



CHAPTER 7

Provisioning the Local PSTN Breakout Support

This document details how PSTN calls can be routed via Local Gateways in the Hosted UCS reference architecture for the Hosted UCS 7.1(a) Release. It also provides steps required to provision the Local PSTN Breakout feature via the VOSS USM application.

In Hosted UCS 7.1(a) Release, the administrator can provision Local Gateways for a customer location. Calls to/from PSTN can be routed via PRI or BRI interfaces. The format of the Calling and Called party number and Nature of Address (NOA) can also be configured in various ways. Additionally, calls to/from PSTN from one location can be routed via a single trunk, or optionally, the administrator can provision two trunks to separate Local and National/International calls.

This chapter is divided into the following sections:

- [Description of the Local PSTN Breakout Support, page 7-1](#)
- [Provisioning Local PSTN Breakout Support, page 7-7](#)

Description of the Local PSTN Breakout Support

This section describes the key characteristics of the Local PSTN Breakout Support feature:

- [Handling PSTN Calls via Central Gateway, page 7-1](#)
- [Handling PSTN Calls via Local Gateway, page 7-4](#)
- [Support for Multiple Trunk Types for Local PSTN Breakout, page 7-7](#)

Handling PSTN Calls via Central Gateway

In Cisco Hosted Unified Communications Services 7.1(a), you can provision a location, so that calls to the PSTN are sent via a Central Gateway.

[Table 7-1](#) lists the generic formats of the cgpn (A), cgpn nature of address (ANOA), cdpn (B), and the cdpn NOA (BNOA) on the Central Gateway trunk when a location is provisioned to route PSTN calls via a central gateway.

Table 7-1 *Outgoing calls to PSTN via Central Gateway*

Call Type	cgpn (A)	ANOA	cdpn (B)	BNOA
Local Call	NDC1-SN2	National	NDC-SN	National

Table 7-1 *Outgoing calls to PSTN via Central Gateway*

Call Type	cgpn (A)	ANOA	cdpn (B)	BNOA
National Call	NDC-SN	National	NDC-SN	National
International Calls	NDC-SN	National	CC3-NDC-SN	International

Table 7-2 lists the generic expected formats of the cgpn (A), cgpn nature of address (ANOA), cdpn (B), and the cdpn NOA (BNOA) on the Central Gateway trunk for incoming calls from PSTN.

Table 7-2 *Incoming calls from PSTN via Central Gateway*

Call Type	cgpn (A)	ANOA	cdpn (B)	BNOA
Local Call	NDC-SN	National	NDC-SN	National
National Call	NDC-SN	National	NDC-SN	National
International Calls	CC-NDC-SN	International	NDC-SN	National

In the US for example, the North American Numbering Plan (NANP) is used. The NANP number is a 10-digit number that consists of the following three parts:

- 3-digit Numbering Plan Area (NPA) code
- 3-digit Central Office (CO) code
- 4-digit line (or station) number

The format of the NANP number is NXX-NXX-XXXX4 (the use of the NPA code is optional in some areas that permit 7-digit local dialing). To avoid confusion between the NPA and CO codes, the NANP numbers in this document will be presented with NPA-NXX-XXXX.

Table 7-3 lists the generic formats of the cgpn (A), cgpn nature of address (ANOA), cdpn (B), and the cdpn NOA (BNOA) on the Central Gateway trunk in the US.

Table 7-3 *Outgoing calls from PSTN via Central Gateway in the United States*

Call Type	cgpn (A)	ANOA	cdpn (B)	BNOA
Local call from 7-digit location	NPA-NXX-XXX X	National	NPA-NXX-XX XX	National
Local call from 10-digit location	NPA-NXX-XXX X	National	NPA-NXX-XX XX	National
Long distance call	NPA-NXX-XXX X	National	NPA-NXX-XX XX	National
International Calls	NPA-NXX-XXX X	National	CC-E164	International

National Destination Code (NDC/NPA) - A nationally optional code field, within the international E.164-numbering plan. The NDC has a network and/or trunk code selection function. The NDC can be a decimal digit or a combination of decimal digits (not including any prefix) identifying a numbering area within a country (or group of countries included in one integrated numbering plan or a specific geographic area) and/or network/services.

Subscriber Number (SN) - The portion of the international E.164-number that identifies a subscriber in a network or numbering area.

Country Code (CC)/National Access Code (NAC) - The combination of one, two or three digits identifying a specific country in an integrated numbering plan, or a specific geographic area.

**Note**

N can be any digits from 2 to 9, and X can be any digits from 0 to 9

Table 7-4 lists the generic expected formats of the cgn (A), cgn nature of address (ANOA), cdpn (B), and the cdpn NOA (BNOA) on the Central Gateway trunk for incoming calls from PSTN for the US.

Table 7-4 Incoming calls from PSTN via Central Gateway in the United States

Call Type	cgn (A)	ANOA	cdpn (B)	BNOA
Local call from 7-digit location	NPA-NXX-XXX X	National	NPA-NXX-XX XX	National
Local call from 10-digit location	NPA-NXX-XXX X	National	NPA-NXX-XX XX	National
Long distance call	NPA-NXX-XXX X	National	NPA-NXX-XX XX	National
International Calls	CC-E164	International	NPA-NXX-XX XX	National

**Note**

Be aware that these are generic numbering formats, and if different formats are required the SI can customize the Ingress and Egress PGW dial plans (P#PADDEDCC# and F#PADDEDCC# dial plans).

Table 7-5 lists the generic expected formats of the the cdpn (B) to NXX-XXXX (for local calls from locations provisioned for 7-digit local dialing support), or to NPA-NXX-XXXX (for local calls from locations provisioned for 10-digit local dialing support), and BNOA to subscriber, on the Central Gateway trunk for outgoing calls to PSTN for the US.

Table 7-5 Customized outgoing local calls to PSTN via Central Gateway in the United States

Call Type	cgn (A)	ANOA	cdpn (B)	BNOA
Local call from 7-digit location	NPA-NXX-XXX X	National	NXX-XXXX	Subscriber
Local call from 10-digit location	NPA-NXX-XXX X	National	NPA-NXX-XX XX	Subscriber

Table 7-6 lists the generic expected formats of the the cdpn (B) to NXX-XXXX (for local calls from locations provisioned for 7-digit local dialing support), or to NPA-NXX-XXXX (for local calls from locations provisioned for 10-digit local dialing support), and BNOA to subscriber, on the Central Gateway trunk for incoming calls to PSTN for the US.

Table 7-6 Customized incoming local calls to PSTN via Central Gateway in the United States

Call Type	cgpn (A)	ANOA	cdpn (B)	BNOA
Local call from 7-digit location	NPA-NXX-XXX X	National	NXX-XXXX	Subscriber
Local call from 10-digit location	NPA-NXX-XXX X	National	NPA-NXX-XX XX	Subscriber

Handling PSTN Calls via Local Gateway

In Cisco Hosted Unified Communications Services 7.1(a), you can provision a location to route PSTN calls via local gateway trunk(s). One, or optionally two, Local Gateway trunks can be provisioned in a number of ways that will enable sending and receiving of the cdpn (B) and BNOA in various formats. This section contains the following topics:

- [Call Admission Control, page 7-4](#)
- [Calling and Called Party Number Presentation, page 7-4](#)
- [Call Routing, page 7-6](#)

Call Admission Control

In HUCS7.1 (a) release, all calls from IP Phones to PSTN and from PSTN to IP Phones are routed directly via Unified CM therefore enabling the correct Call Admission Control (CAC) functionality. The LGW dedicated to a location is configured in Unified Communication Manager as an H.323 gateway and is configured in the same device pool as the IP Phones. Therefore, the Unified Communication Manager location bandwidth is not consumed for calls from IP Phones to LGW and from LGW to IP Phones.

Calling and Called Party Number Presentation

For all call scenarios that traverse the LGW, appropriate configuration can be applied to Unified Communication Manager and LGW to ensure that the Calling Party Number (CgPN) and Called Party Number (CdPN) are presented to the PSTN, the IP Phone or Movius in the required format.

The presentation of the CgPN and CdPN can be configured in a number of ways to satisfy Service Provider requirements for various call scenarios.

For outgoing Emergency calls:

- If the location is configured to use the Cisco Emergency Responder feature, the CgPN number is modified to the Emergency Location Identification Number (ELIN).
- If the location is configured to use the DDI for Emergency feature, the CgPN will be replaced with an E.164 number of the line which originated the call (if the line is associated with an E.164 number) or with the Location Emergency Published Number (if the line is not associated with an E.164 number).
- If the location is not configured to use the Cisco Emergency Responder or DDI for Emergency feature, the CgPN will always be replaced with the Location Emergency Published Number.

For outgoing Non-Emergency PSTN calls, the CgPN will be replaced with an E.164 number of the line which originated the call (if the line is associated with an E.164 number) or with the Location PSTN Published Number (if the line is not associated with an E.164 number).

For outgoing PSTN calls, each trunk can be configured to set the desired NOA, that is the CgPN NOA and CdPN NOA can be set to relevant National/International/Subscriber/Unknown format or Unknown for all call types.

In addition to this, the administrator can configure the trunk to choose:

- No Local Dialing
- 10-digit dialing (for US only) or
- Local Dialing without Area Code (for countries that can support this - 7-digit dialing).

If No Local Dialing is configured then local calls would be sent to and expected to be received from the PSTN trunk in the same way as national calls.

If 10-digit dialing is configured then local calls would be sent to and expected to be received from the PSTN trunk with the NDC.

If Local Dialing without Area Code is configured then local calls would be sent to and expected to be received from the PSTN without the NDC.

For example, in the US:

- National calls can be sent to the PSTN with:
 - 212-5551234 and NOA set to National or
 - 1-212-5551234 and NOA set to Unknown
- International calls can be sent to the PSTN with:
 - 44-1632-123456 and NOA set to International or
 - 011-44-1632-123456 and NOA set to Unknown
- Local calls can be sent to the PSTN with:
 - 5551234 and NOA set to Subscriber (for 7-digit dialing with NDC configured not to be sent),
 - 212-5551234 and NOA set to Subscriber (for 10-digit dialing or 7-digit dialing with NDC configured to be sent) or
 - 1-212-5551234 and NOA set to Unknown

For incoming calls to IP Phones, the CdPN will be replaced with an Internal number of the line (if the line is associated with an E.164 number) so that the call can be routed to the correct IP Phone. Also, the CgPN will be prefixed with the correct PSTN Access Prefix and relevant Access Code so that the user can redial the number if required.

For incoming PSAP call-back calls, if the location is configured to use Cisco ER feature then the CdPN (ELIN) will be replaced with an Internal number (every ELIN is associated to an internal number), so that the call can be routed to the correct Cisco ER.

For incoming calls to Movius (for Voicemail retrieval), the CdPN (E.164 number of the Voicemail pilot allocated to the LGW) will be replaced with an Internal number (every E.164 Voicemail pilot number is associated to an internal number), so that the call can be routed to Movius via Unified CM and PGW.

In cases where a user has dialed the E164 number of a phone within the same location then the CdPN number will be transformed to the relevant internal number so that the call can be routed to the correct IP Phone. Also, the CgPN number will be modified to 8+SLC+EXT, so that the user can identify this as an internal call and be able to redial the number if required. In addition to this, the CLI restriction will be removed if it is applied to the initial outgoing call.

When a call is forwarded to the Local PSTN Gateway:

- If the location is configured to use the DDI for Redirect feature, the CgPN will be replaced with an E.164 number of the line which redirected the call (if the line is associated with an E.164 number) or with the Location PSTN Published Number (if the line is not associated with an E.164 number)
- If the location is not configured to use the DDI for Emergency feature, the CgPN will always be replaced with the Location PSTN Published Number of the line which redirected the call.

In US, there is a distinction between national dialing, local dialing with the NDC (10-digit dialing) and local dialing without the NDC (7-digit dialing). Therefore, Local Gateway trunks can be configured for:

- No Local Dialing—This will result in local calls presented to the PSTN trunk in the same way as national calls.
- 10-digit dialing—This will result in local calls presented to the PSTN with the NDC.
- Local Dialing without Area Code—This will result in local calls presented to the PSTN without the NDC.

Additionally, for all countries, the Local Gateway trunks can be configured to set the Called Party Number (cdpn) B Nature of Address (BNOA) and Calling Party Number (cgpn) A Nature of Address (ANOA) as:

- NOA - Yes— In this case the cgpn and cdpn is set in a relevant format together with appropriate NOA based on the calling number and called destination.
- NOA - No— In this case the NOA is set to Unknown. Both cgpn and cdpn are prefixed with appropriate leading digits to distinguish calling number and called destinations.

For detailed information on all supported call scenarios and numbering presentation, please refer [Appendix E, “Local Gateway Supported Call Scenarios”](#).

Call Routing

Administrators can configure the PSTN call type for each country, from the following predefined call types:

- National
- International
- Emergency
- Service
- Local
- Mobile
- Toll-free
- Premium
- Low-cost

For each location, the administrator can configure to route these call types via Local or Central PSTN breakout. In addition to this, the administrator can select one more call types to be routable for each Local PSTN Gateway trunk.

The locations can be configured to support:

- 7-digit, 10-digit and 11-digit local dialing or
- 10-digit and 11-digit local dialing.

Support for Multiple Trunk Types for Local PSTN Breakout

In Cisco Hosted Unified Communications Services 7.1(a), it is possible to configure the LGW with multiple trunks. Each trunk can route one or more administrator defined PSTN call types. In addition to this the supported trunk interfaces are PRI and BRI.

For details on configuring a local gateway to support PRI or BRI trunk types, refer the section Define Local Gateway Interfaces.

Provisioning Local PSTN Breakout Support

This section describes required steps to provision Local PSTN Breakout support using Local Gateways:

- [Static Configuration, page 7-7](#)
- [Loading the IOS Model, page 7-8](#)
- [Define Call Routing Types in USM, page 7-9](#)
- [Add Service Type for Incoming calls, page 7-10](#)
- [Adding and Configuring Local Gateways, page 7-10](#)
- [Add E.164 inventory for local gateway location, page 7-17](#)
- [Move E.164 numbers to Local Gateway Location, page 7-17](#)
- [Location Administration, page 7-17](#)

Static Configuration

This section details the initial static (manual) configuration required for Local PSTN breakout support for the Local Gateway Static Configuration.

Local Gateway Static Configuration

It is assumed the Cisco IOS device at the customer location will require some level of manual configuration prior to configuring via VOSS-USM. This is typically the IP and access configuration, known as the base configuration, for example it should be configured with a physical or logical loop back interface which will be used as source of the H.323 traffic to Unified Communication Manager. IP configuration must ensure that if loop back interface is configured then the loop back interface can be reached through any of the two physical interfaces. This is possible by enabling routing protocol and configuring it consistently with the core network routing policies.

Furthermore, in Hosted UCS 7.1(a), a number of TCL applications developed by Cisco are used to take over the role of the Default application (the Default application is used to control voice dial-peers in IOS, which is part of IOS' built-in call control that basically binds two call legs whose characteristics are defined by the configured voice dial-peers). These applications are then configured on each voice dial-peer and each verifies on each voice call whether calling and/or called number needs to be translated in the same way as the voice translation-rules did in previous Hosted UCS release. Therefore it is necessary to download these TCL applications into the Voice gateway flash.

Use the following procedure to download the TCL applications:

Procedure:

Step 1 Download the tar file to a (t)ftp server, which contains the Hosted UCS 7.1.1 lite TCL applications.

**Note**

If you are using FTP then you will have to use IOS commands to create telnet username and password, for example

- ip ftp username <xxx>
- ip ftp password <yyy>

Step 2 On the Local Gateway, execute the following command in privileged EXEC mode:

<hostname>**#archive tar /xtract (t)ftp://<host>/<file.tar> flash::** for example:

```
e4lgw1#archive tar /xtract tftp://10.100.100.2/LocalGatewayTCL/hucstcl_v1.0-5.tar flash
```

<hostname>**#call application voice load hucsntpstn**

<hostname>**#conf terminal**

<hostname>**#application**

<hostname>**#service hucsntpstn flash:hucsntpstn.tc**

<hostname>**#call application voice load hucsntvoip**

<hostname>**#conf terminal**

<hostname>**#application**

<hostname>**#service hucsntvoip flash:hucsntvoip.tcl**

Repeat this procedure for all Local Gateways.

Loading the IOS Model

**Note**

Ignore this step if the IOS Device model is already loaded on to USM. If the IOS Device model used with USM version 7.1.3 is country specific then appropriate country IOS Device model should be loaded on to USM.

This section describes required steps to load the Hosted UCS 7.1(a) IOS model. This model defines how USM should configure the Local Gateways.

The IOS command **voice service voip** in the IOS Device 12.x - Model H323 is not provisioned on local gateway if the gateway is provisioned via USM using telnet.

To solve this issue, the relevant IOS commands should be commented (if not already commented out) on the IOS model IOS Device 12.x - Model H323 worksheet before loading the model.

Procedure:

Step 1 Comment out the following lines (3 - 10) in the IOS Device 12.x - Model H323 worksheet

Step 2 Change the first column of the line 11 from A to I as shown below

```
# HUCS AddH323 voice service voip #EOL#
# HUCS AddH323 fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback none #EOL#
# HUCS AddH323 modem passthrough nse codec g711ulaw #EOL#
# HUCS AddH323 allow-connections h323 to h323 #EOL#
# HUCS AddH323 h323 #EOL#
# HUCS AddH323 emptycapability #EOL#
# HUCS AddH323 h245 passthru tcsnonstd-passthru #EOL#
# HUCS AddH323 ! #EOL#
I HUCS AddH323 voice class codec 1 #EOL#
```

Step 3 Save the model.

To prepare USM by loading the IOS Device model, use the following procedure:

Procedure:

Step 1 Choose **Dialplan Tools > Configuration Models**.

Step 2 Browse for the model loader being used, and click **Submit**.



Note Check for any errors or warnings once the loading completes.

Define Call Routing Types in USM

Call routing for call types routed via local gateway are defined as service types in USM. Call Routing Types can be defined in VOSS as service types, having a service category of gatewaycallrouting.

To add a new service type or to look at the existing service types, go to **Setup Tools > Service Types**.

A set of call routing types is available by default in USM. The table below lists the call routing types available, by default, in USM.

Table 7-7 Default Call Routing Services Types supported by USM

Service Type Name	Service Type Description
1	National
2	International
3	Emergency
4	Service
5	Mobile
6	FreePhone
7	Premium
8	Low-Cost
9	Local

Add Call Routing Types to Country

Call routing types available in USM should be made available for the countries supported by provider for local gateway call routing. To enable call routing types for a country, do the following:

-
- Step 1** Go to **Dial Plan Tools > Countries**.
 - Step 2** Select the country to which you want to add call routing types. For example, **United Kingdom**.
 - Step 3** Under **Supported Gateway Call Routing Type**, select all the call routing types which are required for that country, for example check the **check box** for the call routing types in Table 7.
 - Step 4** Click **Modify**.
-

Add Service Type for Incoming calls

**Note**

If the Base-data sheet loaded into USM does not have the Service type IncomingToLGW, then you need to add that service type to map with a Cisco Unified Communication Manager (CUCM) CSS for incoming calls to LGW.

Load the BaseData-Append worksheet on to USM, if it is provided along with the model or follow the steps below to add IncomingToLGW service type:

-
- Step 1** Go to **Setup Tools > Service Types**.
 - Step 2** Click **Add**.
 - Step 3** Under **Details**, enter the following:
 - Service Name—<ServiceTypeName>, it should be **IncomingToLGW**
 - Description—<ServiceDescription>, for example, **Incoming Call to Local PSTN Gateway**
 - Tag—<ServiceTag>, for example, **IncomingToLGW**
 - Service Category—<ServiceCategory>, select **outbound**
 - Step 4** Click **Add**.
-

Adding and Configuring Local Gateways

The administrator needs to follow the following steps to define and configure Local Gateways, at Provider level.

- [Add IOS Device, page 7-11](#)
- [Define Local Gateways, page 7-11](#)
- [Configure Gateway Hardware, page 7-12](#)
- [Define Local Gateway Interfaces, page 7-13](#)

Add IOS Device

To add an IOS Device Type:

-
- Step 1** Go to **Network > IOS Devices**.
- Step 2** Click **Add**.
- Step 3** Click **Add** corresponding to **IPPBX Connected H.323 Local Gateway**.
- Step 4** Under **Device Details**, enter the following :
- Host Name—<Host name of the IOS Device>, for example **e2lgw1**
 - Description—<IOSDeviceTypeDesc>, for example **City2 location2 local gateway**
 - Country—Select <Country>, for example **United Kingdom**
 - Owner—Select <Provider>, for example **UKprovider**
 - Check the **Single Location Only** check box



Note If you enable "Single Location Only, the IOS device can be used in the selected location only.

- Select Location—Select the location to which you want to add local gateway, for example **Reseller_A: Customer_A: Division_A: 1402A2Loc2**
- Step 5** Under **Connectivity Details**, enter the following:
- IP Address—<EthInterface IP Address>, for example **10.190.2.44**
 - IP Address (alternate)—<Alternate IP Address>, for example **10.191.2.44**
 - IP Domain—<Domain name>, for example **ipcbuemea.cisco.com**
 - Config user Required—Select the check box if IOS config user is configured.



Note Config user required flag and config user name should be provided only if the IOS device is configured with telnet/ssh login name.

- Config User name—<IOSConfigUser>, for example **cisco**
 - Config Password—Enter <IOS device config password>, for example **cisco**
 - Enable Password—Enter <IOS device enable password>, for example **cisco**
 - Software Version—Select the proper IOS version, for example, **IOSDevice: 15.x**
- Step 6** Click **Finish**.
-

Define Local Gateways

To define the added IOS device in a Local Gateway do the following:

-
- Step 1** Go to **Network > IOS Devices**.
- Step 2** Click on the newly added IOS device hyperlink
- Step 3** Under **Device Roles**, Gateway, Click **Add**.

- Step 4** Under **Gateway Details**, select the local gateway protocol, **H.225**
- Step 5** Click **Next**.
- Step 6** Under **Gateway Details > Select Device**, Select the CUCM cluster to which you want to register the gateway. For example, **IPPBX:e2c2p, Version 7.1.x**
- Step 7** Click **Next**.
- Step 8** Under **Gateway Functions**, check the **PSTN Local** check box.
- Step 9** Click **Add**.

Repeat this for all required Local Gateways.

Configure Gateway Hardware

To configure gateway hardware do the following:

- Step 1** Go to **Network > IOS Devices**.
- Step 2** Click the IOS Device, for example **e2lgw1**.
- Step 3** Under **Gateway Details**, Click the IOS Device, for example **e2lgw1**.
- Step 4** Under **Interface Details**, Click **Gateway Hardware Configuration**.
- Step 5** Under **Device Settings**, enter the following:
- Call Classification—<Call_Classification>, select **OFFNET**
 - Packet Capture Mode—<PacCapMode>, for example, select **<None>**
 - Gateway Voice Interface<Ehernet H.323 bind interface>, for example **FastEthernet0/0**
 - Tunnelled Protocol—<TunnelledProtocol>, select **<None>**
 - Signalling Port—<H323SigPort>, **1720**
 - Media Resource Group List—select the MRGL, for example, **e2mrglClu2**
- Step 6** Under **Call Routing Information - Inbound Calls**, enter the following:
- Significant Digits—< Significant Digits >, select **ALL**
 - Calling Search Space—<InboundCSS>, select **Incoming Call to Local PSTN Gateway**
- Step 7** Under **Call Routing Information - Outbound Calls**, enter the following:
- Calling Party Selection—Select **Originator**
 - Calling Party Presentation—Select **Allowed**
 - Redirecting Number IE Delivery - Outbound—Check the check box



Note

Redirecting Number is required for all calls forwarded from HUCS to PSTN via local gateway. Hence, Redirecting Number IE Delivery flag must be set for the local gateway outbound calls.

- Step 8** Click **Add**.

Define Local Gateway Interfaces

In Hosted UCS 7.1(a) Local Gateways can route calls via:

- PRI interfaces;
- BRI interfaces.

Following sections describe how different interfaces can be configured:

- [Define Local Gateway PRI Interface](#)
- [Define Local Gateway BRI Interface](#)



Note

Ensure that the Country has been added to the Provider before adding a Local Gateway Interface.

Define Local Gateway PRI Interface

Two steps are required to define a Local Gateway PRI Interface. The administrator needs to define a Port used on the Local Gateway, and then define a trunk used on the previously defined port.

To define a PRI port used on the Local Gateway:

-
- Step 1** Go to **Network > IOS Devices**.
 - Step 2** Click the IOS Device, for example **e2lgw1**
 - Step 3** Under **Gateway Details**, click the IOS device, for example **e2lgw1**
 - Step 4** Under **Interface Details**, click the **Gateway Hardware Configuration**.
 - Step 5** Click **Add Port**.
 - Step 6** Under **Add H.323 Port Summary**, enter the following:
 - Port Type— <PortType>, select **E1** (for PRI)
 - Port Number—<Slot/Subslot/Port>, for example **0 / 1 / 0**
 - Add Range (optional)—<PortRange>, for example **0 / 1 / 1** (if you want to add multiple ports)
 - Step 7** Click **Add**.
-

To define a Trunk used on the previously defined Port:

-
- Step 1** Go to **Network > IOS Devices**.
 - Step 2** Click the IOS Device, for example **e2lgw1**.
 - Step 3** Under **Gateway Details**, click the IOS device, for example **e2lgw1**.
 - Step 4** Under **H.323 Ports**, Select **E1** port you want to configure.
 - Step 5** Click **Configure Selected**.
 - Step 6** Under **Port Configuration**, enter the following:
 - Framing—<FramingMethod>, for example **NO-CRC4**
 - Clock Source—<ClockSrc>, **line**
 - Line Coding—**HDB3**

- ISDN Switch Type—<ISDNSwitchType>, for example, select **primary-net5**
- ISDN B Channel Number Order—select **descending**
- Set Calling Party NOA for Outgoing Calls—<ANOA>
- Set Called Party NOA for Outgoing Calls—<BNOA>

**Note**

If the NOA check box is selected for both cgpn and cdpn, then cgpn & cdpn are set in a relevant format together with appropriate NOA based on the calling number and called destination; If the NOA check box is not selected for both cgpn and cdpn, then the NOA is set to Unknown. Both cgpn and cdpn are prefixed with appropriate leading digits to distinguish calling number and called destinations.

- Local Dialing Method—<LocalDialMethod>, select a local dialing method applicable for that location, for example **No Local dialing**

**Note**

Local Dialing: This choice relates to the expected format of the cdpn (B) for outgoing/incoming PSTN calls. If there is no distinction between national and local dialing, or if the format of the number for local dialing should not be set, select **No local dialing**. All non-international calls will be treated as national calls. If the cdpn (B) for local calls needs to be presented to/from PSTN without an area code (for example some US locations allow 7-digit local dialing), select **Local dialing without area code**. In the US, some areas support 10-digit local dialing. In this case, select **10-digit local dialing**.

- National Area Code (for local dialing)—<NAC>, enter the NAC, for example **1402**

**Note**

For any selected local dialing method, the National Area code must be entered.

Step 7 Click **Next >>**

Step 8 Ensure that all the configuration details entered are correct and then click **Add**.

When configuring a PRI/BRI trunk, the NOA selected for Cgpn and Cdpn does not get updated properly on the USM page and database. The NOA should be modified manually again to set it properly. To solve this issue, do the following:

Procedure:

Step 1 Go to **Gateway Hardware Configuration**.

Step 2 Select the port and click **Configure Selected** on the port; for example, **0/1/0**.

**Note**

Ensure to configure the port by selecting the check box besides the port and clicking "Configure Selected". If you configure a port by clicking the hyperlink on the port number, it does not configure the gateway properly.

Step 3 Set NOA and other parameters properly.

Step 4 Click **Modify**.

Step 5 Ensure that settings are properly reflected on the USM page.

Repeat this for all required PRI Interfaces and for all Local Gateways.

Define Local Gateway BRI Interface

Two steps are required to define a Local Gateway BRI Interface. The administrator needs to define a Port used on the Local Gateway, and then define a trunk used on the previously defined port.

To define a BRI port used on the Local Gateway:

-
- Step 1** Go to **Network > IOS Devices**.
- Step 2** Click the IOS Device, for example **e2lgw1**.
- Step 3** Under the Gateway Details, click the IOS device, for example **e2lgw1**.
- Step 4** Under **Interface Details**, Click the **Gateway Hardware Configuration**.
- Step 5** Click **Add Port**.
- Step 6** Under **Add H323 Port Summary**, enter the following:
- Port Type—<PortType>, select **BRI**
 - Port Number—<Slot/Subslot/Port>, for example **1 / 1 / 0**
 - Add Range (optional)—<PortRange>, for example **1 / 1 / 1** (for adding multiple ports)
- Step 7** Click **Add**.
-

To define a Trunk used on the previously defined Port:

-
- Step 1** Go to **Network > IOS Devices**.
- Step 2** Click the IOS Device, for example **e2lgw1**.
- Step 3** Under the Gateway Details, click the IOS device, for example **e2lgw1**.
- Step 4** Under **Interface Details**, Click the **Gateway Hardware Configuration**.
- Step 5** Under H.323 Ports, Select **BRI** port.
- Step 6** Click **Configure Selected**.
- Step 7** Under **Port Configuration**, enter the following:
- ISDN Switch Type—<ISDNSwitchType>, for example, select **basic-net5**
 - ISDN Layer1 Emulate—<Port Side>, select **Network** (if the BRI port side is NT)
 - ISDN Protocol Emulate—<ProtocolEmulation>, select **Network** (if the BRI port side is)
 - ISDN Overlap Receiving—select **no**
 - ISDN Twait-Disable—select **no**
 - Set Calling Party NOA for Outgoing Calls—<ANOA>
 - Set Called Party NOA for Outgoing Calls—<BNOA>

**Note**

If the NOA check box is selected for both cgpn and cdpn, then cgpn & cdpn are set in a relevant format together with appropriate NOA based on the calling number and called destination. If the NOA check box is not selected for both cgpn and cdpn, then the NOA is set to Unknown. Both cgpn and cdpn are prefixed with appropriate leading digits to distinguish calling number and called destinations.

- Local Dialing Method—<LocalDialMethod>, select a local dialing method applicable for that location, for example **No Local dialing**

**Note**

Local Dialing: This choice relates to the expected format of the cdpn (B) for outgoing/incoming PSTN calls. If there is no distinction between national and local dialing, or if the format of the number for local dialing should not be set, select No local dialing. All non-international calls will be treated as national calls. If the cdpn (B) for local calls needs to be presented to/from PSTN without an area code (for example some US locations allow 7-digit local dialing), select Local dialing without area code. In US, some areas support 10-digit local dialing. In this case, select 10-digit local dialing.

- National Area Code (for local dialing)—<NAC>, enter the NAC, for example **1402**

**Note**

For any selected local dialing method, the National Area code must be entered.

Step 8 Click **Next >>**

Step 9 Ensure that all the configuration details entered are correct and then click **Add**.

When configuring a PRI/BRI trunk, the NOA selected for Cgpn and Cdpn does not get updated properly on the USM page and database. The NOA should be modified manually again to set it properly:

Procedure:

Step 1 Go to **Gateway Hardware Configuration**.

Step 2 Select the port and click the Configure Selected of the port, for example, **1/1/0**.

**Note**

Ensure to configure the port by selecting the check box besides the port and clicking "Configure Selected". If you configure a port by clicking the hyperlink on the port number, it does not configure the gateway properly.

Step 3 Set **NOA and other parameters** properly and click **Modify**.

Step 4 Ensure that settings are properly reflected on the USM page.

Repeat this for all required BRI Interfaces and for all Local Gateways.

Add E.164 inventory for local gateway location

In this section, E.164 numbers which should be associated with local gateway location are added in ranges of 1, 10, 100, 1000, 10000, (10^x where $x = 0,1,2,3,4$) as local breakout E.164 numbers.

Please refer [Adding Area Codes, page 4-3](#), for creating E164 inventory

**Note**

The E164 numbers for local gateway location should be added as "Local" break out numbers.

Move E.164 numbers to Local Gateway Location

Refer [Moving E.164 Number Inventory, page 4-13](#).

Location Administration

This section describes the steps required to configure various location parameters, which are specific for Local PSTN breakout support, for example changing the location preferences.

**Note**

Before proceeding with the provisioning steps in this section ensure that:

- A local gateway location is added with Internal numbers
- E164 number inventory is added and moved to local gateway location
- You haven't assigned any range of E164 numbers to internal numbers.

For further details refer to Section 8 and 13 on "Hosted UCS 7.1(a) Release - USM Provisioning Guide.

This section has the following topics:

- [Change Location Preference, page 7-18](#)
- [Activate Local Gateway Port, page 7-18](#)
- [Apply Local Gateway Call Routing, page 7-19](#)
- [Assign Range of E.164 Numbers to Internal Numbers, page 7-20](#)
- [Assign Range of E164 Numbers to Internal Numbers](#)
- [Add Location PSTN published number, page 7-20](#)
- [Add Location Emergency Published Number, page 7-20](#)
- [Modify/Delete Local Gateway Port Call Routing, page 7-21](#)
- [Modify/Delete Location Call Routing, page 7-21](#)
- [Modify/Delete Location Call Routing](#)
- [Modify/Delete Local Gateway Dial Plan, page 7-22](#)
- [Voicemail Retrieval via Location Local Breakout, page 7-22](#)

**Caution**

Ensure that you are administering the correct Location. The name of the Location will be shown on the screen

Change Location Preference

To change location preference do the following:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location you want to configure.
 - Step 3** Click **Preferences**.
 - Step 4** Click **AssociateFNNinRanges**.
 - Step 5** In **Location > AssociateFNNinRanges**, Check the available Check box.
 - Step 6** Click **Modify**.
-

Activate Local Gateway Port

To activate a local gateway port on a location, do the following:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location you want to activate port.
 - Step 3** Go to **Location Administration > Telephony > Gateways**.
 - Step 4** Select the gateway port to activate, for example Port **1/0/0**
 - Step 5** Click **Activate**.
An **Advanced Dial Plan Configuration** page is displayed.
 - Step 6** Select the Call of Service—**Incoming Calls to Local PSTN Gateway**.
 - Step 7** Click **Activate**.
-

**Note**

When there is a dial plan active for the location, the user can select additional ports or additional gateways from the deactivated port section and select the Activate button. This will take the user to the Advanced Dial Plan Configuration page.

**Note**

When adding ports, the user is restricted from changing the Class of service and the device priority of existing H.323/H.225 protocol ports.

Apply Local Gateway Call Routing

When adding the location level call routing, the route patterns and translation patterns associated with the call routing types that have local call paths are updated. The route list for the route patterns associated with the location and call routing type having local call path are updated to Local Gateway Route List setting of the route pattern. Similarly, the calling search space for the translation patterns associated with the location, and having local call path, is updated to Local Gateway CSS setting of the translation pattern.

While modifying the location level call routing, the route patterns and translation patterns associated with the call routing types are updated.

The route list for the route patterns associated with the location, and associated with the call routing types for which the call path is modified to central, are updated to route list name setting of the route pattern. Similarly, the calling search space for the translation patterns associated with the location, and associated with the call routing types for which the call path is modified to central, update the css name setting of the route pattern.

The route list for the route patterns associated with the location, and having call routing type with local call path, are updated to Local Gateway Route List setting of the route pattern. Similarly, the calling search space for the translation patterns associated with the location, and having local call path, are updated to Local Gateway CSS setting of the translation pattern. While deleting the location level call routing, the route patterns and translation patterns associated with the call routing types having local call path are updated.

To enable location level call routing, follow the steps below:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location in which port is activated.
 - Step 3** Go to **Location Administration > Telephony > Gateways > Call Routing**.
 - Step 4** Select the Call Types which you want to apply on local gateway. For example, Select **All Local**.
 - Step 5** Click **Submit**.
 - Step 6** Go to **Location Administration > Telephony > Gateways > Call Routing**.
 - Step 7** Under **Local Gateway Port Call Routing**, select **all call types**.
 - Step 8** From **Apply Call Routing Configuration to Trunks** menu, select **Once for all the Call Types**.
 - Step 9** Click **Submit**.
-

**Note**

The Local Gateway Port Call Routing section is displayed on the screen once the location level call routing has been applied and H.323 ports have been activated at the location. The first setting displayed in this section is, Apply Call Routing Configuration to Trunks, this has two options available:

- Once for all the Call Types (default) - This implies that call routing configuration will be applied to trunks once for all the call types
- Once per Call Type - The configuration would be applied per call type per trunk.

Once call routing has been applied to the ports, the Apply Call Routing Configuration to Trunks setting cannot be modified, and the drop-down menu is disabled.

Assign Range of E.164 Numbers to Internal Numbers

For a range of internal extensions, USM administrator can assign a range of E.164 numbers to an IP Phone, so that users can receive calls from the PSTN on these extensions. For locations with Local PSTN breakout support, E.164 numbers are associated with internal numbers by associating a range of 10^n numbers, where 'n' can be selected from the values {0,1,2,3,4}.

Ensure that the Location preference 'AssociateFNNinRanges' has been enabled. To assign a range of E.164 numbers to internal numbers using the in-ranges option, do the following:

-
- Step 1** Go to **Location Administration > External Numbers**.
 - Step 2** Click **Associate Range**.
 - Step 3** Under **Select the Size of Range**, enter the following:
 - Range Size—<RangeSize>, for example **10**.
 - Click **Next >>**
 - Step 4** Under **Details**, enter the following for the Range:
 - PSTN Number range—<PSTNRange>, for example **2122110200-2122110209**
 - Extension Number range—<ExtRange>, for example **0200-0209**
 - Step 5** Click **Submit**.
-



Note

In order to associate a range of numbers not equal to 10^n numbers, where 'n' can be selected from the values {0,1,2,3,4}, the second step needs to be repeated a few times. For example, if a range of 21 numbers needs to be associated, this step needs to be repeated three times ($2 * 10^1 + 1 * 10^0$).



Note

Starting from Hosted UCS 6.1(a), USM invokes the PGW TimesTen driver and uses the TimesTen Input in the AssociateFNN transaction (AssociateFNN and AssociateFNNLocalGW scripts) of the PGW_TimesTen_Any model worksheet to create an import file and transfer it to the PGW, where it invokes the HUCSprovx10 PGW script and inserts the associations into the PGW TimesTen database.

Repeat this multiple times (if the range is not equal to 10^n numbers, where n can be selected from the values {0,1,2,3,4},) and for all required locations.

Add Location PSTN published number

To add a PSTN published number for a location, refer the Section [Adding PSTN Published Numbers](#), page 4-15.

Add Location Emergency Published Number

To add an emergency published number for a location, refer the section [Adding Emergency Published Numbers](#), page 4-15.

After the local gateway is provisioned, enter the following IOS commands on the gateway in configuration mode.

```
voice service voip
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback none
modem passthrough nse codec g711ulaw
allow-connections h323 to h323
h323
emptycapability
h245 passthru tcsnonstd-passthru
```

Modify/Delete Local Gateway Port Call Routing

**Note**

The steps mentioned in this section are only for modifying or deleting the existing local gateway port call routing and it should be performed if you want to modify/delete the provisioned local gateway, otherwise not required.

To Modify/Delete location level call types, follow the steps below:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location in which port is activated.
 - Step 3** Go to **Location Administration > Telephony > Gateways > Call Routing**.
 - Step 4** Under **Local Gateway Port Call Routing**, select applicable call types which you want to modify / delete.
 - Step 5** Click **Modify**, if you would like to modify the call routing types or click **Delete** to remove the local gateway call routing for all the call types.
-

Modify/Delete Location Call Routing

**Note**

The steps mentioned in this section are only for modifying or deleting the existing location call routing and it should be performed if you want to modify/delete the provisioned local gateway otherwise not required. Ensure that the steps in [Modify/Delete Local Gateway Port Call Routing, page 7-21](#) is already done before proceeding with this section

To Modify/Delete location level call routing, follow the steps below:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location in which port is activated.
 - Step 3** Go to **Location Administration > Telephony > Gateways > Call Routing**.
 - Step 4** Under **Location Call Routing**, select applicable call types which you want to modify/delete.
 - Step 5** Click **Modify**, if you would like to modify the call routing or click **Delete** to remove the location call routing.
-

Modify/Delete Local Gateway Dial Plan



Note

The steps mentioned in this section are only for modifying or deleting the existing location dial plan and it should be performed if you want to modify/delete the provisioned local gateway otherwise not required. Also, ensure that the steps in [Modify/Delete Local Gateway Port Call Routing, page 7-21](#) and [Modify/Delete Location Call Routing, page 7-21](#) are already done before proceeding with this section.

To Modify/Delete location dial plan, follow the steps below:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location in which port is activated.
 - Step 3** Go to **Location Administration > Telephony > Gateways**.
 - Step 4** Click **Modify Dial Plan**, if you would like to modify the dial plan Class of Service or click **Delete Dial Plan**, to remove the local gateway dial plan.
-



Note

If you would like to change the PRI/BRI trunk definitions of the local gateway, then the location level gateway configurations on USM should be removed as in [Modify/Delete Local Gateway Port Call Routing, page 7-21](#), [Modify/Delete Location Call Routing, page 7-21](#) and [Modify/Delete Local Gateway Dial Plan, page 7-22](#). Otherwise the USM administrator would not allow to modify some of the fields of trunk definition.

Voicemail Retrieval via Location Local Breakout

In HUCS7.1a release, it is possible to configure the Hosted UCS components so that users can retrieve their Voicemail via the LGW.

In addition to this it is possible to configure multiple E.164 numbers for Voicemail retrieval via LGW in order to allow users in different locations to retrieve Voicemails via the closest LGW.

To configure E.164 numbers for voice mail pilot number in order to retrieve voice mail via local gateway PSTN, follow the steps below:

-
- Step 1** Go to **General Administration > Locations**.
 - Step 2** Select the location in which both local gateway and voicemail service are available.
 - Step 3** Click **Advanced Management**.
 - Step 4** Click **Voicemail Mgt**. You should see the available "Local" breakout PSTN numbers. If there is no PSTN numbers available in that location, add local break out E.164 numbers) and move it to this location.
 - Step 5** Click **Associate Range**
 - Step 6** Select the Range Size (1, 10, 1000, 10000) based on the total E.164 numbers which you want to associate to a voice mail pilot., for example, select **1**
 - Step 7** Under **Map a PSTN Range to a single extension**, select the PSTN Number Range for the selected Extension Number (VM pilot number), for example, **01637111010 - 01637111010**.

Step 8 Click **Submit**.
