **Administration** > **Network Settings** > **802.1xSettings**).



2. Navigate to and select either:
 - Disabled – disables the 802.1x feature
 - EAP-MD5 – see Section 32.1.1
 - EAP-TLS - see Section 32.1.2

32.1.1 Configuring EAP-MD5 Mode

Here's how to configure EAP-MD5 mode for 802.1x using the phone's screen.

➤ To configure EAP-MD5 mode for 802.1x using the phone's screen:

1. Navigate to the **EAP-MD5** option and then press **Select** and **Edit**:

2. Enter the following information:
 - **Identity:** User ID
 - **Password:** MD5 password (optional)
3. Press the **Save** softkey; a message appears notifying you that the phone will restart.
4. Press **Apply**.

32.1.2 Configuring EAP-TLS Mode

Here's how to configure EAP-TLS mode for 802.1x using the phone's screen.

➤ To configure EAP-TLS mode for 802.1x using the phone's screen:

1. Navigate to the **EAP-TLS** option and press **Select**
2. Press the **Save** softkey; a message appears notifying you that the phone will restart.
3. Press **Apply**.

32.2 Configuring 802.1x Using Web and Configuration File

Here's how to configure 802.1x using the Web interface or configuration file.

32.2.1 Configuring EAP MD5 Mode

Here's how to configure 802.1x settings for EAP-MD5 using the Web interface.

➤ To configure 802.1x settings for EAP-MD5 using the Web interface:

1. Open the 802.1X Settings page (**Configuration > Network Connections > 802.1X Settings**) and select **MD5** as 'EAP Type'.

Figure 32-1: Web Interface –801.1X Settings - EAP-MD5

2. Configure the 802.1x settings according to the parameters in the table below, and then click **Submit**.

- To configure 802.1x settings for EAP-MD5 using the configuration file:
- Use the table below as reference.

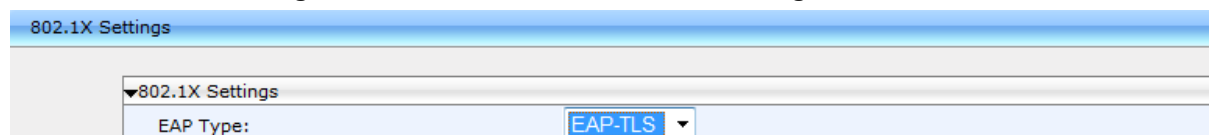
Table 32-1: EAP MD5 Parameters

Parameter	Description
EAP Type [/network/lan/_802_1x/eap_type]	Sets 802.1x Extensible Authentication Protocol mode: <ul style="list-style-type: none">▪ [Disable] = Disables the use of 802.1x▪ [EAP_MD5]=Authentication is implemented by user name and password (Password is optional).▪ [EAP_TLS]= Authentication is implemented by Certificate, Client Certificate and Client Private Key.
Identity [/network/lan/_802_1x/md5_identity]	User ID for md5 mode.
MD5 password [/network/lan/_802_1x/md5_password]	Password for md5 mode. (Leave blank if no password).

32.2.2 Configuring EAP TLS Mode

Here's how to configure the phone's 802.1x settings for EAP-TLS using the Web interface or configuration file.

- To configure 802.1x settings for EAP-TLS using the Web interface:
1. Open the 802.1X Settings page (**Configuration > Network Settings > 802.1X Settings**) and select **TLS** as 'EAP Type'.

Figure 32-2: Web Interface –801.1X Settings - EAP-TLS

The screenshot shows the '802.1X Settings' page. At the top, there is a blue header bar with the text '802.1X Settings'. Below this, there is a section titled '802.1X Settings' with a dropdown arrow. Under this section, there is a label 'EAP Type:' followed by a dropdown menu. The dropdown menu is currently set to 'EAP-TLS'.

2. Click **Submit**.

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33 Configuring SRTP

Secure Real-time Transport Protocol (SRTP) is a protocol that allows encryption for RTP data. Since the RTP encryption key is delivered via SIP, this feature is relevant only when SIP transport is secured, so when using this feature you also need to use SIP over TLS.

SRTP can be configured using the Web interface or configuration file.

➤ **To configure SRTP using the Web interface:**

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**) and scroll down to SRTP.

Figure 33-1: SRTP

- From the drop-down list select an encryption level:
 - ◆ DO NOT SUPPORT ENCRYPTION [Default] [SRTP is disabled]
 - ◆ SUPPORT ENCRYPTION [Negotiation]
 - ◆ REQUIRE ENCRYPTION [SRTP is enabled; both sides must support encryption]
- 2. Click **Submit**.

➤ **To configure SRTP using the configuration file:**

- Use the table below as reference.

Table 33-1: SRTP Parameters

Parameter	Description
SRTP Encryption and Authentication [voip/media/srtp/mode]	<p>Three encryption levels are supported:</p> <ul style="list-style-type: none"> ▪ DoNotSupportEncryption [Default] [SRTP is disabled] ▪ SupportEncryption [Negotiation] ▪ RequireEncryption [SRTP is enabled; both sides must support encryption] <p>Note regarding backward compatibility: In Version 2.2.16, this configuration file parameter replaced the legacy voip/media/srtp/enabled configuration file parameter. The configuration file parameter voip/media/srtp/enabled=1 in previous releases is compatible with the configuration file parameter voip/media/srtp/mode=REQUIRE_ENCRYPTION in this release</p>
[voip/media/srtp/negotiation/mode]	<p>If voip/media/srtp/mode=SUPPORT_ENCRYPTION, two SRTP negotiation modes are supported:</p> <ul style="list-style-type: none"> ▪ Basic (default) [RTP/SRTP negotiation according to the document <i>IMTC Best Practices for SIP Security</i>. This mode is supported by Broadsoft, Microsoft and many other vendors] ▪ RFC5939 [RTP/SRTP capability negotiation using the attributes "a=tcap", "a=acap" and "a=pcfg" as described in RFC 5939]

Parameter	Description
Method [voip/media/srtp/method]	The SRTP encryption method. <ul style="list-style-type: none"> ▪ [AES_CM_128_HMAC_SHA1_32] (default) ▪ [AES_CM_128_HMAC_SHA1_80] ▪ [AES_CM_128_ALL_METHODS]
/voip/media/srtp/use_MKI	Defines the usage of the SRTP Master Key Index. <ul style="list-style-type: none"> ▪ [0] = MKI is not used (default) ▪ [1] = MKI is used
/voip/media/srtp/MKI_length	Defines the maximum length of the SRTP Master Key Index. Range: 1 - 4. Default: 1.
/voip/media/srtp/use_lifetime	Allows the removal of the 'lifetime' parameter from the SRTP Crypto line in SDP. According to RFC 4568, an optional 'lifetime' parameter such as "2^31" must be added to the a=crypto line. This parameter allows the removal of the lifetime in all phone crypto lines in SDP. Configurable parameter values are: <ul style="list-style-type: none"> ▪ [0] = the lifetime is removed ▪ [1] = the lifetime is retained (default)
/voip/media/srtp/RTCP_encrypt_enabled	Default: 1. If set to 0, UnencryptedSRTCP will present at the end of the "a=crypto" line in the SDP offer, for example: a=crypto:1 AES_CM_128_HMAC_SHA1_32 inline:rcO4NFj0PcKk3Pbo7IVhVqpCpQI3MWytScjR L1IS 2^31 UNENCRYPTED_SRTCP
/voip/media/srtp/RTP_encrypt_enabled	Default: 1. If set to 0, UnencryptedSRTP will present at the end of the "a=crypto" line in the SDP offer, for example: a=crypto:1 AES_CM_128_HMAC_SHA1_32 inline:rcO4NFj0PcKk3Pbo7IVhVqpCpQI3MWytScjR L1IS 2^31 UNENCRYPTED_SRTP
/voip/media/srtp/RTP_auth_enabled	Default: 1. If set to 0, UnauthenticatedSRTP will present at the end of the "a=crypto" line in the SDP offer, for example: a=crypto:1 AES_CM_128_HMAC_SHA1_32 inline:TDejshzv6Y04By7Add2KuZaJ9YrvteWSENcp BMZ4 2^31 UNAUTHENTICATED_SRTP

34 Configuring HTTP/S

HTTP/S login authentication can be configured to secure the connection between the phones and a provisioning server, such as the BroadWorks Device Management Provisioning server. Once the connection is secure, software and/or configuration files can be downloaded to the phone.

HTTP/S authentication is supporting using the following methods (configured on the remote server):

- **Basic** – (RFC 2617) username and password are sent in plain text over plain HTTP over the network.
- **Digest** – a hash function is applied to the password before sending it over the network, therefore it is more secure as usernames and passwords are encrypted



Note:

- The enterprise requires an HTTP/S server to support this feature.
- The authentication method is configured on the remote side e.g. Provisioning server.

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35 Logging into a Remote HTTP/S Server from the Phone

During automatic provisioning, the phone can optionally prompt the user to enter the login credentials (username and password) of the provisioning server.

The prompt occurs during the server's authentication process, when it is recognized that an HTTP username and/or password has not been specified, or that these credentials are incorrect.

If so, and if the prompt feature is enabled, the 'Prov. Credentials' screen pops up, prompting the user to enter or reenter these login credentials.

➤ **To configure HTTP/S login authentication in the configuration file:**

- Use the table below as reference:

Table 35-1: HTTP/S Login Authentication

Parameter	Description
[provisioning/configuration/http_auth/ui_interaction_enabled]	<p>Enables the user to be prompted to enter the HTTP username and password on the phone during the automatic provisioning process whenever the login credentials to the provisioning server have not been entered or are incorrect.</p> <p>[0] = (default) The phone's Settings menu's Prov. Credentials option is not available on the phone and therefore the user cannot interactively enter the HTTP password and username. In this case, you must enter values for the HTTP username and password in the configuration file, as specified below.</p> <p>[1] = The user can be prompted to enter the HTTP username and password interactively. Whenever this value is configured and the phone attempts to connect to a remote server, then the user is prompted to enter or reenter these credentials.</p> <p>In addition, the user can manually go the Settings menu option Prov. Credentials to enter their username and password.</p> <p>When this value is enabled, then it is <i>highly recommended</i> to remove the HTTP password and username entries from the configuration file:</p> <ul style="list-style-type: none">▪ provisioning/configuration/http_auth/password▪ [provisioning/configuration/http_auth/user_name]
[provisioning/configuration/http_auth/user_name]	Defines a username required by the HTTP/S server for logging in with authentication.
[provisioning/configuration/http_auth/password]	Defines a password required by the HTTP/S server for logging in with authentication.

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36 Securing the Web Interface using HTTP/S

Here's how to secure management of the phone with HTTP/S authentication, using the Web interface.



Note: To authenticate the connection between the phone and a remote HTTP/S browser, make sure the same certificate and Trusted Root CA are loaded to the phone *and* to the remote HTTP/S browser. For more information, see Section 30.

➤ **To secure management of the phone with HTTP/S authentication, using the Web interface:**

1. In your Web browser, enter the URL, for example, `https://10.13.2.5`; the following screen opens:

Figure 36-1: Securing Web Interface Management with HTTP/S



2. Click the **Continue to this website** link; the Windows Security dialog opens.



3. Enter your 'User Name' and 'Password' (Default = **admin** and 1234); the home page of phone's Web interface opens. You're now managing the phone using the Web interface, secured by HTTP/S.

36.1 Provisioning

Your phones are automatically provisioned by your enterprise's DHCP server when you initially connect them to the IP network and to the power supply.

You can then configure *periodic* automatic provisioning by DHCP server, in the Web interface.

➤ **To configure periodic automatic provisioning by DHCP server:**

1. In the Web interface, open the Automatic Provisioning screen (**Management** tab > **Automatic Update** > **Automatic Provisioning**).

Figure 36-2: Automatic Provisioning

Automatic Provisioning	
Firmware Version :	2.0.2.15
Provisioning Method :	DHCP Options (Dynamic URL) ▼
Dynamic Firmware URL :	tftp://10.1.1.56/\Boot\x86\wdsnbp.com/420HD.img Check Now
Dynamic Configuration URL :	tftp://10.1.1.56/00908f3bbaf5.cfg Check Now
DHCP Option Value :	160
Check Period :	Daily ▼
Every day at :	00:00 ▼
Random Provisioning Time :	120 minutes

2. Configure the firmware file (img) and configuration file (cfg) to be pulled from your enterprise's HTTP server by the DHCP server, in the 'Dynamic Firmware URL' parameter and 'Dynamic Configuration URL' parameter.
3. Configure the provisioning period.



Note: To implement secure provisioning using HTTP/S, the HTTP/S server on the far end (from where you are loading the files) must also support HTTP/S.

37 MAC-Based Authenticaon

Here's how to configure MAC-based authentication.

➤ **To configure MAC-based authentication:**

- Use the table below as reference:

Table 37-1: Authentication

Parameter	Description
[provisioning/configuration/mac_address_in_header]	Enables MAC-based authentication. [0] = (default) Don't insert the phone's MAC address in the header. [1] = Insert the phone's MAC address in the header.

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Part VIII

Maintenance

38 Changing Administrator Login Credentials

You can change the administrator phone's login user name and password. This is the login required to access the Web interface and the Administration menu on the phone. The default administrator user name and password is **admin** and **1234** respectively.

Administrator Login Credentials can be changed using the Web interface or configuration file.

- **To change the administrator's login username and password using the Web interface:**

1. Open the Users page (**Management** tab > **Administration** > **Users**).

Figure 38-1: Users – Administrator Account

Username	<input type="text" value="admin"/>
Password	<input type="password" value="••••"/>
Confirm Password	<input type="password" value="••••"/>

2. In the 'Username' field, enter a username.
3. In the 'Password' field, enter a new password, and then in the 'Confirm Password' field, re-enter this new password.
4. Click **Submit**; a confirmation prompt appears.
5. Click **OK**.

- **To change the login username and password using the configuration file:**

- Use the table below as reference.

Table 38-1: Username and Password Parameters

Parameter	Description
Username [system/user_name]	The phone user name. The default value is admin. Note: This parameter is applicable only to the Web interface.
Password [system/password]	The phone password is by default encrypted. The default value is 1234. To regenerate an encrypted password, see Section 4.6.2. Note: This parameter applies to the Web interface as well as to the phone's screen.

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39 Restarting Phones

The phone can be restarted from the phone or using the Web interface.

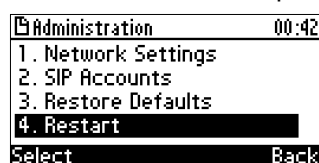
39.1 Restarting from the Phone

Here's how to restart the phone from the phone.

➤ **To restart the phone from the phone:**

1. On the phone, select the **Restart** option. Either:
 - a. MENU key > **Administration** > **Restart**)
-or-
 - b. MENU key > **Settings** > **Restart**

Here's the Administration screen's **Restart** option:



A warning message appears requesting you to confirm:



2. Press the **Yes** softkey to confirm the restart or **No** to cancel.

39.2 Restarting the Phone using the Web Interface

You can use the Web interface to restart your phone.

➤ **To restart the phone:**

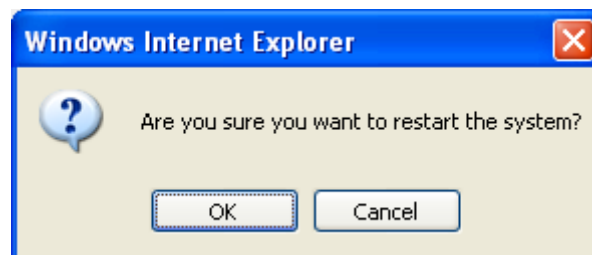
1. Open the Restart System page (**Management > Administration > Restart System**).

Figure 39-1: Restart System



2. Click the **Restart** button; a confirmation box appears prompting you to confirm.

Figure 39-2: Confirmation Box



3. Click **OK**.

40 Restoring Phone Defaults

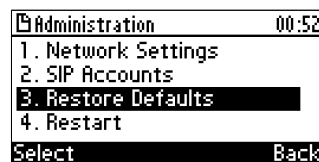
Phone default settings can be restored from the phone's screen or using the Web interface.

40.1 Restoring Factory Defaults from the Phone's Screen

Here's how to restore factory defaults from the phone's screen.

➤ **To restore the phone to default settings:**

1. On the phone, open the Restore Defaults screen (MENU key > **Administration** > **Restore Defaults**).



2. Press the **Select** softkey; a warning message appears requesting you to confirm:



3. Press the **Yes** softkey to confirm reset to defaults or **No** to cancel.



Note: You can restore the phone's settings to their defaults without needing access to the 'Administration' menu or (2) administrator access to the Web interface.

To restore the phone's settings to their defaults if necessary:

1. Long-press the **OK** and MENU keys simultaneously and while pressed, unplug the power cable.
2. Plug the power cable back into the phone and continue to press the OK + MENU keys for +-5 seconds as the boot process starts after connecting the power supply.
3. Release the **OK** + MENU keys; the phone's settings are restored to their defaults.

40.2 Restoring Factory Defaults using the Web Interface

You can restore your phone's settings to factory defaults using the Web interface.

➤ **To restore the phone to factory defaults:**

1. Open the Restore Defaults page (**Management > Administration > Restore Defaults**).

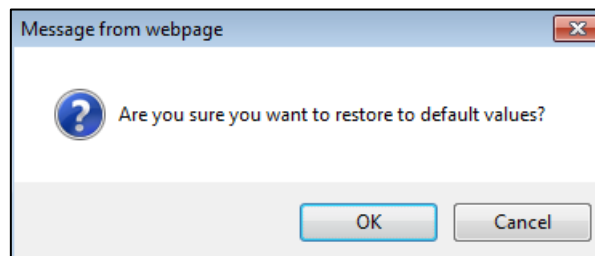
Figure 40-1: Restore Defaults



The screenshot shows a web interface with a light blue header bar. Below the header, there is a white rectangular box containing the text "Restore to Factory Defaults" on the left and a "Submit" button on the right.

2. Click **Submit**.

Figure 40-2: Confirmation to Restore Defaults



3. Click **OK**.



Part IX

Status and Monitoring

41 Determining Network Status

Here's how to determine network status using the Web interface.

41.1 Determining LAN Status

Here's how to determine LAN status information.

➤ **To determine LAN status information:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **Network Status**).

Figure 41-1: LAN Information

LAN Information	
Type:	DHCP Client
IP Address:	10.16.2.162
Subnet Mask:	255.255.0.0
Default Gateway Address:	10.16.0.1
Primary DNS:	10.1.1.11
Secondary DNS:	10.1.1.10
MAC Address:	00:90:8F:1E:DB:3E

41.2 Determining Port Status

Here's how to determine Port Mode status using the Web interface.

➤ **To determine Port Mode status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **Network Status**).

Figure 41-2: Port Mode Status

Port Mode Status		
Attribute	LAN Port	PC Port
Link State:	Up	Down
Negotiation:	Automatic	Automatic
Speed:	100Mbps	N/A
Duplex:	Full	N/A
VLAN Activate:	Enable	Disable
VLAN Id:	0	N/A
VLAN Priority:	0	N/A

41.3 Determining 802.1x Status

Here's how to determine 802.1x status.

➤ **To determine 802.1x status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **Network Status**).

Figure 41-3: 802.1X Status

802.1X Status	
EAP Type:	EAP-TLS
Status:	Failure: No certificates

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42 Determining VoIP Status

Here's how to determine VoIP status using the Web interface.

42.1 Determining Phone Status

Here's how to determine phone status.

➤ **To determine phone status:**

- Open the VoIP Status page (**Status & Diagnostics** tab > **System Status** menu > **VoIP Status**).

Figure 42-1: VoIP Status - Phone Status

Phone Status	
Hook State	On Hook
Audio Device	Ringer

42.2 Determining Line Status

Here's how to determine line status.

➤ **To determine line status:**

- Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **VoIP Status**).

Figure 42-2: Line Status

Line Status	
Line Number	Line 1
SIP Registration	Registered
SIP Registration Server	10.37.4.204
DnD	Off
Mute	Off
Forward State	Disabled
Forward Destination	N/A

42.3 Determining Memory Status

Here's how to determine the device's memory status in real time, using the three Linux commands that are most frequently used to obtain data related to a device's memory state.

➤ **To determine memory status:**

1. Open the Memory Status page (Status & Diagnostics > System Status > Memory Status).

Figure 42-3: Memory Status

2. From the dropdown list select a Linux command from the three available:

- **meminfo**
- **ps**
- **top**

Use the table below as reference.

Table 42-1: Memory Status – Linux Commands

Linux Command	Description
Meminfo	Provides you a snapshot of memory usage on the device.
ps	Provides you a snapshot of the current processes running on the device's CPU.
top	Provides you an ongoing look at processor activity in real time. Displays a listing of the most CPU-intensive tasks on the system.

3. Click **Refresh**; the information requested is displayed.

Figure 42-4: Memory Status – Linux meminfo Command – Displayed Information

▼Command Select

Command: ▼

Command Output

```

MemTotal:      13576 kB
MemFree:       124 kB
Buffers:        0 kB
Cached:        3180 kB
SwapCached:    0 kB
Active:        9168 kB
Inactive:      848 kB
HighTotal:     0 kB
HighFree:      0 kB
LowTotal:      13576 kB
LowFree:       124 kB
SwapTotal:     0 kB
SwapFree:      0 kB
Dirty:         0 kB
Writeback:     0 kB
Mapped:        9020 kB
Slab:          2208 kB
CommitLimit:   6788 kB
Committed_AS: 12324 kB
PageTables:    296 kB
VmallocTotal:  1048560 kB
  
```

4. Click **Save (as text file)** (optional); the information provided by the Linux command is saved to a txt file. You can use the file to make sure all data is stored correctly in memory and to diagnose possible issues such as voice quality, jitter, or memory leakage.
5. Click **Maximize** (optional); the information pane is maximized for an optimal viewing experience.

42.4 Viewing Current Call Information

The Web interface displays call information of a currently established call.

- **To view current call information:**
 - Open the Network Status page (**Status & Diagnostics** tab > **System Status** menu > **VoIP Status**):

Figure 42-5: Web Interface –Line 1 Call Information

Line 1 Call Information	
Call Number	Call 1
Call State	Connected
Origin	Outgoing
Remote Number	569
Remote ID	Sue Lee
Duration	00:00:22
Codec	G722
Packets Sent	825
Packets Received	826
Bytes Sent	132000
Bytes Received	132160
Packets Lost	0
Fraction Lost	0.0%
Jitter	1
Round Trip Delay	22

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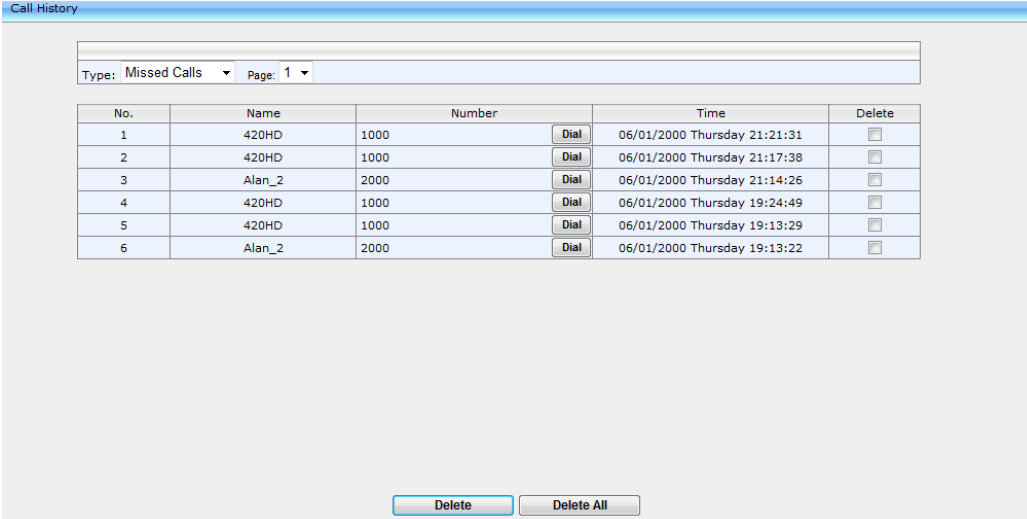
43 Viewing Call History

You can view a list of received calls, missed calls, and dialed numbers. The call duration of the received and dialed calls is also displayed.

➤ **To view call history:**

1. Open the Call History page (**Status & Diagnostics** tab > **History** menu > **Call History**).

Figure 43-1: Call History



The screenshot shows the 'Call History' page. At the top, there is a header bar with the title 'Call History'. Below the header, there is a filter section with 'Type: Missed Calls' and 'Page: 1'. The main content is a table with 6 columns: No., Name, Number, Dial, Time, and Delete. The table contains 6 rows of data. At the bottom of the page, there are two buttons: 'Delete' and 'Delete All'.

No.	Name	Number	Dial	Time	Delete
1	420HD	1000	<input type="checkbox"/>	06/01/2000 Thursday 21:21:31	<input type="checkbox"/>
2	420HD	1000	<input type="checkbox"/>	06/01/2000 Thursday 21:17:38	<input type="checkbox"/>
3	Alan_2	2000	<input type="checkbox"/>	06/01/2000 Thursday 21:14:26	<input type="checkbox"/>
4	420HD	1000	<input type="checkbox"/>	06/01/2000 Thursday 19:24:49	<input type="checkbox"/>
5	420HD	1000	<input type="checkbox"/>	06/01/2000 Thursday 19:13:29	<input type="checkbox"/>
6	Alan_2	2000	<input type="checkbox"/>	06/01/2000 Thursday 19:13:22	<input type="checkbox"/>

2. From the 'Type' drop-down list, select the type of call history (i.e., missed calls, received calls, and dialed numbers) that you want to view; the table lists the call history according to the chosen call history type.
3. You can delete a logged call history entry, by selecting the 'Delete' check box corresponding to the entry that you want to delete, and then clicking the **Delete** button.

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44 Accessing System Information

44.1 Accessing Phone Firmware Version

You can determine the phone firmware version using the Web interface or from the phone screen.

44.1.1 Accessing Firmware Version using the Web Interface

You can determine the firmware version currently running on the phone.

➤ **To view the phone's firmware version:**

- Open the System Information page (**Status & Diagnostics** tab > **System Information** menu > **General**).

Figure 44-1: System Information–Firmware Version

System Information	
Model Name	430HD
Firmware Version	2.2.4.46
Release Date	2015-07-07_11:37:30
MAC Address	00:90:8F:48:4C:F0
Device Certificate	Self-Signed

44.1.2 Accessing Firmware Version from the Phone's Screen

Here's how to determine firmware version on the phone.

➤ **To determine the phone's firmware version from the screen:**

- On the phone, open the Firmware Version screen (MENU key > **Status** > **Firmware Version**):



44.2 Viewing Phone Firmware Release Information

You can view phone firmware release information in the Web interface or in the phone screen.

44.2.1 Viewing Firmware Release Information in the Web Interface

- To view firmware release information in the Web interface:
- Open the Release Information page (**Status & Diagnostics** tab > **System Information** menu > **Release Information**).

Figure 44-2: System Information – Release Information

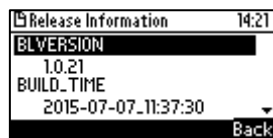
Release Information	
BLVERSION	1.0.24
AUTOMAKE	1
BUILD_OWNER	compile@cmbusrv01
BUILD_PROFILE	405
IMG_BLVERSION	1.0.24
SYSDATETIME	112400002015
VCS	g
BUILD_TIME	2015-11-24_11:53:09
DSPFWVERSION	494002ce4.700.28/494001ce5.700.28
HW_TYPE	405
LOG	0
SWVERSION	2.2.6.9
SW_TYPE	GENERIC
DSP_FW_VERSION_CURRENTLY_LOADED	494002ce4.700.28

44.2.2 Viewing Firmware Release Information on the Phone

Here's how to view firmware release information on the phone.

➤ **To view firmware release information on the phone:**

- On the phone, open the Release Information screen (MENU key > **Status** > **Release Information**).



- Release information includes:

- BL Version
- Build Time
- DSP FW Version
- Hardware Type
- Log
- Software Version
- Software Type

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45 Monitoring Quality of Experience

You can configure the phone to send Quality of Experience reports to a QoE collecting server, such as the AudioCodes SEM server. This mechanism is implemented using RTCP-XR (RTCP Extended Reports). These extended reports include voice quality data events, such as Jitter Buffer, Packet Loss, Delay and Burst, which are collected by the phone during the VoIP session.

When the SIP PUBLISH feature is enabled, upon the termination of the VoIP session e.g. call disconnect or Hold states, values are calculated for each voice quality data event and sent to the QoE server in a SIP PUBLISH message.

RTCP XR information publishing is implemented on the phone according to RFC 6035.

RTP Control Protocol Extended Reports (RTCP XR) is a VoIP management control that defines a set of metrics containing information for assessing VoIP call quality and for diagnosing problems. RTCP XR (RFC 3611) extends the RTCP reports defined in RFC 3550 by providing additional VoIP metrics for Quality of Experience.

45.1 Configuring Remote Voice Quality Monitoring

To report voice quality events from the phone to a Quality of Experience Server (QoE):

- Configure the phone to retrieve RTCP XR events on voice quality data (see Section 45.1.1) -and-
- Configure the phone to send SIP PUBLISH messages to the QoE server, including the RTCP XR events described above and the SIP call messages (see Section 45.1.2).

45.1.1 Configuring RTCP Extended Report

Here's how to configure RTCP-XR (Extended Report for RTP Control Protocol) working mode. You must enable the phone to retrieve RTCP-XR events using one of the methods described in the table below (this feature is by default disabled).

➤ **To configure RTCP_XR working mode using the Web interface:**

1. Open the Media Streaming page (**Configuration** tab > **Voice Over IP** menu > **Media Streaming**), and then scroll down to the RTCP-XR section.

Figure 45-1: Media Streaming - RTCP-XR

▼RTCP-XR	
RTCP-XR Voice Quality Statistics Mode:	Disable ▼

2. Configure the 'RTCP-XR Voice Quality Statistics Mode' parameter, using the following table below as reference.

➤ **To configure RTCP_XR working mode using the configuration file:**

- Use the table below as reference.

Table 45-1: RTCP_XR Parameters

Parameter	Description
RTCP-XR Voice Quality Statistics Mode [voip/rtcp_xr/vq_statistics/mode]	<p>Sets RTCP_XR working mode. Select either:</p> <ul style="list-style-type: none"> ▪ [DISABLE] (default). In this state, no RTCP events are retrieved from the phone and the SIP PUBLISH is not sent, regardless of the state of parameter 'qoe_publish_enabled' (see below). ▪ [EVENTS_ONLY]. In this state, RTCP-XR events with voice quality parameter calculations are sent internally on the phone every five seconds. Each calculation is made on the basis of these RFC 3611 parameters: BT=7, block length = 8SSRC of source, loss rate, discard rate, burst density, gap density, burst duration, gap duration, round trip delay, end system delay, signal level, noise level, Gmin, R factor, ext. R factor, MOS-LQ, MOS-CQ, RX config, JB nominal, JB maximum and JB abs max. The phone sends the summarized RTCP-XR events to the Skype for Business server / OVOC server via SIP SERVICE messages (in Genesis-SIP, SIP PUBLISH messages are used). ▪ [REMOTE_AND_EVENTS]. In this state, the phone sends RTCP-XR events to the remote calling party (i.e. party A sends these events to party B) every five seconds during the VoIP session. The phone sends the summarized RTCP-XR events to the Skype for Business server / OVOC server via SIP SERVICE messages (in Genesis-SIP, SIP PUBLISH messages are used).

45.1.2 Configuring Voice Quality Monitoring

You can set up the phone to report SIP PUBLISH messages to a remote QoE server.

➤ **To configure voice quality monitoring using the configuration file:**

- Use the table below as reference.

Table 45-2: Voice Quality Monitoring Parameters

Name	Role
[/voip/qoe/qoe_publish_enabled]	Determines whether or not to send PUBLISH messages (Default-0).
[/voip/qoe/qoe_server_address]	Sets the QoE server address/hostname to which PUBLISH messages will be sent (Default-0.0.0.0).
[/voip/qoe/qoe_server_port]	Sets the port to which the PUBLISH messages will be sent (Default-5060).

For a full listing of RTCP XR parameters that may be sent to the QoE server, see Appendix G. For example SIP PUBLISH messages, see Appendix H.



Part X

Diagnostics and Troubleshooting

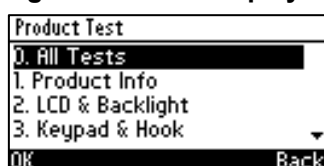
46 Diagnosing Phone Hardware

Here's how to test the phone's hardware functionality.

➤ **To diagnose phone hardware:**

1. Connect the phone's LAN port to a switch using a LAN cable.
2. Ensure that the DHCP server is functioning.
3. Connect a headset to the phone.
4. Power on the phone and wait until initialization is complete.
5. On the keypad, key in the number **0123456789** and then press the star key (*); the diagnostic tests are displayed on the phone screen.

Figure 46-1: Diagnostic Tests Displayed on the Phone



6. Run all tests consecutively (MENU option 0 – All Tests) -OR- run a single test (MENU options 1-10).

MENU Option	Test	Description
0	All Tests	1-10 (listed below), performed in one continuous sequence, where each test is followed by the next in the order listed.
1	Product Info	Displays MAC address, SN (serial number), VERSION, IP address, manufacturing company (AudioCodes) and phone model. Verify that product information is correct.
2	Main Screen & Backlight	Tests the backlight in the main screen. Press OK successively to test correct functionality.
3	BLF screen & Backlight	(Only applicable to 440HD model) Tests the backlight in the BLF. Press OK successively to verify All White, All Black, Backlight On and Backlight Off. Observe screen notifications.
4	Keypad and Hook	Tests off-hook/on-hook functionality. Verify correct functionality. For more details, see Section 46.1.
5	LED	Tests the LEDs. Press OK successively; screen displays 'Green LEDs are on' followed by 'Red LEDs are on' followed by 'Blue LEDs are on' followed by 'All LEDs are on'. Verify correct functionality.
6	Handset	Tests handset microphone for recording/speaking and handset receiver (speaker) for playing/listening. Verify correct functionality. For more details, see Section 46.2.
7	Headset	Tests headset microphone (recording/speaking) and headset headphone/receiver (playing/listening). Verify correct functionality. For more details, see Section 46.3 below.
8	Hands Free	Tests speaker microphone (recording/speaking) and speaker receiver (playing/listening). Verify correct functionality. For more details, see Section 46.4 below.

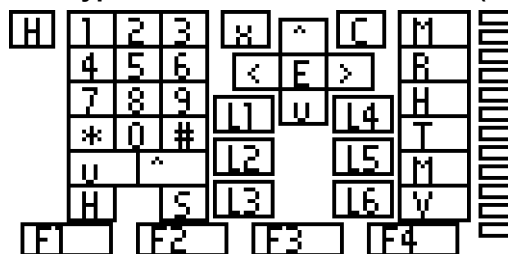
MENU Option	Test	Description
9	USB	(Applies only to 430HD and 440HD models) Plug in a USB device; 'USB device was detected' should be displayed in the screen. Remove it; 'USB device was removed' should be displayed. Verify correct functionality.
10	AUX	Used for debugging.

46.1 Testing Keypad and Hook

➤ To test keypad and hook:

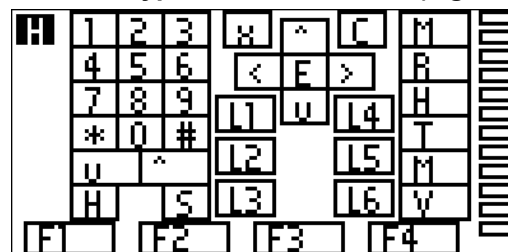
1. On the phone, select MENU option 4, **Keypad and Hook**; the screen displays a graphic representation of the physical keypad (screens differ slightly across phone models).

Figure 46-2: Keypad and Hook Test– On-Hook (e.g., 440HD)



2. Off-hook the handset; the background of the hook indicator ('H') turns black.

Figure 46-3: Keypad Test – Off-Hook (e.g., 440HD)



3. On-hook the handset; the background of the hook indicator ('H') reverts to white.
4. Press each key on the keypad; its representation in the screen turns black.

46.2 Testing Handset

➤ **To test the handset:**

1. Select MENU option 6, **Handset**; the screen indicates 'Off-hook phone'.
2. Off-hook the phone; the screen indicates 'Start recording...' Speak into the handset until the screen displays 'Start playing...' and you hear your speech playing back.

46.3 Testing the Headset

➤ **To test the headset:**

1. Select MENU option 7, **Headset**; the screen indicates 'Press any key'.
2. Press any key; the screen indicates 'Start recording...' Speak until the screen displays 'Start playing...' and you hear your speech playing back.

46.4 Testing Hands Free

➤ **To test hands free:**

1. Select MENU option 7, **Hands Free**; the phone screen indicates 'Press any key'.
2. Press any key; the phone screen indicates 'Start recording...' Speak into the phone speaker for a few seconds until the phone screen displays 'Start playing...' and you hear your speech playing back through the speaker.

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47 Recovering Firmware

Here's how to recover the phone's firmware. See also Appendix C for more detailed information. If the phone is powered off for some reason during the firmware upgrade process, the phone becomes unusable. The recovery process is also available when the phone is connected to a VLAN.

➤ **To recover the phone firmware:**

1. Make sure your DHCP server supports Options 66 (TFTP server address) and 67 (firmware file), and that these are configurable.
2. Before connecting the phone, verify that the TFTP server is running and the firmware file for recovery is located in the correct location.
3. Connect your phone to the IP network, and then connect the phone to the power outlet;
 - a. The phone sends a TFTP request to the IP address indicated in the DHCP Option 66 field to retrieve the firmware file indicated in the DHCP Option 67 field.
 - b. The phone, in the DHCP Discover message sends its model name in the DHCP Option 77 field. The DHCP server, according to the phone model, sets the appropriate firmware file name in the DHCP Option 67 field sent to the phone (e.g., 440HD_2.2.2.img).
 - c. The phone then upgrades to the recovery firmware.
 - d. After the firmware upgrade process completes, the phone boots up successfully.

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48 Configuring System Logging (Syslog)

System logging (Syslog) can be configured using the Web interface or configuration file. Two Syslog options are available:

- Regular Syslog (see the next section)
- Lightweight Syslog (see Section 48.1.2).

48.1.1 Analyzing and Debugging Traffic using Regular Syslog

The System Logging (Syslog) feature is used for traffic analysis and debugging. The feature can be configured using the Web interface or configuration file.

➤ **To configure system logging using the Web interface:**

1. Open the System Logging page (**Status & Diagnostics > Diagnostics > Logging**).

Figure 48-1: Web Interface –System Logging

System Logging	
Activate:	Network
Server IP Address or Host Name:	10.16.2.50
Server Port:	514
Voip Application:	None
Sip Call Control:	None
Sip Stack:	None
Control Center:	None
LCD Display:	None
Web:	None
Watchdog:	None
802.1X:	None
Kernel:	None
DSP:	None
XSI:	Debug
Infra:	Debug

2. Configure using the table below as reference.

➤ **To configure system logging using the configuration file:**

- Use the table below as reference.

Table 48-1: Syslog Parameters

Parameter	Description
Activate [system/syslog/mode]	<p>Enables Syslog. Possible values are:</p> <ul style="list-style-type: none"> • Disable = No Syslog. • Network = Syslog is sent to the Syslog server. (Recommended). • Console = Syslog is sent to the phone console. (You need to connect a serial cable to view the logs. This causes delays in phone operation). • Both = Syslog sends to the Syslog server <i>and</i> to the console. <p>Note: It is recommended to leave this parameter at its default value.</p>
Server IP Address or Host Name [system/syslog/server_address]	The IP address (in dotted-decimal notation) of the computer you are using to run the Syslog server (e.g.,

Parameter	Description
	Wireshark). The Syslog server is an application designed to collect the logs and error messages generated by the phone. The default IP address is 0.0.0.0. Note: This parameter is applicable when Activate is set to Network or Both .
Server Port [system/syslog/server_port]	Defines the UDP port of the Syslog server. The valid range is 0 to 65,535. The default port is 514. Note: This parameter is applicable when Activate is set to Network or Both .
Note: The following Severity level options are applicable for the fields below: <ul style="list-style-type: none"> • None • Emergency • Error • Warning • Notice • Info • Debug 	
VoIP Application [system/syslog/component/voip_application]	Defines multi-layer VoIP application.
SIP Call Control [system/syslog/component/sip_call_control]	Defines MTR layer Radvision.
SIP Stack [system/syslog/component/sip_stack]	Defines SIP Stack Radvision.
Control Center [system/syslog/component/control_center]	Responsible for Networking and running other processes.
LCD Display [system/syslog/component/lcd_display]	Defines the phone screen display.
Web [system/syslog/component/web_server]	Defines the phone Web server.
Watchdog [system/syslog/component/watchdog]	Responsible for keeping other processes running.
802.1X [system/syslog/component/ieee802_1x]	Defines the security protocol.
Kernel	Defines the core of the phone (430HD and 440HD only).
DSP [system/syslog/component/dsp]	Defines the voice engine of the phone (430HD and 440HD only).
XSI [system/syslog/component/xsi]	Defines logging for the xsi feature. Default: DEBUG
Infra [system/syslog/component/infra]	Defines logging for code infrastructure. Default: DEBUG

48.1.2 Analyzing and Debugging Traffic using 'Lightweight Syslog'

A 'Lightweight Syslog' logging mechanism allows you to perform phone logging without affecting phone performance.

➤ **To enable the Lightweight Syslog:**

- In the Web interface, open the phone's System Logging page (**Status & Diagnostics** tab > **Diagnostics** > **Logging**), set the 'Activate' parameter to **Network** and provide a valid IP address and server port. Do not set any of the options (keep all as **None**).

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49 Viewing Error Messages Displayed in the Phone Screen

The table below shows the error messages that may be viewed on the phone.

Table 49-1: Error Messages Displayed in the Phone Screen

Message	Description
LAN Link failure	The LAN link is disconnected.
Registration failure	Received error or no response from the SIP proxy



Note:

- With both errors, the 'ringer' LED remains red until the error is fixed.
- While the error message is displayed, the user can't dial or initiate a call.

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50 Debugging using Packet Recording Parameters

Packet recording parameters allow you to debug voice activity on the phone, using the Web interface or configuration file.

➤ **To debug using the Web interface:**

1. Open the Recording page (**Status & Diagnostics** tab > **Diagnostics** menu > **Recording**).

Figure 50-1: Recording

2. Configure the packet recording parameters using the table below as reference, and then click **Submit**.

➤ **To debug using the configuration file:**

- Use the table below as reference.

Table 50-1: Recording Parameters

Parameter	Description
Remote IP Address or Host Name [voip/packet_recording/remote_ip]	The IP address (in dotted-decimal notation) of the remote computer to which the recorded packets are sent. The recorded packets should be captured by a network sniffer (such as Wireshark). The default value is 0.0.0.0.
Remote Port [voip/packet_recording/remote_port]	Defines the UDP port of the remote computer to which the recorded packets are sent. The valid range is 1024 to 65535. The default value is 50000.
Enable DSP Recording [voip/packet_recording/enabled]	Activates the packet recording mechanism. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

Parameter	Description
Enable RTP Recording [voip/packet_recording/rtp_recording/enabled]	Only displayed if the parameter 'Enable DSP Recording' is enabled. Activates the DSP RTP recording. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Enable EC Debug Recording [voip/packet_recording/ec_debug_recording/enabled]	Activates the Echo Cancellor Debug recording. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Enable Noise Reduction Debug Recording	Traffic on the network stops when the MUTE key is activated. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Enable Network Recording [voip/packet_recording/network_recording/enabled]	Activates the DSP network (TDM Out) recording. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Enable TDM Recording [voip/packet_recording/tdm_recording/enabled]	Activates the DSP TDM (TDM In) recording. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
[voip/packet_recording/cng_debug_recording/enabled]	Default=0

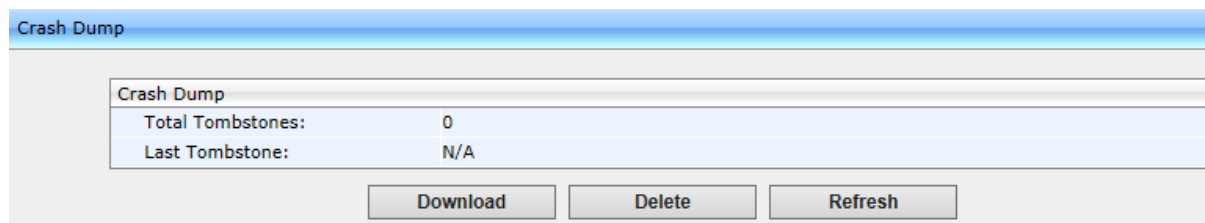
51 Creating a Crash Dump File

Here's how to create a crash dump file using the Web interface. Crash dump copies historical processes to a file. The file is created at the time the problem occurs. You must send it to AudioCodes Customer Technical Support for troubleshooting.

➤ **To download a crash dump file using the Web interface:**

1. Open the Crash Dump page (Status & Diagnostics tab > Diagnostics menu > Crash Dump).

Figure 51-1: Crash Dump



Crash Dump	
Total Tombstones:	0
Last Tombstone:	N/A

Table 51-1: Crash Dump Parameters

Parameter	Description
Total tombstones	The number of crashes on the phone.
Last tombstone	The date and time of the last crash (the exact time of the crash).

2. Click **Download** to save the crash dump file on your computer.

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52 Configuring Port Mirroring

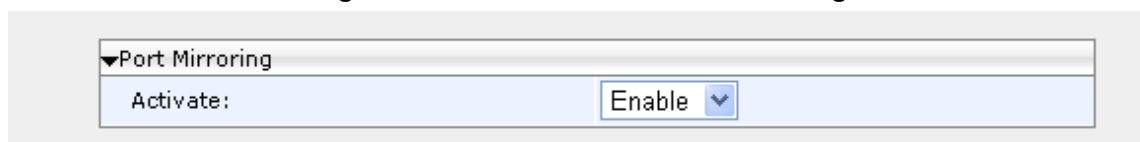
Traffic on the phone's LAN port can be duplicated on its PC port in order to record calls, analyze traffic, and troubleshoot issues.

This port mirroring feature can be configured using the Web interface or configuration file.

➤ **To configure port mirroring using the Web interface:**

1. Open the Recording page (Configuration tab > Network Connections menu > Network Settings).

Figure 52-1: Web Interface –Port Mirroring



▼Port Mirroring

Activate: Enable ▼

2. Configure port mirroring according to the parameters in the table below, and then click **Submit**.

➤ **To configure port mirroring using the configuration file:**

- Use the table below as reference.

Table 52-1: Port Mirroring Parameters

Parameter	Description
Activate [network/pc_port_mirroring/enabled]	Enables port mirroring. <ul style="list-style-type: none">▪ [0] Disable (default) - LAN/PC network interfaces operate in SWITCH mode.▪ [1] Enable - LAN/PC network interfaces operate in HUB mode. The network traffic on the LAN port is reflected in the PC port.

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53 Enabling Tracing

Here's how to set up the phone to store trace messages. You can then send the saved logged trace to AudioCodes Customer Technical Support for effective troubleshooting and diagnosis.

**Note:**

- During regular phone operation it's advisable to *disable* debug tracing for improved performance.
- It's advisable to *enable* debug tracing only if bugs are encountered and AudioCodes asks you to provide tracing logs.

➤ **To enable tracing:**

1. In the Web interface, open the Tracing System Key Behavior page (**Status & Diagnostics** tab > **Diagnostics** > **Tracing**).

Figure 53-1: Tracing System Key Behavior

2. Set the 'Max File Size' field to **1024** (see the table below).
3. Set the 'Trace Level' field to **Debug** to activate tracing to debug level, and then click **Submit** (see the table below).
4. Click **Clean log**, and then power up the phone.
5. To save the log file to your computer, click **Save log**.
6. Send the saved logged trace to AudioCodes Customer Technical Support for troubleshooting.

➤ To configure tracing using the configuration file:

- Use the table below as reference.

Table 53-1: Tracing Parameters

Parameter	Description
[system/trace/console_printf/enabled]	Enables / disables console print. <ul style="list-style-type: none"> ▪ [0] Disable (default) – Disables console print. ▪ [1] Enable - Enables console print.
Trace Level [system/trace/level]	During regular phone operation it's advisable to <i>disable</i> debug tracing for improved performance. It's advisable to <i>enable</i> debug tracing only if bugs are encountered and AudioCodes asks you to provide tracing logs, in which case set this parameter to Debug . Valid values are: <ul style="list-style-type: none"> ▪ None (default) ▪ Emergency ▪ Error ▪ Warning ▪ Notice ▪ Info ▪ Debug
Max File Size [system/trace/max_file_size]	Set to 1024 Default: 200



Part XI

Appendices

A Configuring Phones in Server-Specific Deployments

This appendix shows how to configure phones in server-specific deployments.

A.1 BroadSoft's BroadWorks

Features supported in a BroadSoft environment are:

Table A-1: Features Supported in a BroadSoft Environment

Feature	420HD	430HD	440HD
BSFT DMS for provisioning	√	√	√
BLF Support	X	√	√
Call FWD	√	√	√
Call Transfer	√	√	√
Call Park	√	√	√
Call hold	√	√	√
Dial Plan	√	√	√
Caller ID	√	√	√
Message Waiting Indication	√	√	√
Local 3-Way Conference	√	√	√
DND	√	√	√
Feature key Sync	√	√	√
Network Conference	√	√	√
Shared Call Appearance	X	√	√
Broadworks Phone book support	√	√	√
Voice Message Support	√	√	√
DNS SRV Lookup for Redundancy and register failover	√	√	√
ACD (Automatic Call Distribution)	√		

A.1.1 Configuring BLF

Configuration of the BLF feature is unique when the selected application server is BroadSoft's BroadWorks application platform.



Note: This section only applies to 430HD and 440HD phones.

➤ **To configure BLF in a BroadSoft environment:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure A-1: BLF Configuration in a BroadSoft Environment

▼Application Server	
Type:	BSFT ▼
▼Call Waiting	
Activate:	Enable ▼
Call Waiting SIP Reply:	Queued ▼
▼Call Forward	
Enable:	Enable ▼
Activate:	Disable ▼
▼Conference	
Mode:	Local ▼
▼DND (Do Not Disturb)	
Enable:	Enable ▼
Activate:	Disable ▼
▼Message Waiting Indication (MWI)	
Voice Mail Number:	<input type="text"/>
Activate:	Enable ▼
Subscribe To MWI:	Disable ▼
▼BLF Support	
Activate:	Enable ▼
Call Pick Up:	Disable ▼
BLF Subscription Period:	3600 <input type="text"/> Seconds
User Resource list:	<input type="text"/>
Use Registrar as Application Server Address:	Enable ▼

2. From the 'Application Server Type' drop-down list, select **BSFT**.
3. Under BLF Support do this:
 - a. From the 'Activate' drop-down (**voip/services/busy_lamp_field/enabled** parameter), select **Enable**.
 - b. In the 'BLF Subscription Period' field (**voip/services/busy_lamp_field/subscription_period** parameter), enter the interval between BLF and SIP SUBSCRIBE messages.
 - c. In the 'User Resource List' field (**voip/services/busy_lamp_field/Uri** parameter), enter the resource list URI to which the phone can subscribe to in order to get the BLF information from the application server.

- d. Define the Application Server Address:
 - ◆ Same address as SIP Registrar: From the 'Use Registrar as Application Server Address' (voip/services/busy_lamp_field/application_server/use_registrar parameter) drop-down list, select **Enable**. The Registrar's address is used as the application server's address, defined by the parameter **voip/signalling/sip/sip_registrar/addr** (see Section 16.2).
 - ◆ Unique address: From the 'Use Registrar as Application Server Address' drop-down list, select **Disable**, and then in the 'Application Server Address or Domain Name' field (voip/services/busy_lamp_field/application_server/addrparameter), enter the IP address or domain name of the application server.
4. Click **Submit**.
5. Define speed dial keys with the BLF feature (see Section 25).

A.1.2 Configuring Call Forwarding



Note: This section is only applicable to 430HD and 440HD phones.

A.1.2.1 From the Phone

Call Forwarding can be configured in a BroadSoft environment using the phone's screen.



Note: Before configuring Call Forwarding in the phone's screen, make sure 'Feature Key Synchronization' in the phone's Web interface is disabled (see Section A.1.4).

- **To configure call forwarding on the phone:**
- See the phone's *User's Manual* for detailed information.

A.1.2.2 From BroadSoft's BroadWorks

Call Forwarding can also be configured from the BroadSoft BroadWorks application platform. Call Forwarding status can also be retrieved from it.



Note: To enable BroadWorks-managed Call Forwarding, you must first enable 'Feature Key Synchronization' using the Web interface (see Appendix A.1.4).

The figure below shows Call Forwarding configuration and status in BroadSoft's BroadWorks.

Figure A-2: Configuring Call Forwarding using BroadSoft's BroadWorks

Options: Profile Incoming Calls Outgoing Calls Call Control Client Applications Messaging Service Scripts Utilities	<h2>Incoming Calls</h2> <h3>Basic</h3> <p>Anonymous Rejection - Off Prevent a caller from reaching you when the caller has explicitly restricted his/her number.</p> <p>Call Forwarding Always - On Automatically forward all your incoming calls to a different phone number.</p> <p>Call Forwarding Busy - On Automatically forward your calls to a different phone number when your phone is busy.</p> <p>Call Forwarding No Answer - On Automatically forward your calls to a different phone number when you do not answer your phone after a certain number of rings.</p> <p>Connected Line Identification Restriction - Off Allows a user to restrict their connected identity when receiving a call.</p> <p>Do Not Disturb - Off</p>
--	---



Note: The 'Forward No Reply' timeout can be configured as 'number of rings' rather than as 'seconds' if the BroadSoft Feature Key is enabled (by configuring the cfg file parameter 'voip/line/0/call_forward/timeout_mode' to **RINGS_COUNT** instead of to the default **SECONDS**). For example, if the BroadSoft Feature Key is enabled and 'voip/line/0/call_forward/timeout_mode' is configured to **RINGS_COUNT**, the phone will by default ring 2r (2 rings) before the call is forwarded. The setting can be changed according to user preference to 4r (4 rings), for example. The feature allows compliance with BroadSoft's Feature Key Synchronization method.

For detailed information, see related BroadSoft documentation.

A.1.3 Configuring DnD

The DnD feature can be configured in the phone's screen or in the Web interface.



Note: Before configuring DnD in the phone's screen, make sure 'Feature Key Synchronization' in the phone's Web interface is disabled (see Section A.1.4).

The DnD feature can also be configured using the BroadSoft BroadWorks application server. The figures below show the DnD configuration and status screens in BroadWorks.

Figure A-3: Configuring DnD in BroadSoft's BroadWorks - Status

Figure A-4: Configuring DnD in BroadSoft's BroadWorks

For detailed information, see related BroadSoft documentation.

A.1.4 Configuring FKS

Enabling Feature Key Synchronization synchronizes the DnD and Call Forward functionalities with the BroadSoft BroadWorks server. After activating the feature, the DnD and Call Forward functionalities are performed by BroadWorks rather than the phone. For more information on DnD functionality, see Section 22.8.

➤ To enable Feature Key Synchronization:

1. In the Web interface, open the Services screen (**Configuration > Voice over IP > Services**).

Figure A-5: Services

The screenshot shows the 'Services' configuration page. Under the 'Application Server' section, the 'Type' dropdown menu is currently set to 'Generic'.

2. From the 'Type' dropdown under Application Server, select the **BSFT** (BroadSoft) option; the 'Feature Key Synchronization' dropdown is displayed.

Figure A-6: Services - Feature Key Synchronization

The screenshot shows the 'Services' configuration page with the 'Type' dropdown set to 'BSFT'. The 'Feature Key Synchronization' dropdown menu is now visible and set to 'Enable'.

3. From the 'Feature Key Synchronization' dropdown, select **Enable** and then **Submit**.

A.1.5 Using SIP Authentication for Xsi Access

BroadSoft environment users can enter their BroadWorks user credentials for Xtended Services Interface (Xsi) access. The phones use SIP authentication data to authenticate Xsi access. The phones send the BroadWorks user ID to the Xtended Services Platform (Xsp) to identify the user, along with the SIP authentication user name and password to authenticate access to the Xsi.

A.1.6 Configuring Phones to Connect to the Xsi Interface using HTTP/S Authentication

BroadSoft environment users can enter their BroadWorks user credentials for Xsi access using HTTP/S authentication. The phone supports three Xsi services:

■ Call Center list

Users can be assigned up to three call centers that will be displayed on the right side of the user's phone screen.



Configured on programmable keys 4-6, three call centers Dept. B, Dept. C and Dept. A are displayed on the screen above. The network administrator can enable | disable the feature using configuration file parameter *xsi/callcenter/update* which by default is enabled.

The feature allows enterprise front desk personnel to indicate their availability status (available or unavailable), in each call center, to the BroadWorks server. The server

then efficiently distributes incoming calls to front desk personnel, saving callers from the inconvenience of unanswered referrals or disconnections.

■ **Contact Synchronization**

Contact directories are pulled directly from the BroadWorks server. Case-insensitive Abc name search is performed instantly. Supported directories are Group Directory, Enterprise Directory, Group Common, Enterprise Common and Personal Directory. The network administrator can enable | disable the feature using configuration file parameter *xsi/contact/enable* which by default is enabled. The feature cannot coexist with contacts saved locally on the phone.

■ **Call Log Synchronization**

Call Logs are pulled directly from the BroadWorks server. The phone displays the following Call Logs: All Calls, Missed Calls, Received Calls and Dialed Calls. The network administrator can enable | disable the feature using configuration file parameter *xsi/calllog/enable* which by default is enabled.

➤ **To connect phones to BroadWorks over HTTP/S using the configuration file:**

- Use the table below as reference.

Table A-2: Connecting Phones to BroadWorks over HTTP/S – Configuration File Parameters

Parameter	Description
[xsi/callcenter/update]	<ul style="list-style-type: none"> ■ [1] The phone gets the call center service from the BroadWorks server ■ [0] The phone does not get the call center service from the BroadWorks server (default).
[xsi/contact/enable]	<ul style="list-style-type: none"> ■ [1] Contacts and contact information are saved on the BroadWorks server ■ [0] Contacts and contact information are saved locally on the phone (default)
[xsi/host]	<p>Defines the phones host, BroadWorks server. The phones receive three web services from the server.</p> <ol style="list-style-type: none"> 1 Contacts list 2 Call Log (history of calls dialed, received, missed, etc.) 3 Call Center
[xsi/http_port]	<p>Defines the BroadSoft BroadWorks online server port number. Default: 80. Must be configured for the phones to receive web services from the BroadSoft BroadWorks online server over HTTP.</p>
[xsi/http_security]	<p>Defines the authentication method phones will use opposite the BroadSoft BroadWorks online server. Can be HTTP or HTTPS. Must be configured for the phones to receive web services over HTTP/S from the BroadSoft BroadWorks online server.</p>
[xsi/update_time]	<p>Every 20 minutes (default) phones update their call center status. Programmable keys on the phone indicate call centers' statuses.</p> <ul style="list-style-type: none"> ■ Key illuminated red = Phone unavailable ■ Key illuminated green = Phone available <p>Phone users can press a key to change the phone's status <i>in that call center</i>. If a user presses a key illuminated red, the key turns green and the</p>

	<p>phone's status <i>in that call center</i> changes from unavailable to available. If a key is illuminated green and the user presses it, the phone's status <i>in that call center</i> changes from available to unavailable.</p> <p>The BroadWorks server updates phone status every 20 minutes by default.</p>
[xsi/user_id]	Defines the user ID required for the phone to access the BroadSoft BroadWorks online server.
[xsi/password]	Defines the password required for the phone to access the BroadSoft BroadWorks online server.

A.1.7 Configuring Shared Call Appearance

The SCA feature enables multiple phones to be associated in an SCA group so that calls can be made or received on any phone in the group.



Note:

- The 440HD phone fully supports the Shared Call Appearance (SCA) feature.
- The 405 / 405HD / 420HD / 430HD phones support the feature as *participant only*.

Figure A-7: Shared Call Appearance with Multiple Call Appearance



➤ To configure Shared Calls Appearance:

1. In the BroadSoft server, assign Shared Call Appearance to the user: Under the 'User' level, select the **Call Control** option, and then click the **Shared Call Appearance** tab.

Figure A-8: BroadSoft Server - Assigning Shared Calls Appearance to a User

Options:

- Profile
- Incoming Calls
- Outgoing Calls
- Call Control
- Client Applications
- Messaging
- Service Scripts
- Utilities

Shared Call Appearance

Shared Call Appearance allows administrators to allocate additional devices or lines to you. These devices or lines also ring just like your primary phone. Define the line policy on Device Policies page.

OK Apply Add Cancel

☒ Alert all appearances for Click-to-Dial calls
☒ Alert all appearances for Group Paging calls
☒ Allow Call Retrieve from another location
 Multiple Call Arrangement: ☒ On ☐ Off
☐ Allow bridging between locations
☒ Enable Call Park notification
 Bridge Warning tone: ☐ None
☒ Barge-in only
☐ Barge-in and repeat every 30 seconds
 Device Policies: [Configure device policies](#)

Delete	Identity/Device Profile Type	Identity/Device Profile Name	Line/Port	Edit
<input type="checkbox"/>	Generic SIP Phone	AudioCodesPhone4 (Group)	2421114084_2@as.io...	Edit
<input type="checkbox"/>	Generic SIP Phone	AudioCodesPhone4 (Group)	2421114098@as.iop1...	Edit
<input type="checkbox"/>	Generic SIP Phone	AudioCodesPhone4 (Group)	2421114097@as.iop1...	Edit
<input type="checkbox"/>	Generic SIP Phone	AudioCodesPhone4 (Group)	2421114098@as.iop1...	Edit

[Page 1 of 1]

Identity/Device Profile Type Starts With Find Find All

OK Apply Add Cancel

2. On the Shared Call Appearance page shown in the figure above, click **Add** to configure an 'Identity/Device Profile Type', and then use the table below as reference to configure the parameters.

Table A-3: BroadSoft Server - Shared Call Appearance – Identity/Device Profile Type

Parameter	Description
Alert all appearances for Click-to-Dial calls	See BroadSoft's documentation for detailed information. Select this option when you want your Click-To-Dial calls to ring all phones that have your line appearance. Clear the option if you prefer your line to ring your phone only.
Alert all appearances for Group Paging calls	See BroadSoft's documentation for detailed information.
Allow call retrieve from another location	See BroadSoft's documentation for detailed information. Select this option when you use a feature access code to automatically retrieve a call that was answered at another Shared Call Appearance of your number.
Multiple Call Arrangement	See BroadSoft's documentation for detailed information. Select On to allow multiple calls using your phone number / ID to be dialed or answered simultaneously across all Shared Call Appearances of your number. Select Allow bridging between locations when you want to use a feature access code to bridge a 3-way conference call automatically for any call that has been answered at another Shared Call Appearance of your number. Select Enable Call Park notification for the phone to alert the user visually and audially when a parked call is received.
Bridge Warning tone	See BroadSoft's documentation for detailed information. Select the type of Bridge Warning tone treatment you prefer when you bridge and join a call using a feature access code. Select None to apply no tone alert treatment upon your entry to the call. Select Barge-in only to provide a single tone alert. Select Barge-in and repeat every 30 seconds to provide a tone alert at that interval.

3. Click the **Edit** link adjacent to the selected Line/Port to modify a specific phone that has a Shared Call Appearance of your line.
4. Click **OK**.

Figure A-9: BroadSoft Server – Shared Call Appearance Add

Options:

- [Profile](#)
- [Incoming Calls](#)
- [Outgoing Calls](#)
- [Call Control](#)
- [Client Applications](#)
- [Messaging](#)
- [Service Scripts](#)
- [Utilities](#)

Shared Call Appearance Add
Allows administrators to allocate additional devices or lines to you.

OK Cancel

Identity/Device Profile Name: AudioCodesPhone4 (Group) ▼

* Line/Port: 2421114099 @
as.iop1.broadworks.net ▼

☒ Enable this location
☒ Allow Origination from this location
☒ Allow Termination to this location

OK Cancel

Table A-4: BroadSoft Server - Shared Call Appearance Add

Parameter	Description
Identity/Device Profile Name	See BroadSoft's documentation for detailed information. From the dropdown, select the Identity/Device Profile Type you configured previously.
Line/Port	Enter the required SIP register address-of-record, for example (shown in the figure above): 2421114099@as.iop1.broadworks.net
Enable this location	Select this option to enable this user station.
Allow Origination from this location	Select this option to allow calls to be made from this user station.
Allow Termination to this location	Select this option to allow calls to be received at this user station.

5. In the Web interface, access the Line Settings page (**Voice Over IP > Line Settings**) and from the 'Line 1 Mode' dropdown, select **Shared** (line).

Figure A-10: Line Settings - Shared Line

Line Settings

▼ Line Settings

Line Number: 1 ▼

Line 1 Activate: Enable ▼

Line 1 Display Name: 440HD

Line 1 User ID: 2421114099

Line 1 Authentication User Name: AudioCodesPhoneUser4

Line 1 Authentication Password:

Line 1 Mode: Shared ▼



Note: Icons displayed on the phone's screen indicate if line keys are configured in a Shared Call Appearance group, or as private lines. A hollow icon ☐ indicates a phone configured in an SCA group. A solid icon ■ indicates a phone configured as private.

A.1.8 Setting up a Remote Conference

Here's how to set up BroadSoft's remote conference feature. More than three participants can be added to a remote conference call. A 'local' conference only supports a maximum of three. The feature must be enabled on BroadSoft's BroadWorks server for it to function.

➤ To set up the remote conference feature using the Web interface:

1. In the Web interface, open the Services page (**Configuration > Voice Over IP > Services**).

Figure A-11: Services - Conference

2. From the 'Type' dropdown under 'Application Server', select **BSFT**. The feature must be enabled on BroadSoft's BroadWorks server for it to be supported.
3. From the 'Mode' dropdown under 'Conference', select **Remote**.
4. In the 'Remote Conference Media Server' field, enter the address of the server hosting the remote conference. In the example shown in the figure above, the server's address is conference@iop1broadworks.net
5. Click **Submit**; the user can now establish a remote conference from the phone (see the phone's *User's Manual* for detailed information).

➤ To set up the remote conference feature using the configuration file:

- Use the table below as reference.

Table 53-5: Remote Conference Parameters

Parameter	Description
[voip/services/application_server_type]	Set to BSFT .
[voip/services/conference/conf_ms_addr]	Set the address of the server hosting the remote conference. Example: conference@iop1broadworks.net conference@as.iop1.broadworks.net
[voip/services/conference/mode]	Set the mode to REMOTE .

A.1.9 Loading the Corporate Directory to the Phone

Here's how to load the Corporate Directory to the phone. The Corporate Directory can be loaded either

- manually, by loading a (configurable) txt, cfg, or xml file listing all employees and their details, to the phone, via the Directory page in the Web interface
- automatically, by placing the (configurable) txt, cfg, or xml file on the BroadSoft BroadWorks server, and then when the phone is connected to the network, the phone pulls and automatically uploads the file from the server.

➤ **To load the Corporate Directory manually, via the the Web interface:**

1. In the Web interface, open the Directory page (**Configuration > Personal Settings > Directory**).

Figure A-12: Directory

The screenshot shows the 'Directory' web interface. At the top, there's a 'Corporate Directory' section with a 'Directory Page' dropdown set to 'none'. Below this is a 'Browse...' button and a 'Load Corporate Directory' button. Underneath is a table with columns: No., Name, Office, Home, and Mobile. Below the table is an 'Add Contact' section with input fields for Name, Office, Home, and Mobile, and a 'Submit' button. At the bottom, there's a 'Personal Directory' section with a 'Directory Page' dropdown set to '1'. Below this is a 'Browse...' button and a 'Load Personal Directory' button. At the very bottom, there are 'Delete' and 'Delete All' buttons.

2. In the Corporate Direction section of the screen, click **Browse** and navigate to and select the txt, cfg, or xml file on your PC.
3. Click the adjacent **Load Corporate Directory** button; the file is loaded onto the phone.
4. Verify the upload: On the phone, press the MENU key, navigate down to select the **Directory** option, and then select **Corporate directory**; the directory opens displaying the contacts listed in the corporate directory.

➤ **To load the Corporate Directory automatically, via the BroadSoft server:**

- Place the txt, cfg, or xml file file on the BroadSoft BroadWorks server; when the phone is connected to the network, it pulls and automatically loads the file to the phone.

A.1.10 Adding a Contact to the Corporate Directory

Here's how to add a contact to the Corporate Directory.

➤ To add a contact to the Corporate Directory:

- In the Directory page shown in the figure above, enter the contact's Name, Office, Home and Mobile number fields, and then click **Submit**.

A.1.11 Deleting a Contact from the Corporate Directory

Here's how to delete a contact from the Corporate Directory.

➤ To delete a contact to the Corporate Directory:

1. Scroll down in the Directory page (shown in the figure above), and then select the contact to delete.

Figure A-13: Directory – Delete a Contact

No.	name	Office	Home	Mobile	Select
1	Alan Roberts	4263	Dial		<input checked="" type="checkbox"/>

Delete Delete All

2. Click **Delete**; the contact is deleted from the Corporate Directory. You can select multiple contacts and then click **Delete All**.

A.1.12 Disabling Handset Mode

Administrators can disable handset mode using the configuration file parameter 'voip/handset_mode/enabled' whose default is enabled. Some call centers don't want agents to work with any device other than headsets. In this case, their administrators can change the parameter default to disabled.



Note: Some call centers don't even connect the handsets to the phones. In this case, even though the handsets are not physically connected to the phones, administrators should disable the new parameter.

➤ To disable handset mode:

- Use the table below as reference.

Table A-6: BroadSoft Server - Shared Call Appearance Add

Parameter	Description
[voip/handset_mode/enabled]	<p>When disabled [0], the handset becomes unavailable. Configure either:</p> <ul style="list-style-type: none"> ▪ [1] = Enabled (default) ▪ [0] = Disabled

A.1.13 Displaying a Message in Agents' Phone Screens

Call center administrators can use a configuration file parameter to define a message that will be displayed in agents' phone screens, for example: 'Reminder: Your calls might be recorded'. Agents will then see this message, together with the date (in month/day format), displayed in their screens when their phones are in idle state.

➤ **To display a message in Agents' phone screens:**

- Use the table below as reference.

Table 53-7: Displaying a Message in Agents' Phone Screens

Parameter	Description
[system/display/message_on_screen]	Defines a message that will be displayed in agents' phone screens together with the date (in month/day format)

A.1.14 Changing Phone Screen Backlight Timeout

Call center administrators can use a configuration file parameter to change phone screens' backlight timeout. A phone screen's backlight timeout can also be changed on the phone by the user, unless the call center administrator has disabled the possibility with the configuration file parameter `personal_settings/menu/backlight_timeout/enabled` (see Section 26 for more information about disabling phone hard keys and softkeys).

➤ **To change the backlight timeout:**

- Use the table below as reference.

Table 53-8: Backlight Timeout

Parameter	Description
[system/lcd/backlight/timeout]	Range: 0-6 0 = Always On 1 = 10 seconds (default) 2 = 20 seconds 3 = 30 seconds 4 = 40 seconds 5 = 50 seconds 6 = 60 seconds

A.2 Asterisk, Coral and Metaswitch

A.2.1 Configuring BLF

Configuration of the BLF feature is unique when the selected application server is Asterisk, Coral, or Metaswitch.



Note: This section only applies to the 430HD and 440HD phones.

➤ **To configure BLF for Asterisk application server:**

1. Open the Services page (**Configuration** tab > **Voice Over IP** menu > **Services**).

Figure A-14: BLF Configuration for Application Server Type - Asterisk

The screenshot shows a web interface for configuring BLF. Under the 'Application Server' section, the 'Type' dropdown is set to 'Asterisk'. Under the 'BLF Support' section, the 'Activate' dropdown is set to 'Enable', the 'Call Pick Up' dropdown is set to 'Disable', and the 'BLF Subscription Period' is set to '3600' seconds.

2. From the 'Application Server Type' drop-down list, select either:
 - Asterisk
 - Coral -or-
 - Metaswitch
3. In the BLF Support group, configure the following:
 - From the 'Activate' drop-down list (**voip/services/busy_lamp_field/enabled** parameter), select **Enable**.
 - (Optional) In the 'BLF Subscription Period' field (**voip/services/busy_lamp_field/subscription_period** parameter), enter the interval between BLF and SIP SUBSCRIBE messages.



Note: The application server's address is the same as the SIP Registrar address defined by parameter **voip/signalling/sip/sip_registrar/addr** (see Section 16.2).

4. Click **Submit**.
5. Define speed dial keys with the BLF feature (see Section 25).

A.3 Genesys SIP Server for Contact Centers

This section shows system administrators how to quickly set up AudioCodes' IP phones to operate with a Genesys SIP Server in a Genesys contact center.

A.3.1 Using DHCP to Auto Provision Phones

After connecting the LAN ports of your phones to the IP network and then connecting the phones to the power supply, the phones will *by default* send a request to the Genesys contact center's network server which will then *automatically allocate* an IP address and send configuration information to each phone.

Make sure that the DHCP (Dynamic Host Configuration Protocol) options in your contact center's DHCP server are correctly configured (see Section 9.2).

A.3.2 Verifying Firmware Version

After automatic provisioning, make sure the phone's firmware version is correct.

➤ **To verify firmware version:**

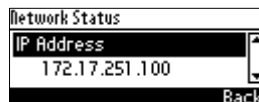
- Navigate to the Firmware Status screen on the phone (MENU key > **Status** > **Firmware Status**).

A.3.3 Accessing a Phone's Web Interface

Use a standard Web browser such as Microsoft Internet Explorer to access any phone's Web interface. Use the phone's IP address as the URL.

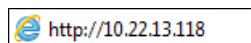
➤ **To obtain the phone's IP address:**

- Open the Network Status screen on the phone screen (MENU key > **Status** > **Network Status**) and navigate down to **IP Address**:



➤ **To access the phone's Web interface:**

1. Open the Web browser and in the URL address field enter the phone's IP address (for example, **http://10.22.13.118** or **https://10.22.13.118**):



The Web login window opens.



Note: The default User Name and Password are **admin** and **1234** respectively.

2. Alternatively, if your DHCP and DNS servers are synchronized, you can access the phone Web browser using the following method:
http://<Phone Model>-<MAC Address>.<Domain Name>
E.g. **http://440hd-001122334455.corp.YourCompany.com**
3. Enter the User Name and Password, and then click **OK**.

A.3.4 Configuring Dual Registration to Ensure SIP Business Continuity for Agents

Here's how to configure dual registration for Genesys SIP Business Continuity, using the Web interface or configuration file.

AudioCodes' 420HD phone supports dual registration for integrating into Genesys' SIP Business Continuity architecture.

SIP Business Continuity provides the ability for a group of agents to continue offering critical business functions to customers in the event of a loss of all Genesys components running at a particular site.

The SIP Business Continuity architecture uses a synchronized, two-site deployment, where Genesys switch and server components are mirrored at each site in an active-active configuration, so that any agent can log in to either switch, at any time.

In a standalone SIP Server configuration with Business Continuity mode activated, AudioCodes 420HD phone will register on two sites simultaneously (i.e., register on both peer SIP Servers at the same time).

➤ **To configure using the Web Interface:**

1. In the Web interface, access the SIP Proxy and Registrar section in the Signaling Protocol screen (**Configuration** menu > **Voice Over IP** > **Signaling Protocol**):

Figure A-15: Signaling Protocol – SIP Proxy and Registrar

The screenshot shows the 'Signaling Protocol' configuration page with a sub-section titled 'SIP Proxy and Registrar'. The settings are as follows:

- Use SIP Proxy: Enable
- Proxy IP Address or Host Name: 10.38.5.107
- Proxy Port: 5060
- Enable Registrar Keep Alive: Disable
- Maximum Number of Authentication Retries: 4
- Use SIP Proxy IP and Port for Registration: Enable
- Use SIP Registrar: Disable
- Registration Expires: 3600 Seconds
- Registration Failed Expires: 60 Seconds
- Use SIP Outbound Proxy: Disable
- Redundant Proxy Mode: A dropdown menu is open showing three options: 'Disable' (selected), 'Primary-Fallback', and 'Simultaneous'.

A 'Submit' button is located at the bottom right of the configuration area.



Note: If you choose to use the BroadSoft-based Automatic Call Distributor (ACD) method in a SIP Business Continuity deployment, the 'voip/signalling/sip/redundant_proxy/mode' cfg file parameter and the 'Redundant Proxy Mode' Web interface parameter cannot be set to **Simultaneous**.

Figure A-16: Signaling Protocol – SIP Proxy and Registrar – Secondary Proxy

The screenshot shows the 'Signaling Protocol' configuration window with the 'SIP Proxy and Registrar' tab selected. The settings are as follows:

- Use SIP Proxy: **Enable** (dropdown)
- Proxy IP Address or Host Name: **10.38.5.107** (text field)
- Proxy Port: **5060** (text field)
- Enable Registrar Keep Alive: **Disable** (dropdown)
- Maximum Number of Authentication Retries: **4** (text field)
- Use SIP Proxy IP and Port for Registration: **Enable** (dropdown)
- Use SIP Registrar: **Disable** (dropdown)
- Registration Expires: **3600** Seconds (text field)
- Registration Failed Expires: **60** Seconds (text field)
- Use SIP Outbound Proxy: **Disable** (dropdown)
- Redundant Proxy Mode: **Simultaneous** (dropdown)
- Secondary Proxy Address: **0.0.0.0** (text field)
- Secondary Proxy Port: **5060** (text field)

A 'Submit' button is located at the bottom right of the window.

2. Configure the parameters using table below as reference.

➤ **To configure using configuration file:**

- Use the table below as reference.

Table A-9: SIP Proxy and Registrar Parameters

Parameter	Description
Use SIP Proxy [voip/signalling/sip/use_proxy]	Determines whether to use a SIP Proxy server. Configure [1] Enable . <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Proxy IP Address or Host Name [voip/signalling/sip/proxy_address]	Enter the IP address or host name (for example, audiocodes.com) of the SIP proxy server. Default: 0.0.0.0
Proxy Port [voip/signalling/sip/proxy_port]	The UDP or TCP port of the SIP proxy server. Range: 1024 to 65535. Default: 5060.
Enable Registrar Keep Alive [voip/signalling/sip/registrar_ka/enabled]	Determines whether to use the registration keep-alive mechanism based on SIP OPTION messages. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable Note: <ul style="list-style-type: none"> ▪ If there is no response from the server, the timeout for re-registering is automatically reduced to a user-defined value (voip/signalling/sip/registration_failed_timeout) ▪ When the phone re-registers, the keep-alive messages are re-sent periodically.

Parameter	Description
Registrar Keep Alive Period [voip/signalling/sip/registrar_ka/timeout]	Defines the registration keep-alive time interval (in seconds) between Keep-Alive messages. Range: 40 to 65536. Default: 60.
Maximum Number of Authentication Retries [voip/signalling/sip/proxy_timeout]	The SIP proxy server registration timeout (in seconds). Range: 0 to 86400. Default: 3600.
Registration Failed Expires [voip/signalling/sip/registration_failed_timeout]	If registration fails, this parameter determines the interval between the register messages periodically sent until successful registration. Range: 1 to 86400. Default: 300.
Use SIP Registrar [voip/signalling/sip/sip_registrar/enabled]	Determines whether the phone registers to a separate SIP Registrar server. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Use SIP Proxy IP and Port for Registration [voip/signalling/sip/use_proxy_ip_port_for_registrar]	Determines whether to use the SIP proxy's IP address and port for registration. When enabled, there is no need to configure the address of the registrar separately. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Registrar IP Address or Host Name [voip/signalling/sip/sip_registrar/addr]	The IP address or host name of the Registrar server. Default: 0.0.0.0.
Registrar Port [voip/signalling/sip/sip_registrar/port]	The UDP or TCP port of the Registrar server. Range: 1024 to 65535. Default: 5060.
Use SIP Outbound Proxy [voip/signalling/sip/sip_outbound_proxy/enabled]	Determines whether an outbound SIP proxy server is used (all SIP messages are sent to this server as the first hop). <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
Outbound Proxy IP Address or Host Name [voip/signalling/sip/sip_outbound_proxy/addr]	The IP address of the outbound proxy (for example, audiocodes.com ; i.e., the same as that configured for the 'Proxy IP Address or Host Name' parameter above). If this parameter is set, all outgoing messages (including Registration messages) are sent to this Proxy according to the Stack behavior. Default: 0.0.0.0
Outbound Proxy Port [voip/signalling/sip/sip_outbound_proxy/port]	The port on which the outbound proxy listens. Range: 1024 to 65535. Default: 5060.

Parameter	Description
Redundant Proxy Mode [voip/signalling/sip/redundant_proxy/mode]	<p>The call center's network administrator can select either</p> <ul style="list-style-type: none">▪ Disable -OR-▪ Primary Fallback -OR-▪ Simultaneous <p>For the dual-registration feature, select Simultaneous; two proxies are registered simultaneously so that at least one should be up and running at any time, preventing the call center from going down.</p> <p>Note that when using the BroadSoft ACD in a SIP Business Continuity deployment, this parameter cannot be set to Simultaneous.</p>
Secondary Proxy Address [voip/signalling/sip/secondary_proxy/address]	<p>Displayed only when Simultaneous is selected for 'Redundant Proxy Mode' (see previous parameter). Define the IP address of the secondary proxy that will be up simultaneously with the primary.</p>
Secondary Proxy Port [voip/signalling/sip/secondary_proxy/port]	<p>Displayed only when Simultaneous is selected for 'Redundant Proxy Mode' (see the parameter before the previous). Define the port of the secondary proxy that will be up simultaneously with the primary.</p>

A.3.5 Disabling the Web Interface

This feature lets the call center's network administrator block Web interface access to agents employed in the call center.

➤ To disable access using configuration file:

- Use the table below as reference.

Table A-10: Disabling the Web Interface

Parameter	Description
[system/web/enabled]	<p>Determines whether or not to enable access to the phone's Web interface.</p> <ul style="list-style-type: none"> ▪ [0] Disable (access prohibited) ▪ [1] Enable (default) (access enabled) <p>This can avoid a potential scenario in which agents deliberately or by accident disrupt the operation of the call center.</p>

A.3.6 Forcing a Reboot on Provisioning

This feature lets the call center's network administrator configure a forced reboot on agents' phones after provisioning.

➤ To force a reboot on provisioning using configuration file:

- Use the table below as reference.

Table A-11: Forcing a Reboot on Provisioning

Parameter	Description
[voip/services/notify/check_sync/force_reboot_enabled]	<p>Determines whether or not to force a reboot on provisioning.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

A.3.7 Provisioning using TFTP / FTP / HTTP / HTTPS in DHCP Options 66/67

This feature lets network administrators enable phones to be automatically provisioned when the phones are plugged in, using TFTP / FTP / HTTP / HTTPS in DHCP Options 66/67.

A.3.8 Enabling Agents to Sign in with Phone Numbers

This feature lets the call center administrator power up all phones without setting a valid SIP account. When an agent then wants to use their phone, they register to the network with their phone number.

➤ **To enable the feature using configuration file:**

- Use the table below as reference.

Table A-12: Enabling Agents to Sign in with Phone Numbers

Parameter	Description
[system/login_sk_before_signed_in]	Determines whether or not to enable agents sign in with phone numbers. <ul style="list-style-type: none">■ [0] Disable (default)■ [1] Enable

A.3.9 Locking Agents' Phones' Alphabetical Keys



Note: Only applies to the 420HD and 405/405HD models.

This feature lets call center network administrators lock agents' phones' alphabetical (non-numerical) keys so that only numerical keys are available to them. This feature provides call centers the option to limit agents to work-specific tasks. The feature reduces private activity on the part of agents. Agents cannot, for example, add contacts to a personal directory.

When this feature is enabled, agents can only use numbers. Only two menus are available in agents' phone screens:

- Status
- Administration

➤ **To lock alphabetical keys using configuration file:**

- Use the table below as reference.

Table A-13: Locking Agents Phones Alphabetical Keys

Parameter	Description
[voip/block_non_numeric_key]	Determines whether or not to lock Agents' phones' alphabetical keys and only allow Agents to use numerical keys. <ul style="list-style-type: none">■ [0] Disable (default)■ [1] Enable

A.3.10 Playing a Beep on an Incoming Call

This feature lets call center network administrators configure a beep to be played when a call comes in if auto-answer is configured. The beep is played on both speaker and headset. Agents will know from the beep that they have an incoming call in which to attend.



Note: To configure the auto-answer feature, see Section 22.7.

- To configure playing a beep using configuration file:
- Use the table below as reference.

Table A-14: Playing a Beep on an Incoming Call

Parameter	Description
[voip/auto_answer/headset_beep/enabled]	Determines whether or not to play a beep on an incoming call, on the headset. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable
[voip/auto_answer/speakerphone_beep/enabled]	Determines whether or not to play a beep on an incoming call, on the speaker. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

A.3.11 Enabling Proactive Mute

This feature lets call center network administrators enable a proactive mute when calls come in so that when they come in, callers cannot hear the agents until the agents unmute by pressing the **Mute** button. The feature can protect call centers from agent conduct that might be offensive to callers. Agents may for example pass an offensive remark to one another about a caller whose call is coming in, without realizing the caller can hear.

- To enable proactive mute using configuration file:
- Use the table below as reference.

Table A-15: Enabling Proactive Mute

Parameter	Description
[voip/proactive_mute/enabled]	Determines whether or not to enable proactive mute. <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable

A.3.12 Configuring Automatic Answer

You can configure a supplementary service on the phones called Automatic Answer. The feature is configured using the configuration file. Use the table below as a configuration reference.

Table 53-16: Automatic Answer

Parameter	Description
voip/talk_event/enabled	<p>Enables the 'talk' event feature.</p> <ul style="list-style-type: none"> ▪ [0] Disable (default) ▪ [1] Enable <p>The phone automatically answers an incoming call if it receives a SIP NOTIFY message with the 'talk' event. If a call is already in progress, the call is put on hold and the incoming call is answered.</p>

A.3.13 Regulating the 'Logged out' Message

This feature lets call center network administrators enable/limit the length of time the 'Logged out' message is displayed in the phone's idle screen after agents log out.

When agents log out, the 'Logged out' message will only be displayed in the phone's idle screen for the length of time, in seconds, configured by the call center network administrator. After the configured time lapses, the message disappears from the screen.

Administrators can also disable the feature.

➤ **To regulate the feature using the configuration file:**

1. Open the Configuration File page in the Web interface (**Management** tab > **Manual Update** > **Configuration File**).
2. Configure the 'logged_out_message_timer' parameter using the table below as reference.

Table A-17: Regulating the 'Logged out' Message

Parameter	Description
[voip/services/ACD/logged_out_message_timer]	<p>[-1] Disabled (default)</p> <p>[0] No 'Logged out' message is displayed.</p> <p>[>1] The time, in seconds, that lapses before the 'Logged out' message, displayed in the phone's idle screen after an agent logs out, disappears. This value also enables the feature.</p>

A.3.14 3PCC (Third Party Call Control)

The 3PCC feature lets an agent control their phone remotely from a computer application. 3PCC always supports the following functions:

- MakeCall (call initiation/setup)
- Release
- Hold
- Retrieve
- Transfer
- Consult
- Conference
- DTMF

➤ **To configure 3PCC using configuration file:**

- ✓ Use the table below as reference.

Table A-18: 3PCC Parameters

Parameter	Description
[voip/talk_event/enabled]	<ul style="list-style-type: none"> ■ [0] Disable (default) ■ [1] Enable



Note: voip/talk_event must be enabled for 3PCC to function.

A.3.14.1 Enabling 3PCC Calls

This feature complies with the RFC 3725 standard for 3PCC in SIP for 'Black Holed' and 'Non SDP'. See the RFC for detailed information.

➤ **To enable 3PCC calls using the configuration file:**

1. Open the Configuration File page in the Web interface (**Management** tab > **Manual Update** > **Configuration File**).
2. Configure the capability using the table below as reference.

Table A-19: Enabling 3PCC Calls

Parameter	Description
[3PCC/make_call/enabled]	<p>[0] = Disable (default)</p> <p>[1] = Enable</p>

A.3.15 Disabling Handset Mode

Administrators can disable handset mode using the configuration file parameter 'voip/handset_mode/enabled' whose default is enabled.

Some call centers don't want agents to work with any device other than headsets. In this case, their administrators can change the parameter default to disabled.



Note: Some call centers don't even connect the handsets to the phones. In this case, even though the handsets are not physically connected to the phones, administrators should disable the new parameter.

➤ **To disable handset mode:**

- Use the table below as reference.

Table A-20: BroadSoft Server - Shared Call Appearance Add

Parameter	Description
[voip/handset_mode/enabled]	When disabled [0], the handset becomes unavailable. Configure either: <ul style="list-style-type: none"> ■ [1] = Enabled (default) ■ [0] = Disabled

A.3.16 Changing Phone Screen Backlight Timeout

Call center administrators can use a configuration file parameter to change phone screens' backlight timeout. A phone screen's backlight timeout can also be changed on the phone by the user, unless the call center administrator has disabled the possibility with the configuration file parameter `personal_settings/menu/backlight_timeout/enabled` (see Section 26 for more information about disabling phone hard keys and softkeys).

➤ **To change the backlight timeout:**

- Use the table below as reference.

Table 53-21: Backlight Timeout

Parameter	Description
[system/lcd/backlight/timeout]	Range: 0-6 0 = Always On 1 = 10 seconds (default) 2 = 20 seconds 3 = 30 seconds 4 = 40 seconds 5 = 50 seconds 6 = 60 seconds

A.3.17 Displaying a Message on Agents' Phones

Call center administrators can use a configuration file parameter to define a message that will be displayed on agents' phones, for example: 'Reminder: Your calls might be recorded'. Agents will then see this message, together with the date (in month/day format), displayed in their screens when their phones are in idle state.

➤ **To display a message on Agents' phones:**

- Use the table below as reference.

Table 53-22: Displaying a Message on Agents' Phones

Parameter	Description
[system/display/message_on_screen]	Defines a message that will be displayed in agents' phone screens together with the date (in month/day format)

A.3.18 Configuring a Redundant (Backup) Genesys Server

A phone can be registered on two Genesys servers simultaneously, to provide immediate backup. The feature enables quick transition to the redundant backup server; redundant proxy usage is available all the time. The phone is registered on the redundant server in the same way as it is registered on the primary server.

➤ **To register a phone on the redundant server:**

1. Open the Signaling Protocol page (**Configuration** tab > **Voice Over IP** menu > **Signaling Protocols**).

Figure A-17: Registering a Phone on the Redundant Genesys Server

Registration Expires:	3600	Seconds
Registration Failed Expires:	300	Seconds
Use SIP Outbound Proxy:	Disable	
Use Redundant Outbound Proxy:	Disable	
Redundant Proxy Mode:	Simultaneous	
Secondary Proxy Address:	0.0.0.0	
Secondary Proxy Port:	5060	

▼ SIP Timers

Retransmission Timer T1:	500
--------------------------	-----

2. Scroll down to the 'Redundant Proxy Mode' and 'Secondary Proxy Address' parameters. Configure them using the table below as reference, and then click **Submit**.

Table 53-23: Redundant Genesys Server - Parameters

Parameter	Description
Redundant Proxy Mode	From the dropdown, select Simultaneously ; you're now in Dual Registration mode; when in this mode, the value of the parameter 'Retransmission Timer T1' is taken from the configuration file parameter 'voip/signalling/sip/redundant_proxy/dual_reg/t1' rather than from the 'Retransmission Timer T1' parameter (see Table 16-8 for more information about this parameter).
Secondary Proxy Address	Provide the IP address of the redundant proxy; the phone then registers on both servers from the outset, instead of transitioning from one to another.

A.3.18.1 Configuring Retransmission Timer T1 Using the Configuration File

Configuration of the T1 retransmission timer is only relevant when in dual registration mode, i.e., after configuring a redundant Genesys server, as shown in the previous section.

- **Configuring Retransmission Timer T1 using the configuration file:**
- 3. Open the Configuration File page in the Web interface (**Management** tab > **Manual Update** > **Configuration File**).
- 4. Configure the capability using the table below as reference.

Table A-24: Retransmission Timer T1 - Parameter

Parameter	Description
[voip/signalling/sip/redundant_proxy/dual_reg/t1]	Only relevant if dual registration / redundancy server is configured. Allows quicker retransmission of SIP messages than the Web interface parameter 'Transmission Timer T1' and overrides it if configured (see Table 16-8 for more information). Default: 20 milliseconds. Range: 20-200.

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B Configuring Automatic Call Distribution (ACD)

**Note:**

- AudioCodes' IP Phones seamlessly interwork with Genesys SIP Server to support ACD functionality. The phones support two different ACD methods: a legacy method referred to as 'Genesys' in the Web interface, and an enhanced method based on BroadSoft's ACD capabilities, referred to as 'BROADSOFT' in the Web interface.
- For optimal ACD functionality with Genesys SIP Server, the BroadSoft-based ACD method must be chosen.

This appendix shows how to enable the ACD (Automatic Call Distribution) feature on the phone using either the Web interface or the configuration file. The feature automatically distributes incoming calls to agents' phones on the basis of agent availability and unavailability.

In contact centers, ACD is a key feature of CTI (Computer Telephony Integration). The feature automatically distributes incoming calls to a specific group of terminals that contact center agents use. Most ACD functionality is the SIP server's responsibility; however, users must inform the Call Center SIP server on the following events:

- Whenever the call center representative logs in or out on the phone. This information is included in a SIP SUBSCRIBE message.
- Whenever the call center representative indicates whether they are ready or not to take a call. When the BroadSoft server is configured, the user can also specify the reason for their unavailability e.g. Lunch break. All this information is included in a SIP NOTIFY message.
- Whenever the user is busy with After Call Work (ACW) (only relevant when a BroadSoft SIP server is configured). This information is included in a SIP NOTIFY message.

All the above actions can be performed on the phone (see the phone's *User's Manual*). The Call Center SIP server then uses the above presence information to automatically distribute calls between agents based on their availability.

ACD systems allow companies that handle a large number of incoming phone calls to direct the callers to a company employee who is able to talk at the earliest opportunity.

The feature is typically implemented in contact centers encountering large numbers of incoming customer calls that must be distributed to available agents to provide immediate support to callers. The feature automatically directs incoming calls to agents working in the contact center whose presence status is 'Ready' rather than not ready. The feature's main benefit is to reduce the time customers are kept waiting and thereby improve service.

AudioCodes' IP phones seamlessly interwork with Genesys' SIP server to support the ACD feature. Once an agent signs in on their phone to ACD, their status is set to 'Ready' and synchronized with Genesys' Server. Incoming calls are directed to an agent whenever their status becomes 'Ready'.

**Note:**

- This feature applies to the 405/405HD, 420HD, 430HD and 440HD phone models.
- The Web interface screenshots shown in this section are of the 420HD model. They're identical to those of the 405/405HD, 430HD and 440HD phone models.

➤ To configure the ACD server using the Web interface:

1. In the Web interface, access the ACD page (**Configuration** tab > **Advanced Applications** > **ACD**):

Figure B-1: ACD



Note: For optimal ACD functionality with Genesys, select the **BROADSOFT** option from the 'Server Type' dropdown.

Figure B-2: ACD – Unavailable Reason Code

ReasonNo.	ReasonCode	ReasonName
0	500	Lunch break
1	501	Coffee break
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	
8	0	
9	0	

2. Configure the parameters using the table below as reference.

- To configure the ACD server using the configuration file:
 - Define a path and configure the parameters using the table below as reference.

Table B-1: ACD Parameters

Parameter	Description
Active [voip/services/ACD/enabled]	From the 'Active' drop-down, choose Enable . <ul style="list-style-type: none"> ■ [0] Disable (default) ■ [1] Enable
Server Type [voip/services/ACD/server_type]	From the 'Server Type' drop-down list, select GENESYS or BROADSOFT . Select the BROADSOFT option for optimal ACD functionality with Genesys. When you select BROADSOFT , after logging into the ACD server, the ACW (After Call Work) softkey will be displayed on the phone and the Missed softkey displayed in the command menu along with the FORWARD and DND options. Note that administrators can optionally hide the ACW softkey (see the next parameter).
[voip/services/ACD/show_acw_softkey/enabled]	Allows administrators to hide the ACW softkey. After logging into the call center's Automatic Call Distributor (ACD) server, the ACW softkey is by default displayed on the phone [1]. Administrators can change this default and hide the softkey [0]. <ul style="list-style-type: none"> ■ [0] Disable ■ [1] Enable (default) The default softkey layout is ACW, READY/Not Ready (when the user is logged on), Login/Logout and Command menu items including Missed and DND . When the ACW softkey is disabled, the display stays the same but <i>without</i> the ACW softkey.
[system/dnd/show_softkey]	Removes the DND item from the Call Menu where it's displayed by default when ACD is enabled. <ul style="list-style-type: none"> ■ [0] Removes DND from the Call Menu ■ [1] Displays DND in the Call Menu (default)
[system/forward/show_softkey]	Removes the Forward item from the Call Menu where it's displayed by default when ACD is enabled. <ul style="list-style-type: none"> ■ [0] Removes Forward from the Call Menu ■ [1] Displays Forward in the Call Menu (default)
Use Sip Server As ACD Server [voip/services/ACD/server_use_sip_server]	From the drop-down, choose Enable . <ul style="list-style-type: none"> ■ [0] Disable ■ [1] Enable
Expire Time [voip/services/ACD/expire_time]	The server registration timeout, in seconds. Range: 0 to 86400. Default: 3600.
Server Address [voip/services/ACD/server_address]	Displayed only when 'Use SIP Server As ACD Server' is set to Disable (see previous). Defines the IP address of the ACD server. Default: 0.0.0.0

Parameter	Description
Server Port [voip/services/ACD/server_port]	Displayed only when 'Use SIP Server As ACD Server' is set to Disable (see previous). Defines the port of the ACD server. Default: 80
User Name [system/user_name]	Enter the agent's User Name. The agent will use this name when logging in to ACD in order to define or change availability status.
Password [system/password]	Enter a password if necessary.
State After Login ¹ [voip/services/ACD/state_after_login]	<p>The call center's network administrator can select either</p> <ul style="list-style-type: none"> ▪ Ready ▪ Not Ready (default) ▪ Not Set <p>If set to Ready, each phone in the call center will automatically be set to a state of readiness to take incoming calls immediately after the call center's agents log in.</p> <p>If set to Not Ready, agents can log in and then manually configure their readiness status on the phone's screen, giving them time to perform personal tasks before beginning work.</p> <p>If set to Not Set, the status of the phone after login will be controlled by the server. For example, if the server is set to be in 'Ready' status following login, the phone will be in 'Ready' status when the user logs in.</p>
First Notify Close Enabled [voip/services/ACD/first_notify_close/enabled]	<ul style="list-style-type: none"> ▪ [0] When an agent logs in, the ACD server is notified that the agent is Ready (available) to take calls. ▪ [1] (Default) When an agent logs in, the ACD server is notified that the agent is Not Ready (unavailable) to take calls. This gives agents time to get organized.
[voip/services/ACD/logged_out_message_timer]	For detailed information, see Appendix A.3.13 .
Unavailable Reason Code [voip/services/ACD/unavailable_reason/0-9/code] Up to 10 reasons can be defined (0-9).	<p>Specifies the code that is sent in the SIP NOTIFY message to the Call Center SIP server to indicate the specific reason for the Call Center representative's unavailability.</p> <p>This parameter is relevant when the 'Server Type' parameter (see above) is BroadSoft.</p>
Reason Name [voip/services/ACD/unavailable_reason/0-9/name]	<p>Describes the unavailability reason code (configured above). For example, 'Lunch'.</p> <p>This parameter is relevant when the 'Server Type' parameter (see above) is BroadSoft.</p>

¹ This parameter is only relevant to Genesys Call Centers.

B.1 Softkey Display and Command Menu Options

The following tables show the different softkey display states and command menu options that are available according to the user's login state and the configured SIP server.

Table B-2: BroadSoft-Softkey Display States and Command Menu Options

State		Softkey #0	Softkey #1	Softkey #2	Softkey #3
Idle	ACD Disabled	Directory	Missed	Forward	DnD
	ACD Enabled (logged out)	Missed	-	Login	Command Menu: ▪ Forward ▪ DnD
	ACD Enabled (logged in)	ACW	Not Ready or Ready	Logout	Command Menu: ▪ Missed ▪ Forward ▪ DnD
Ongoing Call State	ACD Disabled	Hold	Conf	New Call	End
	ACD Enabled (logged out)				
	ACD Enabled (logged in)				
State		Softkey #0	Softkey #1	Softkey #2	Softkey #3
Idle	ACD Disabled	Directory	Missed	Forward	DnD
	ACD Enabled (logged out)	Missed	-	Login	Command Menu: ▪ Forward ▪ DnD
	ACD Enabled (logged in)	Missed	Not Ready or Ready	Logout	Command Menu: ▪ Forward ▪ DnD
Ongoing Call State	ACD Disabled	Hold	Conf	New Call	End
	ACD Enabled (logged out)				
	ACD Enabled (logged in)				

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C Recovering AudioCodes' IP Phone

This appendix shows how to recover AudioCodes' IP phone.

- **To recover the phone, follow this procedure:**
 1. Identify that the phone is in recovery mode (see [below](#))
 2. Recover the phone (see [below](#))
 3. Verify that the phone downloaded the image file (see [below](#))

C.1 Identifying that the Phone is in Recovery Mode

Here's how to identify that the phone is in recovery mode.

- **To identify that the phone is in recovery mode:**
 - Observe the following displayed on the phone's screen:

Figure C-1: Identifying Recovery Mode



-OR-

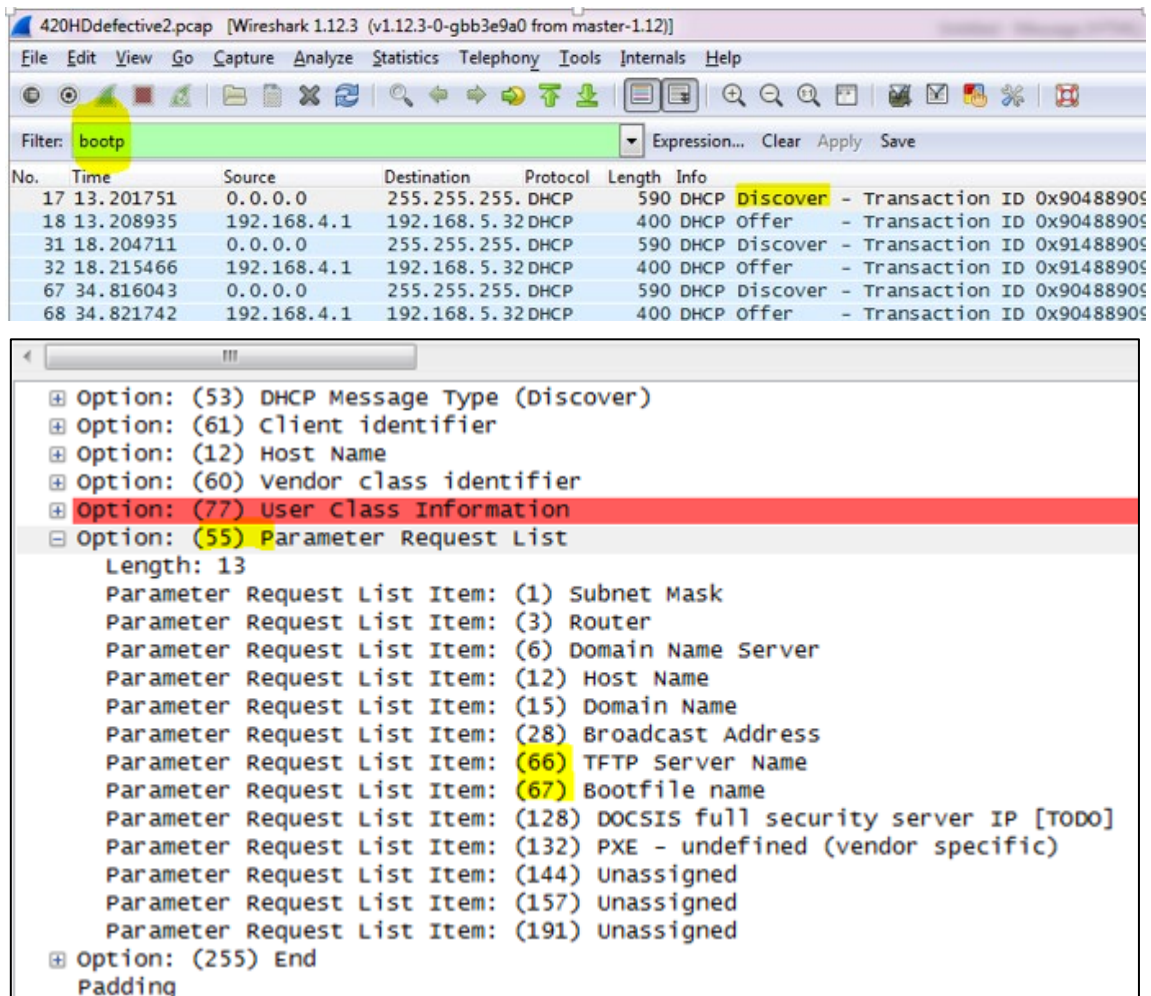
- Observe that the phone reboots every +-5 seconds.
- OR-
- You'll receive a notification notifying you (users *and* network administrators) that the phone has entered recovery mode. All phone models support this notification.

C.2 Verifying that the Phone is in Recovery Mode

You can verify that the phone is in recovery mode.

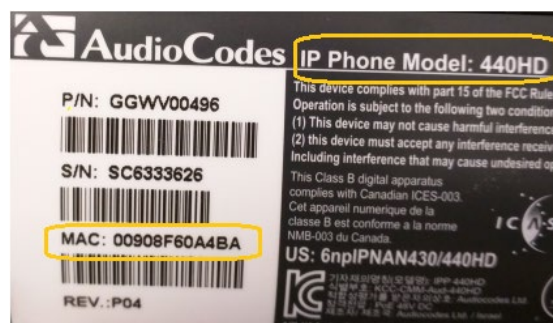
- **To verify that the phone is in recovery mode:**
 1. Connect the phone to the PC and run WireShark.
 2. In WireShark, filter by **bootp** and then check if the phone is requesting Option 66 (TFTP Server) & Option 67 (Bootfile) under Option 55 in the 'DHCP Discover' message, as shown in the figures below.

Figure C-2: Verifying Recovery Mode in Wireshark



3. Make sure that the source Ethernet MAC address is the same as that labeled on the base of the phone. For example:

Figure C-3: Source Ethernet MAC Address in Wireshark Identical to Phone Base's



C.3 Recovering the Phone

Here's how to recover the phone.

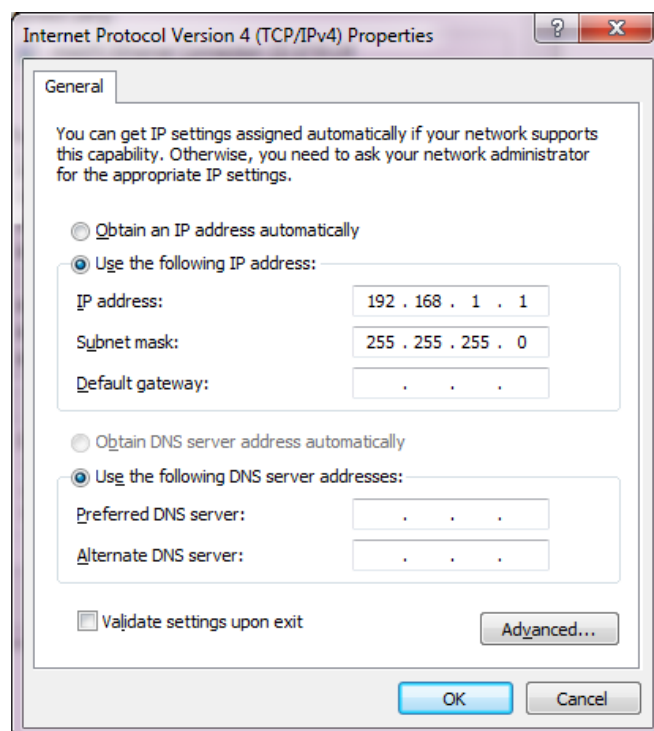
➤ To recover the phone:

1. Configure the PC NIC to which the phone is connected as follows:
 - IP address: **192.168.1.1**
 - Subnet mask: **255.255.255.0**

Figure C-4 below shows the configured settings.

2. Make sure the phone is directly connected (or via a network hub) to the PC LAN NIC.
3. Disable all other PC NICs (also wireless NICs).

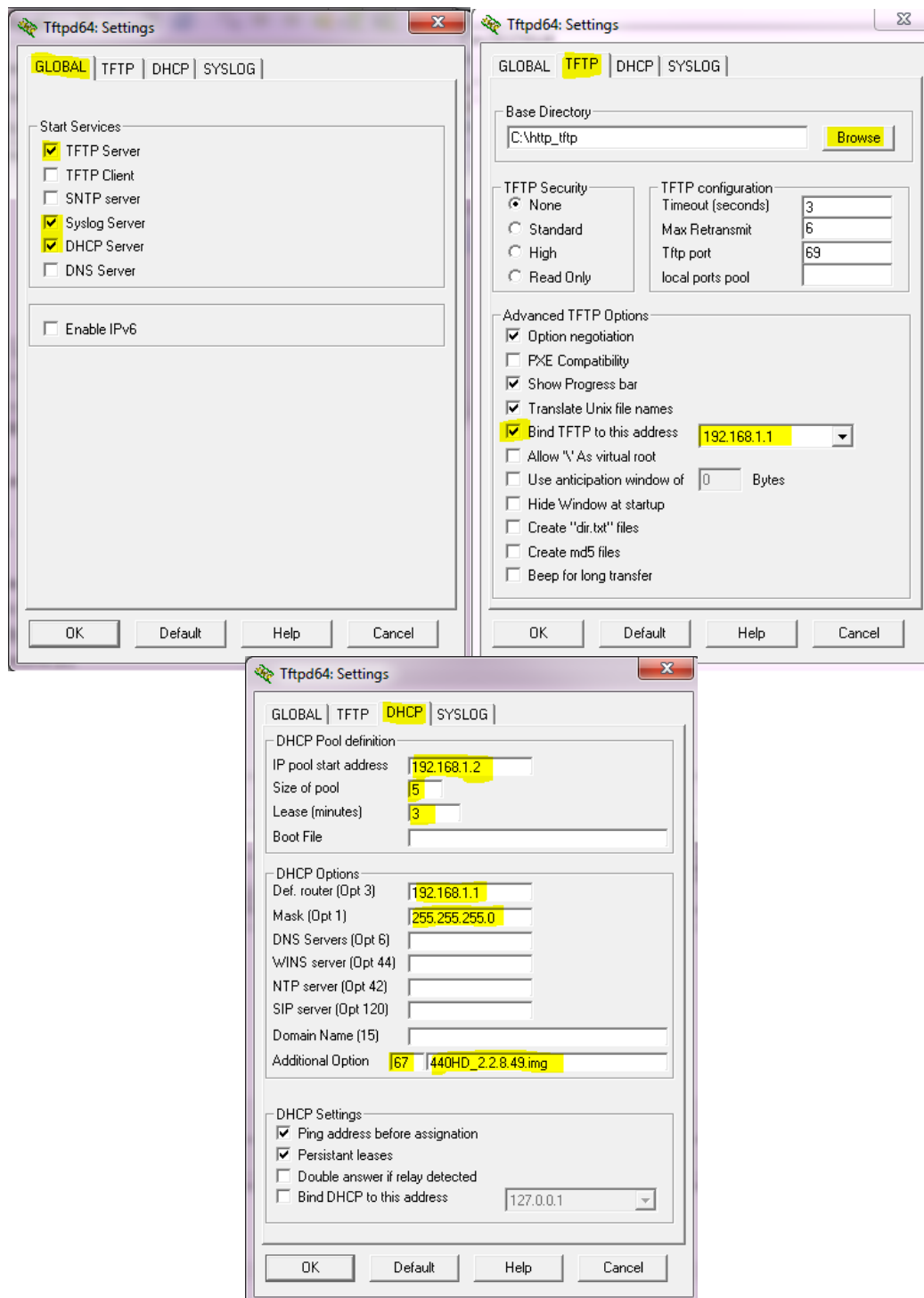
Figure C-4: Recovering the Phone - Configure the PC NIC to which the Phone is Connected



4. Download the following **tftpd64** freeware tool:
http://tftpd32.jounin.net/tftpd32_download.html
5. Run the **tftpd64.exe** executable.
6. Click **Settings** and configure the following settings:

Table 53-3: Configuring tftpd64 Settings

Global	TFTP	DHCP
TFTP Server [=option66]	Browse to the directory in which the AudioCodes IP phone firmware is located.	IP pool start address: 192.168.1.2
Syslog Server	Bind the TFTP to IP address 192.168.1.1	Size of pool: 5
DHCP Server	Leave all other options at their default.	Lease: 3
		Default.router: 192.168.1.1
		Mask: 255.255.255.0
		Additional Option: 67, FW_file_name.img



7. For **tftps64** to accept the new settings, close and open **tftpd64**.

After (1) **tftpd64** is restarted, (2) the phone is directly connected to the PC, and (3) the network settings referred to above are applied, the phone immediately gets the required options [66 and 67] and begins downloading the firmware. Verify that the phone is downloading the image file as shown in the next section.

C.4 Verifying that the Phone is Downloading the Image File

Here's how to verify that the phone is downloading the firmware image file.

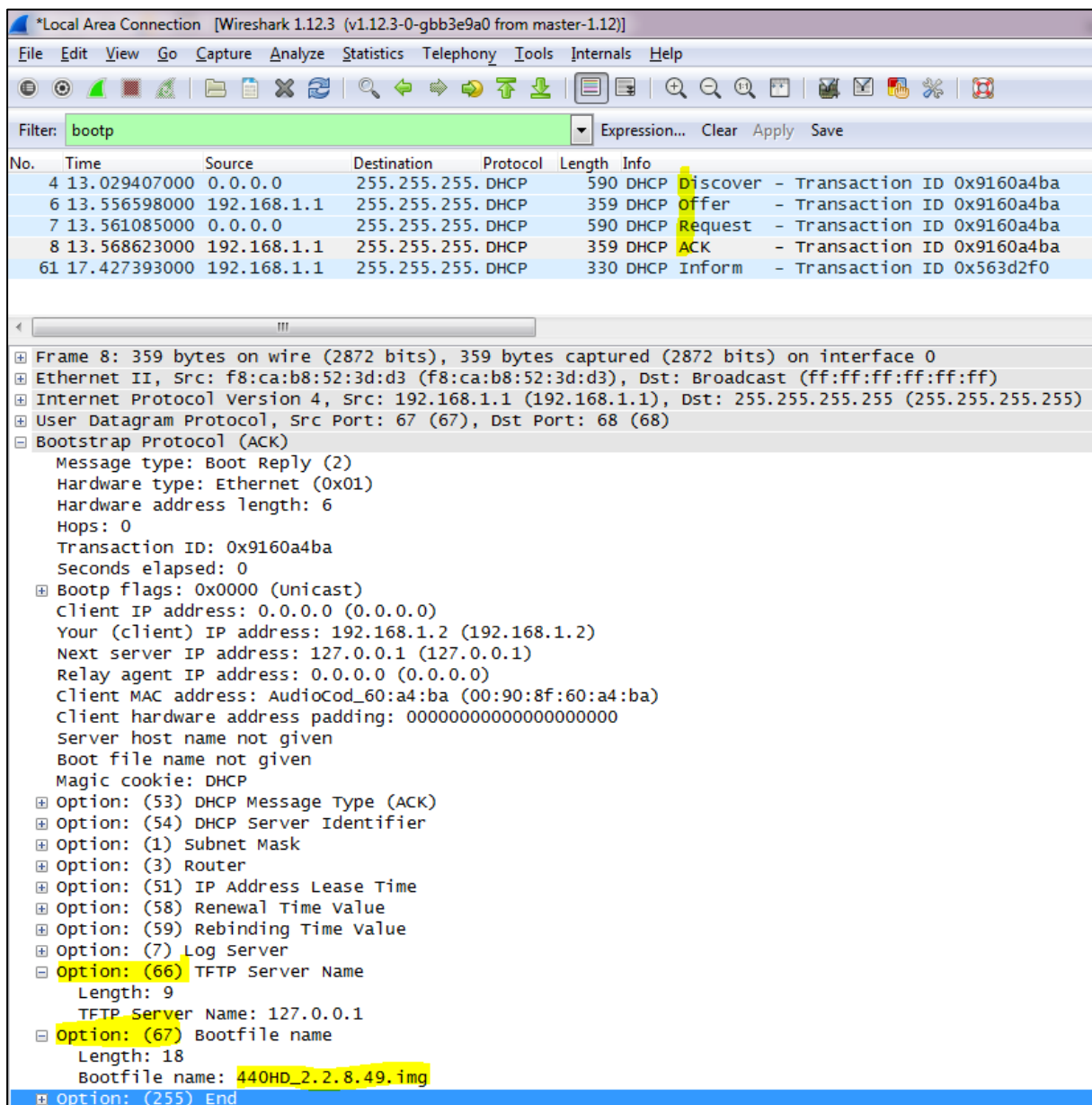
➤ To verify that the phone is downloading the image file, use:

- Wireshark -or-
- tftpd64 -or-
- the phone screen

C.4.1 Verifying Using Wireshark

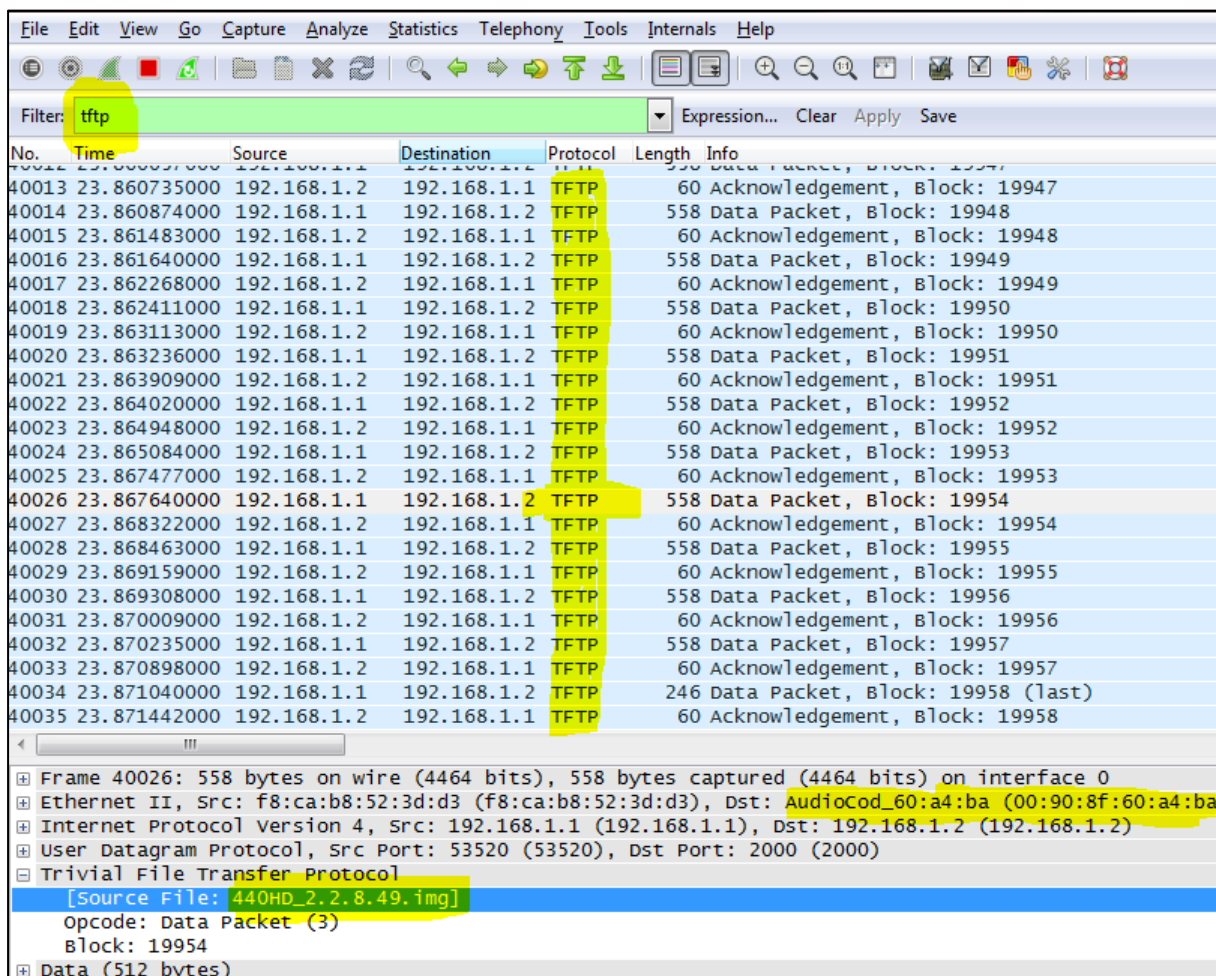
1. In Wireshark, verify that the four DHCP 'DORA' (**D**iscover; **O**ffer; **R**quest; **A**CK) steps are accomplished, as shown in the figure below.

Figure C-5: Verifying with Wireshark that the Phone is Downloading Phone .img File



2. Filter by **TFTP**, as shown in the figure below.

Figure C-6: Verifying .img File Download with Wireshark – Filtering by TFTP



C.4.2 Verifying Using tftpd64

In **tftpd64**, view the indications shown in the figures below.

Figure C-7: Verifying .img File Download using tftpd64

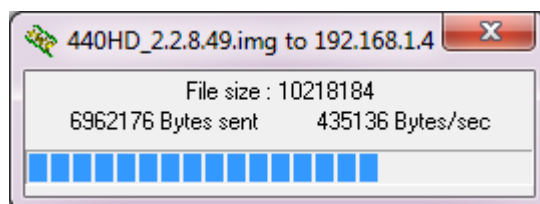
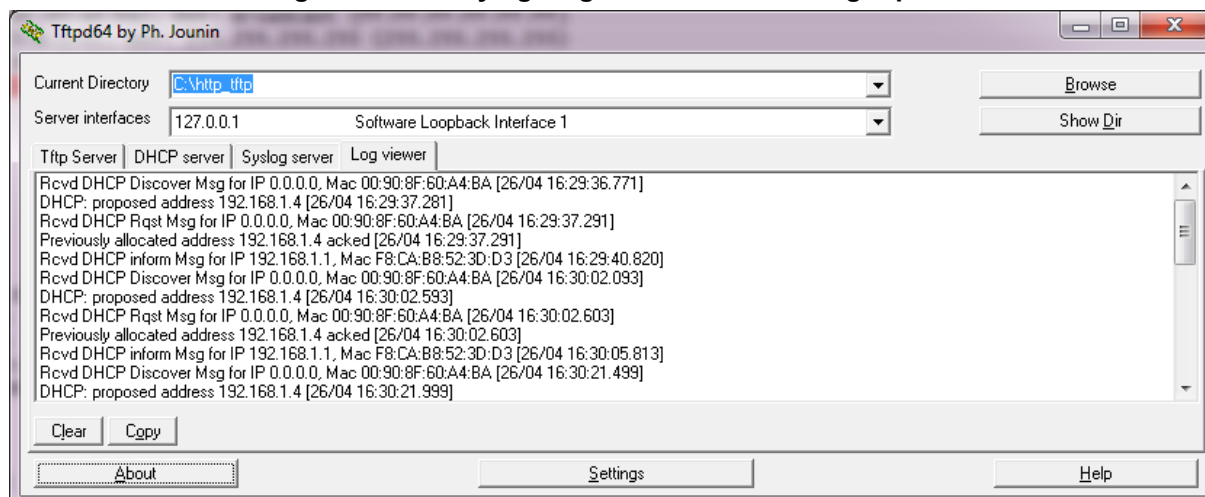
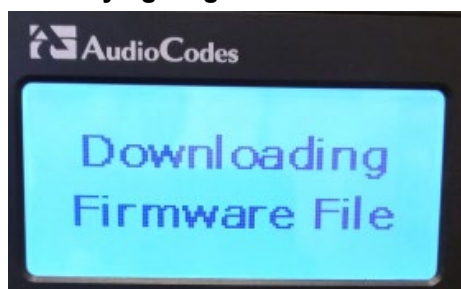


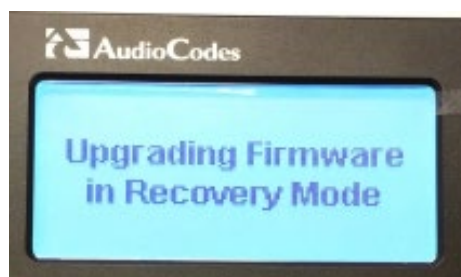
Figure C-8: Verifying .img File Download using tftpd64

C.4.3 Verifying on the Phone

In tftpd64, view the indications shown in the figures below.

Figure C-9: Verifying .img File Download on the Phone

Important: Do not unplug / power-off the phone while the screen displays the message shown below.



You can disconnect the phone from the PC and connect to the network LAN *only after the firmware upgrade finishes*, that is, after the phone's screen displays the following:

Discovering CDP...Discovering LLDP...Acquiring IP...

The phone is now up, functioning, and ready to be provisioned.

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D Deploying AudioCodes IP Phones - Use Case

In a typical scenario, the ISP/integrator:

1. Connects an out-of-the-box phone to the LAN and power supply and manually configures **Static IP** address on the phone (MENU > **Administration** > **Network Settings** > **LAN Connection Type**).
2. Accesses the phone using the Web interface and prepares configuration files for the enterprise customer (see the next section).
3. Places the configuration files on the enterprise customer's HTTP server and configures DHCP Server Option 160 to point to the location (see Section below).



D.1 Preparing Configuration (cfg) Files for the Enterprise Customer

Here's how to prepare configuration files for the enterprise customer.

To prepare configuration files for the enterprise customer:

1. Save the phone's default configuration to file (see the next section [D.2](#) below)
2. Prepare a global.cfg configuration file (see Section [D.1.2](#))
3. Generate private.cfg configuration files (see Section [D.1.3](#))

D.1.1 Saving the Phone's Default Configuration to File

Here's how to save an out-of-the box phone's default (factory) configuration to file. This will be the baseline on which to prepare a global.cfg configuration file afterwards.

➤ **To save a phone's default configuration to a file:**

1. Open a Web browser and connect to the phone's Web interface using **http://<phone's IP address>**
2. In the Web interface home page (System Information), make sure the phone is running the latest firmware version. If not, obtain a new firmware file from AudioCodes and load it to the phone using the Web interface's Firmware Upgrade page (**Management** tab > **Manual Update** > **Firmware Upgrade**).
3. In the Web interface's Restore Defaults page, restore the default configuration (**Management** tab > **Administration** > **Restore Defaults**) in case the default configuration was modified.
4. In the Web interface's Configuration File page, save the default configuration to a file (**Management** tab > **Manual Update** > **Configuration File**).

D.1.2 Preparing a global.cfg Configuration File

Here's how to prepare a configuration file containing *parameter settings common to all users* in the customer enterprise. You'll name the file global.cfg.

➤ **To prepare a global.cfg configuration file:**

1. In the Web interface, change the default settings of *parameters unique to your enterprise customers* (e.g., Language).
2. Make sure the phone functions as expected.
3. In the Web interface's 'Configuration file' page (**Management > Manual Update > Configuration file**), save the modified configuration parameter settings to a file. Name the file global.cfg.

D.1.3 Generating MAC-specific <private>.cfg Configuration Files

Here's how to generate MAC-specific <private>.cfg configuration files that will contain *parameter settings that are unique to each user* in a customer enterprise.

To generate MAC-specific <private>.cfg configuration files:

1. Prepare a csv file (see the next section below)
2. Prepare a template file (see Section D.1.3.2)
3. Automatically generate MAC-specific <private>.cfg configuration files using VolProvision tool (see Section D.1.3.3)

D.1.3.1 Preparing a csv File

Export a csv file from your enterprise customer's IP-PBX or another database. The csv file must list the phones in the enterprise, including MAC address, user name, extension ID, and password of each phone. The csv file contains the tagged records for each phone. When opened as a text file, the csv file looks like this:

```
[mac],[name],[id],[password]
00908F123456,Jonathan,4071,12345
00908F123457,David,4418,12345
```

Table D-1: CSV File Description

[mac]	[name]	[id]	[password]
00908F123456	Jonathan	4071	12345
00908F123457	David	4418	12345



Note:

- The first line of the csv file contains the list of tags (e.g., [mac],[name],[id]).
- The remainder of the csv file contains a line record per cfg file (e.g., 00908f112233,4071,Eitan).
- There is no restriction on the format of the tags (e.g., [tag] or @tag@).

D.1.3.2 Preparing a Template File

This section shows ISPs/integrators how to prepare a template file.

Example of a template file:

```
system/type=420HD
voip/line/0/enabled=1
voip/line/0/id=[id]
voip/line/0/auth_name=[name]
voip/line/0/auth_password=[password]
include global.cfg
```

Define in the template file parameter settings *unique to each user*. Parameter settings unique to each user are typically:

- Line Settings
- Personal Settings
- Phone Directory

Note that the template file contains tags []. The csv file that you prepared previously contains the values for these tags. You'll later use AudioCodes' VoIProvision tool to read the template file, replace the tags with values pulled from the csv file, and automatically generate MAC-specific <private>.cfg configuration files.

Note also that the template file contains **include** functions to link to other files. In the example above, the function **include global.cfg** pulls all parameter settings common to all users from the global.cfg file you prepared previously.

You can include links to specific configuration files, for example:

```
system/type=420HD
include 420HD_<MAC>_voip.cfg
include vlan_conf.cfg
include network_conf.cfg
include provisioning_conf.cfg
```

You can also include URL paths to files in other locations (FTP, TFTP, HTTP, or HTTPS), for example:

```
system/type=420HD
include http://10.10.10.10/420HD_<MAC>_voip.cfg
include https://remote-pc/vlan_conf.cfg
include tftp://10.10.10.10/420HD_<MAC>_network.cfg
include ftp://remote-pc/provisioning_conf.cfg
```



Note: If no URL is provided in the template file, the files are retrieved according to the provisioning information (e.g., DHCP Option 160 or 66/67).

D.1.3.3 Using AudioCodes' VolProvision Tool

Here's how to automatically generate multiple MAC-specific <private>.cfg files using AudioCodes' VolProvision tool. The tool generates a separate cfg file for each phone in the customer enterprise.

➤ **To automatically generate MAC-specific <private>.cfg files:**

1. Place AudioCodes' VolProvision tool (VolProvision.exe) in a folder on your pc.
2. Place the global.cfg configuration file that you prepared, together with the csv file and the template file, in the same folder.
3. Run the VolProvision exe; the tool automatically generates the <private>.cfg files.

```
USAGE: VolProvision <csv file><template file><.cfg file>
```



Note: AudioCodes' VolProvision tool can run on both Linux and Windows platforms. The tool initially parses the csv file to generate the list of tags. The tool then reads each line record of values in the csv file and for each line record, does this:

- Parses the line record to create a list of values
- Opens the template file
- Generates the cfg file name and creates a new cfg file
- Reads the template file, associates the mapped tags with actual values from the csv file, and writes the result to the cfg file
- Closes the cfg file and template file

Example of an automatically generated MAC-specific file:

```
system/type=420HD
voip/line/0/enabled=1
voip/line/0/id=56832432
voip/line/0/auth_name=3423fdwer2tre
voip/line/0/auth_password=123456
include global.cfg
```

The generated configuration (cfg) files use a similar format to the template file only the tags are replaced with the values read by the VolProvision tool from the csv file. The tag in the csv file which defines the MAC address is used as the cfg file name.

D.1.3.3.1 Creating Manually a <private>.cfg Configuration File

You can manually create a <private>.cfg configuration file using a standard ASCII, text-based program such as Notepad. The file name must be the phone's MAC address: **<phone's MAC address>.cfg**. The syntax of the configuration file is as follows:

```
<parameter name>=<value>
```

Ensure that:

- No spaces are on either side of the equals (=) sign
- Each parameter is on a new line

Below is an example of part of a configuration file:

```
system/type=440HD
voip/line/0/enabled=1
voip/line/0/id=1234
voip/line/0/description=440HD
voip/line/0/auth_name=1234
voip/line/0/auth_password=4321
```

D.2 Preparing the DHCP Server to Automatically Provision Phones

➤ **To prepare the DHCP server:**

- Configure DHCP OPTION 160 on the DHCP server. Point the DHCP server to the URL of the configuration files on the HTTP server.
Use the string <MAC>
For example: **http://192.168.2.1/440HD_<MAC>_conf.cfg**

D.3 Making Sure Phones are Correctly Provisioned

➤ **To make sure the phones are correctly provisioned:**

1. Connect one of the phones to the IP network and power supply.
2. Follow the status displayed on the screen. Make sure the phone received an IP address and is upgrading the configuration.
3. The phone reboots with the new configuration.
4. Make sure that all functionalities are functioning flawlessly, e.g., that the phone can make VoIP calls.

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E Supported SIP RFCs and Headers

The following is a list of supported SIP RFCs and methods you can use for the phone.

Table E-1: Supported IETF RFCs

RFC Number	RFC Title
RFC 2327	SDP
RFC 2617	HTTP Authentication: Basic and Digest Access Authentication
RFC 2782	A DNS RR for specifying the location of services
RFC 2833	Telephone event
RFC 3261	SIP
RFC 3262	Reliability of Provisional Responses in SIP
RFC 3263	Locating SIP Servers
RFC 3264	Offer/Answer Model
RFC 3265	(SIP)-Specific Event Notification
RFC 3310	Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA)
RFC 3326 (Partially Supported)	Reason header
RFC 3389	RTP Payload for Comfort Noise
RFC 3515	Refer Method
RFC 3605	RTCP attribute in SDP
RFC 3611	RTP Control Protocol Extended Reports (RTCP XR)
RFC 3665	SIP Basic Call Flow Examples
RFC 3711	The Secure Real-time Transport Protocol (SRTP)
RFC 3725	Third Party Call Control
RFC 3842	MWI
RFC 3891	"Replaces" Header
RFC 3892 (Sections 2.1-2.3 and 3 are supported)	The SIP Referred-By Mechanism
RFC 3960 (Partially Supported)	Early Media and Ringing Tone Generation in SIP (partial compliance)
RFC 3966	The tel URI for Telephone Numbers
RFC 4028 (Partially Supported)	Session Timers in the Session Initiation Protocol
RFC 4240	Basic Network Media Services with SIP - NetAnn
RFC 6035	RTCP XR information publishing for Quality of Experience server monitoring.
draft-ietf-sip-privacy-04.txt (Partially Supported)	SIP Extensions for Network-Asserted Caller Identity using Remote-Party-ID header
draft-ietf-sipping-cc-transfer-05	Call Transfer

RFC Number	RFC Title
draft-ietf-sipping-realtimefax-01	SIP Support for Real-time Fax: Call Flow Examples
draft-choudhuri-sip-info-digit-00	SIP INFO method for DTMF digit transport and collection
draft-mahy-sipping-signaled-digits-01	Signaled Telephony Events in the Session Initiation Protocol



Note: The following SIP features are not supported:

- Preconditions (RFC 3312)
- SDP - Simple Capability Declaration (RFC 3407)
- S/MIME
- Outbound, Managing Client-Initiated Connections (RFC 5626)
- SNMP SIP MIB (RFC 4780)
- SIP Compression – RFC 5049 (SigComp)
- ICE (RFC 5245)
- Connected Identity (RFC 4474)

E.1 SIP Compliance Tables

The SIP device complies with RFC 3261, as shown in the following subsections.

E.1.1 SIP Methods

The device supports the following SIP Methods:

Table E-2: Supported SIP Methods

Method	Supported	Comments
INVITE	Yes	
ACK	Yes	
BYE	Yes	
CANCEL	Yes	
REGISTER	Yes	Send only
REFER	Yes	Inside and outside of a dialog
NOTIFY	Yes	
INFO	Yes	
OPTIONS	Yes	
PRACK	Yes	
PUBLISH	Yes	Send only
SUBSCRIBE	Yes	

E.1.2 SIP Headers

The device supports the following SIP Headers:

Table E-3: Supported SIP Headers

Header Field	Supported
Accept	Yes
Alert-Info	Yes
Allow	Yes
Authorization	Yes
Call-ID	Yes
Call-Info	Yes
Contact	Yes
Content-Length	Yes
Content-Type	Yes
Cseq	Yes
Date	Yes
Diversion	Yes
Encryption	No
Expires	Yes
Fax	Yes
From	Yes
History-Info	Yes
Join	Yes
Max-Forwards	Yes
MIN-SE	Yes
P-Asserted-Identity	Yes
P-Preferred-Identity	Yes
Proxy- Authenticate	Yes
Proxy- Authorization	Yes
Prack	Yes
Record- Route	Yes
Refer-To	Yes
Referred-By	Yes
Replaces	Yes
Remote-Party-ID	Yes
Retry-After	Yes

Header Field	Supported
Route	Yes
Session-Expires	Yes
Supported	Yes
Timestamp	Yes
To	Yes
Unsupported	Yes
User- Agent	Yes
Via	Yes
Voicemail	Yes
Warning	Yes
WWW- Authenticate	Yes

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F Specifications

The IP phone specifications are listed in the table below.

Table F-1: IP Phone Specifications

Feature	Details
VoIP Signaling Protocols	<ul style="list-style-type: none"> ▪ SIP: RFC 3261, RFC 2327 (SDP)
Data Protocols	<ul style="list-style-type: none"> ▪ IPv4, TCP, UDP, ICMP, ARP, DNS and DNS SRV for SIP Signaling ▪ SIP over TLS (SIPS) ▪ 802.1p/Q for Traffic Priority and QoS ▪ VLAN Discovery Mechanism (CDP, LLDP and LLDP-MED) ▪ ToS (Type of Service) field, indicating desired QoS DHCP Client ▪ NTP Client
Media Processing	<ul style="list-style-type: none"> ▪ Voice Coders: G.711, G.729A/B, G.722, and OPUS v1.1. OPUS v1.1: <ul style="list-style-type: none"> ✓ The encoder supports any sampling frequency up to 16 kHz ✓ The encoder supports 10 ms to 120 ms packet time ✓ The decoder can receive any stream (all modes, mono or stereo, any sampling frequency 8 to 48 kHz) ✓ The decoder can receive any packet time apart from 2.5 msec and 5 msec (in 'CELT only' mode only 20 msec packet time is supported) ✓ decoder performs up/downsampling and renders the signal as wideband ✓ Jitter Buffer size is 2 seconds ✓ DTX is currently not supported by the encoder but is supported by the decoder ✓ One channel is supported so 3-way conference and MoH are not. ✓ OPUS management for enhanced voice quality ▪ Acoustic Echo Cancellation: G.168-2004 compliant, 64-msec tail length ▪ Adaptive Jitter Buffer 300 msec ▪ Voice Activity Detection ▪ Comfort Noise Generation ▪ Packet Lost Concealment ▪ RTP/RTCP Packetization (RFC 3550, RFC 3551), SRTP (RFC 3711) ▪ DTMF Relay (RFC 2833)
Telephony Features	<ul style="list-style-type: none"> ▪ Call Hold / Un-Hold ▪ Call Transfer ▪ 3-Way Conferencing (with local mixing) ▪ Redial ▪ Caller ID Notification ▪ Call Waiting Indication ▪ Message Waiting Indication (including MWI LED) ▪ Local and Corporate Directories ▪ Automatic On-hook Dialing ▪ Automatic Answering (Alert-Info header and 'talk' event) ▪ CWRR (Call Waiting Reminder Ring) ▪ Secondary Dial Tone ▪ Call Logs: Missed/Received Calls and Dialed Numbers

Feature	Details
	<ul style="list-style-type: none"> ▪ Programmable Keys (applies only to 430HD and 440HD models) ▪ Speed Dial ▪ Dial Plan (supports up to 4000 characters) ▪ URL Dialing ▪ Call Forward (Unconditional, Busy, No Answer) ▪ BroadSoft Feature Key Synchronization for server-controlled DnD and Call Forward ▪ BroadSoft Shared Call Appearance (on the 430HD and 440HD phones only) ▪ BroadSoft Device Registration Failover ▪ Redundant SIP Proxy Mechanism ▪ Remote Conferencing (RFC 4240) ▪ Multiple Lines (up to six on the 430HD and 440HD models; up to two on the 420HD model)
Configuration / Management	<ul style="list-style-type: none"> ▪ LCD Display User Interface Language Support (Various Languages) ▪ Web-based Management (HTTP/HTTPS) ▪ Auto-Provisioning (via TFTP, FTP, HTTP, and HTTPS) for firmware and proprietary configuration file upgrade ▪ DHCP options (66, 67, and 160) for auto-provisioning ▪ DHCP options (120, 60, and 77) for device information ▪ DHCP option (42 or 4) for the NTP server ▪ DHCP option (43) for vendor specific information ▪ DHCP option (2) for the Time Zone Offset ▪ LDAP (Lightweight Directory Access Protocol) ▪ Private Labeling Mechanism ▪ Configuration file encryption (Entire file and individual parameters)
Debugging Tools	<ul style="list-style-type: none"> ▪ Syslog mechanism ▪ DSP recording ▪ Port mirroring ▪ VoIP Status Web page

Feature	Details
Hardware	<ul style="list-style-type: none"> ▪ LCD screen: Graphic LCD (128 X 48) (420HD model) Graphic LCD (256x12) (430HD and 440HD models) ▪ BLF screen: (only applies to the 440HD model) Graphic LCD (60x376) monochrome ▪ Connectors interfaces: <ul style="list-style-type: none"> ✓ 2 x RJ-45 ports (10/100BaseT Ethernet) for WAN and LAN ✓ RJ-9 port (jack) for Headset ✓ RJ-9 port (jack) for Handset ✓ USB interface for USB headset support ✓ RJ-11 interface for DHSG ▪ Kensington lock ▪ Mounting: <ul style="list-style-type: none"> ✓ Wall and desktop mounting options ✓ One angle for desktop mount, another angle for wall mount ▪ GbE support ▪ Power: <ul style="list-style-type: none"> ✓ DC jack adapter 12V ✓ Power supply AC 100 ~ 240V ✓ PoE: IEEE802.3af ▪ Keys: <ul style="list-style-type: none"> ✓ 4 x softkeys ✓ VOICE MAIL message hotkey ✓ 4-way navigation keys with ENTER Key ✓ MENU ✓ REDIAL ✓ HOLD ✓ MUTE ✓ TRANSFER ✓ VOLUME control key ✓ HEADSET ✓ SPEAKER
Supported Headsets	<p>For the comprehensive list of Jabra headsets, see the Jabra Headset Compatibility Guide</p> <p>For the comprehensive list of Plantronics headsets, see https://compatibility.plantronics.com/deskphone</p> <p>These include:</p> <ul style="list-style-type: none"> ▪ Jabra UC-150 ▪ Jabra Speak 510+ ▪ Jabra Speak 410 ▪ Jabra MOTION OFFICE ▪ Jabra PRO 9470 ▪ Jabra Evolve Series 20, 30, 40, 75, 80 ▪ Microsoft LX-3000 ▪ Plantronics C-310M ▪ Plantronics C-320M ▪ Plantronics HW720 ▪ Plantronics Blackwire Series 300, 325, 510, 520, 710 ▪ Jabra Pro 920 EHS wireless headset ▪ Jabra Pro 9450 EHS wireless headset ▪ Axtel

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G RTCP-XR Parameters

The following table lists the RTCP-XR parameters that may be reported to the QoE server.

Table G-1: RTCP-XR Parameters

Group	Metric Name
General	Start Timestamp
	Stop Timestamp
	Call-ID
	Local Address (IP, Port & SSRC)
	Remote Address (IP, Port & SSRC)
Session Description	Payload Type
	Payload Description
	Sample Rate
	Frame Duration
	Frame Octets
	Frames per Packets
	Packet Loss Concealment
	Silence Suppression State
Jitter Buffer	Jitter Buffer Adaptive
	Jitter Buffer Rate
	Jitter Buffer Nominal
	Jitter Buffer Max
	Jitter Buffer Abs Max
Packet Loss	Network Packet Loss Rate
	Jitter Buffer Discard Rate
Burst Gap Loss	Burst Loss Density
	Burst Duration
	Gap Loss Density
	Gap Duration
	Minimum Gap Threshold
Delay	Round Trip Delay
	End System Delay
	One Way Delay
	Interarrival Jitter
	Min Absolute Jitter
	Signal
	Signal Level
	Noise Level
	Residual Echo Return Noise
Quality Estimates	Listening Quality R
	RLQ Est. Algorithm
	Conversational Quality R

Group	Metric Name
	RCQ Est. Algorithm
	External R In
	Ext. R In Est. Algorithm
	External R Out
	Ext. R Out Est. Algorithm
	MOS-LQ
	MOS-LQ Est. Algorithm
	MOS-CQ
	MOS-CQ Est. Algorithm
	QoE Est. Algorithm

H Example SIP - PUBLISH Message

This appendix displays an example SIP PUBLISH message extracted from RFC 6035. RTCP-XR values are found under the message body.

```
PUBLISH sip:collector@example.org SIP/2.0
Via: SIP/2.0/UDP pc22.example.org;branch=z9hG4bK3343d7
Max-Forwards: 70
To: <sip:proxy@example.org>
From: Alice <sip:alice@example.org>;tag=a3343df32
Call-ID: 1890463548
CSeq: 4331 PUBLISH
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER,
SUBSCRIBE, NOTIFY
Event: vq-rtcpxr
Accept: application/sdp, message/sipfrag
Content-Type: application/vq-rtcpxr
Content-Length: ...

VQSessionReport: CallTerm
CallID: 6dg37f1890463
LocalID: Alice <sip:alice@example.org>
RemoteID: Bill <sip:bill@example.net>
OrigID: Alice <sip:alice@example.org>
LocalGroup: example-phone-55671
RemoteGroup: example-gateway-09871
LocalAddr: IP=10.10.1.100 PORT=5000 SSRC=1a3b5c7d
LocalMAC: 00:1f:5b:cc:21:0f
RemoteAddr: IP=11.1.1.150 PORT=5002 SSRC=0x2468abcd
RemoteMAC: 00:26:08:8e:95:02
LocalMetrics:
Timestamps: START=2004-10-10T18:23:43Z
STOP=2004-10-01T18:26:02Z
SessionDesc: PT=18 PD=G729 SR=8000 FD=20 FO=20 FPP=2 PPS=50
FMTP="annexb=no" PLC=3 SSUP=on
JitterBuffer: JBA=3 JBR=2 JBN=40 JBM=80 JBX=120
PacketLoss: NLR=5.0 JDR=2.0
BurstGapLoss: BLD=0 BD=0 GLD=2.0 GD=500 GMIN=16
Delay: RTD=200 ESD=140 SOWD=200 IAJ=2 MAJ=10
Signal: SL=-21 NL=-50 RERL=55
QualityEst: RLQ=90 RCQ=85 EXTRI=90 MOSLQ=4.2 MOSCQ=4.3
QoEEstAlg=P.564
RemoteMetrics:
Timestamps: START=2004-10-10T18:23:43Z
STOP=2004-10-01T18:26:02Z
SessionDesc: PT=18 PD=G729 SR=8000 FD=20 FO=20 FPP=2 PPS=50
FMTP="annexb=no" PLC=3 SSUP=on
JitterBuffer: JBA=3 JBR=2 JBN=40 JBM=80 JBX=120
PacketLoss: NLR=5.0 JDR=2.0
BurstGapLoss: BLD=0 BD=0 GLD=2.0 GD=500 GMIN=16
Delay: RTD=200 ESD=140 SOWD=200 IAJ=2 MAJ=10
Signal: SL=-21 NL=-45 RERL=55
QualityEst: RLQ=90 RCQ=85 MOSLQ=4.3 MOSCQ=4.2 QoEEstAlg=P.564
DialogID: 1890463548@alice.example.org;to-tag=8472761;
from-tag=9123dh311
```



Note: Remote Metrics are not supported in this version.

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