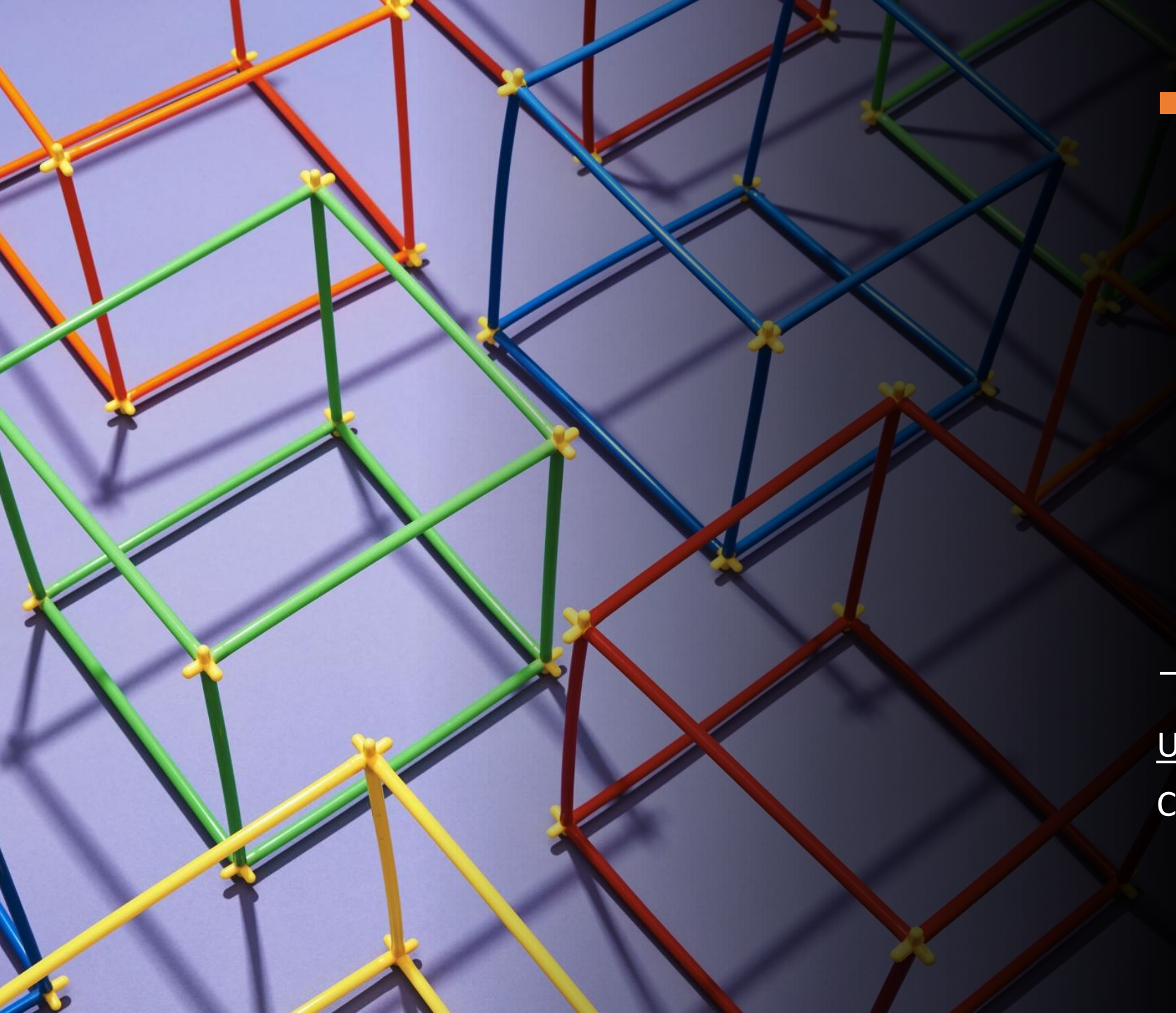


COMUNIACIONES UNIFICADAS

Marzo 2026

UNIDAD 4 - CUCM

Cisco Unified Communications Manager

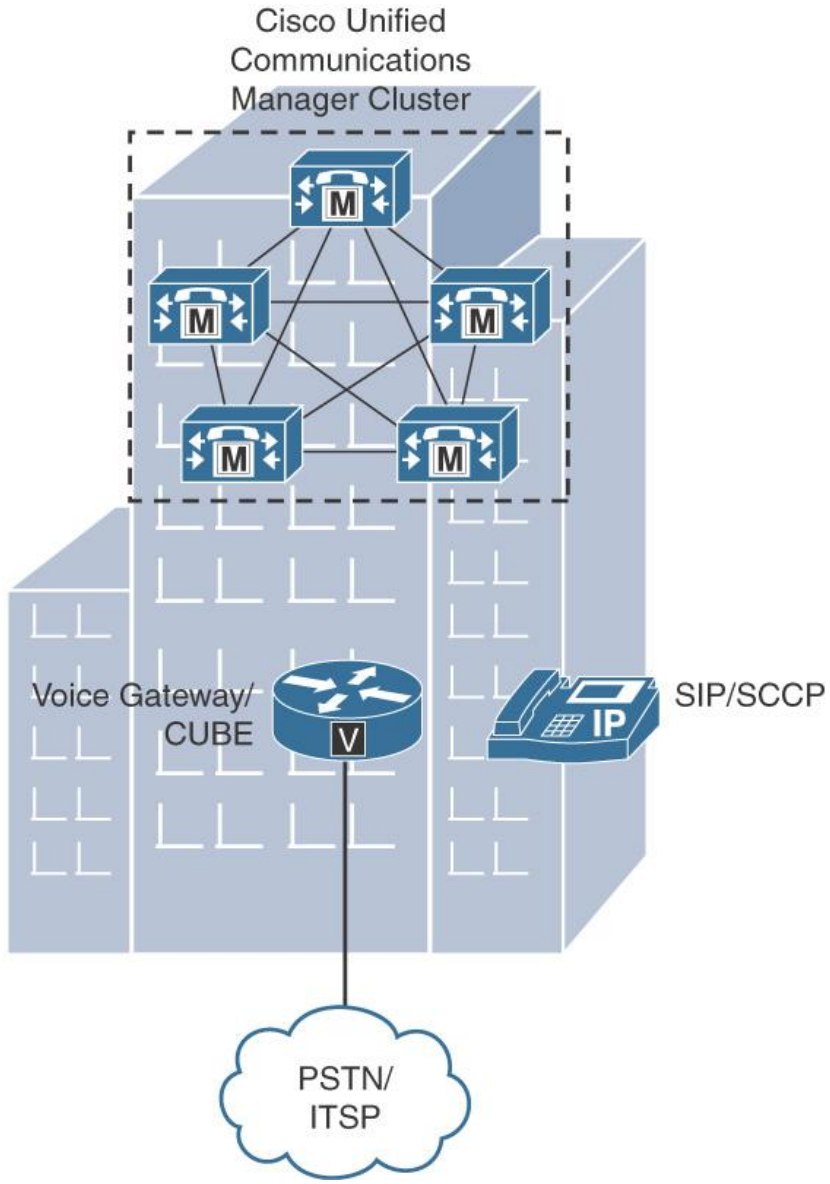
Cisco Unified Communications Manager (CUCM)

Modelo Single Site de CUCM

- Todos los servidores, aplicaciones y recursos de procesadores de señales digitales (DSP) de CUCM se ubican en la misma ubicación física o en varios edificios físicos con conectividad basada en redes de área local (LAN)

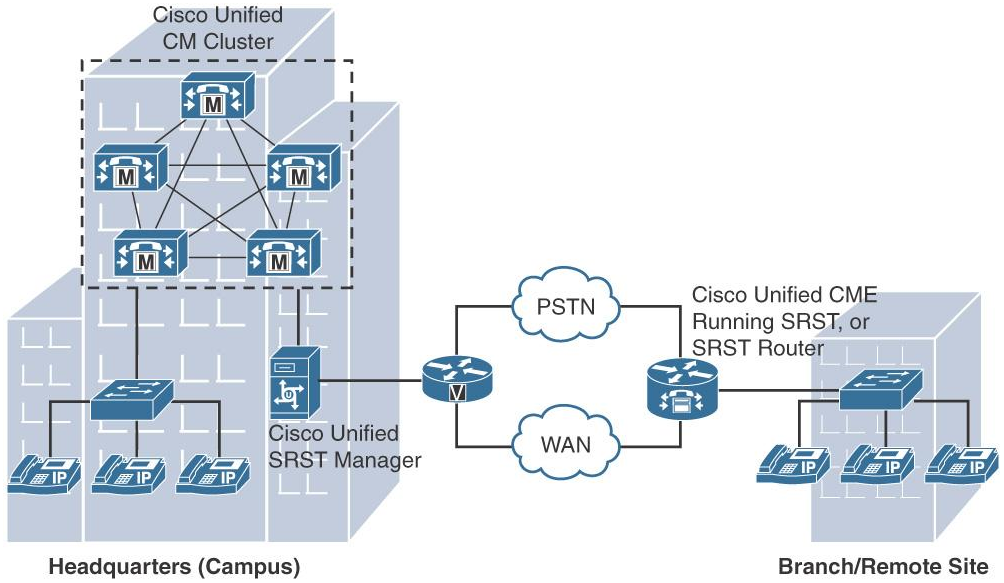
- En este modelo, las llamadas fuera de la LAN (externas) utilizan la red telefónica pública (PSTN).

- Cada clúster admite un máximo de 40 000 teléfonos IP. Si se necesita implementar más de 40 000 teléfonos IP en una configuración de un solo sitio, se pueden implementar varios clústeres dentro de una LAN y conectarlos mediante troncales entre clústeres. Las troncales de puerta de enlace que se conectan directamente a la PSTN gestionan las llamadas externas. Si existe una WAN IP entre sitios, esta se utiliza únicamente para transportar tráfico de datos; no se proporcionan servicios de telefonía a través de la WAN.



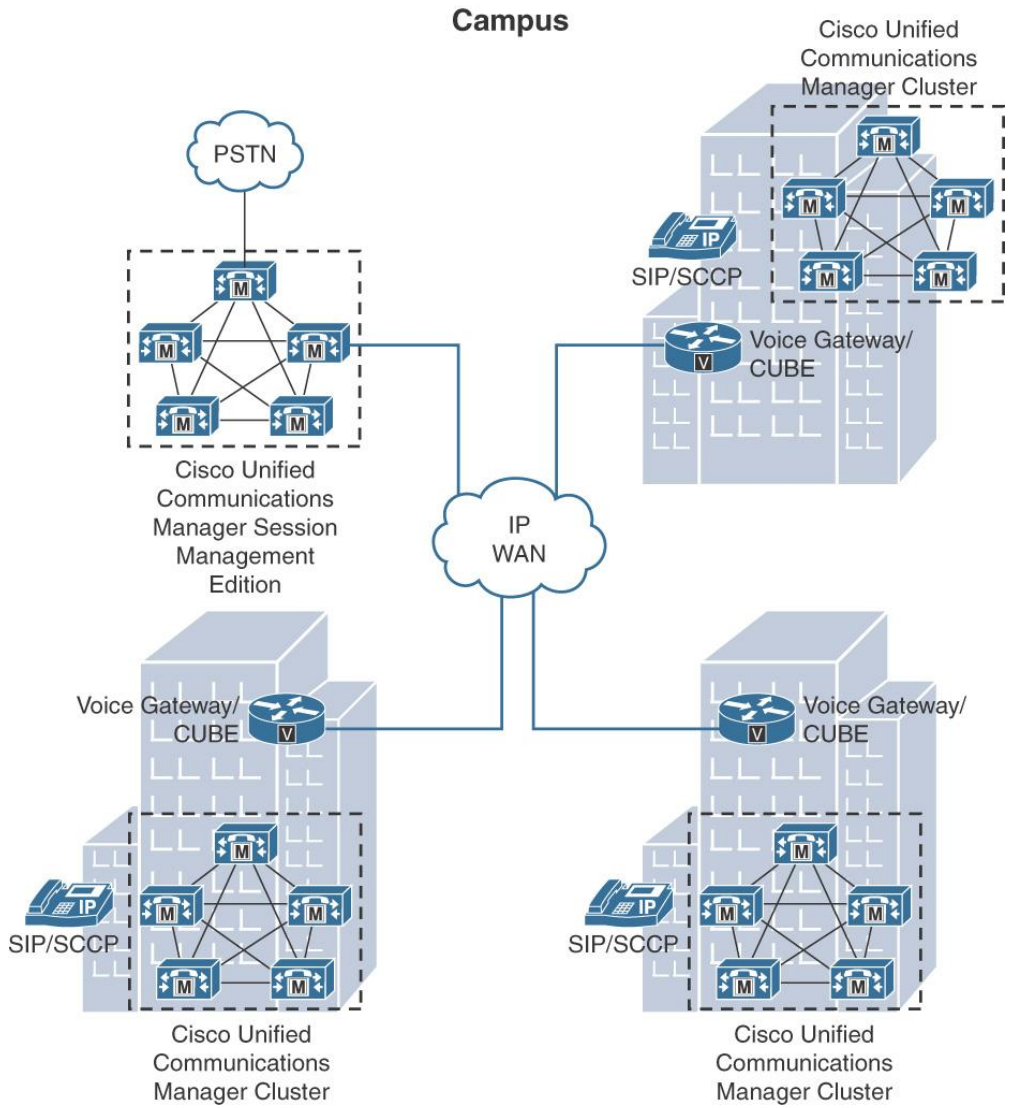
Modelo
Multisite con CUCM centralizado

- La implementación multisitio con un modelo de procesamiento de llamadas centralizado consiste en un clúster de CUCM único, que presta servicios a varios sitios y utiliza la WAN IP para transportar el tráfico de telefonía IP entre ellos.
- La WAN IP también transporta la señalización de control de llamadas entre el clúster CUCM en el sitio central y los teléfonos IP en los sitios remotos.
- Las sedes remotas dependen del clúster CUCM centralizado para gestionar el procesamiento de llamadas.
- Aplicaciones como el correo de voz y los sistemas de respuesta de voz interactiva también suelen estar centralizadas para reducir los costos generales de administración y mantenimiento.
- La función de Cisco Unified Survivable Remote Site Telephony (SRST), disponible en los gateways Cisco IOS, proporciona servicios de procesamiento de llamadas a teléfonos IP remotos durante una interrupción de la WAN.
- Cuando la WAN IP falla, los teléfonos IP de la sucursal remota pueden registrarse en el router Cisco Unified SRST local.
- Este router puede procesar llamadas entre teléfonos IP registrados y enviar llamadas a otros sitios a través de la PSTN.

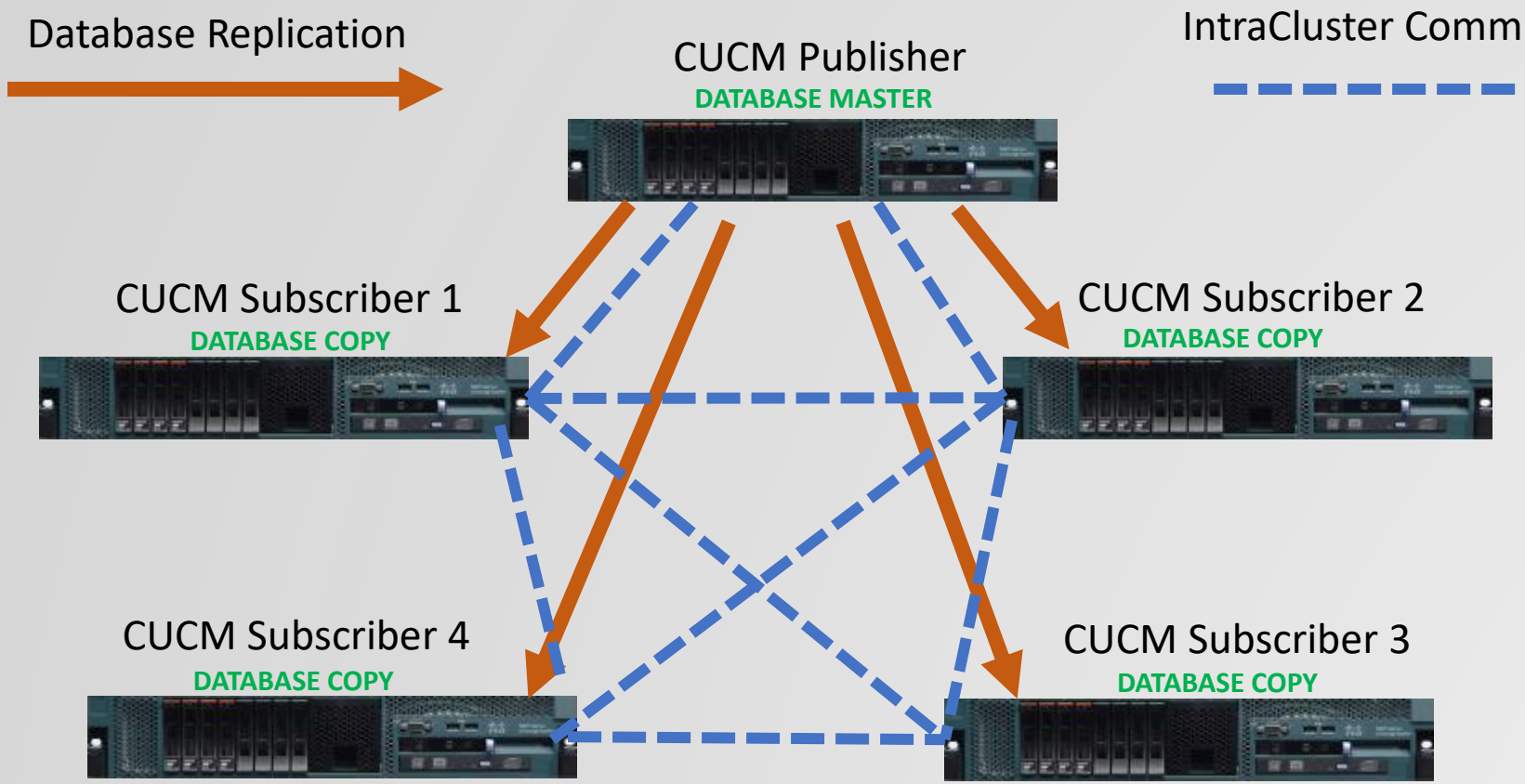


Modelo Multisite con CUCM distribuido

- El modelo para una implementación de WAN multisitio con procesamiento distribuido de llamadas consta de varios sitios independientes, cada uno con su propio cluster de CUCM.
- Una WAN IP transporta el tráfico de voz entre los clústeres distribuidos.
- Las llamadas externas de cada uno de los sitios pueden enrutarse por su voice gateway local en caso de tener una conexion a PSTN mediante algun enlace saliente o, de manera centralizada o centralizarse a través del sitio principal (como se muestra en la imagen)



CUCM Clustering



Un cluster soporta un **<u>único</u>** Publisher y hasta **19** Subscribers:

- **8** como **call-processing.**
- **11** como recursos
  - **TFTP**
  - **Conference Bridge,**
  - **Music on Hold**
  - **Etc**

- El **primary server** de **(call processing),** no tiene por que cumplir el rol de **publisher**

CUCM Clustering

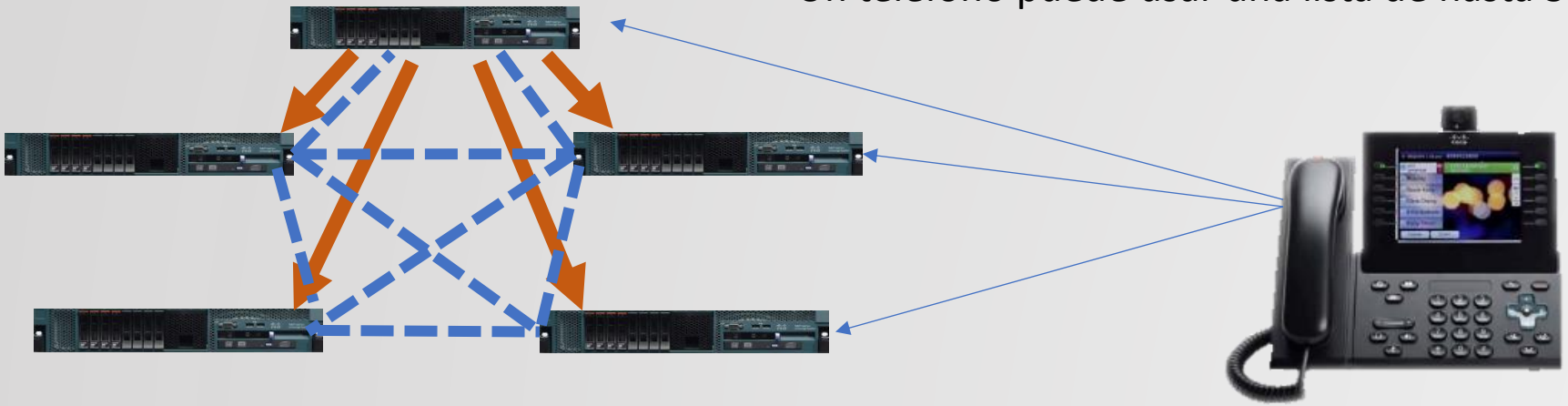
En una instalación típica, el Publisher realiza 2 funciones primarias

- Mantiene la única copia grabable de la base de datos (Informix)
- Sirve las solicitudes de TFTP

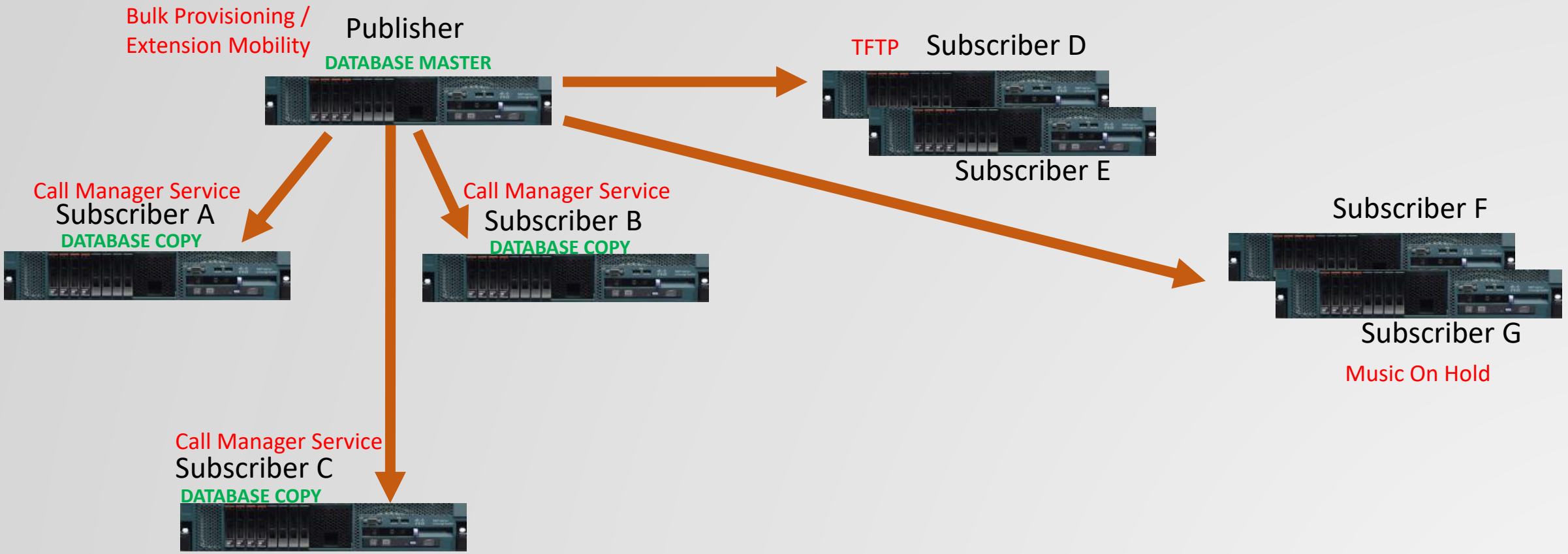
Cisco recomienda mover el role de TFTP a un Subscriber dedicado a partir de los 1000 teléfonos

Si el Publisher se rompe , el cluster continua trabajando con la ultima copia , pero no se puede agregar nuevos teléfonos.

Un teléfono puede usar una lista de hasta 3 servidores para redundancia



CUCM Clustering



Version 14

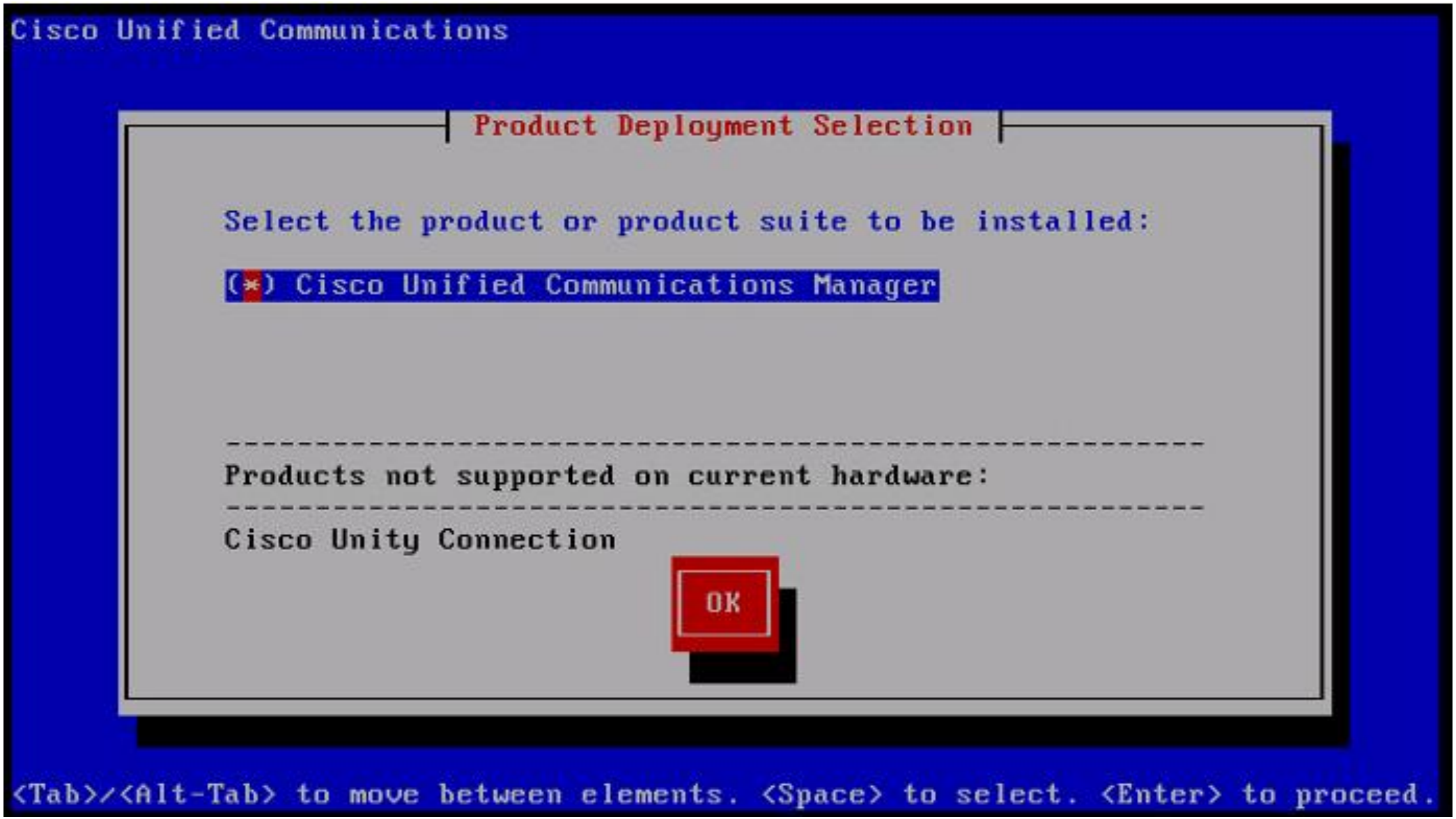
Supported Versions of VMware vSphere ESXi= 6.7, 7.0 U1					Design Guide Upgrade Guide
Component & Capacity Point	**VM Configuration Requirements** click to download OVA file for this version				
	vCPU	**Physical CPU Base Frequency**	**vRAM**	**vDisk**	**vNIC**
UCM Cluster Node	Min 2 See Notes	Min 2.00 GHz See Notes	Min 6 GB See Notes	Min 1 x 80 GB See Notes	1

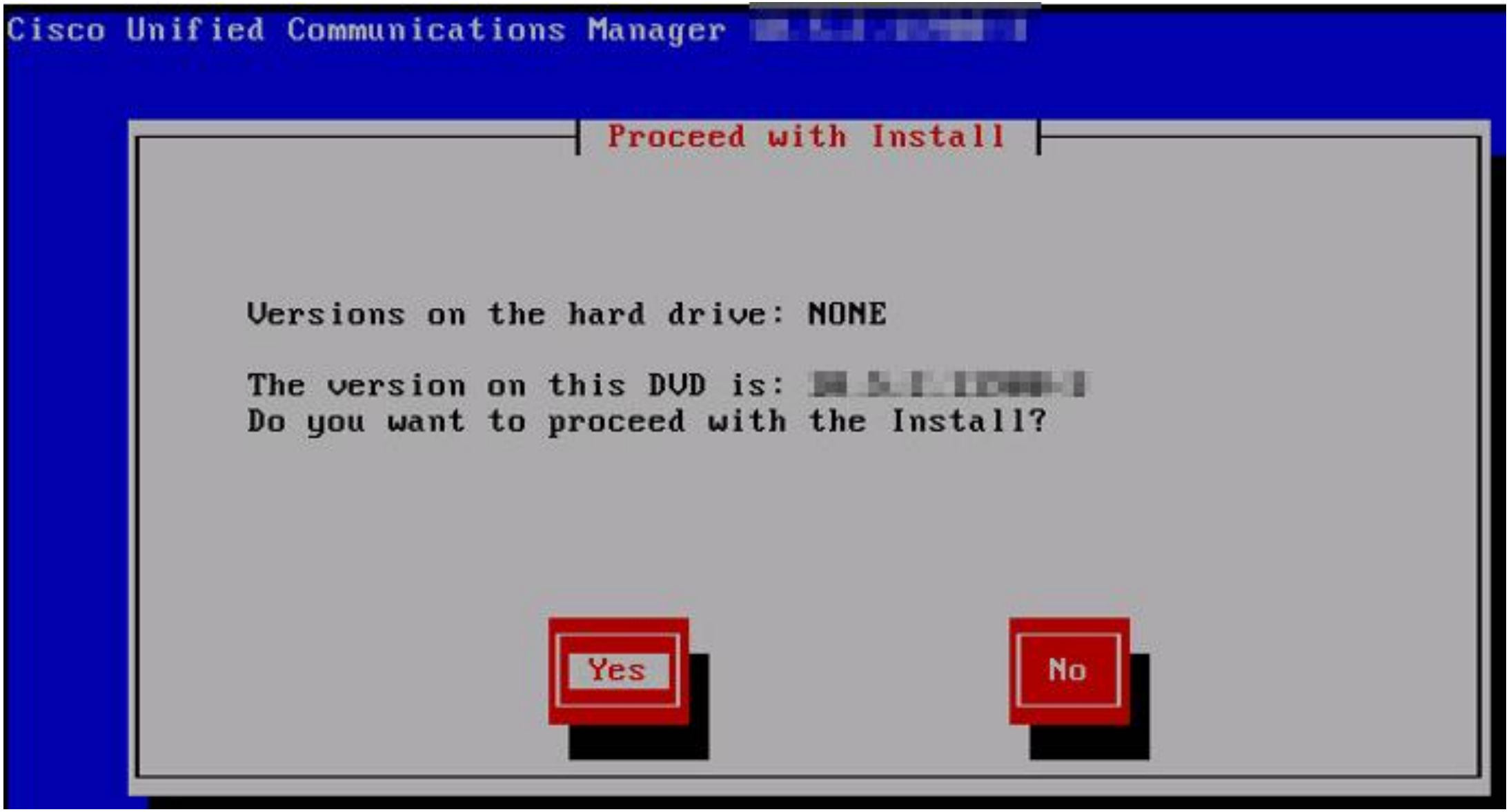
Notes:

- Run Collaboration Sizing Tool (CST) for prescriptive guidance on VM specs.
- See Notes section for VM Configurations and IOPS requirements.
- Refer to Cisco Collaboration Infrastructure for all other details on hardware and VMware support.
- Refer to Quote Collab for modeling VM placement on a user defined hardware configuration.

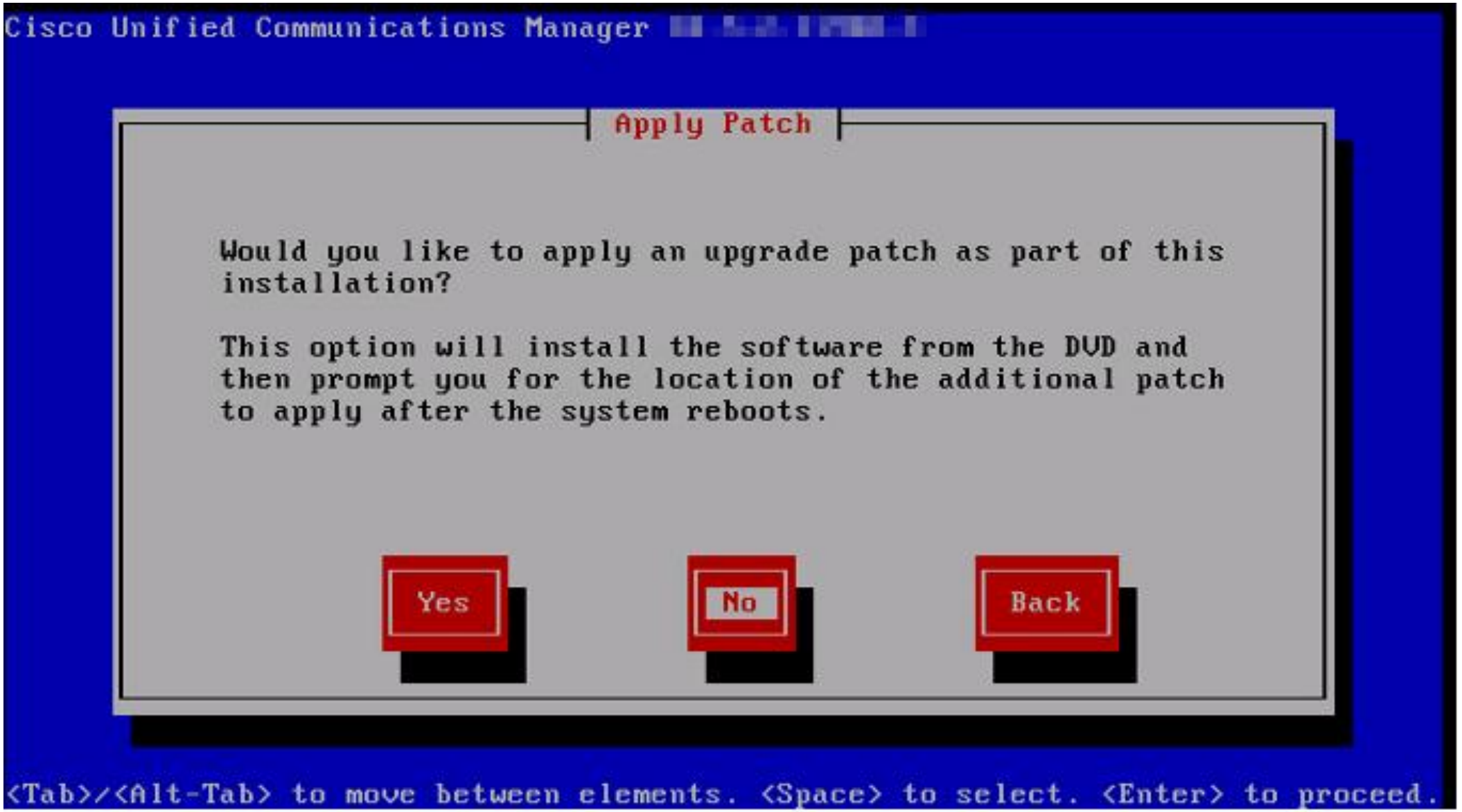
Here are some recommended starting points based on typical requirements; your requirements may be different:

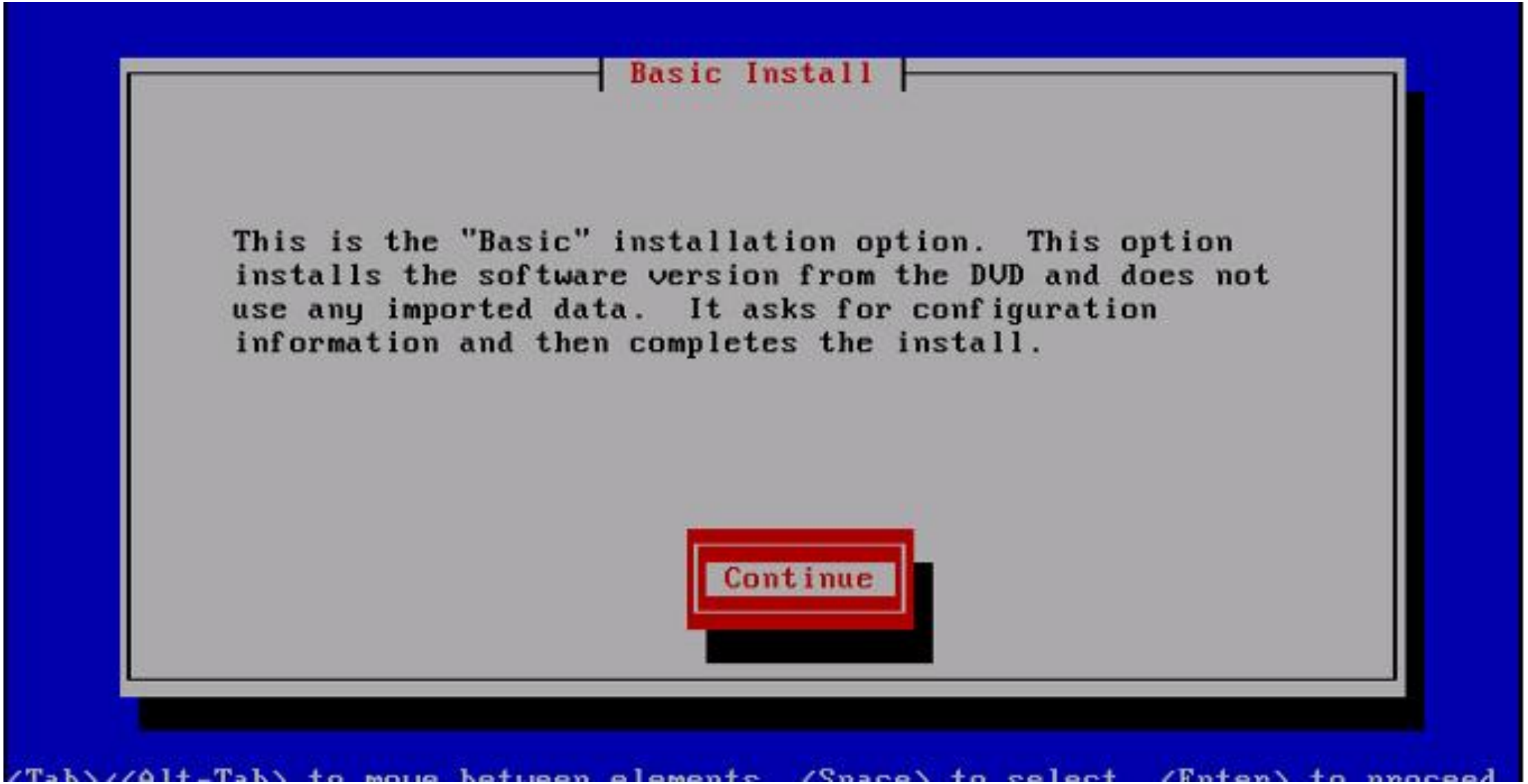
	vCPU	**Physical CPU Base Frequency**	**vRAM**	**vDisk**	**vNIC**
Small Example VM (Small Example Hardware)	2	2.00+ GHz	6 GB	1 x 100 GB	1 (1GbE+)
Medium Example VM (Medium Example Hardware)	2	2.50+ GHz	8 GB	1 x 110 GB	1 (1GbE+)
Large Example VM (Large Example Hardware)	4	2.50+ GHz	8 GB	1 x 110 GB	1 (1GbE+)

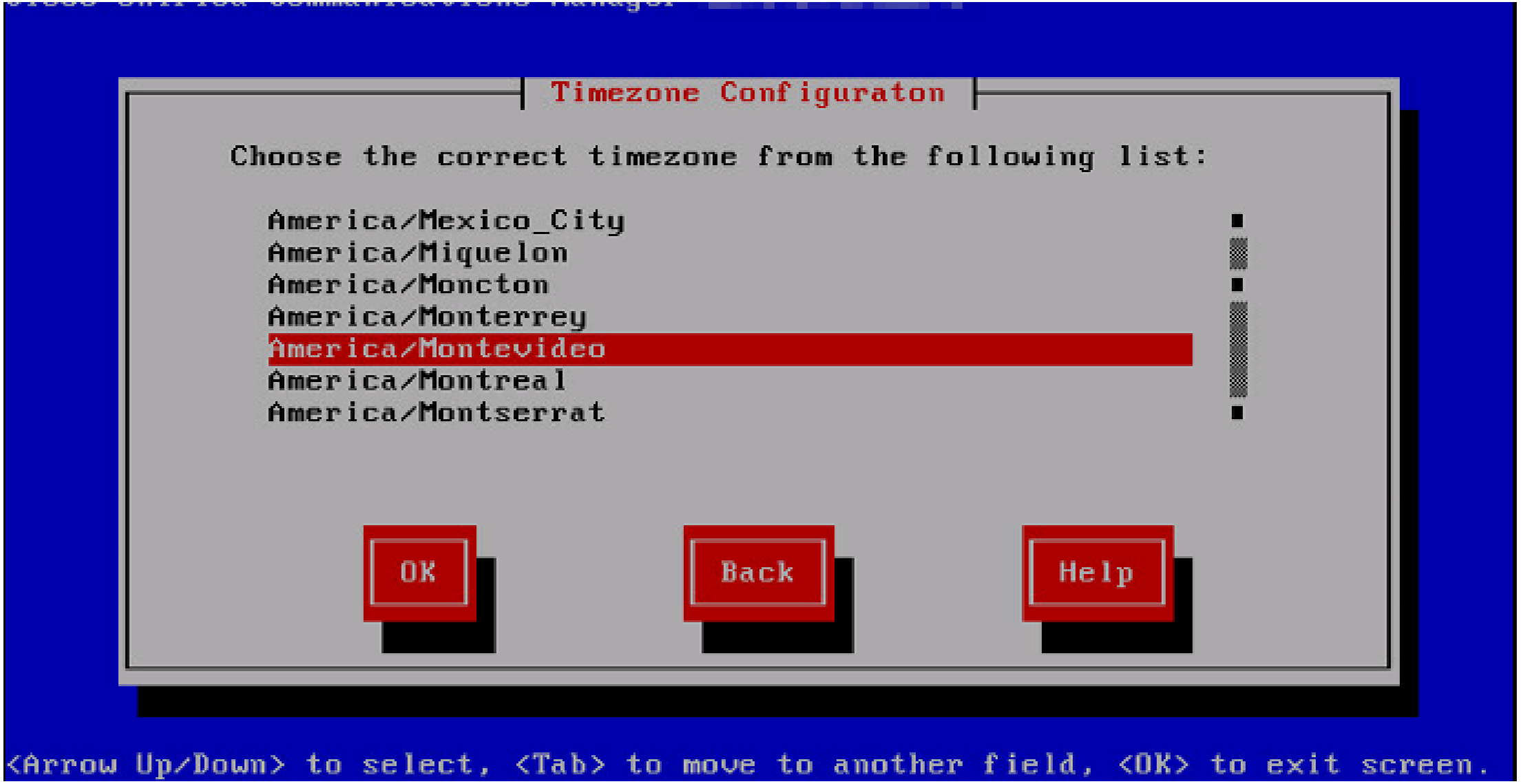

Cisco Unified Communications
Product Deployment Selection
Select the product or product suite to be installed:
(*) Cisco Unified Communications Manager
Products not supported on current hardware:
Cisco Unity Connection
OK
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Cisco Unified Communications Manager
Proceed with Install
Versions on the hard drive: NONE
The version on this DVD is:
Do you want to proceed with the Install?
Yes
No


Cisco Unified Communications Manager
Platform Installation Wizard
This Wizard sets up the initial configuration of the platform.
Before proceeding, complete the pre-installation tasks outlined in the installation guide.
Choose <Proceed> to continue with the wizard.
Choose <Skip> to skip the configuration until later.
Choose <Cancel> to end the installation.
Proceed
Skip
Cancel
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Cisco Unified Communications Manager
Apply Patch
Would you like to apply an upgrade patch as part of this installation?
This option will install the software from the DVD and then prompt you for the location of the additional patch to apply after the system reboots.
Yes
No
Back
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

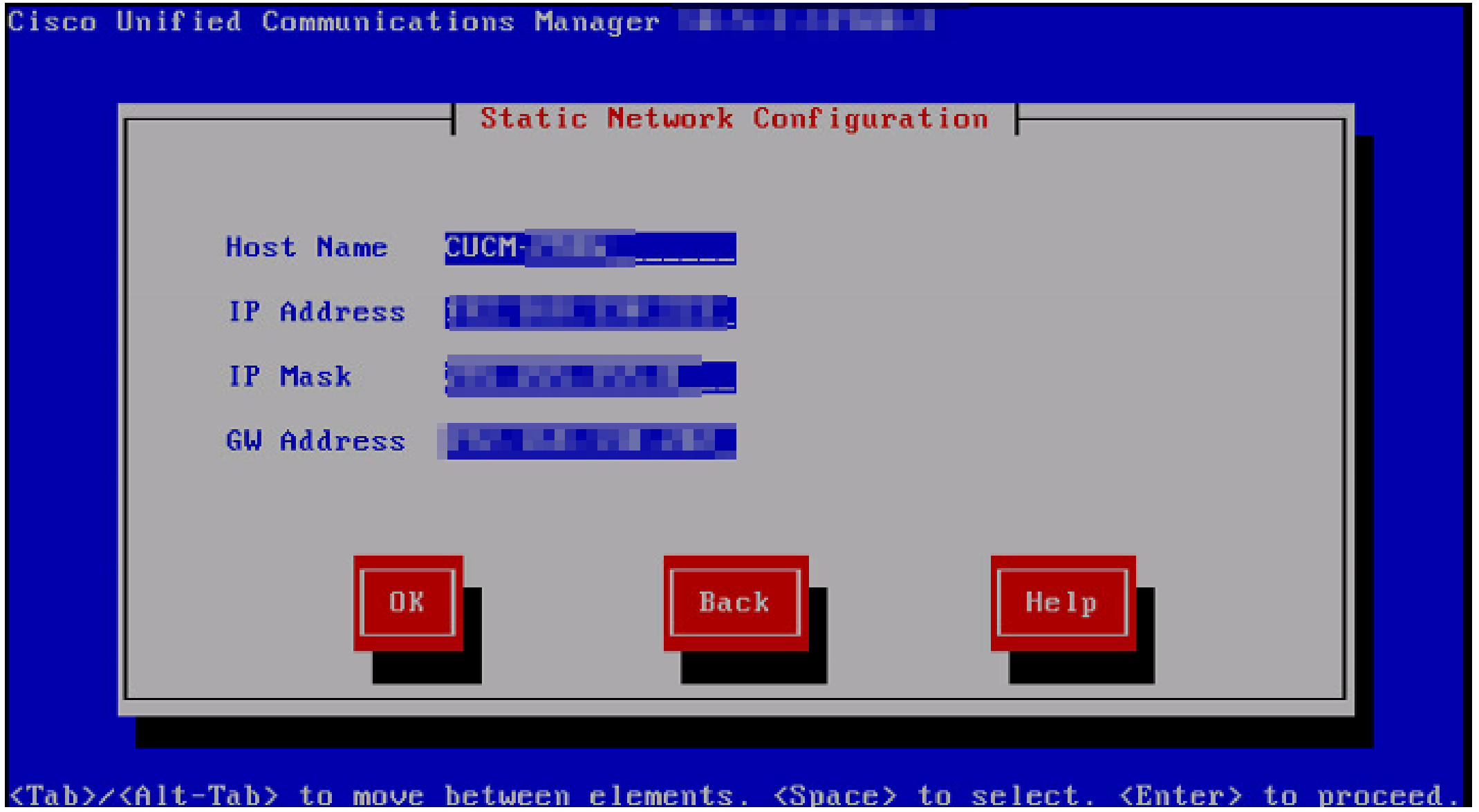

Basic Install
This is the "Basic" installation option. This option installs the software version from the DVD and does not use any imported data. It asks for configuration information and then completes the install.
Continue

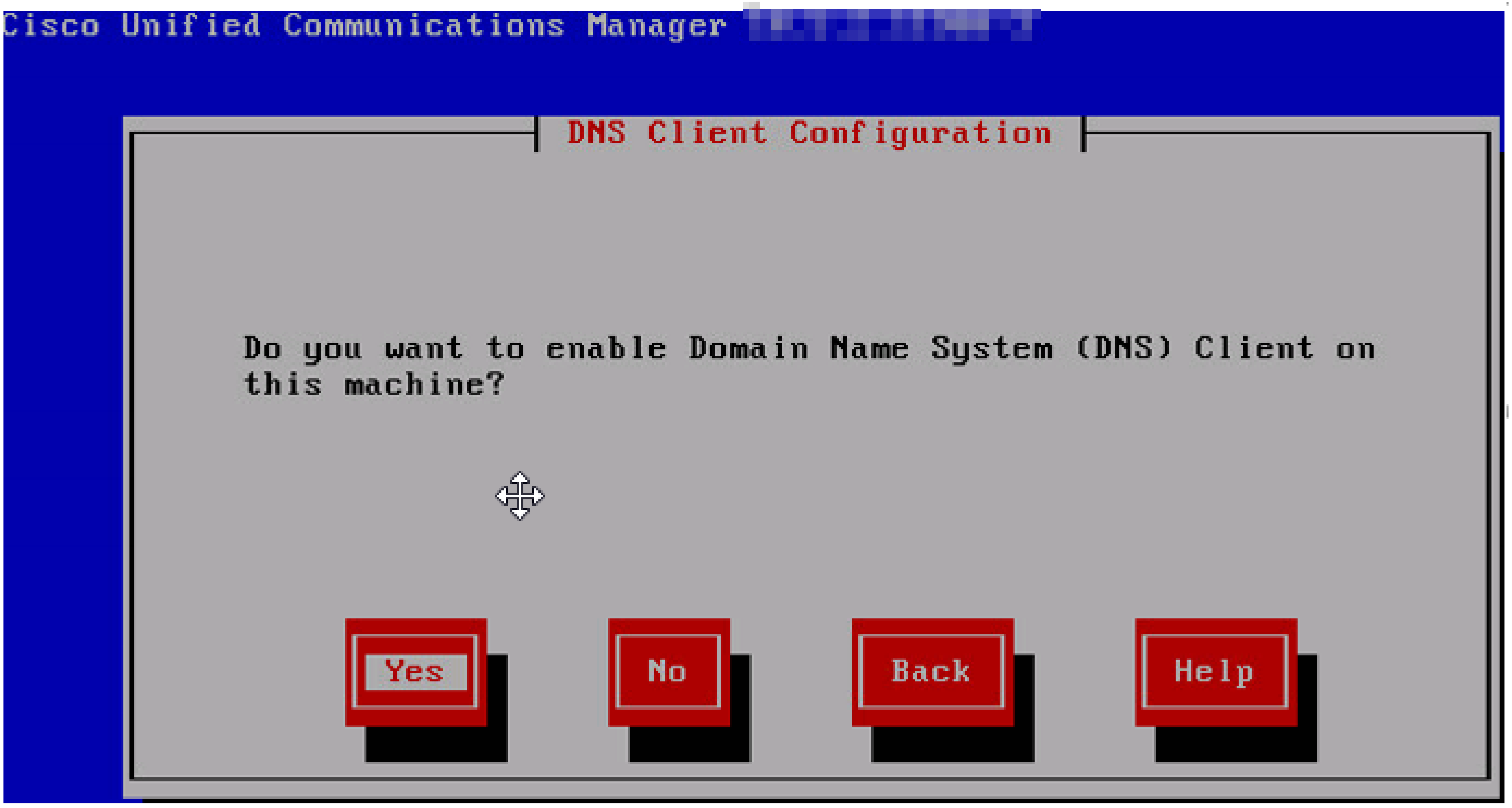

Timezone Configuraton
Choose the correct timezone from the following list:
America/Mexico_City
America/Miquelon
America/Moncton
America/Monterrey
America/Montevideo
America/Montreal
America/Montserrat
OK
Back
Help
<Arrow Up/Down> to select, <Tab> to move to another field, <OK> to exit screen.

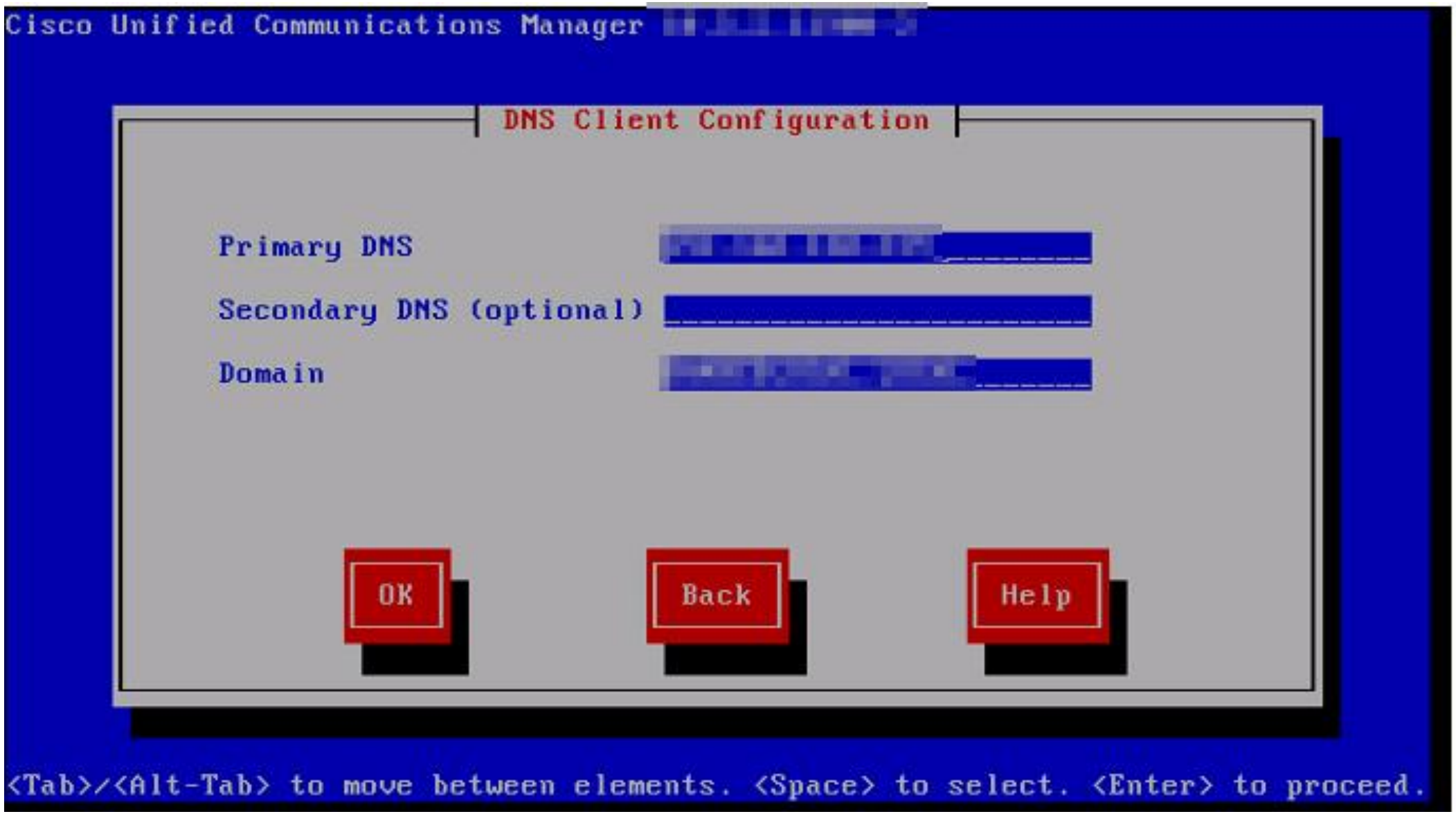

Auto Negotiation Configuration
NIC speed and duplex in a virtual machine are determined by the Host.
They do not need to be configured in the Guest.
Please select "Continue" to proceed with the installation.
Continue
Back
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Cisco Unified Communications Manager
MTU Configuration
Do you want to change the MTU size from the OS default?
No
Yes
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

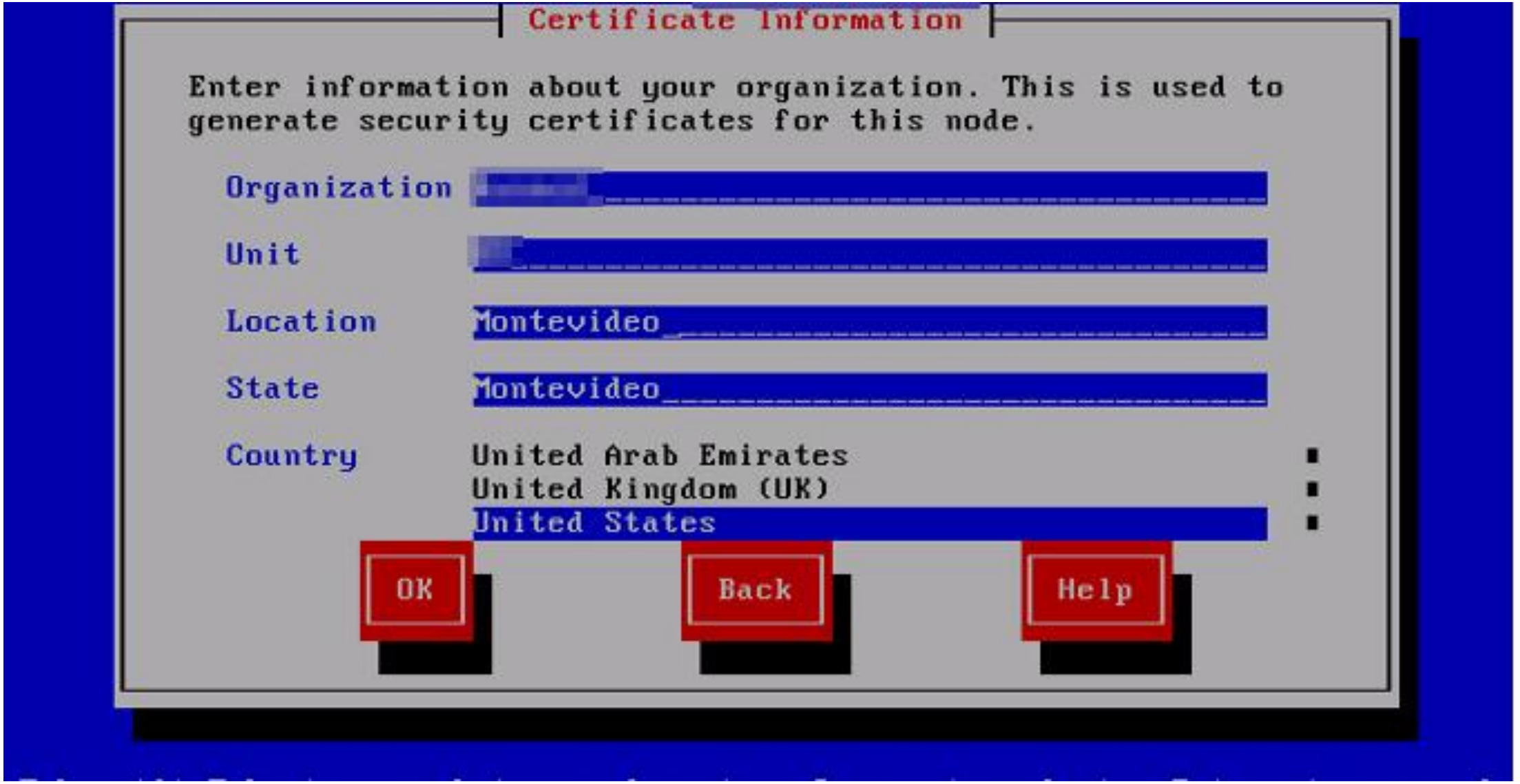

Cisco Unified Communications Manager
DHCP Configuration
Do you want to use Dynamic Host Configuration Protocol
(DHCP) on this machine?
Yes
No
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Cisco Unified Communications Manager
Static Network Configuration
Host Name
CUCM-
IP Address
IP Mask
GW Address
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

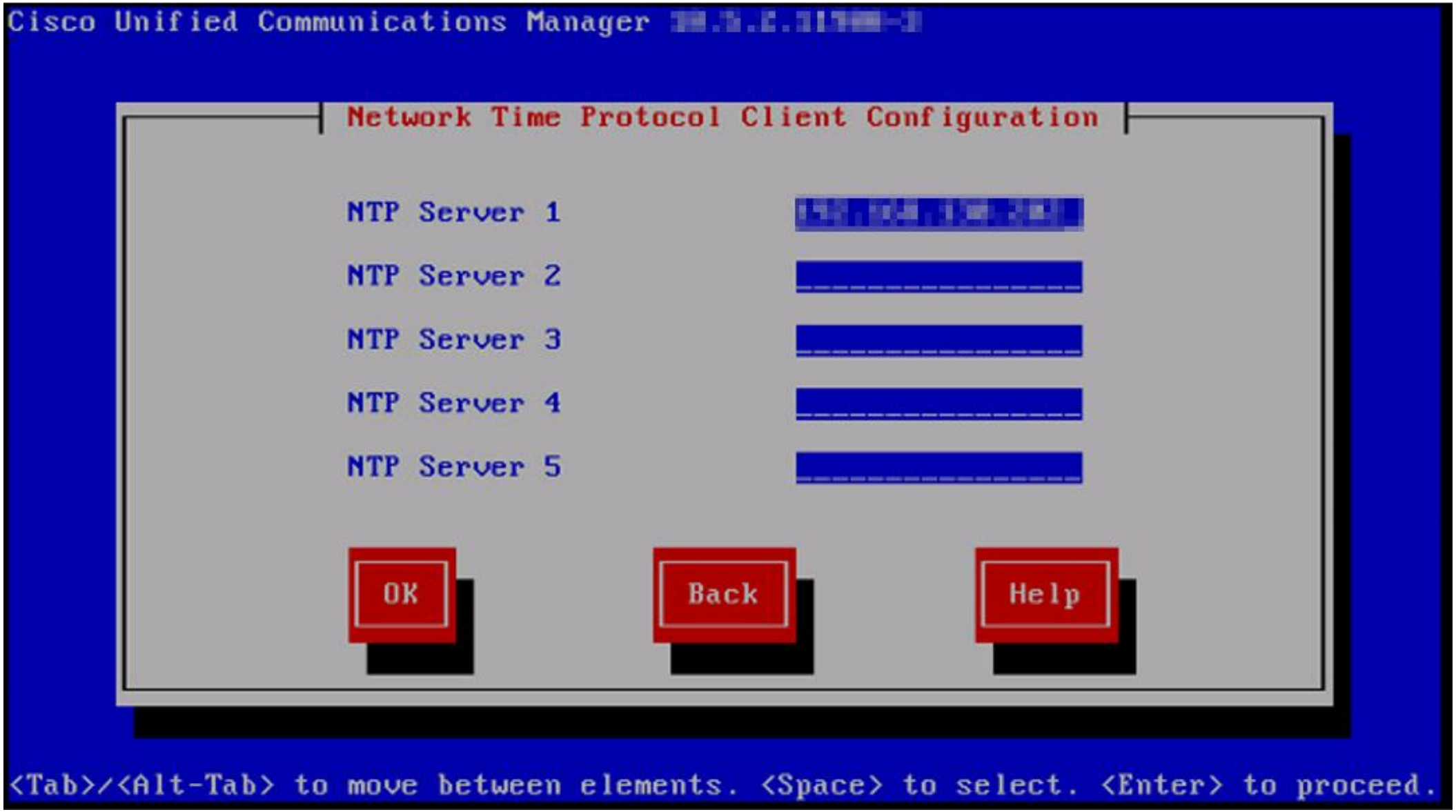

Cisco Unified Communications Manager
DNS Client Configuration
Do you want to enable Domain Name System (DNS) Client on this machine?
Yes
No
Back
Help


Cisco Unified Communications Manager
DNS Client Configuration
Primary DNS
Secondary DNS (optional)
Domain
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


isco Unified Communications Manager
Administrator Login Configuration
Enter the Platform administration username and password.
Choose Help for username and password guidelines.
Administrator ID
Administrator
Password
Confirm Password
OK
Back
Help
Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

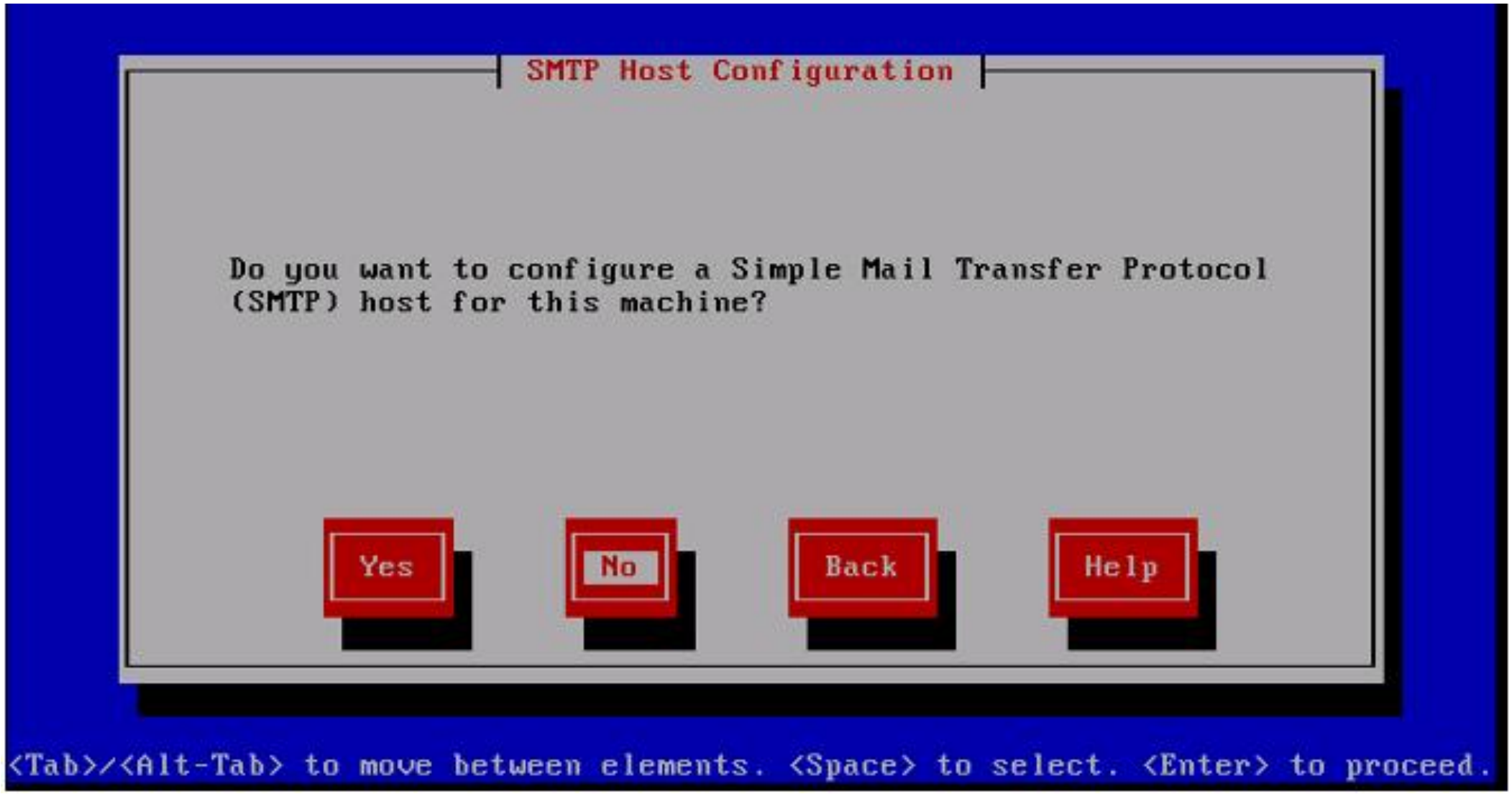

Certificate Information
Enter information about your organization. This is used to generate security certificates for this node.
Organization
Unit
Location
Montevideo
State
Montevideo
Country
United Arab Emirates
United Kingdom (UK)
United States
OK
Back
Help

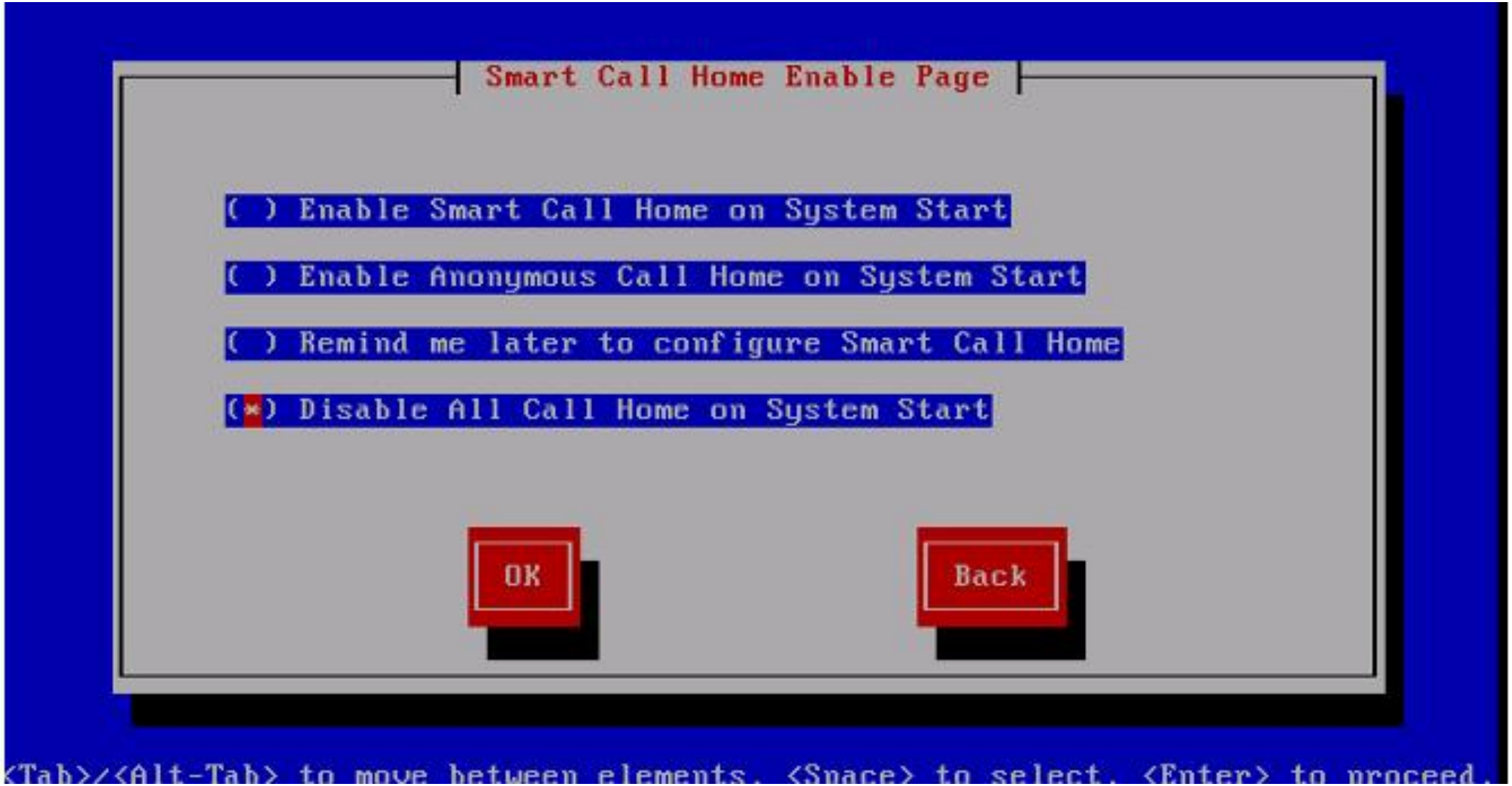
- Si es un **Subscriber** ,
  - Se debe agrergar primero:
    - Ip/Hostname previamente en al GUI del CUCM para indicar que se agrega un nuevo server al cluster

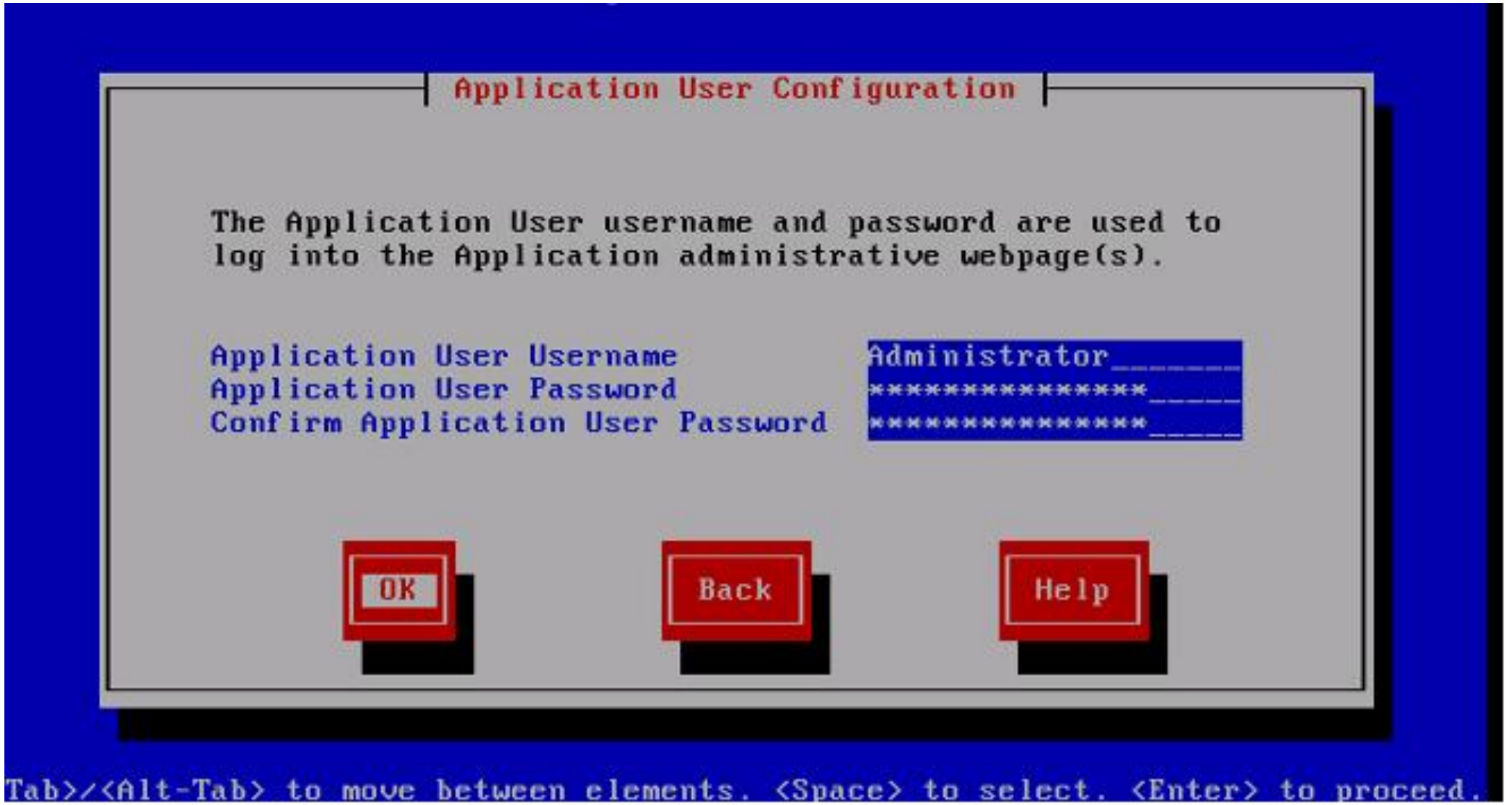

Cisco Unified Communications Manager
Network Time Protocol Client Configuration
NTP Server 1
NTP Server 2
NTP Server 3
NTP Server 4
NTP Server 5
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Cisco Unified Communications Manager 10.5.2.11900-3
Security Configuration
Enter the system security password. This password is used to secure communication between cluster nodes and will also be used by DRS for encryption of backup tar files. Choose Help for username and password guidelines.
Security Password **********
Confirm Password **********
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Security Configuration
Enter the system security password. This password is used to secure communication between cluster nodes and will also be used by DRS for encryption of backup tar files. Choose Help for username and password guidelines.
Security Password **********
Confirm Password **********
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

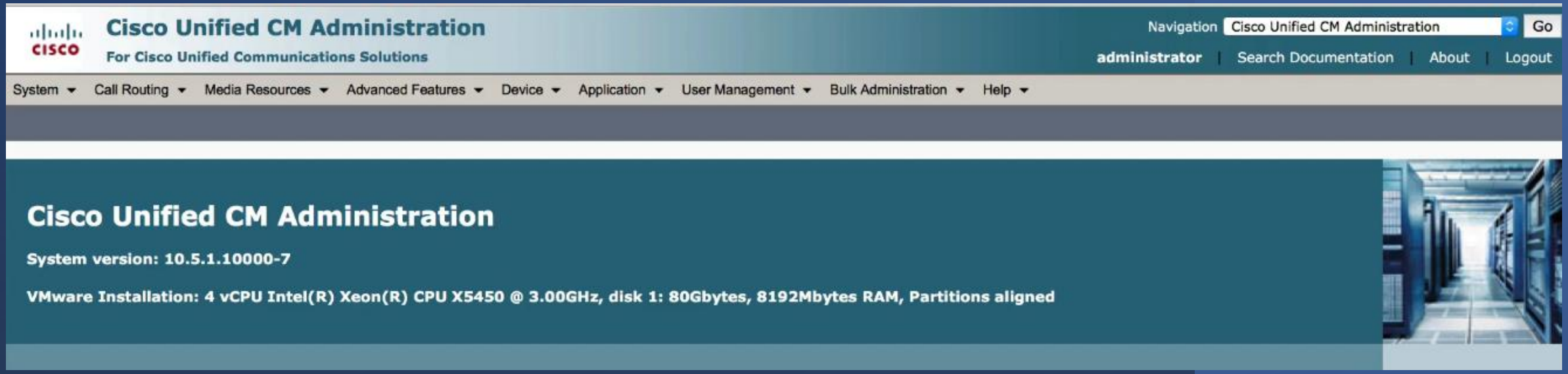

SMTP Host Configuration
Do you want to configure a Simple Mail Transfer Protocol (SMTP) host for this machine?
Yes
No
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

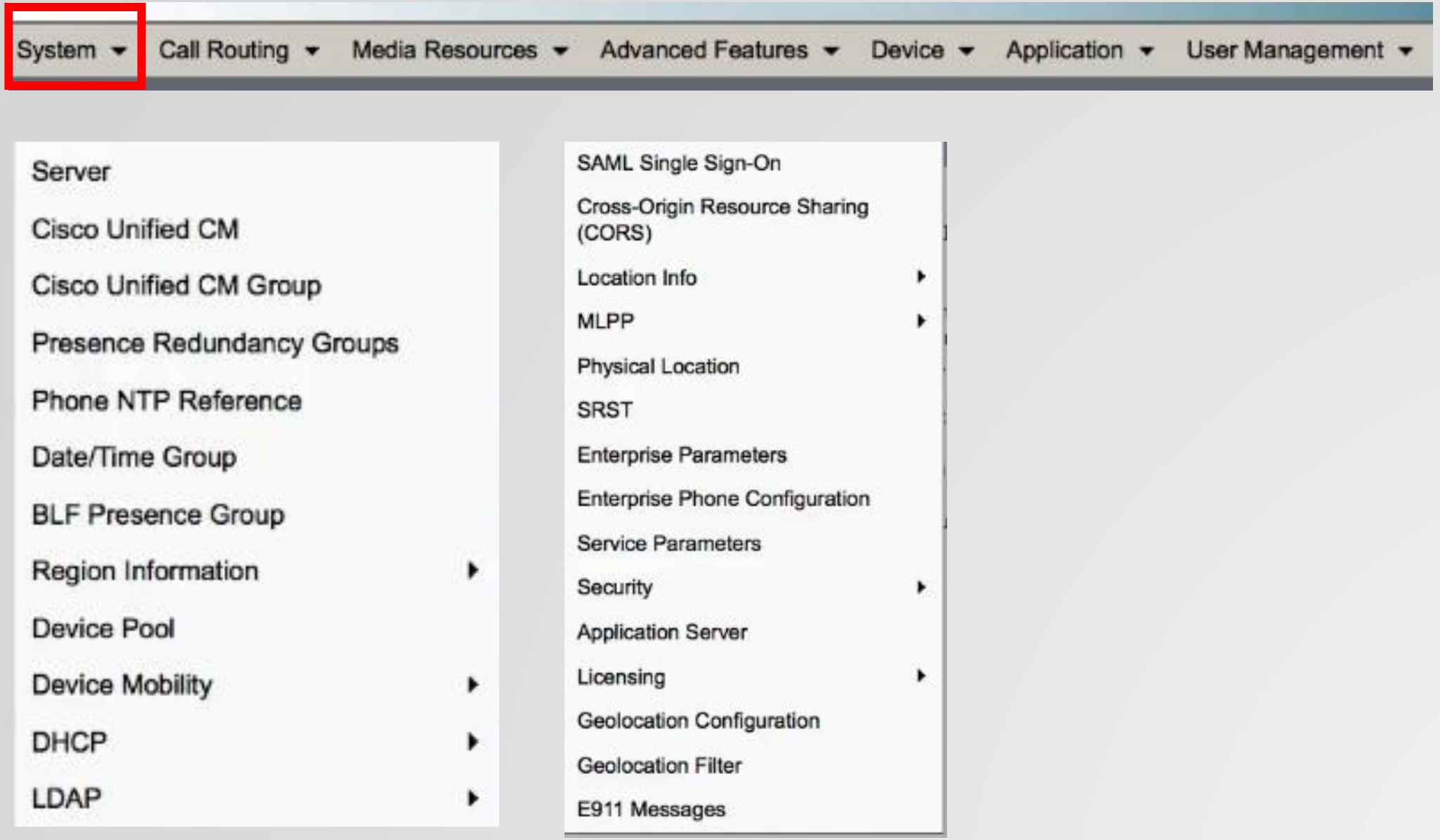

Smart Call Home Enable Page
( ) Enable Smart Call Home on System Start
( ) Enable Anonymous Call Home on System Start
( ) Remind me later to configure Smart Call Home
(*) Disable All Call Home on System Start
OK
Back
<Tab>/<Alt-Tab> to move between elements, <Space> to select, <Enter> to proceed.


Application User Configuration
The Application User username and password are used to log into the Application administrative webpage(s).
Application User Username
Application User Password
Confirm Application User Password
Administrator
OK
Back
Help
Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.


Platform Configuration Confirmation
The Platform Configuration is complete.
Select OK to continue or Back to change the configuration.
Warning: Once you select OK, you will no longer be able to modify the Platform Configuration.
OK
Back
Cancel
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.

CUCM - GUI


Cisco Unified CM Administration
For Cisco Unified Communications Solutions
Navigation
Cisco Unified CM Administration
Go
administrator
Search Documentation
About
Logout
System
Call Routing
Media Resources
Advanced Features
Device
Application
User Management
Bulk Administration
Help
Cisco Unified CM Administration
System version: 10.5.1.10000-7
VMware Installation: 4 vCPU Intel(R) Xeon(R) CPU X5450 @ 3.00GHz, disk 1: 80Gbytes, 8192Mbytes RAM, Partitions aligned


System
Call Routing
Media Resources
Advanced Features
Device
Application
User Management
Server
Cisco Unified CM
Cisco Unified CM Group
Presence Redundancy Groups
Phone NTP Reference
Date/Time Group
BLF Presence Group
Region Information
Device Pool
Device Mobility
DHCP
LDAP
SAML Single Sign-On
Cross-Origin Resource Sharing (CORS)
Location Info
MLPP
Physical Location
SRST
Enterprise Parameters
Enterprise Phone Configuration
Service Parameters
Security
Application Server
Licensing
Geolocation Configuration
Geolocation Filter
E911 Messages

Device Pool

CUCM – Device Pool

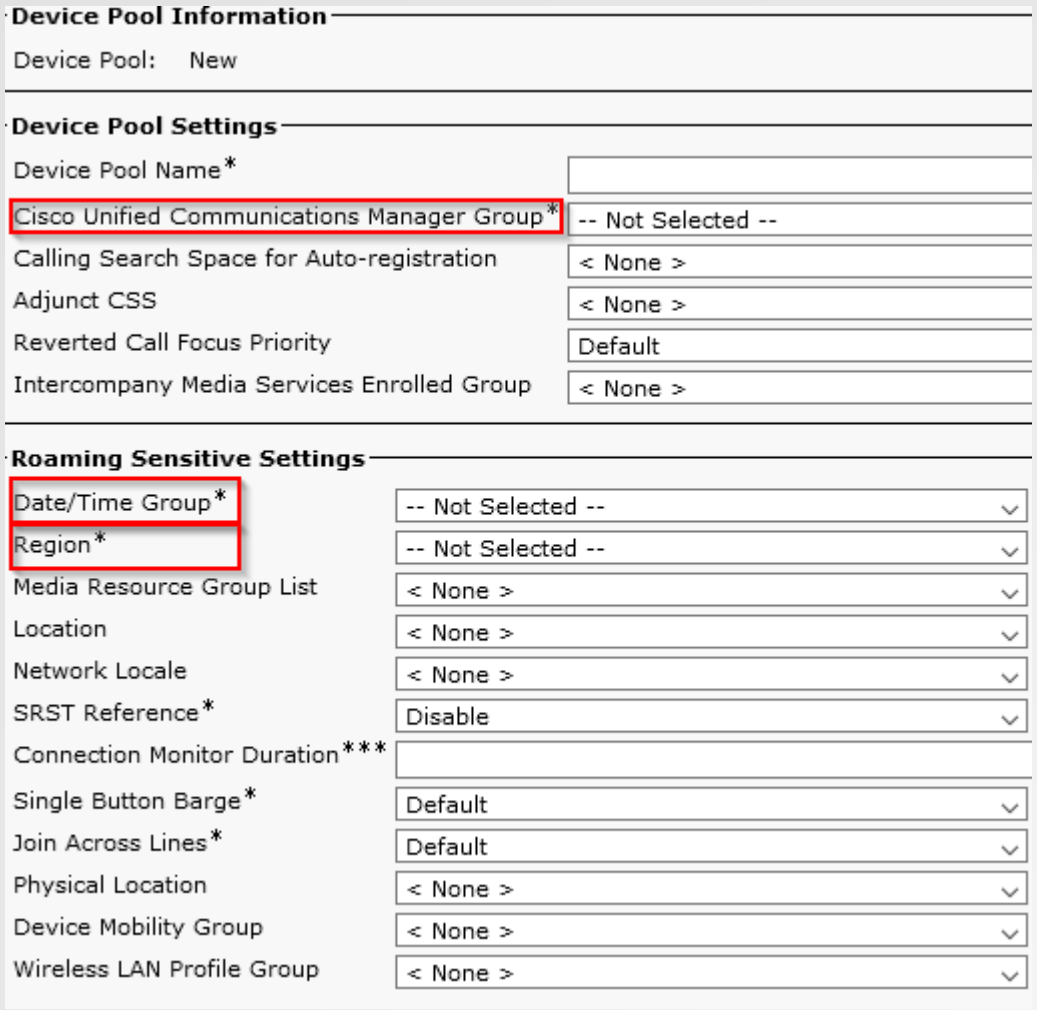
- Requerido
- Opcional

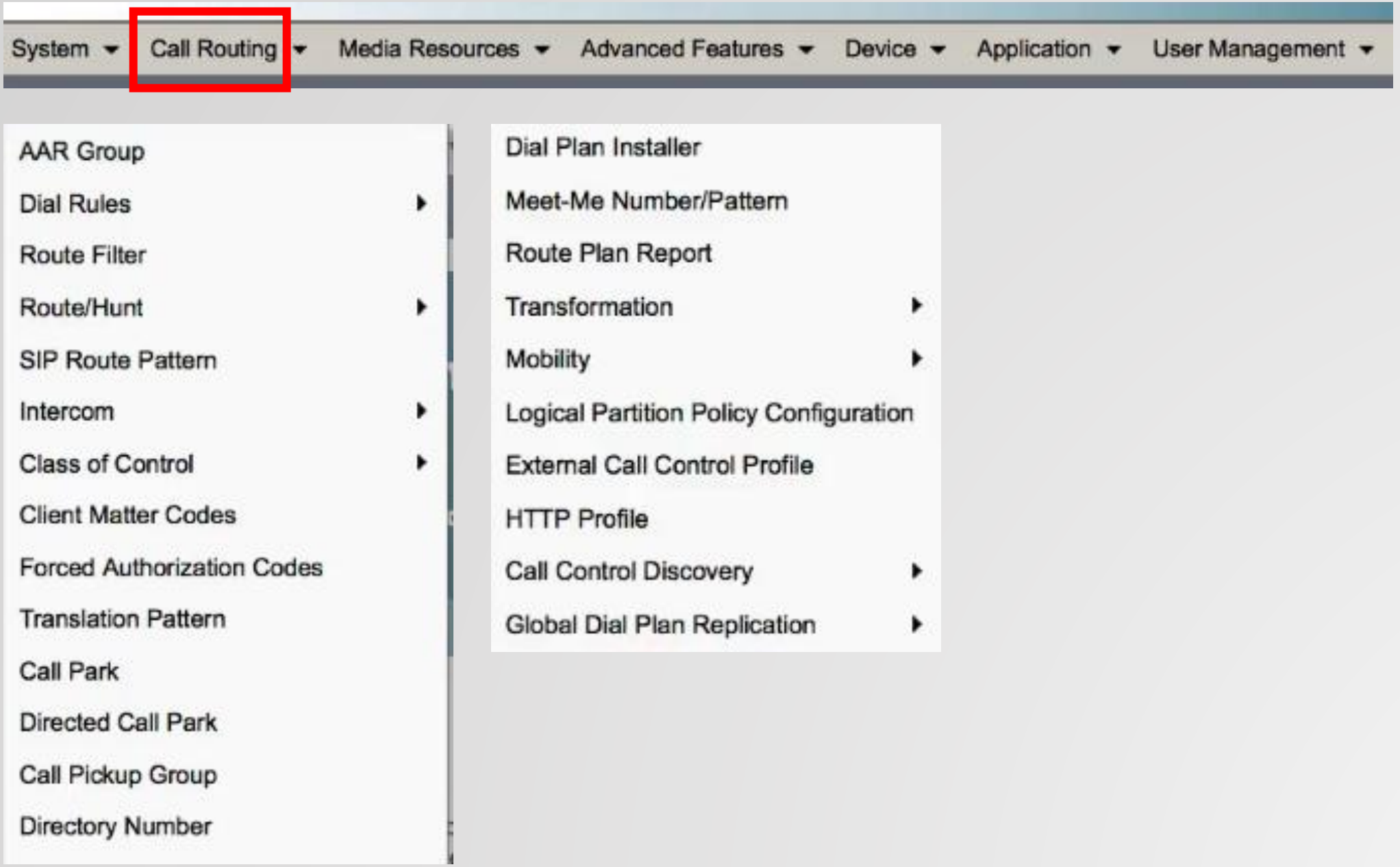
Propósito:

- Brindar una manera conveniente de definir un conjunto de características comunes que se pueden agregar a los dispositivos, en lugar de asignarlas como características individuales

Previo a Configurar el Device Pool, se deben configurar:

- Cisco Unified Communications Manager group.
  - Lista de servidores para Registración del Teléfono
- Date/time group.
- Region.
  - Se usa si se quiere frozar el uso de codecs entre diferentes regiones logicas . De lo contrario se usa el Defualt
- **SRST reference.**
- **Media resource group list.**
- **Calling search space for auto-registration.**




System
Call Routing
Media Resources
Advanced Features
Device
Application
User Management
AAR Group
Dial Rules
Route Filter
Route/Hunt
SIP Route Pattern
Intercom
Class of Control
Client Matter Codes
Forced Authorization Codes
Translation Pattern
Call Park
Directed Call Park
Call Pickup Group
Directory Number
Dial Plan Installer
Meet-Me Number/Pattern
Route Plan Report
Transformation
Mobility
Logical Partition Policy Configuration
External Call Control Profile
HTTP Profile
Call Control Discovery
Global Dial Plan Replication

CUCM BASICS
Partitions & CSS

CUCM - Partition

Una partición comprende una agrupación lógica con características de accesibilidad similares

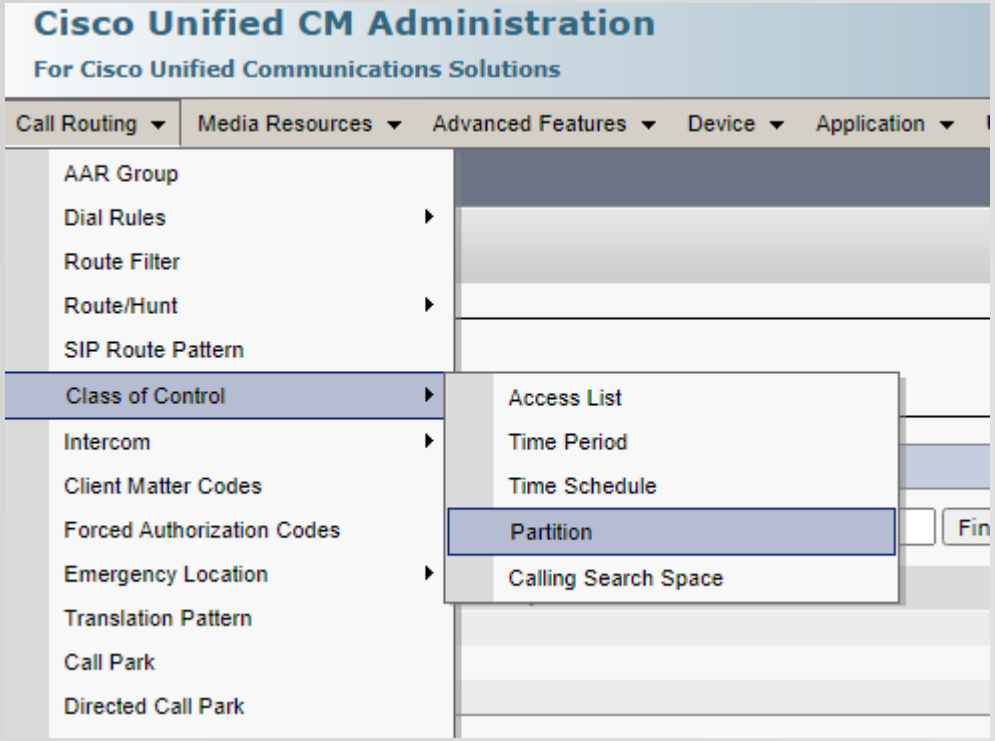
- **números de directorio** (DN)
- **patrones de ruta**(route patterns)
- patrones de traducción (translation patterns)
- puertos de casilla de voz (voice-mail ports)

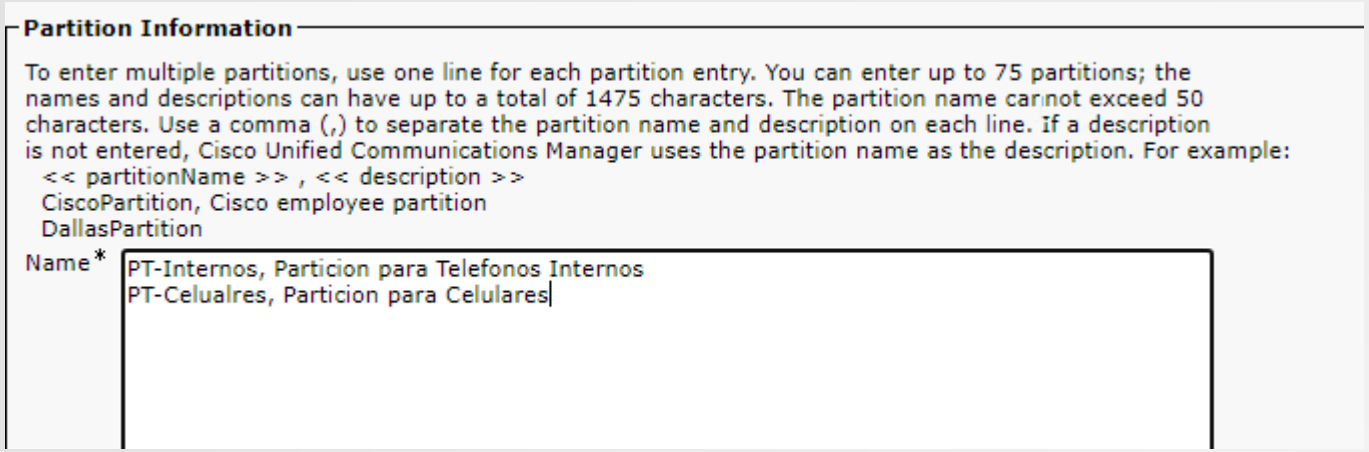
Para simplificar, los nombres de las particiones suelen reflejar sus características, como

- PT-Celulares ,
- PT-Nacionales,
- PT-Interno,
- PT-Secretaria

¿Quién Puede llamarme?

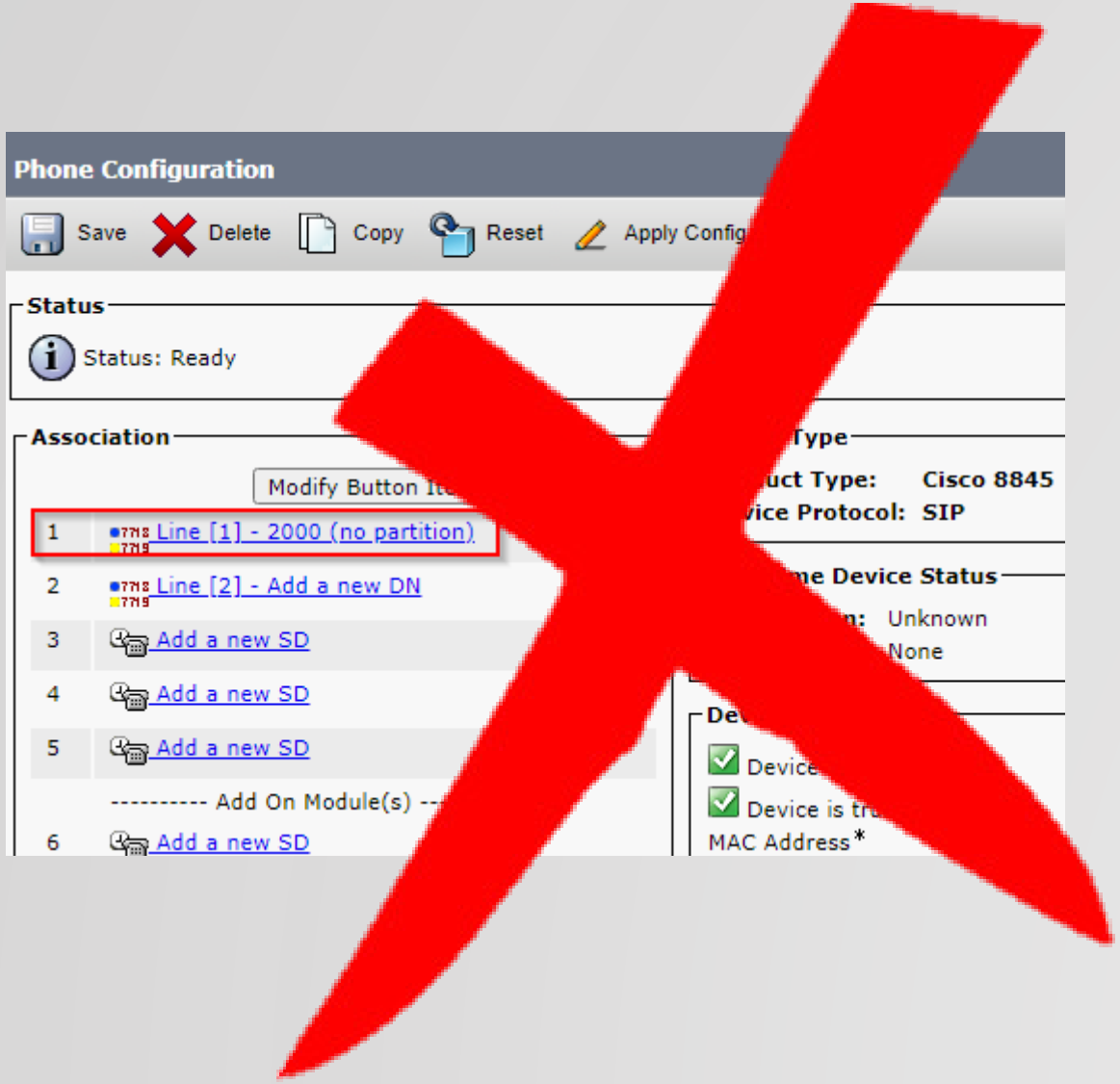
CUCM -

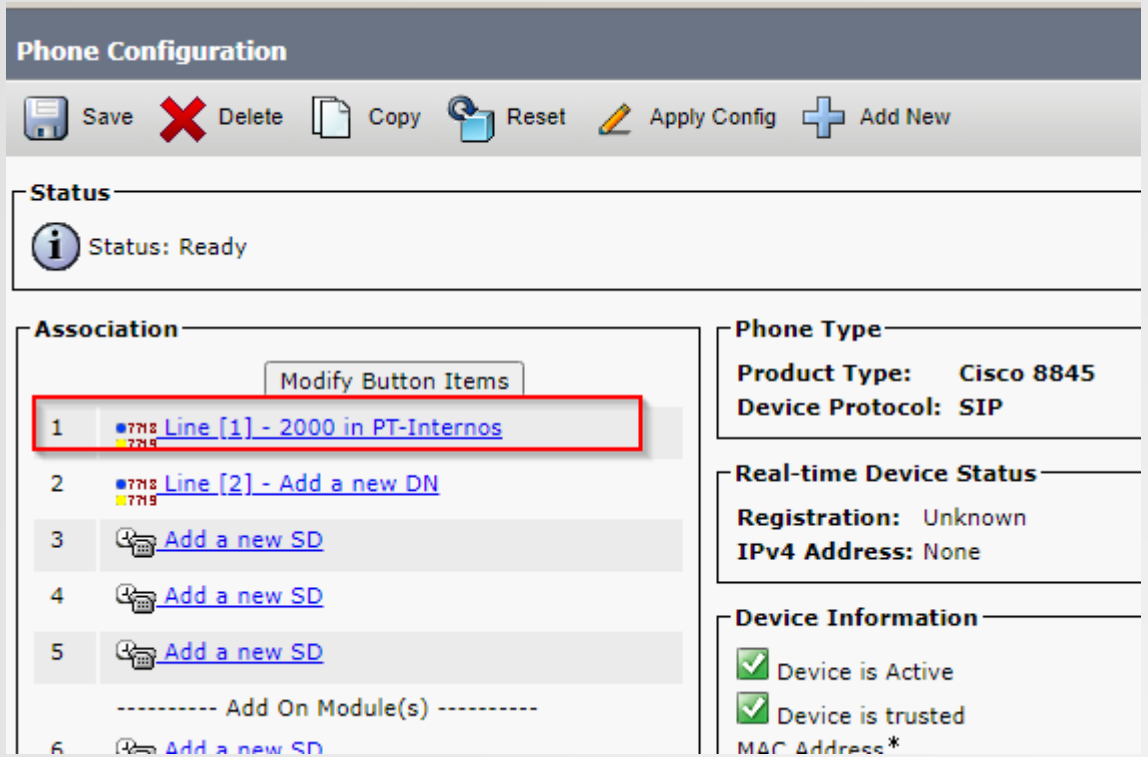




☐	PT-Celualres	Particion para Celulares
☐	PT-Internos	Particion para Telefonos Internos

CUCM - NO PARTITION / PARTITION





CUCM – Calling Search Space - CSS

Un espacio de búsqueda de llamadas (**Calling search space** ,CSS) es una **lista ordenada de particiones**.

Los css determinan las particiones que los dispositivos buscan al intentar completar una llamada:

- Teléfonos IP
- Softphones
- Gateways .

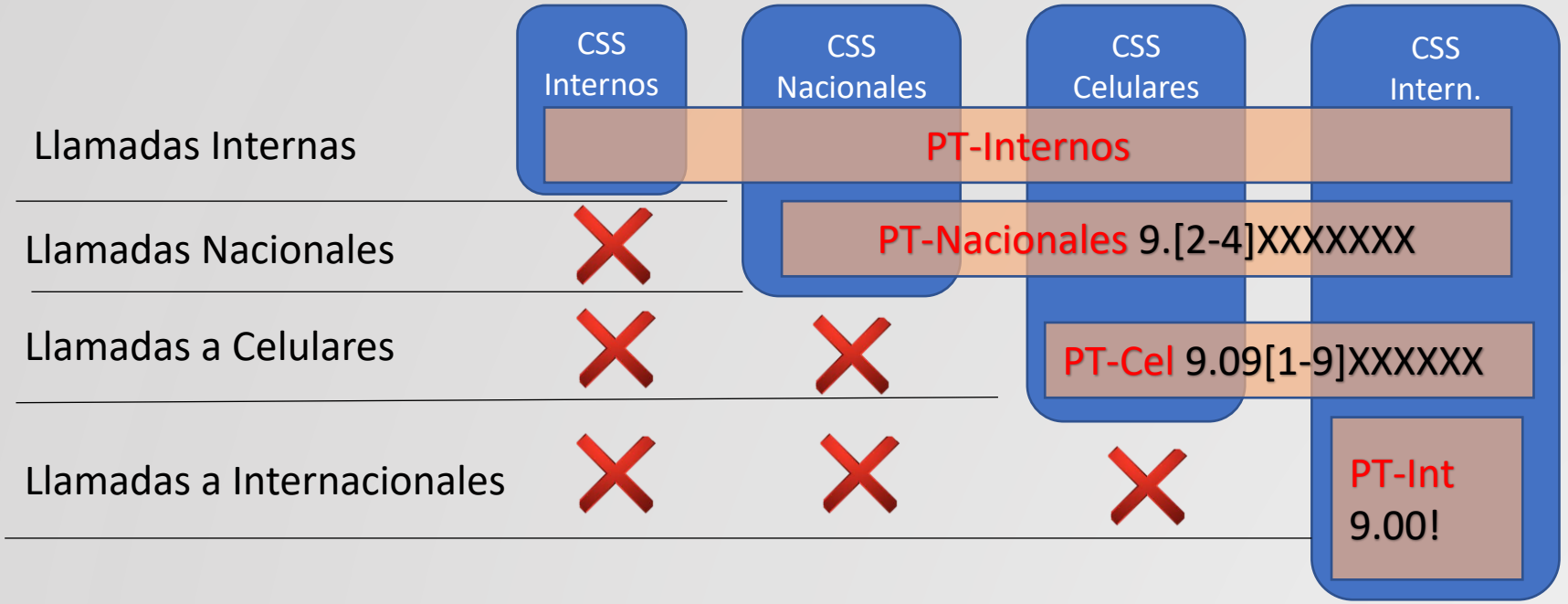
Un CSS ,con nombre “Supervisores” contiene 4 particiones : **Nacionales, Internacionales , Emergencia ,Celulares**

Un CSS, con nombre “Invitados” contiene 2 particiones: **Nacionales, Emergencia**

Si un IP-Phone o DN está configurado con el CSS "Invitado", solo busca en las particiones “Nacionales" y “Emergencia" cuando inicia la llamada.

Si un usuario que llama desde este número intenta marcar un número internacional, no se produce una coincidencia y la llamada no se puede enrutar.

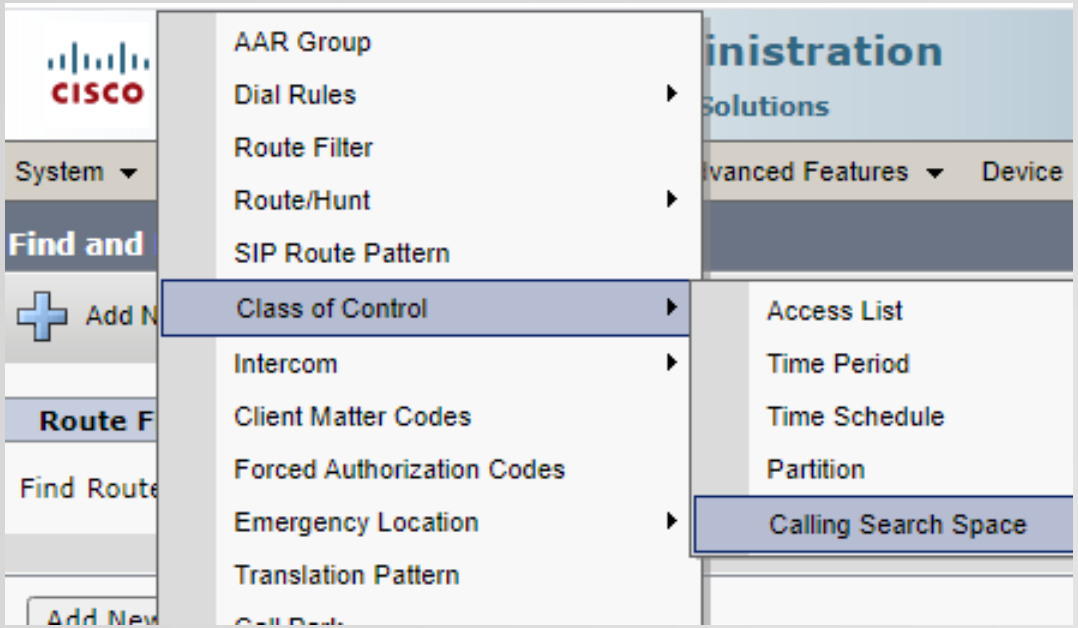
CUCM – CSS / Particiones

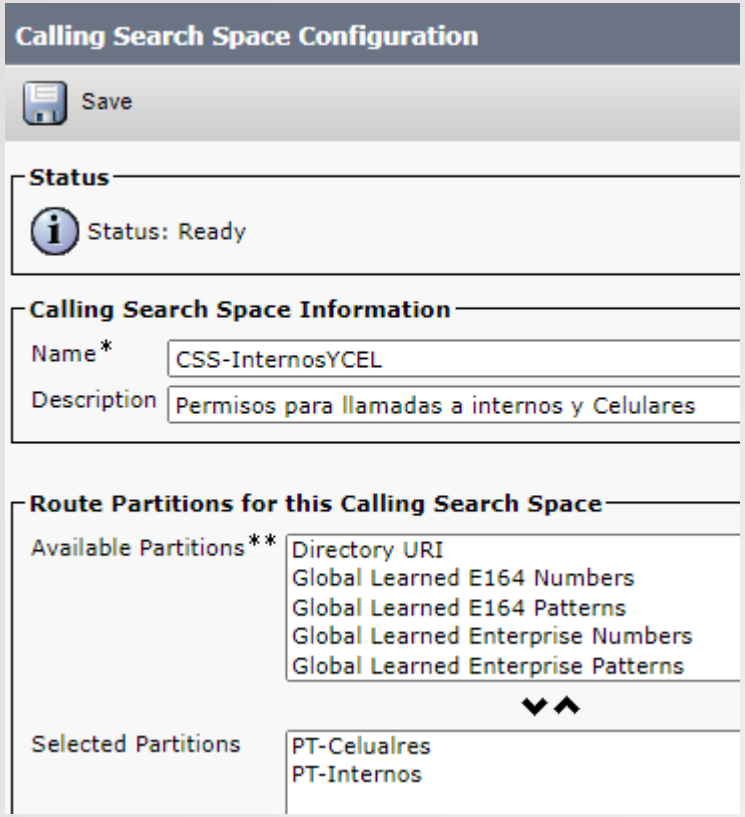


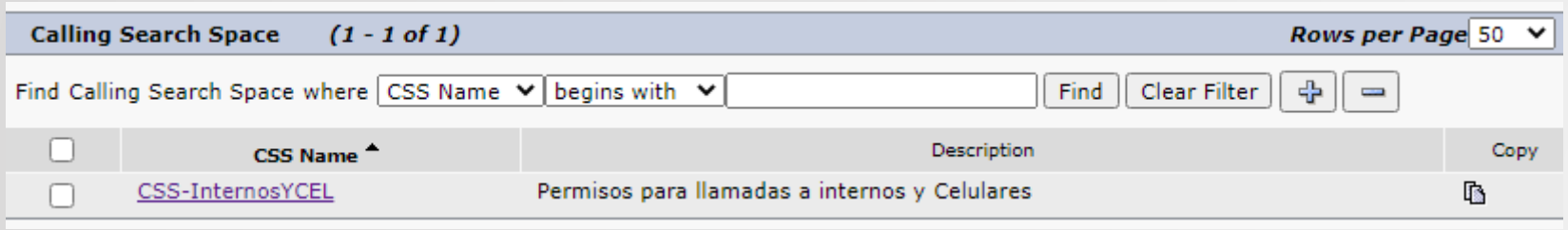
1. A donde puede llamar alguien
2. Ruteo Geográfico

Lista de Particiones

CUCM - CSS


AAR Group
Dial Rules
Route Filter
Route/Hunt
SIP Route Pattern
Class of Control
Intercom
Client Matter Codes
Forced Authorization Codes
Emergency Location
Translation Pattern
Access List
Time Period
Time Schedule
Partition
Calling Search Space
System
Device
Find and
Add N
Route F
Find Route


Calling Search Space Configuration
Save
Status
Status: Ready
Calling Search Space Information
Name*
CSS-InternosYCEL
Description
Permisos para llamadas a internos y Celulares
Route Partitions for this Calling Search Space
Available Partitions**
Directory URI
Global Learned E164 Numbers
Global Learned E164 Patterns
Global Learned Enterprise Numbers
Global Learned Enterprise Patterns
Selected Partitions
PT-Celualres
PT-Internos


Calling Search Space (1 - 1 of 1)
Rows per Page 50
Find Calling Search Space where CSS Name begins with
Find
Clear Filter
CSS Name
Description
Copy
CSS-InternosYCEL
Permisos para llamadas a internos y Celulares

CUCM –NULL Partition

2600 PT-Interno

2601 no partition

Ninguno de los 2 teléfonos tienen configurado un CSS

¿Pueden llamarse?

CUCM – Los CSS cumplen 2 Reglas

Siempre se puede llamar a un DN que no este en una partición

Solo se puede llamar a un DN, si la partición de ese DN esta en el CSS

CUCM – Ejercicio CSS

1 Usuario disca 2000
2 Usuario disca 3000
3 Secretaria disca 3000
4 Secretaria disca 2000
5 Jefe disca 2000
6 Jefe disca 4000
7 Usuario disca
9.001-801-240-7845
8 Jefe disca
9.099-801-478

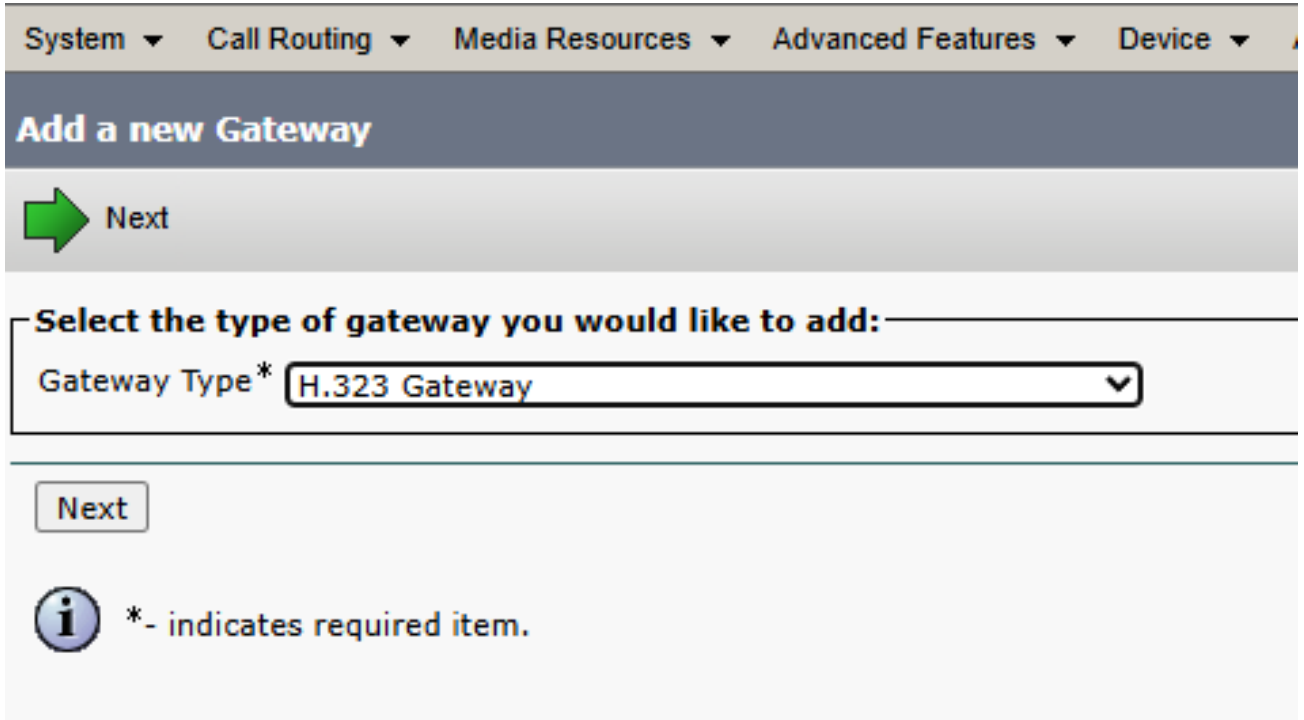
USUARIO	SECRETARIA	JEFE
		
• Linea 1 1000 PT_INTERNO • Linea 2 2000 PT_INTERNO	• Linea 1 2000 PT_SECRETARIA • Linea 2 3000 PT_INTERNO	• Linea 1 3000 PT_JEFE

• CSS:
  • PT_SECRETARIA
  • PT_INTERNO
  • PT_CELULARES
  • PT_NACIONALES
	• CSS:
	  • PT_JEFE
	  • PT_INTERNO
	  • PT_CELULARES
		• CSS:
		  • PT_INTERNO
		  • PT_SECRETARIA
		  • PT_NACIONALES

Path Selection

Agregar GWs al CUCM

- Existen 2 maneras de integrar un Gateway de voz a un CUCM.
- 1) A través de H323 (Protocolo estándar de telefonía tradicional)
- Device/Gateway



Call Routing Information - Inbound Calls

Significant Digits*	All
Calling Search Space	CSS_G1_Nac_Cel_Int
AAR Calling Search Space	< None >
Prefix DN	

- [ ] Redirecting Number IE Delivery - Inbound
- [ ] Enable Inbound FastStart

Connected Party Settings

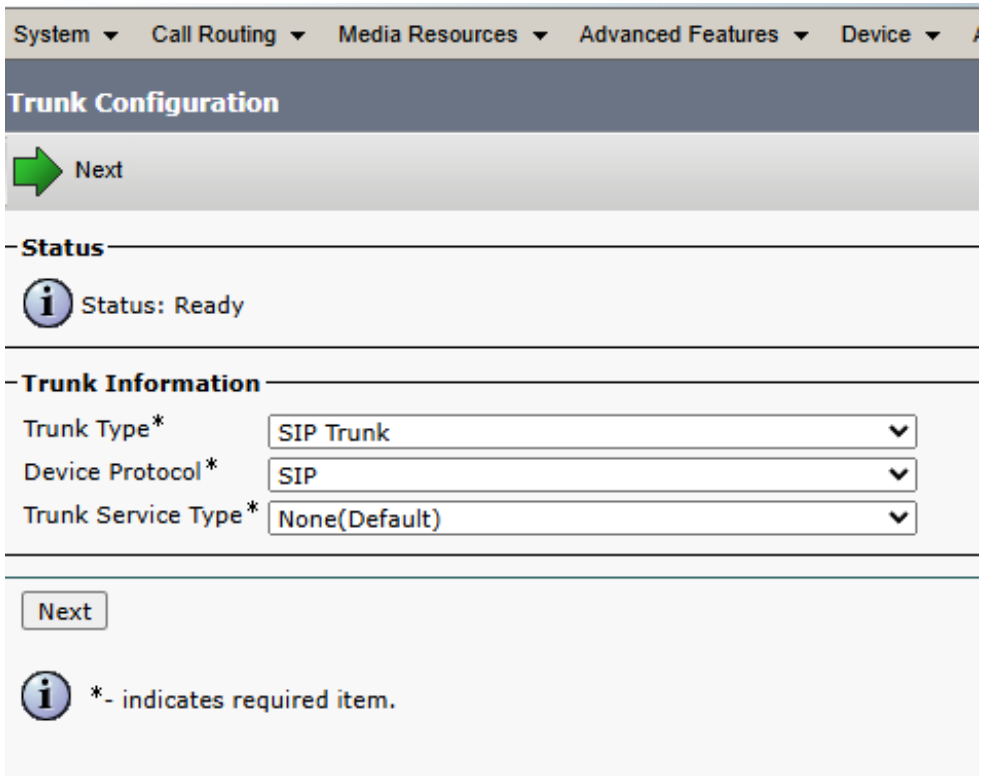
Connected Party Transformation CSS	< None >

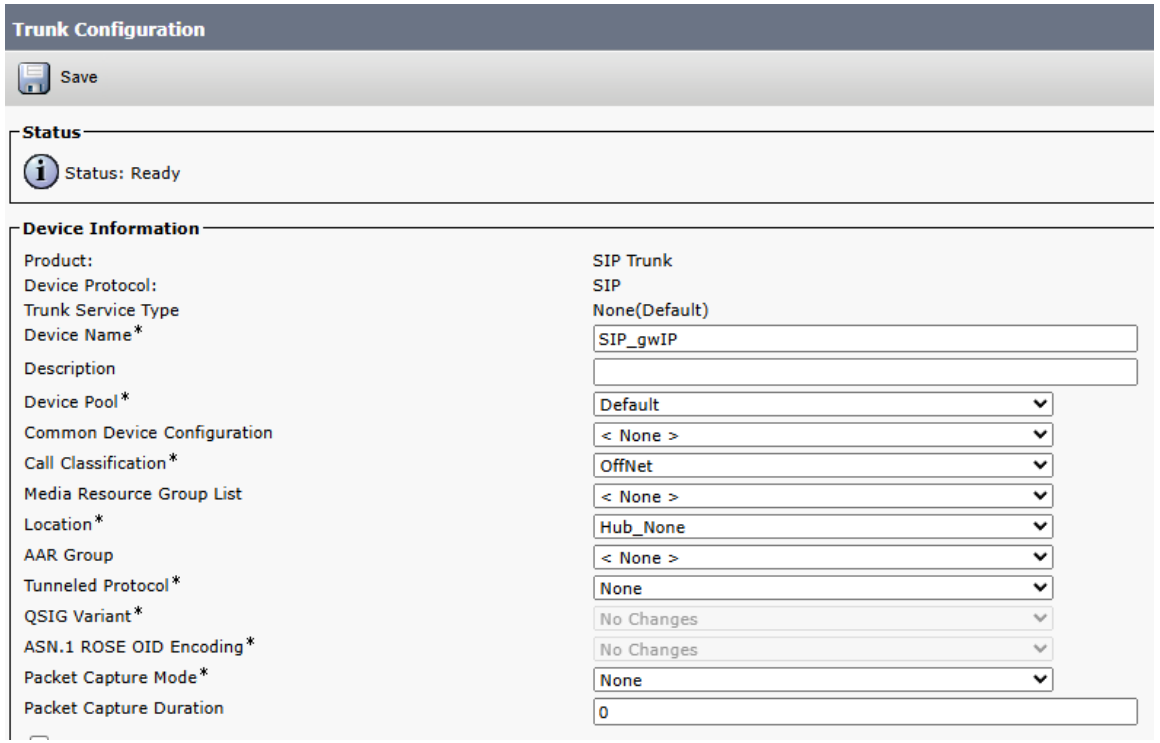
- [x] Use Device Pool Connected Party Transformation CS

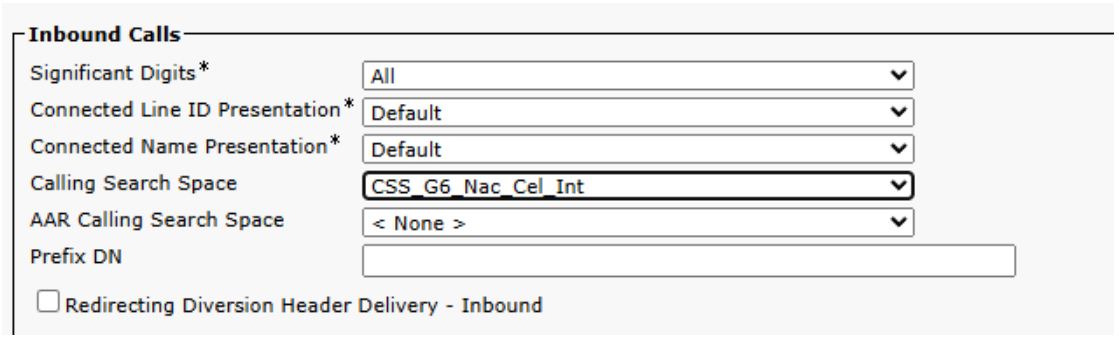
Product	H.323 Gateway
Device Protocol	H.225
⚠ Device is not trusted	
Device Name*	IPdelGW
Description	IPdelGW
Device Pool*	Default
Common Device Configuration	< None >
Call Classification*	OffNet
Media Resource Group List	< None >
Packet Capture Mode*	None
Packet Capture Duration	0
Location*	Hub_None
AAR Group	< None >
Tunneled Protocol*	None
QSIG Variant*	No Changes
ASN.1 ROSE OID Encoding*	No Changes
Use Trusted Relay Point*	Default
Signaling Port*	1720

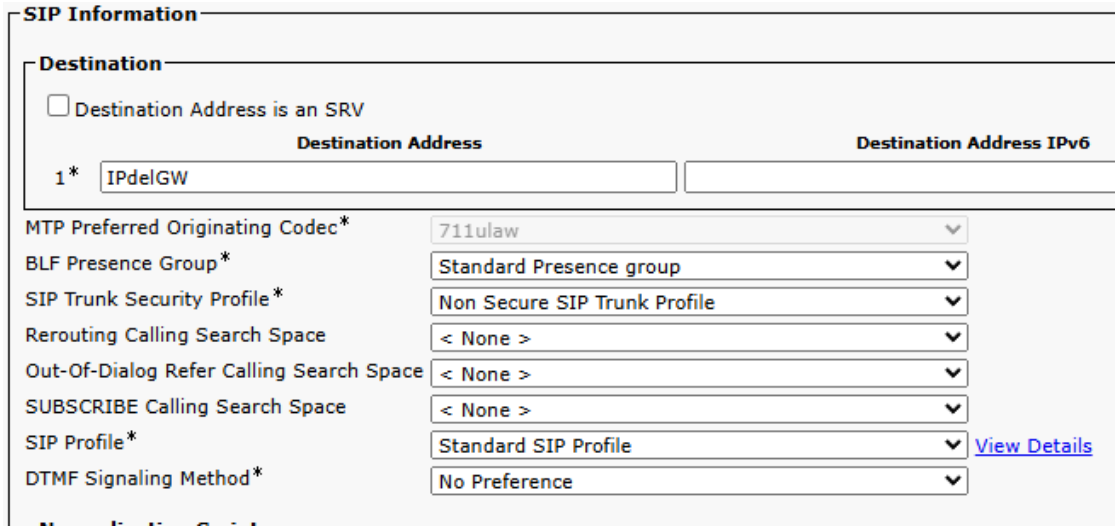
- 2) A través de un Troncal SIP

Device/Trunk

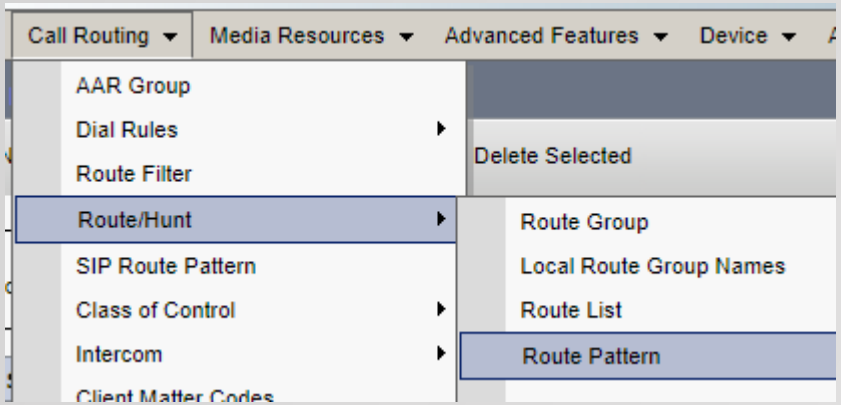


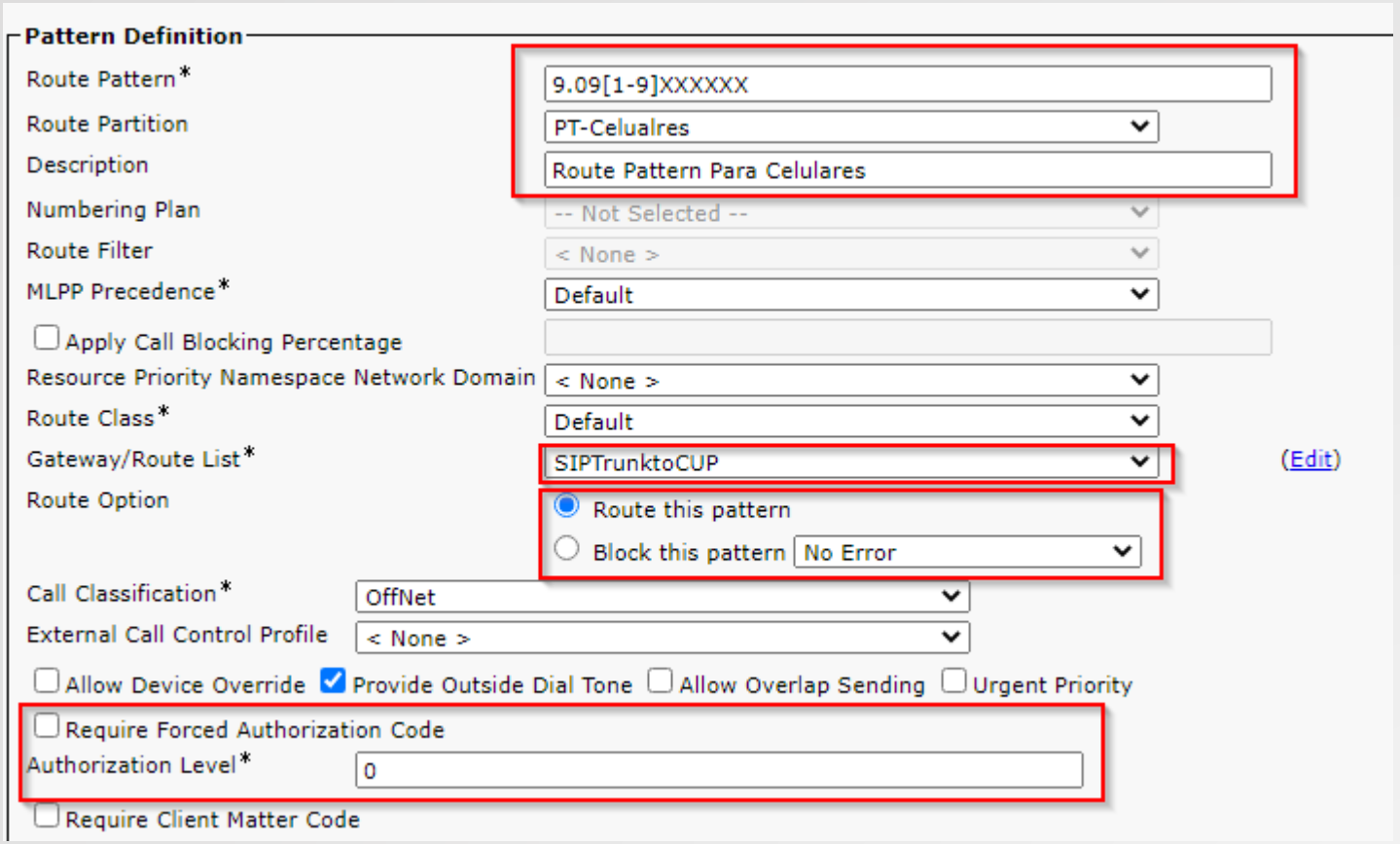


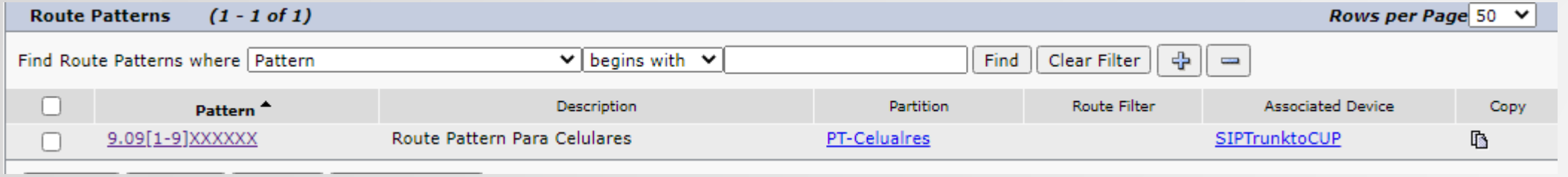

Inbound Calls
Significant Digits*
All
Connected Line ID Presentation*
Default
Connected Name Presentation*
Default
Calling Search Space
CSS_G6_Nac_Cel_Int
AAR Calling Search Space
< None >
Prefix DN
Redirecting Diversion Header Delivery - Inbound


SIP Information
Destination
Destination Address is an SRV
Destination Address
Destination Address IPv6
1*
IPdelGW
MTP Preferred Originating Codec*
711ulaw
BLF Presence Group*
Standard Presence group
SIP Trunk Security Profile*
Non Secure SIP Trunk Profile
Rerouting Calling Search Space
< None >
Out-Of-Dialog Refer Calling Search Space
< None >
SUBSCRIBE Calling Search Space
< None >
SIP Profile*
Standard SIP Profile
View Details
DTMF Signaling Method*
No Preference

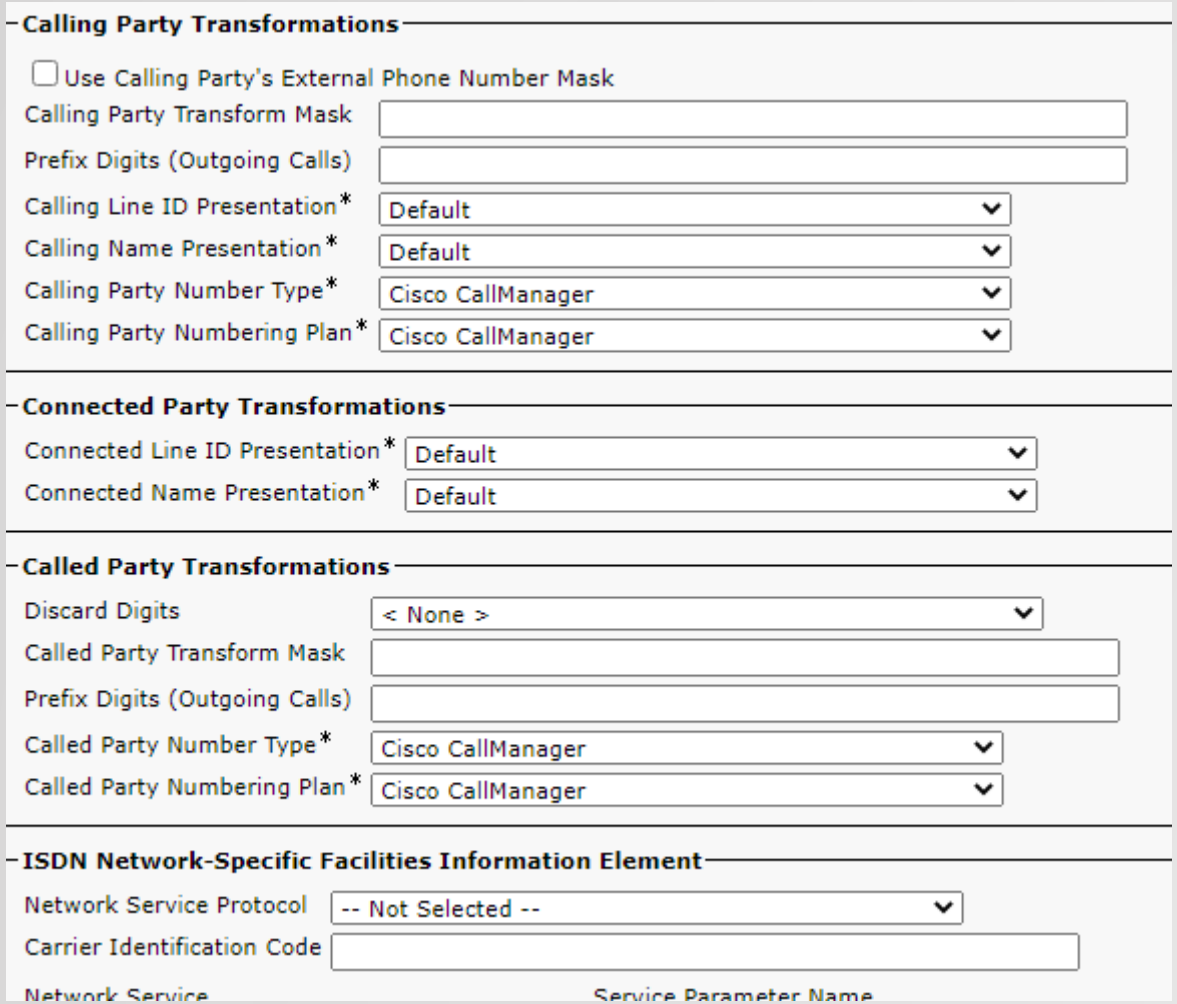
CUCM – Route Patterns

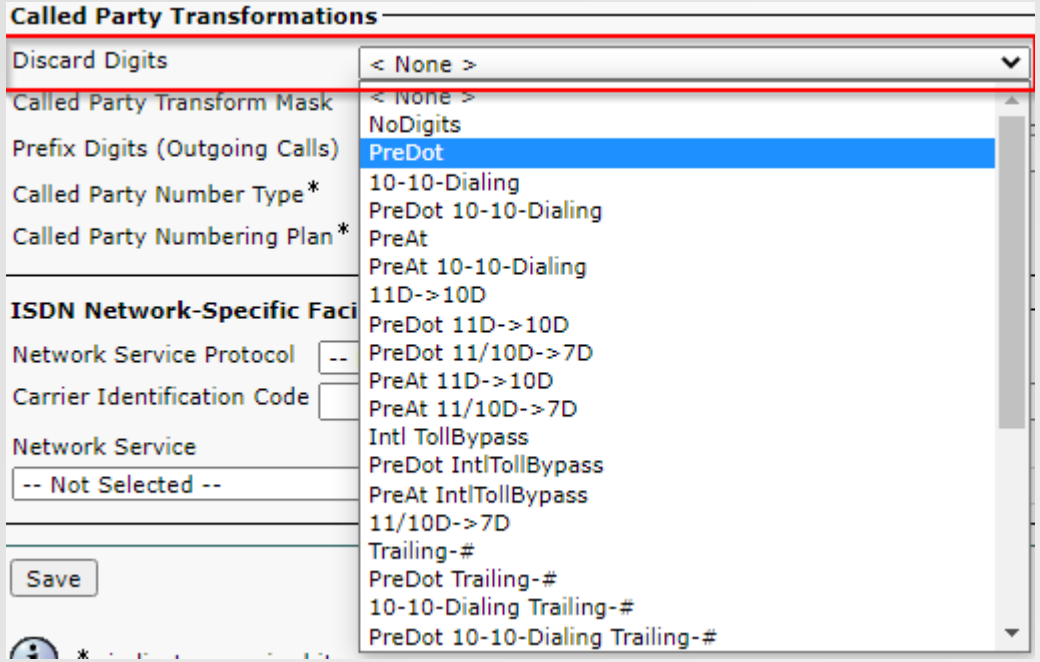






CUCM - Route Patterns





CUCM – Route Group

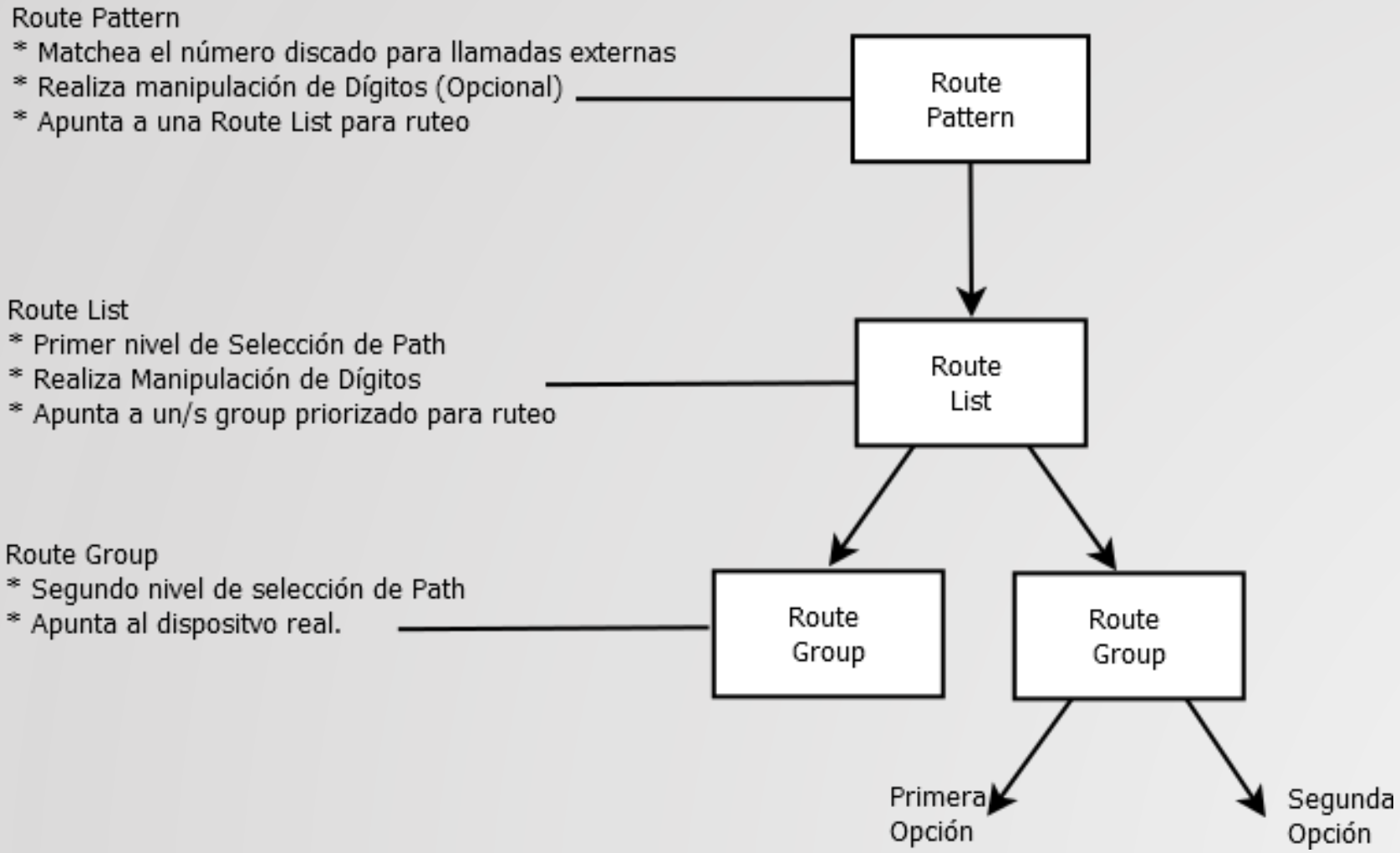
Un **route group** es una lista de devices (gateways, trunks).

Un route group puede ser configurado para manejar estas distribuciones

- **distribución circular (round-robin)**
  - es usada para distribuir recursos de carga

- **distribución arriba-abajo (top-down)**
  - para priorizar el uso de una gateway dentro de un route group

CUCM – Selection Path



CUCM – Path Selection

- Para implementar una elección de camino (path selection) en el CUCM, la lógica del procesamiento de llamada debe ser construida desde abajo hacia arriba (bottom-up)

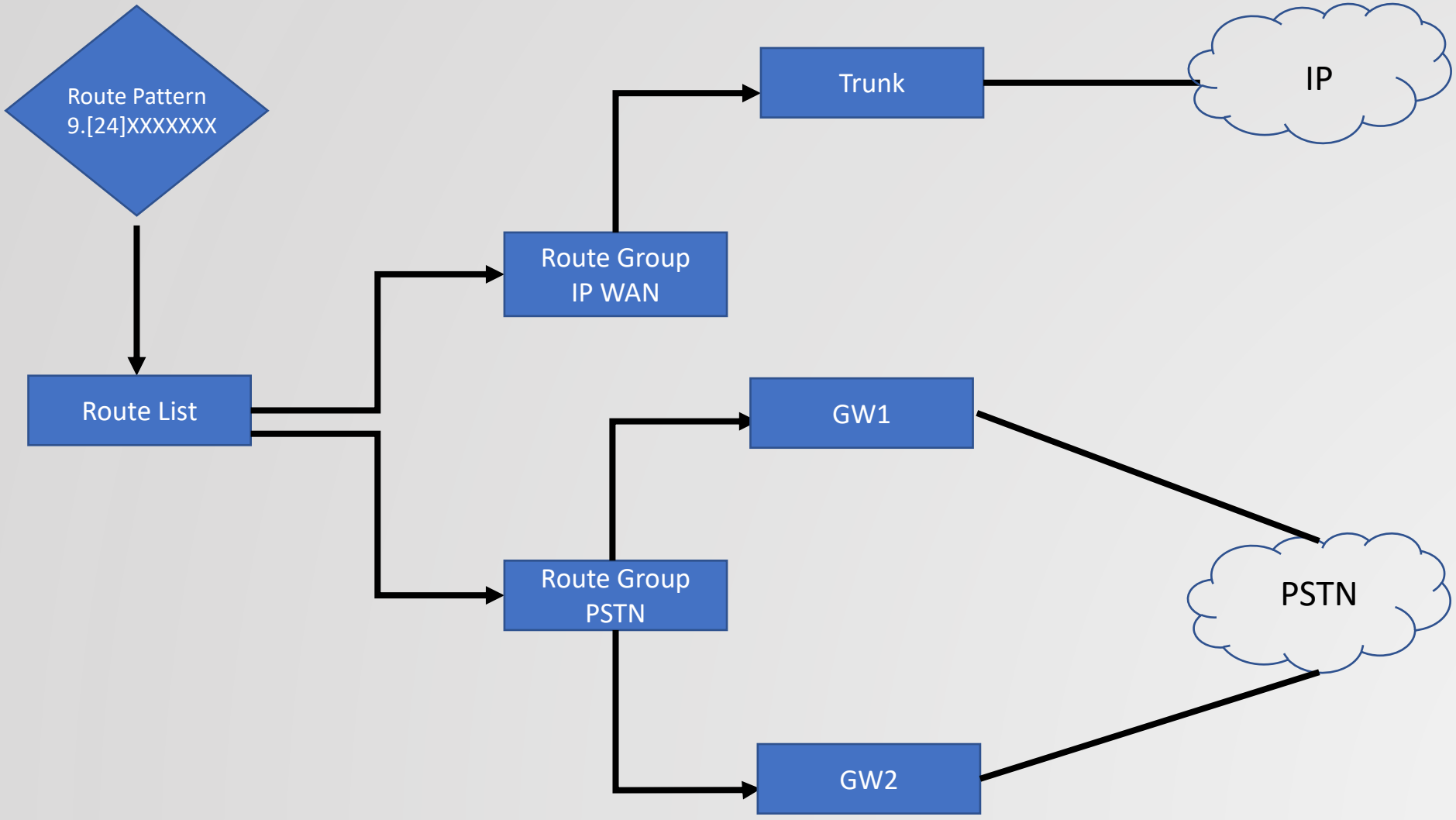
- Cuando se crea un route group, recién ahi se pueden cargar los dispositivos que va a formar parte del grupo.

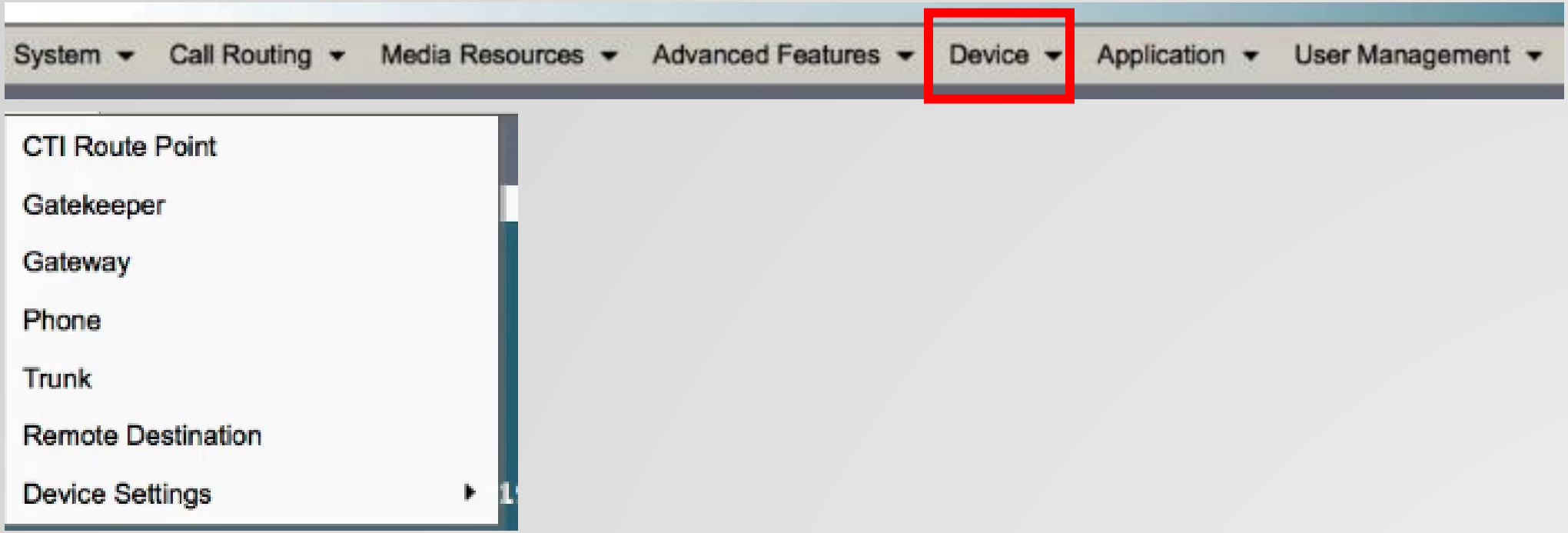
- Si los devices no existen todavía, no hay nada que se pueda correlacionar al route group

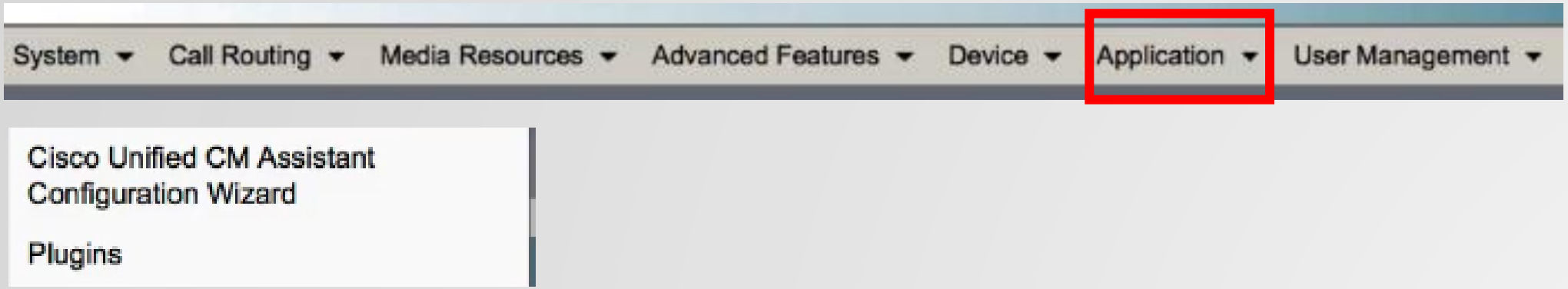
- Los siguientes pasos debe realizarse en el orden dado

    - Paso 1 Agregar Dispositivos (Gateways y trunks).
    - Step 2 Crear route groups con devices disponibles
    - Step 3 Crear route list con route group disponibles.
    - Step 4 Crear route patterns apuntando a los route lists

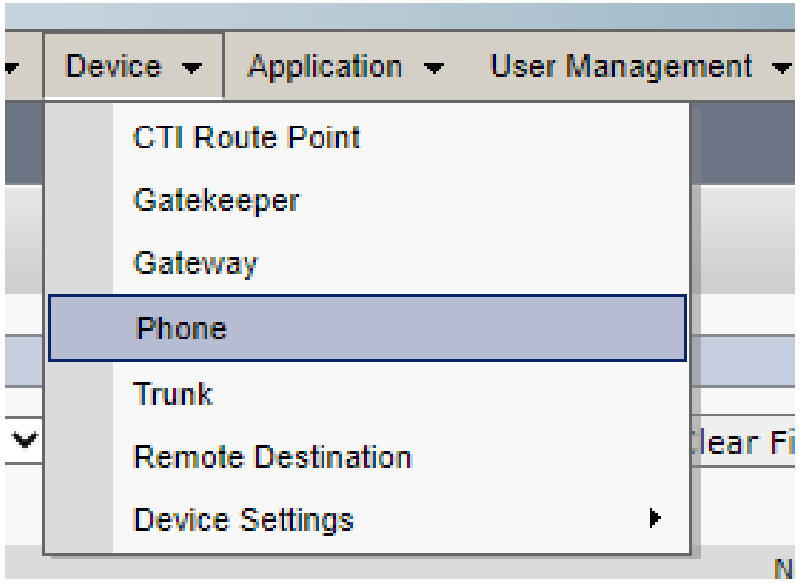
CUCM -

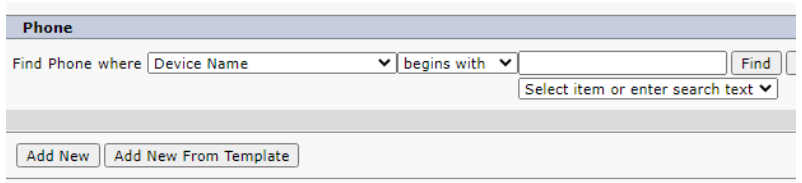

Route Pattern
9.[24]XXXXXXX
Route List
Route Group
IP WAN
Route Group
PSTN
Trunk
GW1
GW2
IP
PSTN

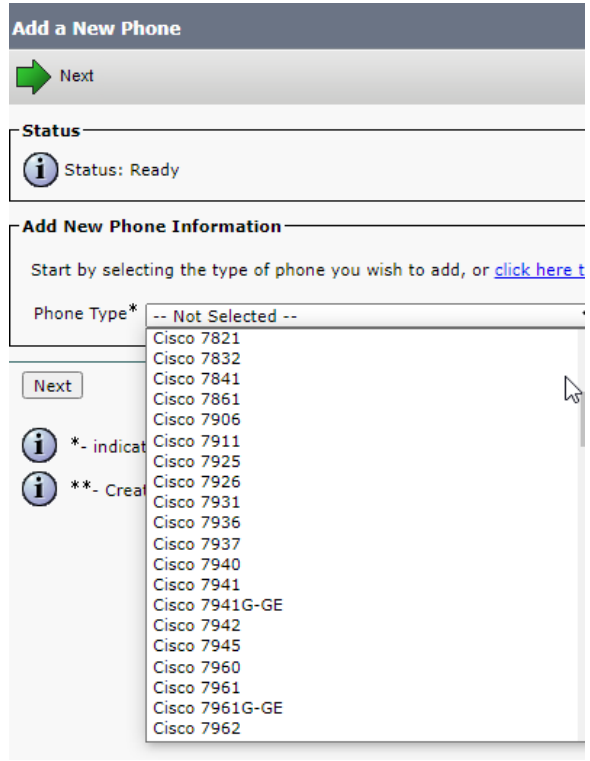

System
Call Routing
Media Resources
Advanced Features
Device
Application
User Management
CTI Route Point
Gatekeeper
Gateway
Phone
Trunk
Remote Destination
Device Settings


System
Call Routing
Media Resources
Advanced Features
Device
Application
User Management
Cisco Unified CM Assistant Configuration Wizard
Plugins

CUCM – Como agregar un IP Phone







CUCM – IP Phone