



# Cisco Expressway Registrar

Deployment Guide

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Cisco Expressway X8.9



## Preface

### Change History

**Table 1 Deployment Guide Change History**

Date	Change
December 2016	Updated for X8.9.
August 2016	Changed document title. From <i>Cisco Expressway Basic Configuration (Single Expressway-C) Deployment Guide</i> . To <i>Cisco Expressway Registrar Deployment Guide</i> .
July 2016	Initial release for X8.8.

# Contents

Preface .....	3
Change History .....	3
Introduction .....	7
Example Network Deployment .....	8
Network Elements .....	8
Process Summary .....	9
Prerequisites .....	10
Run the Service Setup Wizard .....	11
Overview .....	11
Task 1: Accessing and Navigating the Wizard .....	11
Task 2: Running the Service Setup Wizard and Applying Licenses .....	13
Expressway System Configuration .....	14
Task 3: Setting the System Name .....	14
Task 4: Configuring DNS .....	14
Task 5: Replacing the Default Server Certificate .....	15
Task 6: Configuring NTP Servers .....	16
Task 7: Configuring SIP Domains .....	16
Routing Configuration .....	18
Pre-search Transforms .....	18
Search Rules .....	18
Task 8: Configuring Transforms .....	18
Task 9: Configuring Local Zone Search Rules .....	19
Endpoint Registration .....	21
System Checks .....	22
Registration Status .....	22
Call Signaling .....	22
Maintenance Routine .....	23
Creating a System Backup .....	23
Optional Configuration Tasks .....	24
Task 10: Configuring Routes to a Neighbor Zone (Optional) .....	24

Task 11: Configuring Cisco TMS (Optional) .....	25
Task 12: Configuring Logging (Optional) .....	27
Task 13: Configuring Registration Restriction Policy (Optional) .....	28
Task 14: Configuring Device Authentication Policy (Optional) .....	28
Task 15: Configuring Registration by Remote Endpoints (Optional) .....	29
Task 16: Restricting Access to ISDN Gateways (Optional) .....	29
Appendix 1: Configuration Details .....	32
Appendix 2: DNS Records .....	34
Obtaining Documentation and Submitting a Service Request .....	35
Cisco Legal Information .....	36
Cisco Trademark .....	36



## Introduction

This document describes how to configure a single Cisco Expressway-C platform for use in a basic video infrastructure deployment. It takes you through the following tasks:

1. Using the Service Setup Wizard to select the services you want to use and to apply the corresponding keys (licenses).
2. Configuring system parameters and routing information.
3. Checking that the system is working as expected.
4. Configuring optional items such as Cisco TMS, system logging, and access restrictions.

If your deployment includes a Cisco Expressway-E, use the *Expressway-E and Expressway-C Basic Configuration Deployment Guide* on the [Expressway configuration guides page](#) instead.

The appendices to the document provide detailed reference information, as follows:

- Expressway configuration details used in this document are listed in [Appendix 1: Configuration Details, page 32](#).
- DNS records required for the example deployment used in this document are in [Appendix 2: DNS Records, page 34](#).

For descriptions of all system configuration parameters, see the *Expressway Administrator Guide* and the Expressway web application's online field help [\[?\]](#) and page help [\[?\]](#).

### Example configuration values used in this guide

For ease of reading this guide is based around an example deployment, which uses the following assumed configuration values throughout:

LAN1 IPv4 address	10.0.0.2
IPv4 gateway	10.0.0.1
LAN1 subnet mask	255.255.255.0
Domain name	<i>internal-domain.net</i>

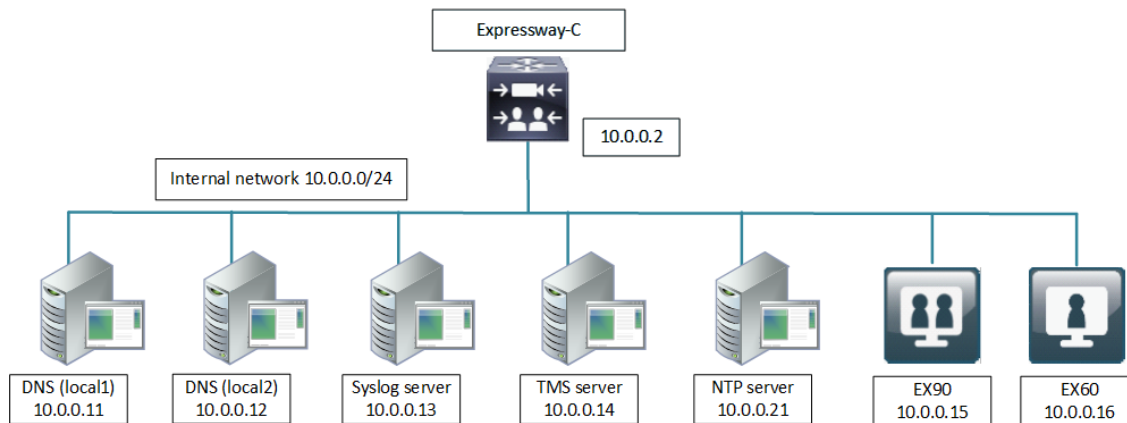
### Information in other deployment guides

This document does not describe how to deploy a clustered system, or systems running device provisioning, device authentication, or FindMe applications, or how to configure the Expressway system for Unified Communications services. For more details about these features, see the following documents:

- *Expressway Cluster Creation and Maintenance Deployment Guide* on the [Expressway configuration guides page](#)
- *Cisco TMS Provisioning Extension Deployment Guide* on the [VCS configuration guides page](#) (includes instructions for deploying FindMe - note that this guide is on the VCS page and not on the Expressway page)
- *Cisco VCS Authenticating Devices* on the [VCS configuration guides page](#) (note that this guide is on the VCS page and not on the Expressway page)

## Example Network Deployment

**Figure 1 Example Network for the Deployment Described in this Document**



## Network Elements

### Internal Network Elements

The internal network elements are devices which are hosted on your local area network. Elements on the internal network have an internal network domain name. This name is not resolvable by a public DNS. For example, the Cisco Expressway-C is configured with an internally resolvable name of `expc.internal-domain.net` (which resolves to an IP address of 10.0.0.2 by the internal DNS servers).

Element	Role
Cisco Expressway-C	SIP Registrar & Proxy, H.323 Gatekeeper for devices located on the internal network.
EX90 and EX60	Example endpoints hosted on the internal network which register to the Cisco Expressway-C.
DNS (local 1 & local 2)	DNS servers used by the Cisco Expressway-C to perform DNS lookups (resolve network names on the internal network).
DHCP Server	Provides host, IP gateway, DNS server, and NTP server addresses to endpoints located on the internal network.
Cisco TMS Server	Management and scheduling server. See <a href="#">Task 11: Configuring Cisco TMS (Optional)</a> , page 25.
Syslog Server	Logging server for Syslog messages. See <a href="#">Task 12: Configuring Logging (Optional)</a> , page 27.
NTP Server	Provides the clock source used to synchronize devices.

### SIP and H.323 Domain

The example deployment is configured to route SIP (and H.323) signaling messages for calls made to URIs which use the domain `internal-domain.net`. The DNS SRV configurations are described in [Appendix 2: DNS Records](#), page 34.



## Process Summary

### **Before You Begin**

- [Prerequisites, page 10](#)

### **Run the Service Setup Wizard**

- [Task 1: Accessing and Navigating the Wizard, page 11](#)
- [Task 2: Running the Service Setup Wizard and Applying Licenses, page 13](#)
- [Examples for Running the Service Setup Wizard, page 1](#)

### **Expressway system configuration tasks**

- [Task 3: Setting the System Name, page 14](#)
- [Task 4: Configuring DNS, page 14](#)
- [Task 5: Replacing the Default Server Certificate, page 15](#)
- [Task 6: Configuring NTP Servers, page 16](#)
- [Task 7: Configuring SIP Domains, page 16](#)

### **Routing configuration tasks**

- [Task 8: Configuring Transforms, page 18](#)
- [Task 9: Configuring Local Zone Search Rules, page 19](#)

### **Optional configuration tasks**

- [Task 10: Configuring Routes to a Neighbor Zone \(Optional\), page 24](#)
- [Task 11: Configuring Cisco TMS \(Optional\), page 25](#)
- [Task 12: Configuring Logging \(Optional\), page 27](#)
- [Task 13: Configuring Registration Restriction Policy \(Optional\), page 28](#)
- [Task 16: Restricting Access to ISDN Gateways \(Optional\), page 29](#)

## Prerequisites

Before you begin any of the tasks in this guide, make sure that the following prerequisites are complete.

### General prerequisites

- We recommend that you use the Expressway web user interface to do the system configuration. This guide assumes that you are using a web browser running on a PC. The PC needs an Ethernet connection to a LAN which can route HTTP(S) traffic to the Expressway.
- Review the relevant release notes on the [Expressway release notes page](#).
- Have the *Expressway Administrator Guide* on the [Expressway maintenance and operation guides page](#) available for reference before you start.

### IP address and password prerequisites

This guide also assumes that you have already configured a static IP address and changed the default passwords, as described in the appropriate installation guide:

- *Cisco Expressway Virtual Machine Installation Guide* on the [Expressway installation guides page](#).
- *Cisco Expressway CE1100 Appliance Installation Guide* on the [Expressway installation guides page](#).

**Note:** Expressway requires a static IP address. It doesn't use DHCP/SLAAC to get an IP address.

## Run the Service Setup Wizard

### Overview

The Service Setup Wizard makes it easier to configure and license the Expressway for its chosen purpose in your environment. It also simplifies the user interface. You select from a list of popular Expressway services and the wizard then prompts you with the licensing requirements for those services. You can also use the wizard to review and edit the Expressway basic network settings (typically already configured during initial installation).

When you restart the Expressway, the user interface is tailored to match your service selections. You only see menus and pages for the services you chose.

**Note:** Some services are incompatible and cannot be selected together. The [Expressway Administrator Guide](#) and the online help provide a matrix of compatible services. The matrix specifies which services you can use together on the same system or cluster.

### What If I Don't Want to Use the Wizard?

A skip option exists if you don't want to use the wizard. If you change your mind later, you can go back and run it at any time (**Status > Overview** page; click **Run service setup**).

If you opt to skip the wizard, you need to deal with the Expressway licensing setup requirements manually before you start the configuration tasks in this guide. Also, the user interface isn't customized to reflect your specific service selections.

## Task 1: Accessing and Navigating the Wizard

There are multiple ways to access the wizard:

- As of X8.8, you'll automatically see the Service Setup Wizard when you first log in to the Expressway user interface. You don't need to launch it.
- If you previously logged in or have upgraded, you'll see the **Status > Overview** page as usual. Click **Run service setup** to launch the wizard.
- If you've already run the wizard you can rerun it at any time. From the **Status > Overview** page, click **Return to service setup**.

To navigate the wizard:

- Click **Skip Service Setup Wizard** if you want to back out of the wizard completely, or **Back** to return to the previous page.
- Click **Continue** to save and move to the next wizard page.

Run the Service Setup Wizard

Figure 2 Service Setup Wizard Example - Selection Page

Welcome to Cisco Collaboration services ? Help Logout

**Select Series**

Expressway series	<input checked="" type="radio"/> <small>i</small>
VCS series	<input type="radio"/>

**Select Type**

Expressway-C	<input checked="" type="radio"/> <small>i</small>
Expressway-E	<input type="radio"/>

**Select Services**

After you select services, you get a simplified menu that is relevant to your selection. i

Cisco Spark Hybrid Services	<input type="checkbox"/>
Mobile and remote access	<input type="checkbox"/>
Jabber Guest services	<input type="checkbox"/>
Microsoft interoperability	<input type="checkbox"/>
Registrar	<input type="checkbox"/>
Collaboration Meeting Rooms (CMR) Cloud	<input type="checkbox"/>
Business to business calls	<input type="checkbox"/>
Proceed without selecting services	<input type="checkbox"/>

If you proceed without selecting services, you will get the full menu.

## Task 2: Running the Service Setup Wizard and Applying Licenses

This guide applies to deployments with local networking only (with the Cisco Expressway-C but no Cisco Expressway-E). For these deployments, choose the *Registrar* service in the wizard. This is the core video conferencing service.

### Process

1. Choose *Expressway series*.
2. Choose *Expressway-C*.
3. Check the box for the *Registrar* service.
4. Click **Continue** to move to the **Option keys** page of the wizard.
5. On the **Option Keys** page, click the [Product License Registration Portal](#) link to go to the licensing portal. (For this step you need to work away from the wizard to obtain the necessary licenses, and you need the serial number of the system.) In the licensing portal, enter the necessary details for the required licenses. For example, to register desktop systems like the EX90, you'll need to add Desktop System registration licenses. Detailed information about using the licensing portal is in the online help or the [Expressway Administrator Guide](#). An ordering guide for our products is available on the Cisco [Collaboration Ordering Guides page](#).
6. Wait for system-generated emails from the licensing portal with the release key and option key.
7. Back in the wizard, paste the text from the release key email into the first text area. The system reads the release key out of the pasted text and displays it next to the text area.
8. Paste the text from the option keys email into the second text area. The system reads the option keys out of the pasted text and displays them next to the text area.
9. Create a new paste area and paste in your room or desktop system registration license keys.
10. Click **Add Keys**.
11. Click **Continue**.
12. Review the network configuration and modify the settings if necessary. Save any changes before you continue the wizard.
13. Click **Finish**.
14. Restart the system when prompted.

**Result:** When you log in, the user interface is tailored to match your service selections. You only see menus and pages for the services you chose.

### What to do next

The Service Setup Wizard part of the configuration process is now complete. Go to the next section in this guide "[Expressway System Configuration](#)."

## Expressway System Configuration

### Task 3: Setting the System Name

The **System name** defines the name of the Expressway. It appears in various places in the web interface and is also used by Cisco TMS. We recommend using a name that lets you easily and uniquely identify the Expressway.

To configure the **System name**:

1. Go to **System > Administration**.
2. Configure the **System name** as follows:

<b>System name</b>	Enter <code>EXPC</code>
--------------------	-------------------------

3. Click **Save**.

### Task 4: Configuring DNS

#### System Host Name

The **System host name** defines the DNS hostname that this system is known by. Note that this is not the fully-qualified domain name, just the host label portion.

Note that `<System host name>.<Domain name>` = FQDN of this Expressway.

To configure the **System host name**:

1. Go to **System > DNS**.
2. Configure the **System host name** as follows:

<b>System host name</b>	Enter <code>expc</code>
-------------------------	-------------------------

3. Click **Save**.

#### Domain Name

The **Domain name** is the name to append to an unqualified host name before querying the DNS server.

To configure the **Domain name**:

1. Go to **System > DNS**.
2. Configure the **Domain name** as follows:

<b>Domain name</b>	Enter <code>internal-domain.net</code>
--------------------	--

3. Click **Save**.

The fully qualified domain name for the Cisco Expressway-C is now `expc.internal-domain.net`

#### DNS Servers

The DNS server addresses specify the IP addresses of up to five domain name servers to be used for resolving domain names. In either of the following cases you must specify at least one default DNS server for address resolution:

- To use fully qualified domain names instead of IP addresses when specifying external addresses. For example, for LDAP and NTP servers, neighbor zones and peers.
- To use features such as URI dialing or ENUM dialing.

The Expressway queries one server at a time. If that server is unavailable the Expressway tries another server from the list.

In the example deployment two DNS servers are configured for each Expressway, which provides a level of DNS server redundancy. The Cisco Expressway-C is configured with DNS servers which are located on the internal network.

To configure the **Default DNS server** addresses:

1. Go to **System > DNS**.
2. Configure the DNS server **Address** fields as follows:

<b>Address 1</b>	Enter 10.0.0.11
<b>Address 2</b>	Enter 10.0.0.12

3. Click **Save**.

## Task 5: Replacing the Default Server Certificate

For extra security, you may want to have the Expressway communicate with other systems (such as LDAP servers, neighbor Expressways, or clients such as SIP endpoints and web browsers) using TLS encryption.

For this to work successfully in a connection between a client and server:

- The server must have a certificate installed that verifies its identity. This certificate must be signed by a Certificate Authority (CA).
- The client must trust the CA that signed the certificate used by the server.

The Expressway allows you to install a certificate that can represent the Expressway as either a client or a server in connections using TLS. The Expressway can also authenticate client connections (typically from a web browser) over HTTPS. You can also upload certificate revocation lists (CRLs) for the CAs used to verify LDAP server and HTTPS client certificates.

The Expressway can generate server certificate signing requests (CSRs). This removes the need to use an external mechanism to generate certificate requests.

For secure communications (HTTPS and SIP/TLS) we recommend that you replace the Expressway default certificate with a certificate generated by a trusted certificate authority.

Note that in connections:

- to an endpoint, the Expressway acts as the TLS server
- to an LDAP server, the Expressway is a client
- between two Expressway systems, either Expressway may be the client with the other Expressway being the TLS server
- via HTTPS, the web browser is the client and the Expressway is the server

TLS can be difficult to configure. For example, when using it with an LDAP server we recommend that you confirm the system is working correctly over TCP before attempting to secure the connection with TLS. We also recommend using a third party LDAP browser to verify that your LDAP server is correctly configured for TLS.

**Note:** Be careful not to allow your CA certificates or CRLs to expire. This may cause certificates signed by those CAs to be rejected.

To load the trusted CA list, go to **Maintenance > Security certificates > Trusted CA certificate**.

To generate a CSR and/or upload the Expressway's server certificate, go to **Maintenance > Security certificates > Server certificate**.

Additional server certificate requirements apply when configuring your Expressway system for Unified Communications. For full information, see *Expressway Certificate Creation and Use Deployment Guide* on the [Expressway configuration guides page](#).

## Task 6: Configuring NTP Servers

The **NTP server** address fields set the IP addresses or Fully Qualified Domain Names (FQDNs) of the NTP servers to be used to synchronize system time. The **Time zone** sets the local time zone of the Expressway.

To configure the NTP server address and time zone:

1. Go to **System > Time**.
2. Configure the fields as follows:

<b>NTP server 1</b>	Enter 10.0.0.21
<b>Time zone</b>	GMT in this example

3. Click **Save**.

**Time** You are here: [System](#) > Time

**NTP servers**

NTP server 1	Address	<input type="text" value="10.0.0.21"/>		Authentication	<input type="text" value="Disabled"/>	
NTP server 2	Address	<input type="text"/>		Authentication	<input type="text" value="Disabled"/>	
NTP server 3	Address	<input type="text"/>		Authentication	<input type="text" value="Disabled"/>	
NTP server 4	Address	<input type="text"/>		Authentication	<input type="text" value="Disabled"/>	
NTP server 5	Address	<input type="text"/>		Authentication	<input type="text" value="Disabled"/>	

**Time zone**

Time zone

## Task 7: Configuring SIP Domains

The Expressway acts as a SIP Registrar for configured SIP domains, accepting registration requests for any SIP endpoints attempting to register with an alias that includes these domains.

- Registration restriction (Allow or Deny) rules can be configured to limit acceptable registrations. See [Task 13: Configuring Registration Restriction Policy \(Optional\)](#), page 28.
- If authentication is enabled, only devices that can properly authenticate themselves will be allowed to register.

To configure a SIP domain:

1. Go to **Configuration > Domains**.
2. Click **New**.
3. Enter the domain name into the **Name** field, such as `example.com`.
4. Click **Create domain**.
5. The **Domains** page displays all configured SIP domain names.



## Expressway System Configuration

**Domains** You are here: [Configuration](#) > [Domains](#) > [New](#)

[Configuration](#)

Domain name  ?

## What To Do Next

The Expressway system configuration is now complete. Go to the next section, "*Routing Configuration.*"

## Routing Configuration

### Pre-search Transforms

Pre-search transform configuration allows the destination alias (called address) in an incoming search request to be modified. The Expressway applies the transformation before any searches are sent to external zones.

The pre-search transform configuration described in this document is used to standardize destination aliases originating from both H.323 and SIP devices. This means that the same call searches work for calls from both H.323 and SIP endpoints.

For example, if the called address is an H.323 E.164 alias "01234", the Expressway automatically appends the configured domain name (in this case example.com) to the called address (that is, 01234@example.com making it into a URI), before attempting to set up the call.

- Use pre-search transforms with care. They apply to *all* incoming signaling messages, not just to call requests.
- Transformations can also be carried out in search rules. Consider whether it's best to use a pre-search transform or a search rule to modify the called address to be looked up.

### Search Rules

Search rules define how the Expressway routes calls (to destination zones, such as to Unified CM, or another Expressway, or Meeting Server) in specific call scenarios. When a search rule is matched, the destination alias can be modified according to the conditions defined in the search rule.

The search rules described in this document are used to ensure that endpoints can dial H.323 devices that have registered E.164 numbers or H.323 IDs without a domain portion. The search rules first search for received destination aliases without the domain portion of the URI, and then search with the full URI.

The routing configuration in this document searches for destination aliases that have valid SIP URIs. That is, using a valid SIP domain, such as id@domain.

You can configure routing which enables calls to unregistered devices on an internal network (routing to the addresses of IP of the devices) by configuring a search rule with a mode of *Any IP address* with target Local Zone. However this is not recommended (and not described in this document). The best practice is to register all devices and route using destination aliases.

## Task 8: Configuring Transforms

The pre-search transform configuration described in this document is used to standardize destination aliases originating from both H.323 and SIP devices.

The following transform modifies the destination alias of all call attempts made to destination aliases which do not contain an '@'. The old destination alias has @example.com appended to it, thus standardizing all called destination aliases into a SIP URI format.

To configure the transform:

1. Go to **Configuration > Dial plan > Transforms**.
2. Click **New**.

## 3. Configure the transform fields as follows:

<b>Priority</b>	Enter 1
<b>Description</b>	Enter Transform destination aliases to URI format
<b>Pattern type</b>	<i>Regex</i>
<b>Pattern string</b>	Enter ([^@]*)
<b>Pattern behavior</b>	<i>Replace</i>
<b>Replace string</b>	Enter \1@example.com
<b>State</b>	<i>Enabled</i>

4. Click **Create transform**.

**Create transform** You are here: [Configuration](#) > [Dial plan](#) > [Transforms](#) > [Create transform](#)

**Configuration**

Priority	<input type="text" value="1"/> ⓘ
Description	<input type="text" value="Transform destination aliases to URI format"/> ⓘ
Pattern type	Regex ⓘ
Pattern string	* <input )"="" type="text" value="([^@]*"/> ⓘ
Pattern behavior	Replace ⓘ
Replace string	<input type="text" value="\1@example.com"/> ⓘ
State	Enabled ⓘ

## Task 9: Configuring Local Zone Search Rules

To configure the search rules to route calls to the Local Zone (to locally registered endpoint aliases):

1. Go to **Configuration > Dial plan > Search rules**.
2. First disable the supplied default search rule (**LocalZoneMatch**), as follows:
  - a. Select the check box next to **LocalZoneMatch**.
  - b. Click **Disable**.
  - c. Click **OK**.
3. Click **New**.

4. Configure the search rule fields as follows:

<b>Rule name</b>	Enter Local zone - full URI
<b>Description</b>	Enter Search local zone for SIP devices with a domain
<b>Priority</b>	Enter 50
<b>Protocol</b>	<i>Any</i>
<b>Source</b>	<i>Any</i>
<b>Request must be authenticated</b>	<i>No</i>
<b>Mode</b>	<i>Alias pattern match</i>
<b>Pattern type</b>	<i>Regex</i>
<b>Pattern string</b>	Enter <code>(.+@example.com.*</code>
<b>Pattern behavior</b>	<i>Leave</i>
<b>On successful match</b>	<i>Continue</i>
<b>Target</b>	<i>LocalZone</i>
<b>State</b>	<i>Enabled</i>

5. Click **Create search rule**.

## Endpoint Registration

The example network configuration diagram shows two endpoints.

Endpoint	IP address	Network
EX90	10.0.0.15	Internal network
EX60	10.0.0.16	Internal network

After system configuration, endpoint registration should be possible using these endpoint configuration details:

EX90 (uses SIP protocol)	
SIP URI	user.one.ex90@example.com
SIP Proxy1	expc.internal-domain.net
EX60 (uses SIP protocol)	
SIP URI	user.two.mxp@example.com
SIP Proxy1	expc.internal-domain.net

## What To Do Next

The Expressway routing configuration is now complete. Go to the next section, "*System Checks*."

## System Checks

### Registration Status

Check that all endpoints which are expected to be registered are actually registered to the relevant Expressway. And that they are registering the expected aliases. All successfully registered endpoints are listed on **Status > Registrations > By device**.

If the expected endpoints are not registered, review the following items:

- The endpoint's registration configuration.
- The SIP domains ([Task 7: Configuring SIP Domains, page 16](#)).
- Any registration restriction configuration applied to the Expressway (optional, [Task 13: Configuring Registration Restriction Policy \(Optional\), page 28](#)).

### Call Signaling

If calls do not complete:

- Review the Cisco Expressway-C search rule configuration.
- Check the search history page for search attempts and failures (**Status > Search history**).
- Check the Event Log for call connection failure reasons (**Status > Logs > Event Log**).

### What To Do Next

When you've completed the system checks and are satisfied that the system is working as expected, [create a system backup](#) and then go on to "[Optional Configuration Tasks](#)".

## Maintenance Routine

### Creating a System Backup

To create a backup of Expressway system data:

1. Go to **Maintenance > Backup and restore**.
2. Optionally, enter an **Encryption password** with which to encrypt the backup file.  
If a password is specified, the same password will be required to restore the file.
3. Click **Create system backup file**.
4. After the backup file has been prepared, a pop-up window appears and prompts you to save the file (the exact wording depends on your browser). The default name is in the format:  
**<software version>\_<hardware serial number>\_<date>\_<time>\_backup.tar.gz**.  
(The file extension is normally **.tar.gz.enc** if an encryption password is specified. However, if you use Internet Explorer to create an encrypted backup file, the filename extension will be **.tar.gz.gz** by default. These different filename extensions have no operational impact; you can create and restore encrypted backup files using any supported browser.)  
The preparation of the system backup file may take several minutes. Do not navigate away from this page while the file is being prepared.
5. Save the file to a designated location.

Log files are not included in the system backup file.

## Optional Configuration Tasks

### Task 10: Configuring Routes to a Neighbor Zone (Optional)

You can optionally set up neighbor zones and associated search rules on the Cisco Expressway-C if you want to route calls to other systems. To another Expressway for example, or to a Cisco VCS, Cisco Meeting Server, or Unified CM.

#### Example: Cisco VCS Neighbor Zone

This example assumes that you want to route calls toward devices that are registered to a Cisco VCS. The devices have an address (destination alias) in the format `<alias>@vcs.domain`.

**Note:** You may need more rules or transforms if any H.323 devices have registered E.164 numbers or H.323 IDs without a domain portion.

To configure a neighbor zone to the Cisco VCS:

1. Go to **Configuration > Zones > Zones**.
2. Click **New**.
3. Configure the fields as follows, and leave all other fields with their default values:

	Cisco Expressway-C
<b>Name</b>	Enter Neighbor zone to VCS
<b>Type</b>	<i>Neighbor</i>
<b>H.323 Mode</b>	<i>On</i>
<b>H.323 Port</b>	Enter 1719
<b>SIP Mode</b>	<i>On</i>
<b>SIP Port</b>	Enter 5061
<b>SIP Transport</b>	<i>TCP</i>
<b>Location Peer 1 address</b>	Enter the address of the Cisco VCS neighbor system

4. Click **Create zone**.

To configure the search rule to route calls to the Cisco VCS:

1. Go to **Configuration > Dial plan > Search rules**.
2. Click **New**.



## Optional Configuration Tasks

## 3. Configure the search rule fields as follows:

	Cisco Expressway-C
<b>Rule name</b>	Enter Route to VCS
<b>Description</b>	Enter Search VCS neighbor zone
<b>Priority</b>	Enter 100
<b>Protocol</b>	Any
<b>Source</b>	Any
<b>Request must be authenticated</b>	No
<b>Mode</b>	Alias pattern match
<b>Pattern type</b>	Suffix
<b>Pattern string</b>	Enter @vcs.domain
<b>Pattern behavior</b>	Leave
<b>On successful match</b>	Continue
<b>Target</b>	Neighbor zone to VCS
<b>State</b>	Enabled

4. Click **Create search rule**.

## SIP Trunks to Unified CM

To configure a SIP trunk to Unified CM, see [Cisco Unified Communications Manager with Expressway Deployment Guide](#).

## Task 11: Configuring Cisco TMS (Optional)

The following configuration enables the Expressway system to be integrated to a Cisco TelePresence Management Suite (Cisco TMS).

Points to note:

- Further configuration tasks are also required on Cisco TMS to fully integrate the Expressway with the TMS server. For details, see [Cisco TMS Administrator Guide](#) on the [TMS Maintain and Operate Guides page](#).
- Enabling SNMP speeds up the Expressway - TMS integration process, but is not essential.

To enable and configure SNMP:

## Optional Configuration Tasks

1. Go to **System > SNMP**.
2. Configure the SNMP fields as follows:

<b>SNMP mode</b>	<i>v3 plus TMS support</i>
<b>Community name</b>	Check that it is <i>public</i>
<b>System contact</b>	Enter <i>IT administrator</i>
<b>Location</b>	Enter <i>example.com head office</i>
<b>Username</b>	Enter <i>VCS</i>
<b>Authentication mode</b>	<i>On</i>
<b>Type</b>	<i>SHA</i>
<b>Password</b>	Enter <i>ex4mpl3.c0m</i>
<b>Privacy mode</b>	<i>On</i>
<b>Type</b>	<i>AES</i>
<b>Password</b>	Enter <i>ex4mpl3.c0m</i>

3. Click **Save**.

**SNMP** You are here: [System](#) > [SNMP](#)

**Configuration**

SNMP mode: v3 plus TMS support

Community name: public

System contact: IT administrator

Location: example.com head office

Username: VCS

**Authentication**

Authentication mode: On

Type: SHA

Password:

**Privacy**

Privacy mode: On

Type: AES

Password:

To configure the necessary external manager (Cisco TMS) parameters:

## Optional Configuration Tasks

1. Go to **System > External manager**.
2. Configure the fields as follows:

<b>Address</b>	Enter 10.0.0.14
<b>Path</b>	Enter tms/public/external/management/ SystemManagementService.asmx
<b>Protocol</b>	Select <i>HTTP</i> or <i>HTTPS</i>
<b>Certificate verification mode</b>	Select <i>On</i> or <i>Off</i>  The certificate is only verified if the value is <i>On</i> and the protocol is set to <i>HTTPS</i> . If you switch this on then Cisco TMS and Expressway must have appropriate certificates.

3. Click **Save**.

**External manager** You are here: [System](#) > External manager

**Configuration**

Address:  ⓘ

Path:  ⓘ

Protocol:  ⓘ

Certificate verification mode:  ⓘ

## Task 12: Configuring Logging (Optional)

The following configuration enables event logs to be sent to an external logging server using the SYSLOG protocol.

- The **Local event log verbosity** setting controls the granularity of event logging. 1 is the least verbose, 4 the most.
- We recommend a minimum level of 2. This provides both system and basic signaling message logging.

To configure a logging server:

1. Go to **Maintenance > Logging**.
2. Configure the fields as follows:

<b>Local event log verbosity</b>	2
<b>Remote syslog server 1: Address</b>	Enter 10.0.0.13
<b>Remote syslog server 1: Message Format</b>	<i>IETF syslog format</i>

3. Click **Save**.

## Task 13: Configuring Registration Restriction Policy (Optional)

You can limit the aliases that endpoints can register, using either an Allow list or a Deny list. This is an example of how to configure Allow list registration restrictions:

1. Go to **Configuration > Registration > Allow List**.
2. Click **New**.
3. Create an allow pattern by configuring the following fields. This example limits registrations to endpoints which register with an identity that contains “@example.com”.

<b>Description</b>	Enter Only allow registrations containing "@example.com"
<b>Pattern type</b>	Regex
<b>Pattern string</b>	Enter .*@example\.com

4. Click **Add Allow List pattern**.

**Create allow pattern** You are here: [Configuration](#) > [Registration](#) > [Allow List](#) > Create allow pattern

**Configuration**

Description  ⓘ

Pattern type  ⓘ

Pattern string  ⓘ

To activate the registration restriction:

1. Go to **Configuration > Registration > Configuration**.
2. Configure the **Restriction policy** as follows:

<b>Restriction policy</b>	Allow List
---------------------------	------------

3. Click **Save**.

**Registration configuration** You are here: [Configuration](#) > [Registration](#) > Configuration

**Configuration**

Restriction policy  ⓘ

## Task 14: Configuring Device Authentication Policy (Optional)

Authentication policy is applied by the Expressway at the zone and subzone levels. It controls how the Expressway challenges incoming messages (for provisioning, registration, phone books, and calls) from that zone or subzone and whether those messages are rejected, treated as authenticated, or treated as unauthenticated within the Expressway.

Each zone and subzone can set its **Authentication policy** to *Check credentials*, *Do not check credentials*, or *Treat as authenticated*.

## Optional Configuration Tasks

- Registration authentication is controlled by the Default Subzone configuration (or the relevant alternative subzone).
- Initial provisioning subscription request authentication is controlled by the Default Zone configuration.
- Call and phone book request authentication is controlled by the Default Subzone (or relevant alternative subzone) if the endpoint is registered, or by the Default Zone if the endpoint is not registered.

By default, zones and subzones are configured as *Do not check credentials*.

## Task 15: Configuring Registration by Remote Endpoints (Optional)

This task applies if you want to support registration of remotely located endpoints, such as home workers. To do this, you configure the Cisco Expressway-E to proxy incoming remote SIP registration requests on to the Cisco Expressway-C. Then, if a proxied request meets any relevant conditions, the Cisco Expressway-C registers the requesting endpoint.

**Note:** Currently we do not support proxy registration by remote H.323 endpoints.

To allow proxy registration by remote SIP endpoints, you configure the Cisco Expressway-E protocol settings:

1. Go to **Configuration > Protocols > SIP**.
2. In the **Registration Controls** section, set **SIP registration proxy mode** according to your security requirements.

We recommend setting it to *Proxy to known only*, which forwards proxied requests only to known neighbor and traversal server zones.

### Traversal Zones

No special configuration is required. As the Cisco Expressway-E does not support registrations, the **SIP Accept proxied registrations** field for the associated Traversal Zone should be *Allow* for Cisco Expressway-C and *Off* for Cisco Expressway-E.

### Dial plan

We recommend that you configure the search rules for remote registrations on the Cisco Expressway-C. You do not need any extra search rules on the Cisco Expressway-E.

## Task 16: Restricting Access to ISDN Gateways (Optional)

We recommend that you restrict unauthorized access to any ISDN gateway resources (also known as toll-fraud prevention). This section describes one way to achieve this.

In these examples, an ISDN gateway is registered to the Cisco Expressway-C with a prefix of 9. And / or it has a neighbor zone specified that routes calls starting with a 9.

This example describes how to configure the Cisco Expressway-C to stop calls that come in through the gateway, from being able to route calls back out of the gateway.

To do this, you load some specially constructed CPL onto the Cisco Expressway-C and configure its **Call policy mode** to use *Local CPL*.

### Creating a CPL File

The CPL file can be created in a text editor.

Here are two example sets of CPL. In these examples:

- “GatewayZone” is the neighbor zone to the ISDN gateway.
- “GatewaySubZone” is the subzone to the ISDN gateway (required if the gateway registers the 9 prefix to the Expressway).

## Optional Configuration Tasks

- Calls coming into the ISDN gateway and hitting a FindMe do not ring devices that use the gateway. So for example, calls forwarded to a mobile phone are disallowed.

This example CPL excludes any checking of whether the calling party is authenticated:

```
<?xml version="1.0" encoding="UTF-8" ?>
<cpl xmlns="urn:ietf:params:xml:ns:cpl"
xmlns:taa="http://www.tandberg.net/cpl-extensions"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:ietf:params:xml:ns:cpl cpl.xsd">
<taa:routed>
  <taa:rule-switch>
    <!--Check that gateway is not hairpinning call - Neighbor zone -->
    <taa:rule originating-zone="GatewayZone" destination="9.*">
      <!-- Calls coming from the gateway may not send calls back out of this gateway -->
      <!-- Reject call with a status code of 403 (Forbidden) -->
      <reject status="403" reason="ISDN hairpin call denied"/>
    </taa:rule>
    <!-- Check that gateway is not hairpinning call - Subzone for registered gateway -->
    <taa:rule originating-zone="GatewaySubZone" destination="9.*">
      <!-- Calls coming from the gateway may not send calls back out of this gateway -->
      <!-- Reject call with a status code of 403 (Forbidden) -->
      <reject status="403" reason="ISDN hairpin call denied"/>
    </taa:rule>
    <taa:rule origin=".*" destination=".*">
      <!-- All other calls allowed -->
      <proxy/>
    </taa:rule>
  </taa:rule-switch>
</taa:routed>
</cpl>
```

This example CPL also ensures that the calling party is authenticated:

```
<?xml version="1.0" encoding="UTF-8" ?>
<cpl xmlns="urn:ietf:params:xml:ns:cpl"
xmlns:taa="http://www.tandberg.net/cpl-extensions"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:ietf:params:xml:ns:cpl cpl.xsd">
<taa:routed>
  <taa:rule-switch>
    <!-- Check that calling party is authenticated -->
    <taa:rule authenticated-origin="" destination="9.*">
      <!-- Reject call with a status code of 403 (Forbidden) -->
      <reject status="403" reason="ISDN call denied as unauthenticated caller"/>
    </taa:rule>
    <!-- Check that gateway is not hairpinning call - Neighbor zone -->
    <taa:rule originating-zone="GatewayZone" destination="9.*">
      <!-- Calls coming from the gateway may not hairpin and send calls back out -->
      <!-- Reject call with a status code of 403 (Forbidden) -->
      <reject status="403" reason="ISDN hairpin call denied"/>
    </taa:rule>
    <!-- Check that gateway is not hairpinning call - Subzone for registered gateway -->
    <taa:rule originating-zone="GatewaySubZone" destination="9.*">
      <!-- Calls coming from the gateway may not hairpin and send calls back out -->
      <!-- Reject call with a status code of 403 (Forbidden) -->
      <reject status="403" reason="ISDN hairpin call denied"/>
    </taa:rule>
    <taa:rule origin=".*" destination=".*">
      <!-- All other calls allowed -->
      <proxy/>
    </taa:rule>
  </taa:rule-switch>
</taa:routed>
</cpl>
```

## Loading the CPL onto Cisco Expressway-C

To configure the Cisco Expressway-C to use the CPL:

1. Go to **Configuration > Call Policy > Configuration**.
2. Click **Browse....** Select the CPL file you created in the previous step from your file system.
3. Click **Upload file**.
  - If the file upload succeeds, you see a "File upload successful" message.
  - If you receive an "XML invalid" message, correct the problems with the CPL file and upload it again.
4. Select a **Call policy mode** of *Local CPL*.
5. Click **Save**.

**Call Policy configuration** You are here: [Configuration](#) > [Call Policy](#) > Configuration

**Configuration**

Call Policy mode  ⓘ

**Save**

**Policy files**

Call policy file	CPL File	<input type="text" value="Show Call Policy file"/> ⓘ
CPL XSD file	XSD File	<input type="text" value="Show CPL XSD file"/> ⓘ
CPL extensions xsd file	XSD File	<input type="text" value="Show CPL extensions XSD file"/> ⓘ
Select the new Call Policy file	<input type="text"/>	<input type="button" value="Browse..."/> ⓘ

**Upload file**

## Appendix 1: Configuration Details

This appendix summarizes the configuration required for the Cisco Expressway-C.

### Cisco Expressway-C System Configuration

Configuration item	Value	Expressway page
System configuration		
System name	EXPc	System > Administration
LAN1 IPv4 address	10.0.0.2	System > Network interfaces > IP
IPv4 gateway	10.0.0.1	System > Network interfaces > IP
LAN1 subnet mask	255.255.255.0	System > Network interfaces > IP
DNS server address 1	10.0.0.11	System > DNS
DNS server address 2	10.0.0.12	System > DNS
DNS Domain name	internal-domain.net	System > DNS
DNS System host name	expc	System > DNS
NTP server 1	10.0.0.21	System > Time
Time zone	GMT	System > Time

### Cisco Expressway-C transforms and search rules

Configuration item	Value	Expressway page
Transform		
Pattern string	([^\@]*)	Configuration > Dial plan > Transforms
Pattern type	Regex	Configuration > Dial plan > Transforms
Pattern behavior	Replace	Configuration > Dial plan > Transforms
Replace string	\1@example.com	Configuration > Dial plan > Transforms
Local search rule 1		
Rule name	Local zone - no domain	Configuration > Dial plan > Search rules
Priority	48	Configuration > Dial plan > Search rules
Source	Any	Configuration > Dial plan > Search rules
Mode	Alias pattern match	Configuration > Dial plan > Search rules
Pattern type	Regex	Configuration > Dial plan > Search rules
Pattern string	(.+)\.com.*	Configuration > Dial plan > Search rules
Pattern behavior	Replace	Configuration > Dial plan > Search rules
Replace string	\1	Configuration > Dial plan > Search rules
On successful match	Continue	Configuration > Dial plan > Search rules
Target	LocalZone	Configuration > Dial plan > Search rules



## Appendix 1: Configuration Details

Configuration item	Value	Expressway page
Local search rule 2		
Rule name	Local zone - full URI	Configuration > Dial plan > Search rules
Priority	50	Configuration > Dial plan > Search rules
Source	Any	Configuration > Dial plan > Search rules
Mode	Alias pattern match	Configuration > Dial plan > Search rules
Pattern type	Regex	Configuration > Dial plan > Search rules
Pattern string	(.+@example\..com.*	Configuration > Dial plan > Search rules
Pattern behavior	Leave	Configuration > Dial plan > Search rules
On successful match	Continue	Configuration > Dial plan > Search rules
Target	LocalZone	Configuration > Dial plan > Search rules

## Appendix 2: DNS Records

The following records are required in the local DNS which hosts the internally routable domain: internal-domain.net to allow internal messages to be routed to the Cisco Expressway-C.

### Local DNS A Record

Host	Host IP address
expc.internal-domain.net	10.0.0.2

### Local DNS SRV Records

Name	Service	Protocol	Priority	Weight	Port	Target host
internal-domain.net.	h323cs	tcp	10	10	1720	expc.internal-domain.net.
internal-domain.net.	h323ls	udp	10	10	1719	expc.internal-domain.net.
internal-domain.net.	h323rs	udp	10	10	1719	expc.internal-domain.net.
internal-domain.net.	sip	tcp	10	10	5060	expc.internal-domain.net.
internal-domain.net.	sip	udp *	10	10	5060	expc.internal-domain.net.
internal-domain.net.	sips	tcp	10	10	5061	expc.internal-domain.net.

\* SIP UDP is disabled on Expressway by default.

For example, the DNS records would be:

```
_h323cs._tcp.internal-domain.net. 86400 IN SRV 10 10 1720 expc.internal-domain.net.
_h323ls._udp.internal-domain.net. 86400 IN SRV 10 10 1719 expc.internal-domain.net.
_h323rs._udp.internal-domain.net. 86400 IN SRV 10 10 1719 expc.internal-domain.net.
_sip._tcp.internal-domain.net.    86400 IN SRV 10 10 5060 expc.internal-domain.net.
_sip._udp.internal-domain.net.    86400 IN SRV 10 10 5060 expc.internal-domain.net.
_sips._tcp.internal-domain.net.   86400 IN SRV 10 10 5061 expc.internal-domain.net.
expc.internal-domain.net.        86400 IN A 10.0.0.2
```

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