This guide covers the guidelines to be followed when deploying Esna Cloudlink as a bridge between Unified Communication servers and cloud based contact applications.

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INTRODUCTION TO ESNA CLOUDLINK

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Introduction

Esna Cloudlink is a software solution that generates communication and collaboration revenue for organizations that want to migrate core business solutions, such as email and sales force automation, to the cloud. Its cloud-based integration provides competitive differentiation on new greenfield UC opportunities, specifically with customers using cloud-based applications, such as Google™ Apps and Gmail, Lotus™, Zimbra™, and other email and collaboration platforms.

The Esna Cloudlink platform offers new integrated services for corporate unified communications management solutions. Esna Cloudlink seamlessly integrates corporate UC applications with cloud based programs providing integrated unified messaging and communication services. Esna Cloudlink also provides integrated voice and fax services with these market leading platforms that are becoming essential alternatives for organizations looking to leverage the cloud to reduce costs and increase efficiencies with email and collaboration.

Unified Messaging

- Voicemail integrated with the cloud based application and message waiting light support with an existing PBX.
- Users can integrate their existing voicemail to the cloud for native email access. Read, respond, and manage communications through web based and embedded email platforms and web services.
- Esna Cloudlink delivers the core unified messaging functionality users are accustomed to from traditional email solutions, such as phone or PC playback, live reply, and more through integrated web services.

Call Presence and Control

- Provides integrated presence and dialing from a cloud based solution using the Jabber SDK.
- Offers rich integrated phone status and presence.
- Phone status enables click-to-dial using the corporate phone system.
- Ability to have phone presence integrated with a user’s Calendar.
Pre-Requisites

These instructions assume that the corporate UC system has already been setup and is functioning properly, that all user voice mailboxes are configured, and a corporate email account exists for each person that will use Esna Cloudlink. The web application must have all of the user mailboxes created before Esna Cloudlink can connect the two sides.

When using Google Apps, a Domain for the company must also be setup as the target for Esna Cloudlink, and as the location where users will retrieve their voice messages. Other applications may have similar requirements. Contact your network administrator for details.

Access to the cloud application is through an OAuth 2.0 or a Superuser sign-on, depending upon the web based application being targeted. IMAP should be enabled for all accounts.

**Warning:** The use of an OAuth 2.0 or Superuser sign-on is required. Otherwise, the synchronization of messages between the corporate server and the cloud will fail.

Software Requirements

<table>
<thead>
<tr>
<th>SOFTWARE</th>
<th>VERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Windows Server 2008 R2 (64-bit)</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2012</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2016</td>
</tr>
<tr>
<td>Unity Connection</td>
<td>8.5.1ES78 or 8.6.2ES20 and later</td>
</tr>
<tr>
<td>Esna Cloudlink</td>
<td>4.0+</td>
</tr>
</tbody>
</table>

**Caution:** It is strongly recommended that the operating system drive has a minimum of 100GB reserved exclusively for the O/S. This is in addition to any amount required for the Officelinx voice server installation.
Ports

The following ports must have access through the firewalls and security devices on both the corporate network and the Esna Cloudlink servers. If these ports are blocked, then the system will not function correctly.

<table>
<thead>
<tr>
<th>PORT</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Port used for email to fax</td>
</tr>
<tr>
<td>88</td>
<td>Communication between the company’s UC and Esna Cloudlink servers</td>
</tr>
<tr>
<td>135*</td>
<td>Calendar and Contact synchronization (MAPI/RPC)</td>
</tr>
<tr>
<td>443</td>
<td>Web Access and SRM (SSL), License authentication</td>
</tr>
<tr>
<td>993</td>
<td>IMAP/TSE eMail synchronization (SSL)</td>
</tr>
<tr>
<td>5222</td>
<td>XMPP Client connection (FRFC3920)</td>
</tr>
</tbody>
</table>

* - Calendar and Contact Synchronization use MAPI, which uses RPC (Remote Procedure Call). RPC port assignment is typically handled dynamically when required, with port 135 used to locate the correct port. Both 135 and the MAPI/RPC ports must be opened to ensure correct operations.

For more information, click here.

For information about setting up a static port for MAPI/RPC, click here.
http://support.microsoft.com/kb/270836
Installation

The installation of Esna Cloudlink must proceed in the following order:

1. Install and configure the corporate messaging system. This must include establishing all of the user mailboxes and addresses.

2. Setup the account, domain and users on the web based application (i.e. Gmail, Exchange).

3. Install and configure Esna Cloudlink.

The UC messaging system and the web based application must be setup before Esna Cloudlink can connect the mailboxes on both sides.

Consult the appropriate chapters of this document for additional information on setting up the different brands of messaging system, and different web based communication applications.
NEW AND CHANGED FEATURES

OAuth2 Support

Google Apps supports OAuth2 for improved authentication and security. Rather than requiring each individual's username and password for data synchronization, you may use a single OAuth2 login with the authority to oversee all Google accounts within an organization. Define the OAuth2 settings in the Feature Group, then all mailboxes within that Feature Group can enter their user name only and skip the password.

Gmail API Support

Esna has added support for the new Gmail API from Google. This feature replaces the IMAP protocol used for synchronizing messages between the servers (IMAP is still supported).
3

GOOGLE APPS SIGN-ON

In This Chapter:

16  Google Apps Sign-On Through OAuth 2.0
17  Synchronization Through OAuth 2.0
22  Configuring Esna Cloudlink
Google Apps Sign-On Through OAuth 2.0

The OAuth2 API key is Google's recommended approach for third party application servers, such as Esna Cloudlink, which require access to domain data on the user's behalf. Other applications may only need info at the time of user access.

The scope of access can be controlled through the Google Apps Admin Panel > Manage API Client Access. Esna application servers require access to Gmail, Drive, Calendar, Admin, CalDAV and Contacts through the API scope. Calendar and Contact API access is read only.

For more information:

https://developers.google.com/accounts/docs/OAuth2

The OAuth key does not give Esna Cloudlink any administrator level privileges (add/delete/update user accounts). This is a different API implementation that requires separate authorization from the Google Apps domain admin panel.
Synchronization Through OAuth 2.0

**Warning**: This procedure will set up the Esna Cloudlink Server to use the Gmail API for synchronization. If you are updating from an earlier version of Esna Cloudlink that used the IMAP protocol, voice messages received prior to the update can no longer be synchronized. For example, deleting an old message on Gmail will not cause the message to be removed from the server as well.

2. Click **APIs** under **APIs & auth**. Under the **Google Apps APIs** list, click and enable each one of **Drive API**, **Calendar API**, **Gmail API**, **Contacts API** and **CalDAV API**.

3. Under **API & Auth**, select **Credentials**. Click **Create new Client ID**.

4. Select **Service account**. Enable the **P12 Key** button and click **Create Client ID** to continue.
5. Google copies an **API Project** file to the local machine. This file has a `.p12` extension. If prompted, select the location on the local drive to save the file to. By default the file will be save to the **Downloads** folder for the current user. Copy the file to both the `C:\UC\UCCSE` and `C:\UC\IMAPTSE` folders. (Change the path accordingly if Esna Cloudlink installed to a different location.)

6. The client ID and password will be generated by the system. Make note of the **Private Key password** for use in later stages of this setup.

   Click **Okay, got it** to continue.

7. Rename both copies of the API Project file to match the email address generated for the **Service Account**. Record the **Client ID** (number portion) for use in later stages of this setup.

   **Hint**: The text can be copied directly from the pop-up window, then use paste to rename the file.

   **Caution**: Do Not change the extension of the file. Always ensure it retains the **P12** extension.
Configuring OAuth 2.0

1. Login to Google Apps as an administrator.
2. Click Settings and choose Manage this domain.
3. If prompted, provide the necessary administrator account and password details to login.
4. At the Admin Console, choose Security and click API Reference.
5. In the section for API access, place a check in the Enable API access box.
   Click Save Changes.
6. Return to the **Security** page, click **Advanced settings**.

7. Click **Manage API client access**.
8. Enter the complete **Client ID** value, both the user and domain portions, received in step 7, into the **Client Name** field.

In the space for **One or More API Scopes**, enter the following string to insert all required scopes:

```
```

**Hint**: Copy and paste the string above into the space in Chrome. This will greatly reduce the chance of misspelling the entry and breaking the configuration.

**Note**: The last scope listed above is associated with the Admin SDK and is used to include the contacts’ Google directory pictures. If this feature will not be used, then this scope can be omitted.

9. When ready, click the **Authorize** button.
Configuring Esna Cloudlink

Once OAuth 2.0 has been configured, Esna Cloudlink must be setup to use it. The following procedure is conducted on the Esna Cloudlink Server.

1. Open Cloudlink Manager.
2. Under Message Delivery > Account, enter your company domain, followed by the user portion of the client ID received in step 7. For example - companydomain/123456789012 ...

   For Password, type in the Private Key password for the client ID received in step 5.

3. Click Save when finished.
4. On the Voice Server, open the UC/UCCSE folder.
5. Edit the CSE.exe.config file using any text editor (e.g. Notepad).

   Locate the tag UseGMailAPI and set its value to True.

   Go to File > Save to complete the change.

6. Stop and Start the UC Content Synchronization Engine service on the Esna Cloudlink Server, or restart the server.

The setup is complete.

Hint: The Delivery Method IMAP Superuser is preferable when using OAuth2 authorization.
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- 32 Esna Cloudlink Cisco Server Setup
- 34 Setting Up the Unity Connection Administrator
- 36 Installing Esna Cloudlink
Esna Cloudlink bridges Cisco's Unified Call Manager and Unity Connection servers with a Cloud-based messaging application, providing enhanced global connectivity to users. Access your corporate emailbox, read messages, and compose new ones to send to contacts. Update your contacts list and calendar through a supported application, and Esna Cloudlink will mirror those changes on the Unity Connection Server.
Esna Cloudlink is housed on-site, providing with the ability to instantly maintain and manage all aspects of the service for
the corporation, as well as offering better data security. On-site hosting provides immediate access to the system so that
any problems can be dealt with swiftly. Any required changes can be made as needed. All data for the system is kept on
the corporation's own computers, providing the benefit of added security for sensitive information.
Enabling SSL from the IIS

Introduction

Ensure that SSL is properly configured on the Esna Cloudlink server IIS site.

**Note:** Digital certificates encrypt data using Secure Sockets Layer (SSL) technology, the industry-standard method for protecting web communications. The SSL security protocol provides data encryption, server authentication, message integrity, and optional client authentication for a TCP/IP connection.

SSL is built into all major browsers and web servers. By installing a digital certificate, you enable your browser’s SSL capabilities.

Requirements

<table>
<thead>
<tr>
<th>REQUIREMENTS</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>License</td>
<td>---</td>
</tr>
<tr>
<td>Software</td>
<td>Officelinx (Esna Cloudlink) version 8.5 + or Esna Cloudlink version 4.0 +.</td>
</tr>
</tbody>
</table>
Procedure

SSL configuration is done on the Microsoft Windows platform hosting the site. This guide is provided as a courtesy for those who wish to configure SSL with Esna Cloudlink. For further assistance, consult the professionals at Microsoft and its affiliates.

This example shows Windows Server 2008 with IIS 7.

1. From the Windows desktop, click **Start > All Programs > Administrative Tools > Server Manager**.
2. In the left hand-pane, open **Roles**, then **Web Server (IIS)**, and select **Internet Information Services (IIS) Manager**.
3. Under **Connections**, choose the web site. In the **Home** pane for the site, scroll down to the **IIS** section and double-click **Server Certificates**.

4. In the right-hand **Actions** pane, click **Create Certificate Request**.

![Image of Server Manager interface showing steps to create a certificate request.](image)
5. Fill in the information for **Distinguished Name Properties**.

   **Common name**: Enter the publicly accessible URL for the site.
   **Organization**: Type the corporation name.
   **Organizational unit**: Define the department for this certificate.
   **City/locality**: Enter the location information.
   **State/province**: Enter the location information.
   **Country/region**: Enter the location information.

   Click **Next** when ready.

6. Choose the **Cryptographic service provider** and **Bit length** (2048 or better is recommended) required by the certifying agency.

   Click **Next**.

7. Enter the filename and path for the certificate request file.

   Click **Finish**.

8. Pass this file to the authority providing the certificate. Make sure that it has the correct file extension specified by the authority.

9. The certifying authority will return the certificate in another file.

   Save the certificate file on the computer's hard drive in a known location.
10. In the right-hand **Actions** pane, click **Complete Certificate Request**.

11. To **Specify Certificate Authority Response**, enter the path to and the filename of the certifying authority's response from step 9. Click the ellipsis button to browse for the file.

   Enter a user **Friendly name** to use when referring to this certificate.

   Click **OK** when finished. The certificate will be installed for the site.

Double-clicking on the **Server Certificates** icon brings up a list of the certificates installed on the server. The new certificate is listed using its **Friendly name**.
Cisco Environment Setup

1. Navigate to CUCM Web interface.

2. Log into CUCM.
3. Navigate to **User Management > Application Users.** Add a new user for the Esna Cloudlink TAPI connection.

4. Ensure that the user has enabled control of all devices on the system.

Also ensure that the user is added to all relevant CTI permission groups.

Click **Save.**

5. Download Cisco TAPI client (32 or 64-bit depending on your Esna Cloudlink Server OS).
Esna Cloudlink Cisco Server Setup

1. Download and run the installer. After installing the prerequisites, you are presented with the following screen. Enter the number of CUCM TAPI Service Providers (TSP) to install. Specify the location where the program will be installed on the hard drive. Click Next.

![Installer Screen]

2. Enter the previously configured user information and IP of your CTI Manager (CUCM). Click Next.

![User Information]

**Note:** There is a limit of 2500 monitored devices for CUCM per server in a cluster. Esna Cloudlink can only enable functionality for this many users/devices concurrently on a single Esna Cloudlink server.

**Note:** If secure configuration is required, refer to the relevant Cisco documentation for additional setup information.
3. Accept the defaults. Click **Next**.

Once installation completes, you may be prompted to restart. Click **Yes**.
Setting Up the Unity Connection Administrator

Make the following changes to Unity Connection Administrator.

1. From the Administrator, go to Advanced > API Settings.

2. Enable the Display Message Header Information of Secure Messages through CUMI and Allow Message Attachments through CUMI checkboxes.

3. Click Save to continue.

4. In the left-hand pane, locate the Users menu item. At least one of the users must have Mailbox Access Delegate Account and System Administrator selected under Assigned Roles.

**Hint:** This can be a separate Administrator account if required.

Click Save.
5. Ensure that the **Corporate E-mail Address** field of the Unity Connection user is the same as for the Google Apps account. This is required for all users who are to be synchronized with Google Apps.
Installing Esna Cloudlink

All pre-requisites must be completed before installing Esna Cloudlink.

**Note:** Make sure that all of the necessary Services for your operating system have been installed before proceeding with the installation. Refer to the appropriate section of the Server Installation Guide for further details. Also make sure that Windows Firewall is disabled, and that Windows Automatic Update is turned off.

**Note:** If you have Autorun disabled on your system, please browse into the DVD and double-click the `InstallUC.bat` file to begin the installation process.

1. Insert the Esna Cloudlink 5.1 installation DVD into the DVD drive. The following screens will appear.

2. Once the Windows components have been verified, the following screen will appear.

   Click **Next** to begin the installation procedure.

   **Note:** The installer will automatically install the necessary packages at the beginning of the installation if they do not already exist on the system. These packages may include **Sentinel Protection**, **Microsoft Visual C++ Redistributable** and **Microsoft .Net Framework 4.5**. This process may take a while depending on the required components.

   **Note:** Clicking on the **Documentation** button will provide you with the default set of PDF documents which comprehensively cover most aspects of Esna Cloudlink.

3. When prompted, click **Run** to confirm the installation. The necessary files will begin to be installed.
4. Once the process is complete the licensing screen will appear. It is recommended that you use Online Activation whenever possible. To do so, simply enter the Serial Number and Site ID which has been provided to you.

   Click Request Online Activation when finished.

   **Warning:** It is essential that the system/PC clock be properly set before activating the license. Any subsequent changes to the clock can adversely affect or terminate the license.

5. Most of the fields in the Customer Site Registration window should already be filled in based upon the license and site numbers entered. Complete the form where necessary (all fields are required).

   Enter the security code into the space provided, then click Submit.

6. Confirm the contents of your license then click on the Set as Active License button.

   **Note:** Whenever your license is updated (e.g. through the addition of new features, extensions, etc.) please restart the server after activating the license so that the new parameters can become active.
7. If the process was successful the following confirmation screen will appear.
   Click **OK**.

8. Click **Exit** to close the license window and continue with the installation.

9. Enter the DCOM settings (local machine administrator login information). This is required by services which use local administrator rights.
   Click **OK** after entering the necessary credentials.

10. Review all the license agreements and select the **I accept** button for all entries to continue.
    Click **Next** when ready.

11. You will be asked to select the destination of the installation. You may change the hard drive destination through the drop down menu. By default, the installation will be made on the C drive.
    Click **Next** to continue.
12. Select the Components required at your site.

   Click Next.

13. If any required Windows services have not been installed on the system, or if the server has not yet been setup with the Country and Area Code dialing information, a reminder will appear here.

   ![Diagrams showing installation process]

   Install the missing Windows services and information, then click Next to continue with the installation.

   **Note:** These warnings will only appear if the required components and information have not yet been added to the server.

14. The preliminary information required for installation is now complete.

   Click Next.
15. The selected components will now be installed. This process may take a while.

16. If you are warned about components being in use, either use the automatic option or manually close the process which is interfering with the installation.

   Click **OK** when ready.

17. After all the components are copied, you may be asked to provide the settings for the **PBX** that you have chosen. Since this process varies greatly from system to system, please ensure that you configure your site's PBX exactly as required.

18. The Esna Cloudlink Manager starts automatically once all components have been installed.

   Click **Add** to create a new Endpoint connection.

19. Enter the required information.

   **Name**: Give the connection a descriptive name (required for all installations).

   **Cisco Unity Connection** (required for all installations):
   - **Server**: Enter the URL/IP Address of the Unity Connection server.
   - **Account**: Enter the user account login name.
   - **Password**: Enter the password for the login account.

   **Important**: You must ensure that the specified account possesses the **Mailbox Access Delegate Account Role** on the Unity Connection server.
Message Delivery - There are three Delivery Methods available. Select from:

<table>
<thead>
<tr>
<th>Delivery Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronized (IMAP superuser)</td>
<td>For connections to Gmail and MS Exchange</td>
</tr>
<tr>
<td>Synchronized (IMAP user)</td>
<td>Used for all other connections (i.e. Lotus, Zimbra). Individual user account login. Provides Message Light indicator synchronization</td>
</tr>
<tr>
<td>E-mail forward (SMTP)</td>
<td>Included as an option for sites where IMAP is not available</td>
</tr>
</tbody>
</table>

**Synchronized (IMAP superuser):**

**Delivery method:** Select Synchronized (IMAP superuser) from the dropdown list.

**Server:** If this field is not populated for you, enter the address of the IMAP server (i.e. Gmail, Exchange).

**Port:** This should also be filled in by the system. Enter 993 as the port number if required.

**Account:** Enter the OAuth Consumer key account name.

**Password:** Enter the password for the OAuth Consumer secret.
E-mail forward (SMTP):
Delivery Method: Select E-mail forward (SMTP) from the dropdown list. The remaining options under this section will be disabled.

Synchronized (IMAP user):

**Note:** It is recommended for sites upgrading from an earlier version to 10.1 that all mailboxes in Esna Cloudlink be deleted. They will be recreated with the first synchronization, and there may be difficulties receiving new messages if the mailboxes are not removed.

Delivery method: Select Synchronized (IMAP user) from the dropdown list.
Server: If this field is not populated for you, enter the address of the IMAP server (i.e. Lotus, Zimbra).
Port: This should also be filled in by the system. Enter 143 as the port number (or any port specified by your site administrator) if required.

The individual account login credentials are known only to the user and cannot be entered here. When Esna Cloudlink attempts to synch and finds no credentials, or fails to successfully login after several retries, it will send an email to the user with a link requesting the password.
Click the link, then enter and confirm the user's **current** IMAP server password at the prompt. Esna Cloudlink will use this during future login attempts. This does not change the password, but gives Esna Cloudlink access to the account.

**Note**: The default number of attempts to login before failing is **3**. This is controlled through the UC Admin > Feature Group. Double-click the Feature Group of the user to open the properties, and go to the Synchronization Options tab. Change Max No Of Logons to the preferred value.
On the Esna Cloudlink server, go to **Start > Officelinx > IMAPTSE - Diagnostics and Configuration Tool**. Login using the administrator credentials. Select the company, and click the **IMAP Synchronization Settings** icon.

**For Lotus users ONLY:** Open the Performance/Tuning tab and disable the **High Performance Pack** checkbox.

On the GUI/Other tab, ensure that the **Only OfficeLinx originated messages** checkbox is disabled. Click **Apply**, then close the Tool. For all other platforms, leave this option enabled.

On the Esna Cloudlink server, open the **eeam.ini** file using any text editor (e.g. NotePad). Find the entry for **TNM** and set its value equal to **7**. Save the file and close the editor.

On the Esna Cloudlink server, open the **UC Admin** program. Go to **Configuration > HTTP**. Double-click **URL - Data** in the right-hand pane to open its properties. Under **Value Data**, change the portion of the address [www.yourcompany.com](http://www.yourcompany.com) to the IP address of the Esna Cloudlink server (i.e. 192.168.0.0). Leave the rest of the
string unchanged.
**For Lotus users ONLY**: On the Lotus server, go to the properties page for each user account. Ensure that the Short name/UserID is the same as the username (without the domain) that appears under Internet Address.

![Image of Lotus server properties](image.png)

**Provisioning Options** (optional for all installations):

- **Admin Mailbox**: Enter an administrator’s mailbox number. This extension will receive warnings from the system regarding license expiration. If this field is left blank, these messages will be sent to a mailbox at random, so it is strongly recommended that an address be provided.

- **Enable only for COS**: This allows the administrator to specify one or more (separated by commas) Class of Service names. Only users within those Classes of Service will be synchronized.

**Message Options** (required for E-mail forward, optional for Synchronized installations):

- **Enable WebLinks Message Content**: Check this box to enable the WebLinks feature.

- **Attach original files**: By default, WebLinks will only deliver the links to voice messages in the email notification. Enable this option to have the audio files included as attachments.

- **WebLinks Host Address** (required for E-mail forward (SMTP)): Enter the address of the Esna Cloudlink server.

- **Run WebLinks Host Configuration**: This button uploads the chosen settings to the program to enable synchronization between the mail server and Gmail. This button must be used whenever there is a change to the host address.

**Note**: When in a Synchronized (IMAP ...) environment, the Enable WebLinks Message Content button changes the way voice messages are offered to a user. When disabled, voice messages are sent with an email as an attachment. This can represent a security risk for some sites. Enabling WebLinks Message Content will have the email provide only a link to the voice message. Clicking the link will stream the message to the recipient, but it will never be stored anywhere but the UC Server.

**Synchronization Settings** (only available for Gmail and Exchange connections):

- **Calendar Synchronization**: Check this box to enable synchronization of calendar entries.

- **Call History Synchronization**: Check this box to enable synchronization of call history data.

20. Click **Save** when ready.
21. The new connection has been created. The service is currently stopped.

   Highlight the connection, then click **Start**.

   **Note:** Additional endpoints can be added by clicking **Add**. Make sure that the service is not running (click **Stop**) when attempting to add new endpoints.

22. The connection is now running.

23. Click **Finish** to restart the server.

   If you wish to restart your computer at a later time, disable the **Restart** check box then click **Finish**.
5

ENVIRONMENTAL CONSIDERATIONS

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50 Minimum System Capacity
51 Network Requirements and Specifications
52 Software Requirements
53 IMAP TSE Gateway Requirements
53 Server Network Requirements
53 Server Email Integration Requirements
54 General System Configuration
57 Server Requirement Q & A
Maximum System Capacity

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esna Cloudlink Users</td>
<td>5,000 users per server *</td>
</tr>
</tbody>
</table>

*Note: Esna Cloudlink is a dedicated application which should only be installed as the primary application on any server. Sharing system resources with other applications may inhibit proper functionality of Esna Cloudlink.

*Note: Currently, only single server installations with a maximum of 5,000 users are supported by Esna Cloudlink. Future development will include increasing capacity by linking computers in a multi-server configuration.

* - To support more users, additional Esna Cloudlink servers and licenses are required. For example, to support 30,000 users, 6 or more licensed Esna Cloudlink servers are required.
Network Requirements and Specifications

Esna Cloudlink can exist as a standalone server on a local area network which allows for network-based user and system administration.

For proper deployment, connect the Esna Cloudlink server to your network via the 100 baseT NIC interface and then boot up the server.

**Warning:** You can only have a maximum of 2 network cards installed in a single server computer.

**Note:** The Esna Cloudlink server must be provided with sufficient administrative rights to the network so it can co-exist as another workstation on your local area network. For more information contact your LAN Administrator.

**Note:** Esna Cloudlink server does not support IPv6 and is only compatible with IPv4. If the server is to access the Internet, a secondary source (e.g. router, hub, etc.) which utilizes IPv6 may be used. For internal traffic, everything must be configured through IPv4.

The following is an example of how Esna Cloudlink can be configured within an organization's network. By having a network infrastructure as shown here, you can ensure the functionality of Esna Cloudlink within the organization while protecting all assets through the necessary security measures (e.g. firewall) from Internet or other external connections.

Before installing Esna Cloudlink, install the following software:

- **Supported OS:**
  - Windows Server 2008 R2 (64-bit)
  - Windows Server 2012
  - Windows Server 2016

Cloudlink Public Ports (required for access to UC services from public internet):

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 (HTTP)</td>
<td>Web Client and Gadget access</td>
</tr>
<tr>
<td>443 (HTTPS)</td>
<td>Secure Web Client and Gadget access</td>
</tr>
<tr>
<td>25 (SMTP)</td>
<td>Fax services via eMail-to-fax</td>
</tr>
</tbody>
</table>

Before installing Esna Cloudlink, install the following software:
Software Requirements

Minimum software requirements to run the Esna Cloudlink server:

<table>
<thead>
<tr>
<th>SOFTWARE</th>
<th>VERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Windows Server 2008 R2 (64-bit)</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2012</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2016</td>
</tr>
<tr>
<td>Unity Connection</td>
<td>8.5.1ES78 or 8.6.2ES20 and later</td>
</tr>
<tr>
<td>Esna Cloudlink</td>
<td>4.0+</td>
</tr>
</tbody>
</table>

**Note:** Each version of Microsoft Windows requires different features and/or services to be activated before installing Esna Cloudlink. Please refer to Esna’s Server Install Guide for details on each OS’s requirements.

Anti-Virus Software Installation

Esna Cloudlink has only been validated with Norton Anti-virus Corporate Edition. Other anti-virus software applications that have been installed with Esna Cloudlink are:

- McAfee VirusScan
- BitDefender

**Note:** Please ensure that, after installing your antivirus program, the UC folder and all of its subfolders are excluded from the scan. Scanning the UC folder can significantly decrease the performance of Esna Cloudlink.

Disk Fragmentation Management

Sites with significant amount of traffic and messages may be prone to fragmentation of the hard disk which can lead to reduced performance. In order to prevent this, you must install and configure fragmentation management software such as Diskeeper which can be scheduled to run primarily during off hours.
IMAP TSE Gateway Requirements

In order to use IMAP TSE, the IMAP mail server must support the following standards:
- IMAP4Rev1 (RFC2060) - IMAP4 standard.
- IMAP4 UIDPLUS extensions (RFC2359) - extensions to IMAP4 standard for handling message IDs.
- Esna Cloudlink integrates with Google Apps.
- IMAP services enabled on the email server.
- IMAP services must be installed and fully operational prior to deploying Esna Cloudlink with the IMAP Gateway.
- User name and password (with permission) so UC can access user mailboxes on existing mail server.
- Free IMAP TCP/IP port available between the Esna Cloudlink and email server.

Server Network Requirements

Networking requirements depend on what configuration and traffic load the system will bear. In most cases 100 Mbps (minimum 100BaseT) will suffice between the Esna Cloudlink, IMAP TSE and the Email servers. In larger (500+ UC user) configurations a 1 GB network connection between the Esna Cloudlink and Email servers is required. In such cases a 1GB layer 2-switch between all servers is also required.

The Esna Cloudlink Server can exist as a network-connected server on a LAN allowing for network-based user and system administration.

Server Email Integration Requirements

Esna Cloudlink Server can be a voicemail-only system although most deployments will involve some degree of email functionality.

Refer to Server Messaging Type Characteristics And Deployment Scenarios on page 69 in this document for more information on the possible system deployment scenarios.
General System Configuration

Message Compression and Storage

Depending on which deployment scenario you select, messages may be stored on the Esna Cloudlink Server, on the Email Server or both.

It is very important that you know the message storage requirements of your particular environment. The following factors will affect this calculation:

- days to keep read messages
- days to keep unread messages
- message format used
- maximum message length
- maximum number of messages allotted for per user ( inbox only)
- number of Unified Messaging users ( must account for email on the Esna Cloudlink Server)

The message format is the factor used to calculate storage capacity as the format determines the size of the actual messages.

ADPCM32 and WAVGSM are the two most commonly used message formats. Normally, voicemail-only users are configured to use ADPCM32, while Integrated and Unified Messaging users typically use WAVGSM.

<table>
<thead>
<tr>
<th>FILE FORMAT</th>
<th>KBYTES/SEC</th>
<th>KBYTES/MIN</th>
<th>MB/HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPEG-1 Audio Layer 3 (MP3)</td>
<td>8</td>
<td>480</td>
<td>28800</td>
</tr>
<tr>
<td>Wave ALAW 8kHz (G711)</td>
<td>64</td>
<td>3840</td>
<td>230400</td>
</tr>
<tr>
<td>Wave MuLAW 8kHz (G711)</td>
<td>64</td>
<td>3840</td>
<td>230400</td>
</tr>
</tbody>
</table>

In certain deployments where copies of voicemail messages are stored on the Email Server, storage capacities per email mailbox remain the same. Use WAVGSM format sizing when calculating storage requirements for the Email Server.

Additional coding algorithms (i.e. G.726) are available providing voice formats in WAVE while enabling compression at 1.6 kb/sec.
Server Configurations

The following PC configurations have been created to address different system sizes:

CONFIGURATION 'A' (Capacity: up to 100 users)

- Single Server Configuration
  - Esna Cloudlink Server *(IMAPTSE on same machine if used)*
  - Intel® Dual Core Processor (2.7 GHz) or higher
  - 4 GB RAM minimum
  - 100 GB SATA HD, 7,200 RPM minimum
  - 100 MB NIC or higher

CONFIGURATION 'B' (Capacity: up to 500 users)

- Single Server Configuration
  - Esna Cloudlink Server *(IMAPTSE on same machine if used)*
  - Intel® Dual Core Processor (2.7 GHz) or higher
  - 4 GB RAM minimum
  - RAID 1+0 4X146 GB SCSI/SATA/SAS HD, 10,000 RPM minimum
  - 1 GB NIC
  - Storage available 292 GB
  - Diskeeper installed to minimize fragmentation

CONFIGURATION 'C' (Capacity: up to 1,000 users)

- Single Server Configuration
  - Esna Cloudlink Server
  - Intel® Quad-Core Xeon 5600 series CPU or higher
  - 4 GB RAM minimum
  - RAID 1+0 4X146 GB SCSI/SATA/SAS HD, 10,000 RPM minimum
  - Diskeeper installed to minimize fragmentation
  - 1 GB NIC or higher
  - Storage available 292 GB

CONFIGURATION 'D' (Capacity: up to 5,000 users)

- Single Server Configuration
  - Esna Cloudlink Server
  - Dual Intel® Quad-Core Xeon 5600 series CPU or higher
  - 8 GB RAM minimum
  - RAID 1+0 4X146 GB SCSI/SATA/SAS HD, 10,000 RPM minimum
  - Diskeeper installed to minimize fragmentation
  - 1 GB NIC
  - Storage available 292 GB

**Note:** When determining system RAM for all configurations, if your database is expected to exceed 2GB in size, the server should have at least 8 GB RAM installed to ensure good performance.
Email traffic is broken down into the following three (3) measurable categories:

<table>
<thead>
<tr>
<th>Mailbox Profile</th>
<th>Daily Message Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>5 sent / 20 received</td>
</tr>
<tr>
<td>Medium</td>
<td>10 sent / 40 received</td>
</tr>
<tr>
<td>Heavy</td>
<td>20 sent / 80 received</td>
</tr>
</tbody>
</table>

Voice Mail

Assuming the average message length is 30 seconds the voice mail traffic is broken down into the following three (3) measurable categories:

<table>
<thead>
<tr>
<th>Mailbox Profile</th>
<th>Daily Message Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3 received</td>
</tr>
<tr>
<td>Medium</td>
<td>7 received</td>
</tr>
<tr>
<td>Heavy</td>
<td>15 received</td>
</tr>
</tbody>
</table>

Note: IMAP TSE performance is directly proportional to the performance of the site's email server. The higher the performance on the email server the higher the performance and speed on the Esna Cloudlink server. Failure to maintain an adequate email server may result in slower than necessary message updates.

Note: System performance can be drastically affected on environments where individuals or groups of users receive messages that are considered greater than those of a heavy mailbox profile. Esna accepts no liability from any customers whose daily email usage is greater than the those outlined above.
Server Requirement Q & A

Please refer to the below Q&A article for a general understanding of the hardware requirement of the Esna Cloudlink system.

What is a RAID 10 system?

RAID 10, also known as RAID 1+0 or RAID 0+1, is a RAID system where 2 drives are mirrored and then spanned with 2 other mirrored drives. This gives you the ability to lose 1 of each in the set in each mirror (1/2 of the drives) and still work at full speed. This is the recommended setup for the Office-LinX system and the RAID 0+1 is the preferred choice.

How about RAID 6 or RAID 5?

RAID 5 and 6 would be an optimal choice if Esna Cloudlink were a read only system. Unfortunately the act of writing burdens the RAID system since every log entry requires the entire span to be updated (parity needs to be updated with every change). If a RAID 5 or RAID 6 becomes fragmented there is a problem since small pieces of info will still take the entire stripe and parity needs to be calculated for every change once again.

What speed Hard Drives should we use?

Most typical server Hard Drives will be either 10,000 RPM or 15,000 RPM. Either one will suffice for Esna Cloudlink. The 15,000 RPM drives are much hotter but are also 50% faster. The trade off is the electric consumption over performance. If it is a huge install base that has lots of UM with IP voice ports we suggest the 15,000 RPM but this is not a requirement.

What can I do to increase the effectiveness of the RAID system?

An extra drive (one or more) may be configured as a hot swap spare. This is generally a good practice since it will automatically start rebuilding the RAID if one of the drives fail, removing the need for human interaction.

What is the total storage of a RAID system?

Total storage would be ½ of the combined storage of all the drives.

Is there a numerical restriction on the RAID system?

The number of drives that can be used in the RAID system must be even, with 4 being the minimum (4, 6, 8 etc).

Can I install Esna Cloudlink on an server that is already in use?

Esna Cloudlink is a dedicated application which should only be installed as a primary application on any server. Sharing system resources with other applications may keep Esna Cloudlink for working correctly.
6  VIRTUAL MACHINE SUPPORT

In This Chapter:

60  Introduction

64  Virtual Environment Deployment Example

67  Virtual Machine Environment Specification Example
Introduction

Many organizations are now turning to virtual environments for their server needs due to their cost and efficiency. Rather than having a room full of servers, virtual servers on hosted or in-house environments can now perform the functions of multiple computers.

Esna Cloudlink can be installed on a virtual environment enabling you to reuse the equipment you already have. Instead of buying a new computer to host the voice server, upgrades to existing hardware may be sufficient through virtualization.

Requirements

<table>
<thead>
<tr>
<th>SOFTWARE</th>
<th>VERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM Software</td>
<td>VMware vSphere 4.x / 5.0</td>
</tr>
<tr>
<td>OS for Esna Cloudlink</td>
<td>Microsoft Windows Server 2008 R2 (64-bit) / Windows Server 2012</td>
</tr>
</tbody>
</table>

**Note:** vSphere has been tested on versions 4.x and 5.0.

<table>
<thead>
<tr>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
</tr>
<tr>
<td>Requires Intel® CPU which meets or exceeds the requirements of vSphere 4.x / 5.0</td>
</tr>
</tbody>
</table>

Virtual Environment Limitations

You cannot directly upgrade an existing Esna Cloudlink server to a virtual environment. However, you can move an existing server onto a virtual machine by migrating the database using the utilities provided on the Esna Cloudlink installation DVD. Esna Cloudlink must be installed on a new virtual machine with a clean operating system.

**Warning:** Importing an existing Esna Cloudlink environment to a virtual image is not supported.

Esna Cloudlink installed on a virtual environment requires the same hardware resource as non-virtual machine environments. Please refer to **Network Requirements and Specifications on page 51** for more information on resource requirements.
Deployment Configuration Considerations

- An Esna Cloudlink server may be installed on the root drive (the same drive where Windows is installed). This must be a local drive. iSCSI targets are not supported.
- An Esna Cloudlink server may be installed on a secondary drive (on a different drive from where Windows is installed). This must be a local drive. iSCSI targets are not supported.
- The drives may each be a physical drive (for best performance), or a single drive with partitions.
- The folders \uc\logs, \uc\DB, and \uc\messages may be mounted to a local drive. Network or mapped drives are not supported.
- In an ESX(i)/VMWare environment, SAN/iSCSI is supported, but only at the ESX(i) level. The iSCSI target must be mounted and managed by the ESX(i) host. If a virtual machine is to have a C drive and a D drive, they must be added as a virtual hard disk using the VMWare client.
- The rules for drive types and options are the same for virtual machine environments. The storage must be local, Direct Attached Storage or SAN.

**Warning:** These configurations have been tested and approved by Esna for use with Esna Cloudlink. While other configurations may be possible, Esna cannot provide support in these areas.
Audio and Video Limitations

Many virtual environments do not natively support audio and video feeds between the host and client machines. The site administrator is responsible for establishing the audio and video connection between the host and the Chrome browser on a remote machine.

VMware Technology Guidelines

VMware offers a wide range of technologies which may be implemented on a virtual machine for greater redundancy and ease of maintenance. This section explains which features are compatible with Esna Cloudlink and how to utilize VMware solutions with Esna Cloudlink in mind.

- **vMotion**: vMotion allows for the migration of an active Server without affecting its operational status. This means you can move a virtual machine that is currently active from one ESXi host to another without having to shut it down. For Esna Cloudlink, this means that you will be able to move the voice server without having to turn it off first. This allows system administrators to migrate the system at any time during the day without down time. Depending on timing and available resources, you may or may not see a disruption in service during the transfer. For example, if the voice server has an active call when you start the migration, the call may be dropped or it may stay connected after a short pause depending on how quickly the migration can finalize. vMotion is a manual process.

- **High Availability**: VMware also offers its own High Availability solution. VMware's HA model is initiated in 2 ways: one is hardware (machine) failure and the other is software (Operating System) failure. When the ESXi hardware fails on a system monitored by HA, VMware will automatically restart the Virtual Machine image on another ESXi host. If the OS becomes unresponsive, VMware HA will start the virtual machine on another ESXi host and bring the server back online. This will lead to down time while VMware moves operations onto another host. Esna Cloudlink will be down during the recovery period and will not be able to bridge the UC system with the cloud until the secondary virtual image is fully up and running. The recovery occurs automatically, but it must be ‘hard coded’ to a specific recovery ESXi server. If there are no available resources on the recovery server, Esna Cloudlink may fail to restart.

- **Distributed Resource Scheduler**: Distributed Resource Scheduler is intended for sites with multiple physical ESXi servers available. DRS keeps track of hardware resources, and is able to see the current availability of CPUs, RAM, etc. on all servers. When the main server crashes, DRS will automatically allocate the necessary resources and restart the virtual machine in a suitable environment. This means that Esna Cloudlink will be guaranteed a minimum level of resources upon recovery to ensure there is no reduction in service. This is an advantage offered by DRS when compared to HA alone since HA does not consider hardware requirements when allocating space for a new virtual machine to replace the crashed server.

- **Fault Tolerance**: Fault Tolerance offers a higher level of protection than HA by eliminating downtime. A virtual machine being monitored by an FT system will have a shadow image created that is identical to the monitored virtual machine. When the main server becomes unavailable for any reason, the shadow image which has been reproducing all activity on the main server will become active, instantly replacing the crashed server. This reduces the chance of an interruption or data loss in most active environments. However, due to the extensive nature of FT's monitoring, FT can only support virtual machines with a single core CPU. This does not meet Esna Cloudlink minimum hardware requirements, so Esna Cloudlink will remain incompatible with FT until the algorithm is changed to support the resources required.
**Due to the way in which Fault Tolerance is designed, Esna Cloudlink cannot function within the FT model. FT is limited with regard to computer resources (e.g. single core processor) while Esna Cloudlink has specific minimum resource requirements to function properly. Until VMware upgrades the FT system to support higher amounts of resources, Esna Cloudlink cannot be deployed under the FT model.**

<table>
<thead>
<tr>
<th>Feature</th>
<th>VMOTION</th>
<th>VMWARE-HA</th>
<th>DRS</th>
<th>FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Migration</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Recovery from Hardware Crash</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Recovery from Software Crash</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>0 Down Time during Crash</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Smart Allocation of Hardware Resources</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td><strong>Esna Cloudlink Support</strong></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N*</td>
</tr>
</tbody>
</table>

**KNOWN BEHAVIORS:**

- **Mobility**
  - No interruption
  - Interrupted until HA recovers
  - Interrupted until HA recovers
  - N/A*
Virtual Environment Deployment Example

The following are performance results from a virtualized Esna Cloudlink system running 100 active voice ports with 1,000 users registered under the system. Please keep in mind that this is a limited test run to showcase how a typical operation may perform under a virtual environment. This example does not guarantee an identical level of performance on every virtual environment, but rather serves as a guideline with regards to Esna Cloudlink's behavior under virtual environments.

Cloudlink installations should perform as well as or better than shown.

CPU Usage

Esna Cloudlink used an average of 58.945% of the CPU capacity, which equates to 5,643.95 MHz. When considering the Maximum requirement, providing at least 6.8 GHz of CPU resources to Esna Cloudlink will guarantee a consistent level of performance.
Datastore Latency

Esna Cloudlink achieved a low average latency of 5.356ms for reading and 2.378ms for writing.

Disk Usage Rate

Esna Cloudlink had an average disk usage rate of 1,106.344 KBps with a peak of 1,767 KBps. Ensuring a data transfer rate of 1,800 KBps to Esna Cloudlink will guarantee a consistent level of performance.
Network Usage Rate

Esna Cloudlink had an average network usage rate of 870.094 KBps with a peak of 1,185 KBps. Providing 1,200 KBps of network bandwidth to Esna Cloudlink will guarantee a consistent level of performance.

Conclusion

Since Esna Cloudlink is designed to be the sole application running on a given Virtual Machine, it is easy to assign the necessary resources for Esna Cloudlink. By ensuring that Esna Cloudlink always has access to the required resources, you will be able to guarantee the level of performance required by your site.
Virtual Machine Environment Specification Example

The following configurations are taken from Server Configurations on page 55. Also, please keep in mind that Esna Cloudlink is sensitive to storage read/write speed and network bandwidth speed/availability when using these configuration examples.

CONFIGURATION 'A' (100 Users)

- Esna Cloudlink Server (*IMAP TSE on same machine if used*)
- 2 Intel® vCPUs
- 2 GB RAM
- 100 GB Storage
- Virtual NIC

CONFIGURATION 'B' (500 Users)

- Esna Cloudlink Server (*IMAP TSE on same machine if used*)
- 2 Intel® vCPUs
- 2 GB RAM
- 292 GB Storage
- Virtual NIC
- Diskeeper installed to minimize fragmentation

CONFIGURATION 'C' (1,000 Users)

- Esna Cloudlink Server
- 4 Intel® vCPUs
- 2 GB RAM
- 292 GB Storage
- Diskeeper installed to minimize fragmentation
- Virtual NIC

CONFIGURATION 'D' (5,000 Users)

- Esna Cloudlink Server
- 8 Intel® vCPUs
- 4 GB RAM
- 292 GB Storage
- Diskeeper installed to minimize fragmentation
- Virtual NIC
Messaging Configuration (IMAP)

This section will help to construct a configuration of the Esna Cloudlink Messaging solution when using IMAP as the protocol to retrieve messages from the mail server. The material presented here is applicable to the following email servers:

- Gmail (Google Apps)

This section uses the following criteria:

- number of users
- email traffic
- voice mail traffic

**Note:** The ratio of voicemail users to UC users is NOT considered relevant to this configuration.

<table>
<thead>
<tr>
<th>SOFTWARE</th>
<th>MINIMUM SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMAP TSE Server OS</td>
<td>Windows Server 2008 R2 (64-bit)</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2012</td>
</tr>
</tbody>
</table>

- IMAP4 compatible mail server
- IMAP services enabled on the email server
- The IMAP TSE Gateway acts as a group of IMAP4 clients to connect to the messaging storage server to perform synchronization activities for Esna Cloudlink.
- User name and password (with permission) so that UC can access user accounts on existing mail server
- The Email Server must be IP-addressable from Esna Cloudlink
- It is recommended that the email environment is fully operational before Esna Cloudlink is implemented
- It is recommended that IMAP services are installed and fully operational before deploying Esna Cloudlink with the IMAP TSE Gateway
- There must be a free IMAP port available between the Esna Cloudlink and Email servers. In addition, a TCP/IP connection must be available between the LDAP, Esna Cloudlink, and Email servers.
- Esna Cloudlink supports a maximum of **5,000** users per server. More users can be supported through the use of more servers. For example, to support 30 000 users, 6 or more licensed Esna Cloudlink servers are required.
In This Chapter:

72 Introduction

73 Page Manifest

74 Wrapper Layout

76 Example Page
Introduction

Collaboration Tags provide a means, through the programming code on a web page, to add presence and dialing functionality directly to the page. Integration between web pages and the voice server is managed by the iLink for Cisco or iLink Pro browser extensions.

Contact lookup and presence tags are created using the extension’s content script loaded to each browser page (including file URLs if enabled). Each page where collaboration tags appear must contain a basic declarative markup to help the script decide what elements should be identified as a contact to link. There may also be a CSS (style sheet) to display the new content using the host page’s standard appearance.

Whenever the content script finds a tag representing a person or an address, it will use the email address to build a link between the contact’s details from the voice server and the web page. Once the link is established, an HTML element containing the person’s information is wrapped into a special construct containing:

- **Spot**: Used for the default click action, or for a show card on hover. This can also be used to show personal presence information, or another type of image.
- **Card** (optional): If Card is enabled in the page manifest, it will contain a set of labels, images and a list of actions. Depending on the manifest, the card can appear after a Spot Click or Spot Hover.
- **List of actions**.

Once a person element is identified and linked through the extension, it will track their presence and make updates to available actions in real-time. Logging out of, or disabling the extension will not remove the HTML wrappers, but the default CSS rules make the additional elements invisible on the page. The collaboration tags are restored automatically once the extension is running again.

![Collaboration Tags Diagram](image)
Page Manifest

In order to minimize changes to existing web pages when enabling collaboration tags, each page must declare a number of options. Each option is represented by a meta tag in the page header.

iLink scans the page for the specified Class, then uses the associated Attribute to create the link to the voice server.

```html
<meta name="x-ilink-lookups" content="1" />
This command enables collaboration tags on the page. If this line is missing, collaboration tags will not work.
```

```html
<meta name="x-ilink-classes" content="person" />
This is a space separated list of CSS classes which are expected to contain the personal information. Elements can also appear inline with other data. For example:

Bob's email address is <span class="person" person-id="test@test.com">First Last</span> during the week.

HTML A (anchor) elements are automatically scanned for personal information to create the link without the need to define it as a class. For example:

```html
<a href="mailto:test@test.com">First Last</a>
```

**Note:** For HTML A (anchor) elements, only mailto: addresses are detected as personal information and the corresponding email address is used to build the link.

```html
<meta name="x-ilink-attrs" content="person-id ./" />
This is a space separated list of attributes that define the location of a contact address within the class. For example:

```html
<span class="person" person-id="test@test.com">First Last</span>
```

The " . " (dot) at the end of the attribute (...content="person-id ." ...) allows the address to be contained directly within the class (person) element text, omitting the explicit attribute assignment (person-id). For example:

```html
<span class="person">test@test.com</span>
```

```html
<meta name="x-ilink-mode" content="hoverCard" />
This command sets the mode of the Collaboration tags. It contains a space separated list of available reactions.

- **spotAction:** Click the item to trigger the default action. The action depends upon which iLink extension is used.
- **spotCard:** Click the element to display a contact card on the page.
- **hoverCard:** Hover over the element to trigger the display of the contact card.
- **static:** All person elements are replaced by contact cards on the page.

**Note:** Only spotAction and hoverCard can be enabled at the same time. All other configurations are mutually exclusive.
Wrapper Layout

Once an item is identified as a person element, the content script will wrap it as shown below.

Original HTML

```
<span class="person" person-id="test@test.com">First Last</span>
```

Wrapped HTML

```
<span class="jsc-wrap" jsc-status="offline">
    <span class="jsc-spot">
        <span class="jsc-card">
            <img src="...">
            <div>... labels ...</div>
            <hr>
            <a href="ws://" jsc-action="open" title="Open contact">Open</a>
            <a href="ws://" jsc-action="mail" title="Send email">Mail</a>
        </span>
        <span class="person jsc-data" person-id="test2@test.com">First Last</span>
    </span>
</span>
```

The extension has exclusive control over the content of the wrapper. It can change an image URL, a set of labels, the list of available actions, etc. To provide a specific appearance, the host page can include additional CSS rules.

To show the presence image 🟥🟨🟦🟪

```
.jsc-wrap[jsc-status='offline'] .jsc-spot
{
    background-image: url('offline.png');
}
.jsc-wrap[jsc-status='dnd'] .jsc-spot
{
    background-image: url('dnd.png');
}
.jsc-wrap[jsc-status='away'] .jsc-spot
{
    background-image: url('away.png');
}
.jsc-wrap[jsc-status='online'] .jsc-spot
{
    background-image: url('online.png');
}
```

To modify the card background

```
.jsc-wrap > .jsc-card
{
    background-color: green;
}
```
To change fonts

```html
.jsc-wrap > .jsc-card
{
  font-family: arial;
}
```

To hide person image

```html
.jsc-wrap > .jsc-card > img
{
  display: none;
}
```

Setting action icons and Removing action labels

```html
.jsc-card > [jsc-action]
{
  color: transparent;
  background-size: 1em 1em;
  background-position: center center;
  background-repeat: no-repeat;
  border: none;
  width: 1em;
  min-width: 1em;
}
.jsc-card > [jsc-action]:hover
{
  background-color: orange;
}
[jsc-action='open']
{
  background-image: url('open.png');
}
[jsc-action='call']
{
  background-image: url('call.png');
}
[jsc-action='chat']
{
  background-image: url('chat.png');
}
[jsc-action='mail']
{
  background-image: url('mail.png');
}
```
Additional Notes:

- All images used with **spot** or **card** should be provided by the host page within the CSS. Collaboration tags provide only the contact's image when available.
- While you cannot exclude certain information from being displayed by the manifest, such as labels and some actions, the CSS can be used to hide unwanted areas of the card.

Example Page

Display

The following sample HTML code produces a web page similar to this:

```
<link collaboration-tags test>

Here is a simple list:
- First Last
- First Last
- User
- Vendor
- User Two
- User Three

Also there is an inline element sample: person@domain.com provided.
```
The sample code for this page is:

```html
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>iLink dev tags</title>
<!--
Turn on Collaboration tags, and define the elements that will be used to create links to the voice server.
-->
<meta name="x-ilink-lookups" content="1"/>
<meta name="x-ilink-classes" content="person"/>
<meta name="x-ilink-attrs" content="person-id"/>
<meta name="x-ilink-mode" content="hoverCard spotAction"/>
<!--
This section defines the presence graphic element for the offline, set as dnd, away, and online conditions.
-->
<style>
.jsc-wrap[jsc-status='offline'] .jsc-spot
{
background-image: url('offline.png');
}
.jsc-wrap[jsc-status='dnd'] .jsc-spot
{
background-image: url('dnd.png');
}
.jsc-wrap[jsc-status='away'] .jsc-spot
{
background-image: url('away.png');
}
.jsc-wrap[jsc-status='online'] .jsc-spot
{
background-image: url('spot.png');
}
</style>
<style>
.jsc-card > [jsc-action]
{
color: transparent;
background-size: 1em 1em;
background-position: center center;
background-repeat: no-repeat;
border: none;
width: 1em;
min-width: 1em;
}
.jsc-card > [jsc-action]:hover
{
background-color: orange;
}
<!--
Defines the icons used for open contact, call, chat, and mail Actions.
-->
[jsc-action='open']
{
background-image: url('open.png');
}
[jsc-action='call']
{
background-image: url('call.png');
}
[jsc-action='chat']
{
background-image: url('chat.png');
}
[jsc-action='mail']
{
background-image: url('mail.png');
}
</style>
</head>
</html>
```
iLink collaboration tags test

Here is a simple list:

- First Last
- First Last
- First Last
- User
- Tester
- User Two
- User Three

Also there is an inline element sample <span class="person">person@domain.com</span> provided.