

Deployment Guide

AudioCodes 420HD Compatible IP Phone Tested and Qualified for Microsoft® Lync®

Document #: LTRT-21920



Microsoft Partner
Gold Unified Communications



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Notice

This document provides instructions on how to quickly deploy AudioCodes 420HD Lync-Compatible IP Phone in a Microsoft environment.

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Abbreviations and Conventions

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

Related Documentation

Document Name
LTRT-09910 310HD & 320HD & 420HD IP Phone Administrator's Manual v2.0.0
LTRT-11840 420HD IP Phone for Lync Quick Guide
LTRT-11890 420HD IP Phone with Microsoft Lync User's Manual Ver. 2.0.0
LTRT-21910 300HD & 400HD IP Phone Firmware Upgrade Configuration Note

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 <http://www.audiocodes.com/downloads>.

1 Introduction

If you are deploying AudioCodes 420HD Compatible IP Phone Tested and Qualified for Lync (hereafter referred to as *420HD Lync-Compatible IP Phone*) in a Microsoft® Lync™ environment that does not have existing Lync Compatible and/or Optimized IP phones, you may need to perform additional configuration for the following prior to installing the 420HD Lync-Compatible IP Phones:

- DNS A and SRV records
- DHCP Scope Options
- NTP servers
- Edge servers (if exist in the network)
- Hardware Load Balancers (if exist in the network)

Microsoft provides documentation on their Web site that describes how to configure and implement these requirements:

- Lync 2013: <http://technet.microsoft.com/en-us/library/gg425854.aspx>
- Lync 2010: [http://technet.microsoft.com/en-us/library/gg425854\(v=ocs.14\).aspx](http://technet.microsoft.com/en-us/library/gg425854(v=ocs.14).aspx)



Note: This document assumes that the configuration items listed above have been done and describes how to verify that the basic Microsoft environment is ready for the deployment of AudioCodes 420HD Lync-Compatible IP Phone.

Reader's Notes

2 Verifying Microsoft Environment Configuration

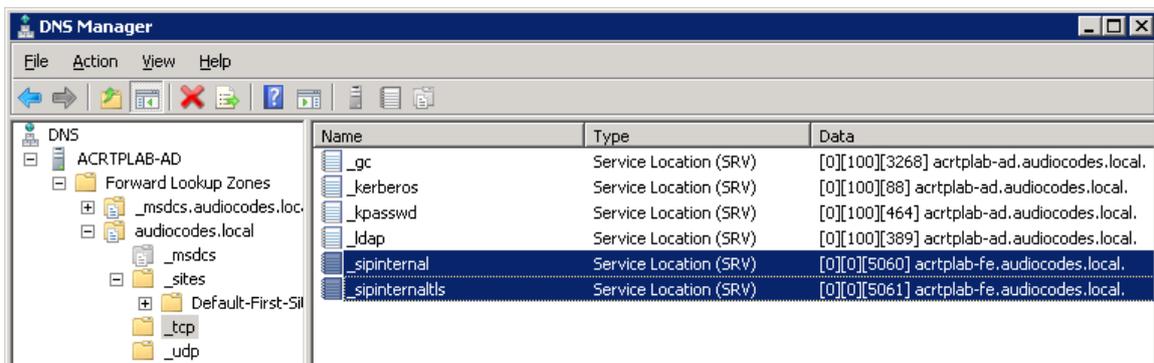
Prior to proceeding with deployment, verify configuration and setup of the DNS server and DHCP server in the Microsoft environment, as discussed in the following subsections.

2.1 DNS Server

Verify the following configuration on the DNS server:

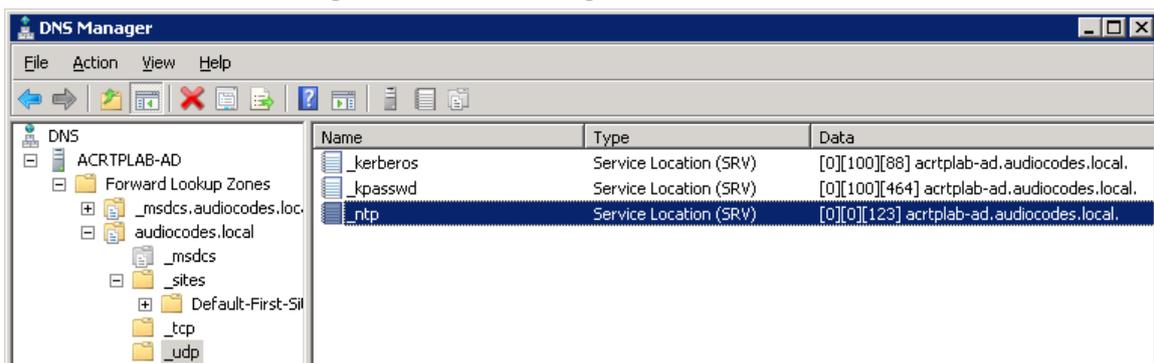
1. **A records** for the FQDN's of the pools hosting the Registrar services, which includes the Lync Front End Pools and the SBA or SBS's in the network.
2. **SRV records** that specify the two SIP FQDN's used for internal routing for communications:
 - `_sipinternal._tcp.<SIP Domain>`
 - `_sipinternaltls._tcp.<SIP domain>`

Figure 2-1: DNS Manager SIP SRV Records



3. **SRV record(s) _ntp._udp.<SIP Domain>** for the NTP server(s) used in the internal network. NTP uses UDP port 123 which needs to be defined in the record. The 420HD IP Phone contacts this server to obtain the necessary time prior to attempting to contact the Registrar server. See Section A.2 on page 19 for special notes regarding this issue.

Figure 2-2: DNS Manager NTP SRV Records



4. **SRV record(s) _sip.tls.<sip domain>** (external TLS) for the Edge Server(s) enables external devices to connect using SIP over TLS to the Registrar internally. See Section A.3 on page 19 for special notes regarding this issue.
5. **A record(s) <server name>.<SIP domain>** for the Reverse proxy FQDN which enables remote (external) devices to connect using TLS over HTTP to the Device Update Web service. See Section A.3 on page 19 for special notes regarding this issue.

2.2 DHCP Server

Verify the following configuration on the DHCP server:

1. **Scope Option 43** for Lync Pool Certificate Provisioning Service URL `https://<LyncWebPoolFQDN>:443/CertProv/CertProvisioningService.svc`, which is tied to vendor class ID: MS-UC-Client. See Section A.1 on page 19 for special notes.
2. **Scope Option 43** for Virtual Local Area Network (VLAN) ID. This is only required if you use a VLAN for unified communications (UC), or if you do not use Link Layer Discovery Protocol (LLDP)-enabled switches in the Enterprise to provide VLAN IDs. This Scope Option is tied to a separate vendor class ID: CPE-OCPHONE. If you use this option, then additional DHCP options associated with this vendor class may be required.
3. **Scope Option 120** for FQDN for the Certificate Authority pool Registrar. Specify the FQDN of the pool for the first logon server for the device. Typically, this is a Director pool if deployed; otherwise, this is the Front End pool FQDN. The pool FQDN suffix must match the user's SIP URI.
4. **Scope Option 42** for the NTP Timer Server. This option is required only in an intranet-only environment or a PIN-authentication scenario to resolve the time server address. See Section A.2 on page 19 for special notes.
5. **Scope Option 2** for NTP Time Zone Option. To enable the correct time on the phone for the specific time zone, this option needs to be set. Current settings for North America are as follows:
 - 0xffffc7cd - 4 hours
 - 0xffffb9b0 - 5 hours
 - 0xffffaba0 - 6 hours
 - 0xffffd90 - 7 hours
 - 0xffff8f80 - 8 hours
 See Section A.2 on page 19 for special notes.
6. **Scope Option 15** for specifying the connection-specific DNS domain name suffix used by the DHCP client.
7. **Scope Option 119** for specifying the domain search list for resolving DNS host names.

Figure 2-3: DHCP Scope Options

Option Name	Vendor	Value	Class
002 Time Offset	Standard	0xffffc7cd	None
003 Router	Standard	172.17.0.1	None
042 NTP Servers	Standard	172.17.0.10	None
119 DNS Search List	Standard	audiocodes.local	None
001 UCIdentifier	MSUCClient	4d 53 2d 55 43 2d 43 6c 69 65 6e 74	None
002 URL Scheme	MSUCClient	68 74 74 70 73	None
003 Web Server FQDN	MSUCClient	61 63 72 74 70 6c 61 62 2d 66 65 2e...	None
004 Time Server	Standard	172.17.0.10	None
004 Port	MSUCClient	34 34 33	None
005 Relative Path for Cert Prov	MSUCClient	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
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

Figure 2-4: DHCP Server Scope Options

Option Name	Vendor	Value	Class
001 UCIdentifier	MSUCClient	4d 53 2d 55 43 2d 43 6c 69 65 6e 74	None
002 URL Scheme	MSUCClient	68 74 74 70 73	None
003 Web Server FQDN	MSUCClient	61 63 72 74 70 6c 61 62 2d 66 65 2e...	None
004 Time Server	Standard	172.17.0.10	None
004 Port	MSUCClient	34 34 33	None
005 Relative Path for Cert Prov	MSUCClient	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

3 Lync Requirements

Ensure that the following Lync requirements have been fulfilled:

1. Lync Services (Front End, Mediation, Web Services) are deployed and running.
2. Lync Dial Plan and Call routing are configured.
3. If remote access is required, ensure that the Edge Server(s) is deployed, configured and running.
4. Lync users are enabled for Enterprise Voice.
5. Determine the sign-in method to Lync method for 420HD IP Phone users:
 - Domain/UserID/Password.
 - Phone number and personal identification number (PIN). If this method is required, the PIN code and PIN policies need to be configured in Lync through the Lync Management Power Shell using the **set-csclientpin** command. Issuing the command without the **-pin** option will auto-generate a PIN based on PIN policies.

Figure 3-1: get-csclientpininfo Command

```

Administrator: Lync Server Management Shell
PS C:\Users\Administrator.AUDIOCODES> get-csclientpininfo -id "Boris Bouslov"

Identity           : sip:borish@audiocodes.local
IsPinSet           : True
IsLockedOut        : False
LastPinChangeTime : 3/11/2013 2:53:00 PM
PinExpirationTime  :

PS C:\Users\Administrator.AUDIOCODES> _
  
```

Figure 3-2: set-csclientpin Command

```

Administrator: Lync Server Management Shell
PS C:\Users\Administrator.AUDIOCODES> set-csclientpin -id "Geoff Ruff"

Identity           Pin           PinReset
-----
sip:geoffr@audiocodes.l... 78783         False

PS C:\Users\Administrator.AUDIOCODES> set-csclientpin -id "Geoff Ruff" -pin 147852

Identity           Pin           PinReset
-----
sip:geoffr@audiocodes.l... 147852         True

PS C:\Users\Administrator.AUDIOCODES> _
  
```

Reader's Notes

4 AudioCodes 420HD IP Phone Installation

4.1 420HD IP Phone Pre-requisites

Prior to installation, ensure that the following 420HD IP Phone pre-requisites exist:

1. 420HD IP Phone is running the Lync-enabled firmware.
2. Phones that are to be deployed externally (i.e., remote users) may need to be logged into the Enterprise network locally so that IP Phone certificates can be loaded to the phone automatically (DHCP Option 43) or manually by the user.
3. HTTP ports 80 and 443 are open, to allow the 420HD IP Phone to obtain certificates from Lync.
4. Port 443 is used for Lync's Device Update Web service, and port 80 is used to receive updates while on the Enterprise network.
5. Port 443 is used for Device Update Web service to request/receive updates for remote users (i.e., external to Enterprise network).

4.2 Installing AudioCodes 420HD IP Phone

Follow the procedure below for installing the 420HD IP Phone.

➤ **To install the 420HD IP Phone:**

1. Plug the 420HD IP Phone into a Power-over-Ethernet (PoE) switch if available, or cable it to a switch and then connect the phone to the power supply. The phone undergoes the following boot sequence as displayed on the phone's LCD screen:
 - a. HD VoIP logo
 - b. Initializing
 - c. Discovering LLDP
 - d. Discovering CDP
 - e. Acquiring IP
 - f. Initializing
 - g. Initializing Network
 - h. Signing In
 - i. Discovering Lync Server
 - j. Signing in Contact Time Server
 - k. RegisteringOnce the phone completes the boot-up process, the presence status on the phone indicates "Offline".
2. Press the **Sign in** softkey.
3. Sign in to Lync:
 - To sign in with a domain\username and password:
 - a. If using Lync sign-in address (borisb@audiocodes.local) to sign in, use the keypad numbers 2 through 9 to select the alphanumeric characters and 1 for the special characters @ and . (dot).
 - b. Press the bottom of the Navigation key to scroll down to **User Name**, and then enter the domain name\username (e.g., audiocodes\borisb).
 - c. Press the bottom of the Navigation key to scroll down to **Password**, and then enter the password.
 - d. Press the **Sign in** softkey.

- To sign in with an extension number (e.164 - 19195551212 or Extension 1212 {from EXT=1212 in Line URI field in Lync Control Panel}) and a PIN code:
 - a. Change the default sign-in method by pressing the bottom of the Navigation key to scroll down to **Switch sign-in method**, and then press the OK key or **Select** softkey.
 - b. Enter the phone number.
 - c. Press the bottom of the Navigation key to scroll down to **Pin code**, and then enter your PIN code.
 - d. Press the **Sign in** softkey.

The phone signs in to Lync and the phone's presence status is changed to "Available". If the phone fails to sign in, an error message is displayed on the LCD.

5 Troubleshooting

This section provides various troubleshooting procedures.

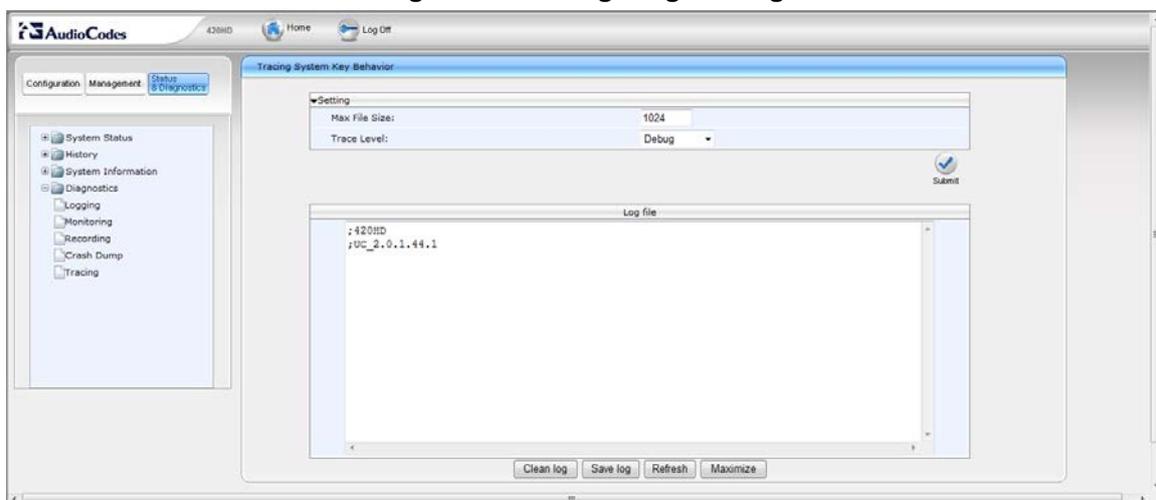
5.1 Enabling Tracing

It is recommended to set up the phone to store trace messages for effective troubleshooting and diagnosis.

➤ **To enable tracing:**

1. Log in to the Web management tool of the 420HD IP Phone, using HTTPS (e.g., <https://172.17.0.103>) through your Web browser. The phone's IP address can be obtained from the DHCP server, or from the 420HD LCD screen (press MENU button > press 5 for **Status** menu > press OK button for **Network Status** menu > press OK button > press the Navigation key to scroll down until the IP address is displayed).
2. Open the Tracing page (**Status & Diagnostics** tab > **Diagnostics** menu > **Tracing**).
3. Set the 'Max File Size' field to **1024**.
4. Set the 'Trace Level' field to **Debug** to activate tracing to debug level.
5. Click **Submit**.
6. Click **Clean log**, and then power up the 420HD IP Phone.
7. After the 420HD IP Phone completes the power-up process, click **Save log**.
8. Send the saved logged trace to AudioCodes Customer Technical Support for troubleshooting.

Figure 5-1: Configuring Tracing



5.2 Troubleshooting Procedures

This section provides various troubleshooting procedures.

5.2.1 Unable to Sign in to Lync using Username/Password

Problem	Unable to sign in to Lync using the username/password sign-in method.
LCD Message	"Invalid address, username or password"
Corrective Actions	
<ol style="list-style-type: none"> 1. Ensure that you have correctly entered the sign-in address, username, and password. 2. Ensure that you have the correct username/password; it may have changed in the Enterprise's Active Directory. 3. Ensure that you are in the correct sign-in method (press the Sign-in softkey, scroll down to Switch sign-in method, and then press the OK key or Select softkey). 	

5.2.2 Unable to Authenticate User using PIN

Problem	Unable to authenticate user when signing in to Lync using PIN code.
LCD Message	"The phone number or extension is not valid"
Corrective Actions	
<ol style="list-style-type: none"> 1. Ensure that you have entered the phone number / PIN code correctly. 2. Ensure that you have the correct PIN code; it may have changed in the Enterprise's Active Directory. 3. Ensure that you are in the PIN code sign-in method (press the Sign-in softkey, scroll down to Switch sign-in method, and then press the OK key or Select softkey). 	

5.2.3 IP Phone Fails Registration Process

Problem	The phone fails to register.
LCD Message	-
Corrective Actions	
Ensure the following:	
<ol style="list-style-type: none"> 1. DHCP Option 43 has been configured. 2. Access is possible from the following Web site: https://YOUR_AUTHORITY_SERVER:443/CertProv/CertProvisioningService.svc 3. If the environment supports more than one CA Certificate, this must be included in the CA Certificate file and loaded to the IP Phone. 	

5.2.4 How to Verify CA Certificate is Trusted / Authorized by IP Phone

Problem	How do I know if my CA Certificate is trusted and authorized by the IP Phone?
LCD Message	-
Corrective Actions	
Verify whether your public trusted certificate is listed in Microsoft Public Trusted Certificates (http://technet.microsoft.com/en-us/library/gg398270(v=ocs.14).aspx).	

5.2.5 Invalid Time Server

Problem	The time server is invalid.
LCD Message	-
Corrective Actions	
Ensure that NTP (DHCP Option 42) is configured in the DHCP server and is defined as NTP SRV records. If not, manually configure it.	

5.2.6 Invalid Time Offset

Problem	The time offset is incorrect.
LCD Message	-
Corrective Actions	
Ensure that the Time Offset (DHCP Option 2) is configured in the DHCP server. If not, manually configure Daylight Saving Time (DST) values in the 420HD IP Phone.	

Reader's Notes

A Referenced Notes

A.1 Certificates

All Lync Server deployments use certificates for the Lync Server roles, since the servers and clients communicate using TLS. If internal certificates are used, the root CA certificate must be published in the caCertificate attribute for Lync Phone Edition.

To allow external access for IP phones, a PKI infrastructure must exist. Devices must have a valid Lync Server certificate, which is obtained when the Lync user logs on and it is issued from a public certification authority (CA) (recommended by Microsoft) or a private CA. Public Certificate Authorities include Comodo, Cybetrust, Verisign, Entrust, Equifax, GeoTrust, and GoDaddy. The 420HD IP Phone has the same list of Public Trusted Certificates as listed on Microsoft Certificates for Lync Phone Edition page at [http://technet.microsoft.com/en-us/library/gg398270\(v=ocs.14\).aspx](http://technet.microsoft.com/en-us/library/gg398270(v=ocs.14).aspx).

Certificates need to be verified before starting deployment.

Scope Option 43 relies on five sub-options that must be provisioned:

- Scope Option 1 – UC Identifier: **MS-UC-Client**
- Scope Option 2 – URL Scheme: **https**
- Scope Option 3 – Web Server FQDN: i.e. **acrtplab-fe.audiocodes.local**
- Scope Option 4 – Port: **443**
- Scope Option 5 – Relative Path for Certificate Provisioning:
/CertProv/CertProvisioningService.svc

A.2 NTP Server

The 420HD Lync-Compatible IP Phone requires NTP to set the correct time and date for phones running Lync Phone Edition. The time cannot be more than five minutes off from the Lync server time (any time zone). If NTP servers are not configured at the customer Enterprise, time.windows.com and time.nist.gov can be used.

Ensure that the NTP is reachable (pingable) from the 420HD IP Phone, as the time on the phone must be within five minutes of the Lync Registrar server.

NTP DHCP Options (2, 4, and 42) can be configured manually using the 420HD IP Phone's Web-based management interface or Configuration file.

A.3 Edge Server

When configuring the Edge Server in the Configure a Reverse Proxy step, configure the reverse HTTP proxy to use the Device Update Web service virtual directory `https://<external Server FQDN>:443` for the external URL for Web Services and the Device Update Web service.

If the Edge Server is already deployed, you can get this information from Lync Server Control Panel on the Topology page by viewing the Edge Server properties.

If Hardware Load Balancers are used, ensure that the following ports are open for this functionality:

- **On a Registrar:** 5061, 5063 (for SIP connections)
- **On Web Services:** 80 (HTTP) and 443 (HTTPS)
- **On a hardware load balancer:** 444 (for HTTPS between server components), and ensure that source network address translation (SNAT) is allowed.

Deployment Guide

