Application Note

Microsoft Lync 2013 [v5.0.8308.0] to Verizon Business SIP Trunk via the Cisco Unified Border Element 10.5 [IOS 15.4(3)M]

12/12/2014

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Note: Testing was conducted in Tekvizion labs

Introduction

Service Providers today, such as Verizon Business, are offering alternative methods to connect to the PSTN via their IP network. Most of these services utilize SIP as the primary signaling method and a centralized IP to TDM gateway to provide on-net and off-net services. Verizon Business SIP trunk is a SP offering that allows connection to the PSTN and may offer the end customer a viable alternative to traditional PSTN connectivity via either Analog or T1 lines. A demarcation device between these services and customer owned services is recommended. The Cisco Unified Border Element provides demarcation, security, interworking and session management services.

- This application note describes how to configure a Lync 2014 with a Cisco Unified Border Element (CUBE) for connectivity to Verizon Business SIP trunk service. The deployment model covered in this application note is Lync 2013/CUBE to Verizon Business SIP trunk. This document does not address 911 emergency outbound calls. For 911 feature service details contact Verizon Business, directly.
- Testing was performed in accordance to Cisco's SIP Trunk Test Plan and all features were verified. Key features verified are:

o CPE outbound to SP Offnet gateway(PSTN)

o SP Offnet gateway(PSTN) inbound to CPE (G.729 offered first)

o CPE Telephone Number Support – digit translations

o CPE Offnet Call Conference

o CPE Intra-Site Call Conference

o CPE Intra-Site Attended Call Transfer

o CPE Intra-Site Unattended Call Transfer

o CPE Call Hold and Resume (call hold is always done on the IP PBX side)

o CPE Voice Mail

o SP Voice Mail

o CPE Find Me (CFU)

o Simultaneous Calls

o CPE Auto Attendant

o CPE to PSTN offnet gateway international call

o CPE Find Me (Call Forward Don't Answer)

o Codec mid-call re-negotiation (to be tested without transcoder)

o Dial plans

o PRACK with SDP

- The Cisco Unified Border Element configuration detailed in this document is based on a lab environment with a simple dial-plan used to ensure proper interoperability between Verizon Business SIP network and Cisco Unified Communications. The configuration described in this document details the important commands to have enabled for interoperability to be successful and care must be taken, by the network administrator deploying CUBE, to ensure these commands are set per each dial-peer requiring to interoperate to Verizon Business SIP network.

Network Topology

The network topology includes the Microsoft Lync 2013 Enterprise Edition and 2 Lync clients. Cisco UBE published as a PSTN gateway in the Lync topology. Verizon was used as the service provider with a SIP trunk to the Cisco UBE.

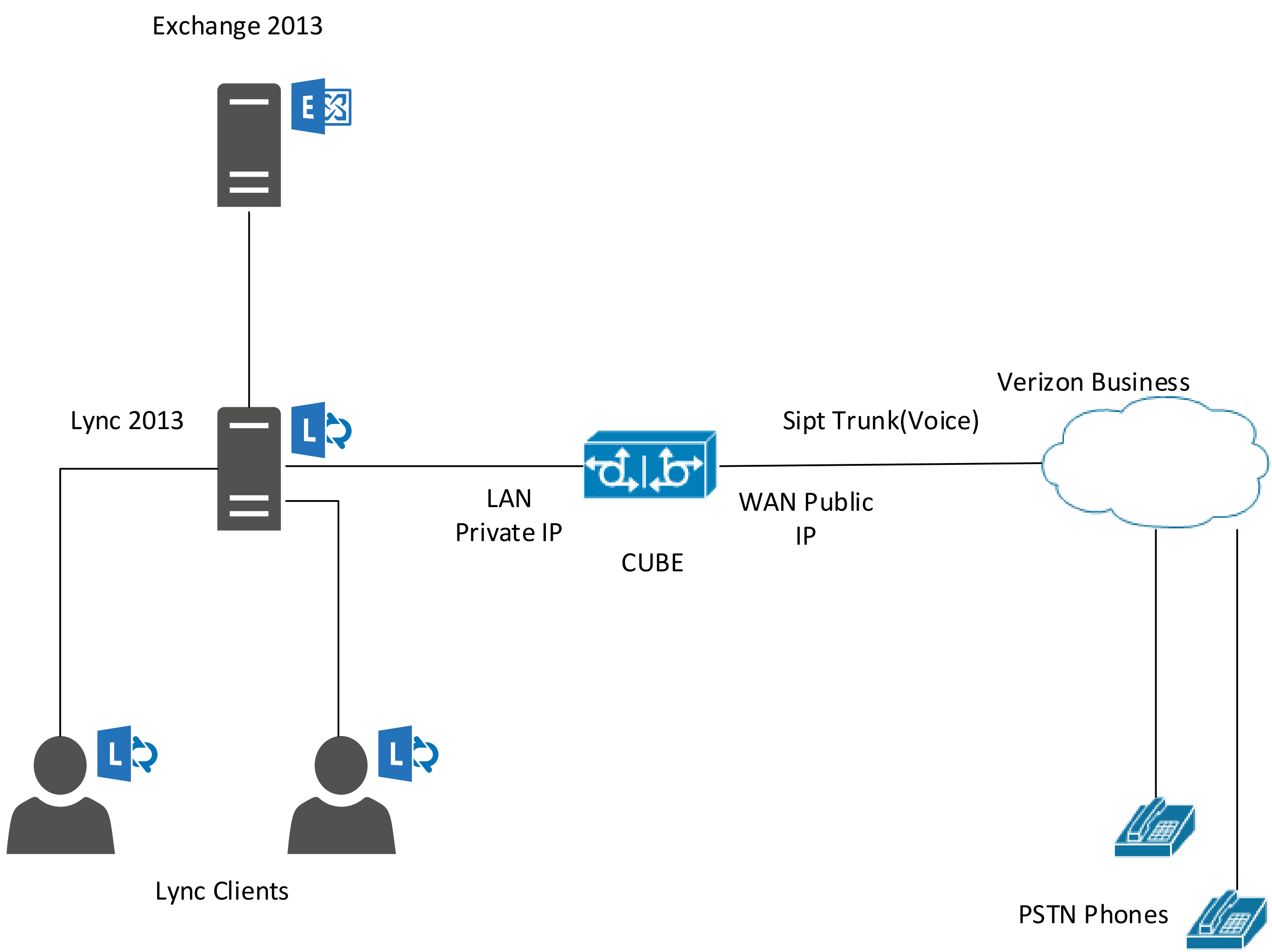

Figure 1. Basic Call Setup

System Components

Hardware Components

- Cisco UBE 3945

Software Requirements

- Cisco UBE IOS 15.4(3)M
- Microsoft Lync 2013 V5.0.8308.0
- Microsoft Exchange 2013 CU7

Features

Features Supported

- Lync only supports attended and semi-attended. Call can be completed. However, caller ID on the terminating side does not get updated after transfer is completed
- Call from/to PSTN to/from CPE – Basic and International calls , digit translations
- Hold/Resume
- DTMF
- Call Forwarding CFA and CFNA
- Support for early media

Features Not Supported

- Lync does not support codec G.729
- Lync need a third party vendor to support Fax.
- Lync does not support blind transfers.
- Lync does not have a call forward busy feature.

Caveats

- Caller ID updates are not observed on call transfer scenarios.
- Lync does not support Call Forwarding on Busy .
- Lync doens’t support G729 calls.Hence all calls were tested with G711ulaw.Codec negotiation tests were done with G711u and Alaw.
- Lync cannot send a call with anonymous caller id
- There is a work around needed for CPE outbound calls. If the workaround is not implemented calls are disconnected after 30 minutes.
- The Diversion header needs to be manipulated for call forward to work.

Configuration

Configuring Cisco Unified Border Element (CUBE)

```
Cisco IOS Software, C3900e Software (C3900e-UNIVERSALK9-M), Version 15.4(3)M, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Mon 21-Jul-14 12:23 by prod_rel_team

ROM: System Bootstrap, Version 15.1(1r)T5, RELEASE SOFTWARE (fc1)

centurylink1 uptime is 4 days, 20 hours, 14 minutes
System returned to ROM by power-on
System image file is "flash0:c3900e-universalk9-mz.SPA.154-3.M.bin"
Last reload type: Normal Reload
Last reload reason: power-on



This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco CISCO3925-CHASSIS (revision 1.0) with C3900-SPE200/K9 with 1797120K/300032K bytes of memory.
Processor board ID FTX1744AMAD
4 Gigabit Ethernet interfaces
4 Channelized (E1 or T1)/PRI ports
1 Virtual Private Network (VPN) Module
DRAM configuration is 72 bits wide with parity enabled.
256K bytes of non-volatile configuration memory.
4001760K bytes of ATA System CompactFlash 0 (Read/Write)


License Info:

License UDI:

-------------------------------------------------
Device#   PID                   SN
-------------------------------------------------
*1        C3900-SPE200/K9       FOC174142TF



Technology Package License Information for Module:'c3900e'
```

```
-----------------------------------------------------------------------
Technology    Technology-package              Technology-package
                 Current            Type         Next reboot
-----------------------------------------------------------------------
ipbase       ipbasek9          Permanent     ipbasek9
security     securityk9        Permanent     securityk9
uc           uck9              Permanent     uck9
data         None              None          None
NtwkEss      None              None          None
CollabPro    None              None          None

Configuration register is 0x2102




Building configuration...


Current configuration : 4234 bytes
!
! Last configuration change at 21:20:49 UTC Fri Dec 12 2014 by cisco
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname VZB
!
boot-start-marker
boot-end-marker
!
aqm-register-fnf
!
! card type command needed for slot/vwic-slot 0/0
logging buffered 999999
!
no aaa new-model
!
!
!
!
!
!
!
!
!
!
!
!
!
!
ip name-server 10.64.1.3
ip cef
no ipv6 cef
!
```

```
!
multilink bundle-name authenticated
!
!
!
!
!
cts logging verbose
!
!
voice-card 0
!
!
!
voice service voip
 ip address trusted list
! The IP address below are the Service Provider and Lync 2013
  ipv4 XX.XX.XX.XX
  ipv4 YY.YY.YY.YY
 no ip address trusted authenticate
 address-hiding
 allow-connections sip to sip
 no supplementary-service sip moved-temporarily
 no supplementary-service sip refer
 fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0 fallback none
 sip
  rel1xx supported "rel100"
  header-passing
  referto-passing
  early-offer forced
  midcall-signaling passthru
  sip-profiles inbound
!
!
voice class uri LYNC sip
! ** Lync IP address **
 host ipv4:XX.XX.XX.XX
!
voice class uri PSTN sip
! ** SIP trunk provider IP Address **
 host ipv4:YY.YY.YY.YY


voice class codec 1
 codec preference 1 g711ulaw
!
!
! ** This allows call forwards to work ***
voice class sip-profiles 1
 request INVITE peer-header sip Referred-By copy "sip:(.*)@" u01
 request INVITE sip-header Diversion add "Diversion: <sip:sip-uri@97.79.185.189>"
 request INVITE sip-header Diversion modify "sip-uri" "\u01"
 request INVITE sip-header Referred-By remove
!
!** This allows calls to last longer than 30 minutes **
voice class sip-profiles 2
 request INVITE sip-header Session-Expires modify "(.*)" "\1;refresher=uas"
!
!
```

```
voice class sip-copylist 1
 sip-header Referred-By
!
!
!
!
hw-module pvdm 0/0
!
hw-module pvdm 0/1
!
!
redundancy
!
!
!
!
!
!
!
!
!
interface GigabitEthernet0/0
! ** WAN IP address **
 ip address XX.XX.XX.XX 255.255.255.128
 ip virtual-reassembly in
 ip virtual-reassembly out
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
!   ** LAN IP address **
 ip address YY.YY.YY.YY 255.255.255.0
 ip virtual-reassembly in
 ip virtual-reassembly out
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/3
 no ip address
 shutdown
 duplex auto
 speed auto
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!

! ** Default route **
ip route 0.0.0.0 0.0.0.0 XX.XX.XX.XX
!
!
```

```
nls resp-timeout 1
cpd cr-id 1
!
!
control-plane
!
 !
 !
 !
 !
!
mgcp behavior rsip-range tgcp-only
mgcp behavior comedia-role none
mgcp behavior comedia-check-media-src disable
mgcp behavior comedia-sdp-force disable
!
mgcp profile default
!
!
!
!
dial-peer voice 400 voip
 description ** LAN side to Lync **
 destination-pattern 97255511[01]
 session protocol sipv2
 session target ipv4:XX.XX.XX.XX
 session transport tcp
 voice-class codec 1
 dtmf-relay rtp-nte
!
dial-peer voice 500 voip
 description ** WAN side to PSTN **
 destination-pattern .T
 session protocol sipv2
 session target ipv4:YY.YY.YY.YY
 session transport udp
 voice-class codec 1
 voice-class sip profiles 1
 no voice-class sip copy-list
 no voice-class sip referto-passing
 dtmf-relay rtp-nte
!
dial-peer voice 401 voip
 description ** LAN side from Lync **
 session protocol sipv2
 session transport tcp
 incoming uri via LYNC
 voice-class codec 1
 voice-class sip profiles 2 inbound
 voice-class sip copy-list 1
 dtmf-relay rtp-nte
!
dial-peer voice 501 voip
 description ** WAN side from PSTN **
 session protocol sipv2
 session transport tcp
 incoming uri via PSTN
 voice-class codec 1
 dtmf-relay rtp-nte
```

```
!
!
!
!
gatekeeper
 shutdown
!
!
!
line con 0
line aux 0
line vty 0 4
 login local
 transport input telnet
!
scheduler allocate 20000 1000
!
end
```

Configuring the Lync 2013 Server

The validation of Microsoft Lync with Cisco UBE includes the following integration steps from Lync perspective:

- Adding the Cisco UBE as a PSTN Gateway on the Lync Topology Builder
- Associating Gateway with a Mediation pool
- Adding Lync users with DIDs provided by the Service provider.
- Configuring a Dial Plan
- Configuring a Voice Policy
- Configuring a Route
- Trunk configuration to enable all relevant features required for the test.

Lync Topology builder: Adding PSTN Gateway

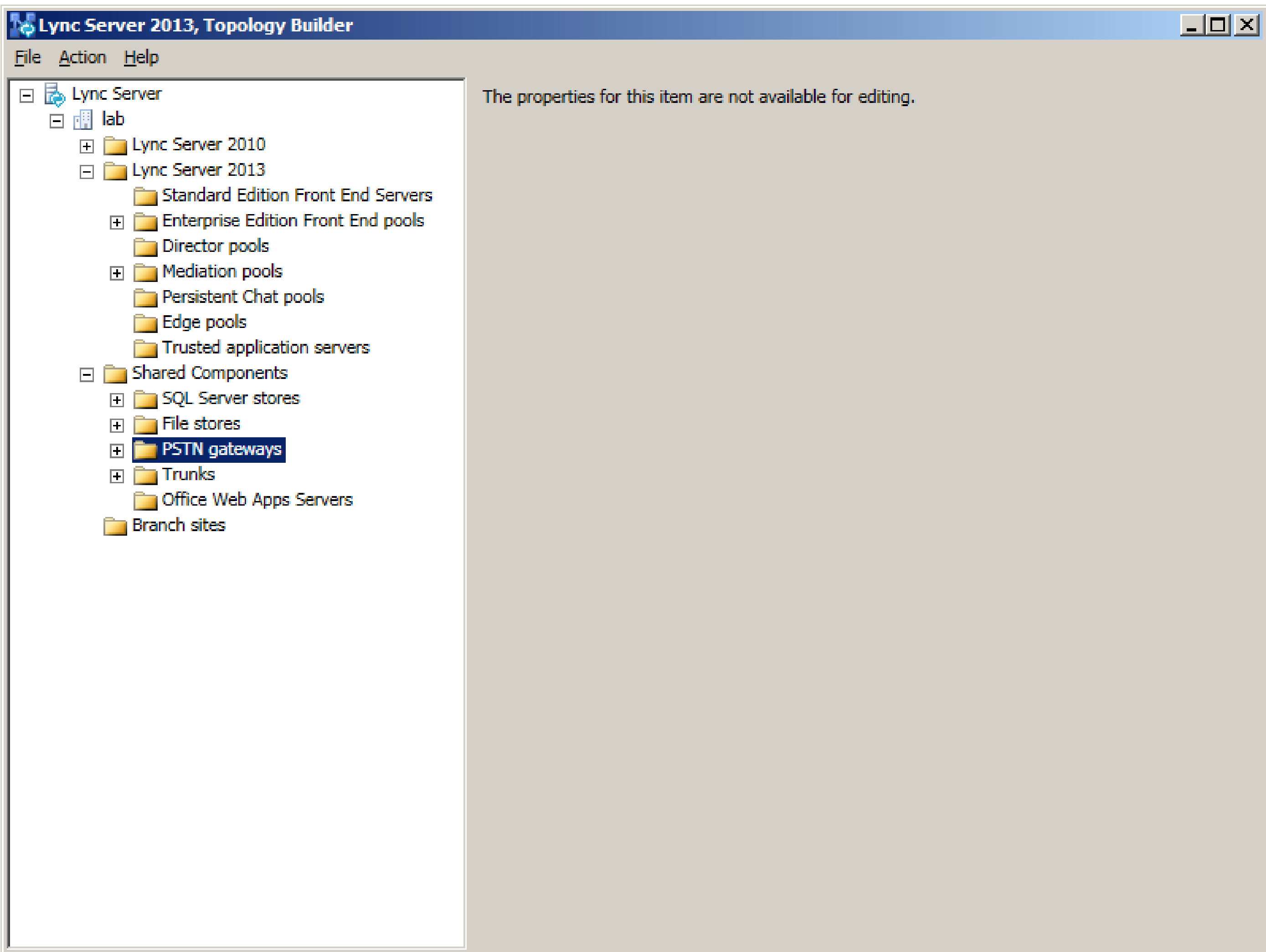

Figure 2. Lync Topology Builder- PSTN Gateway

Lync Topology builder: Associating Gateway with Mediation pool

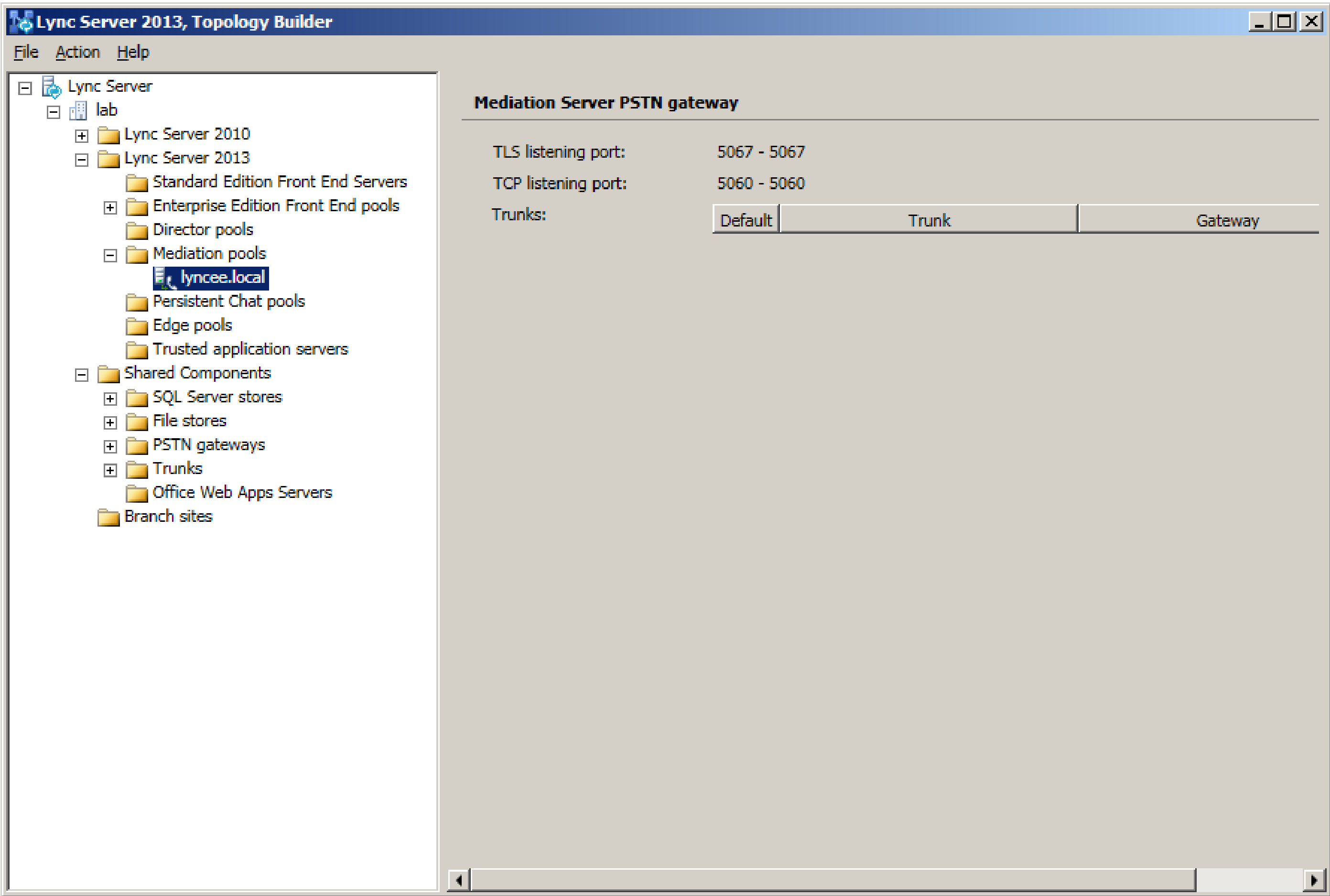

Figure 3. Lync Topology Builder- Mediation pools

Lync Server: Control Panel: Adding users

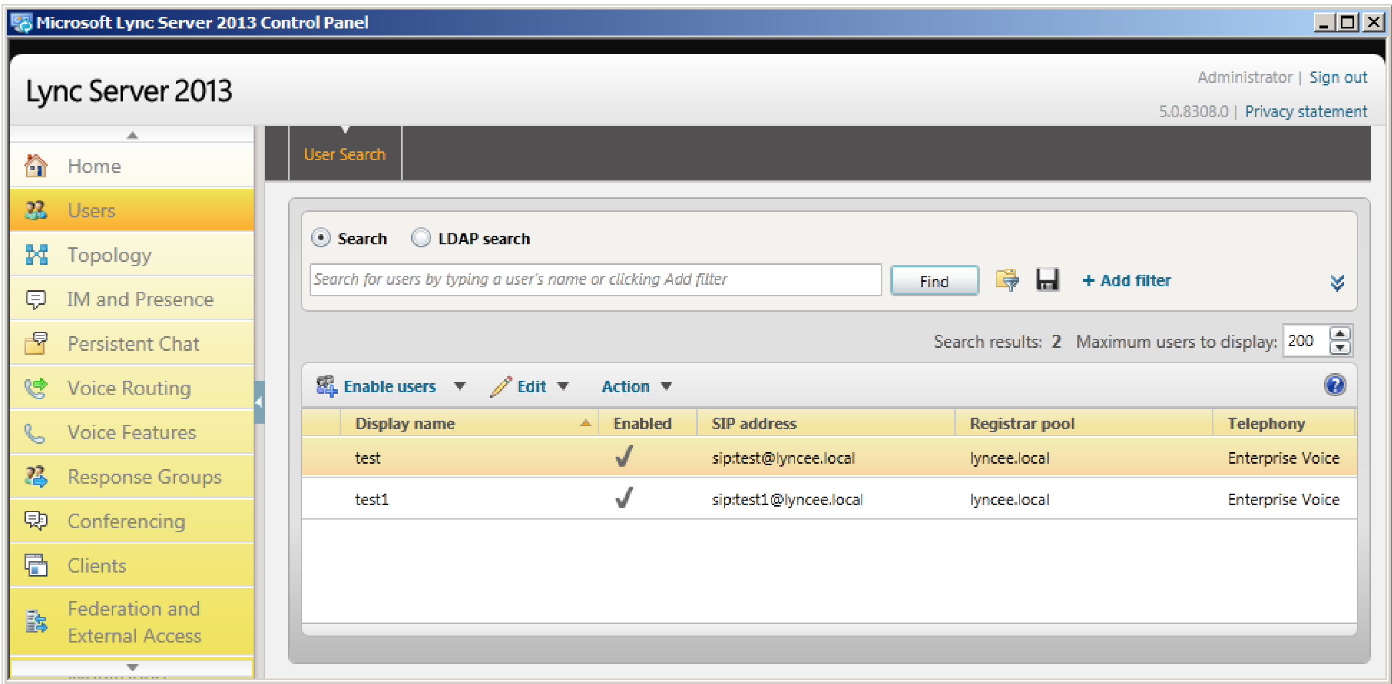

Figure 4. Lync Server: Control Panel- Users

Lync Control panel: Configuring Dial Plan

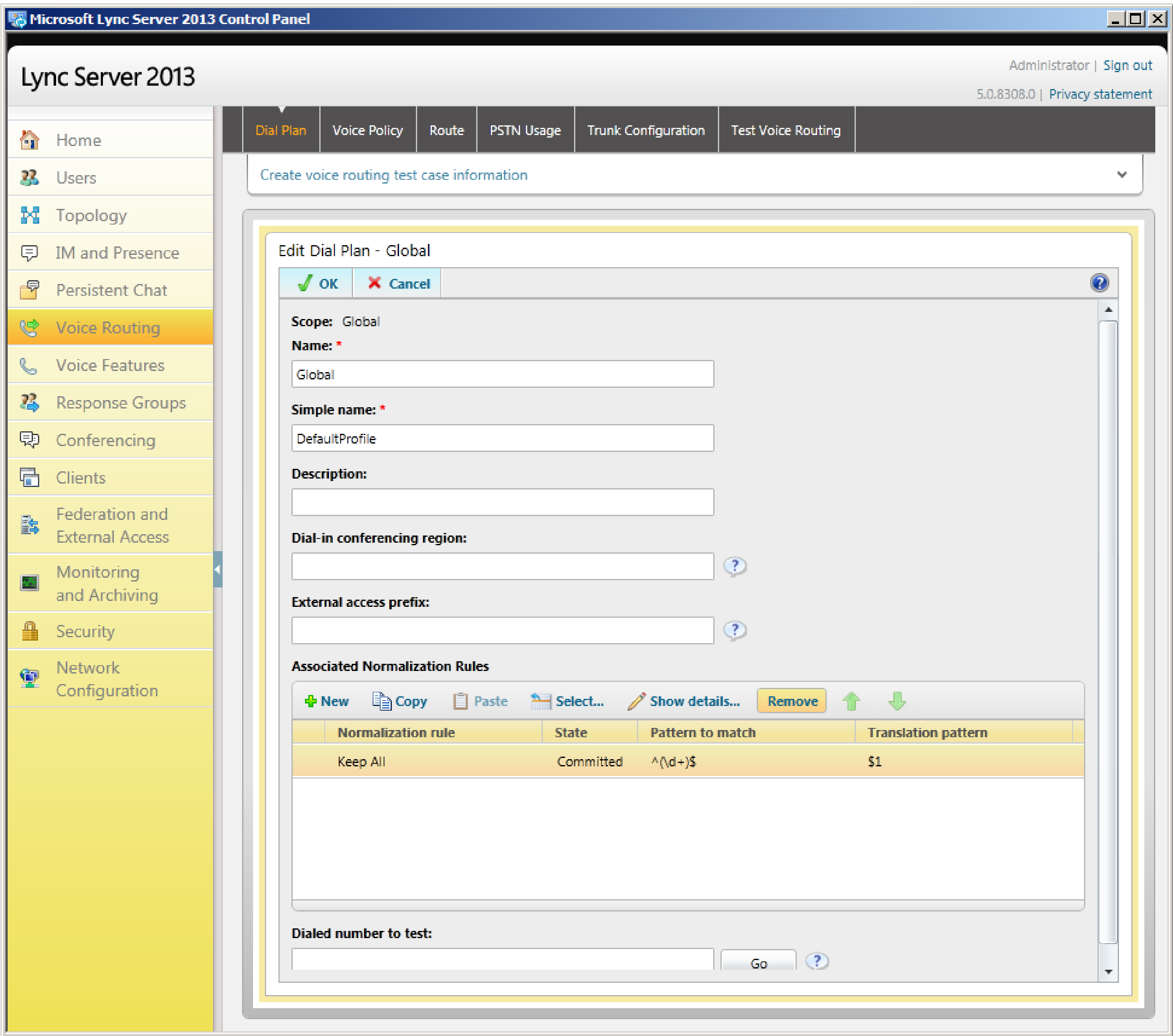

Figure 5. Lync Control panel - Dial Plan

Lync Control panel: Configuring Voice Policy

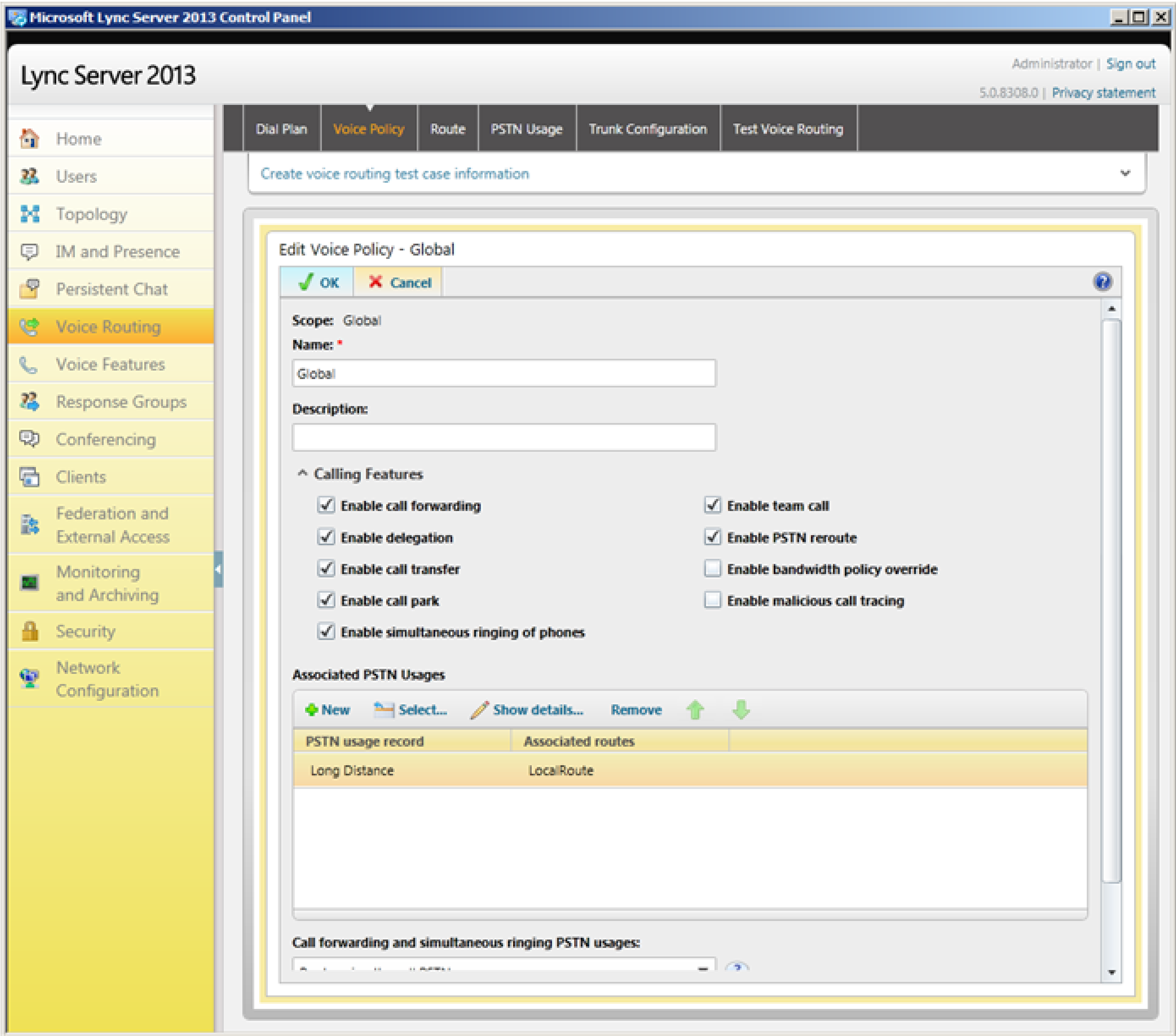

Figure 6. Lync Control Panel- Voice Policy

Lync Control panel: Configuring Route

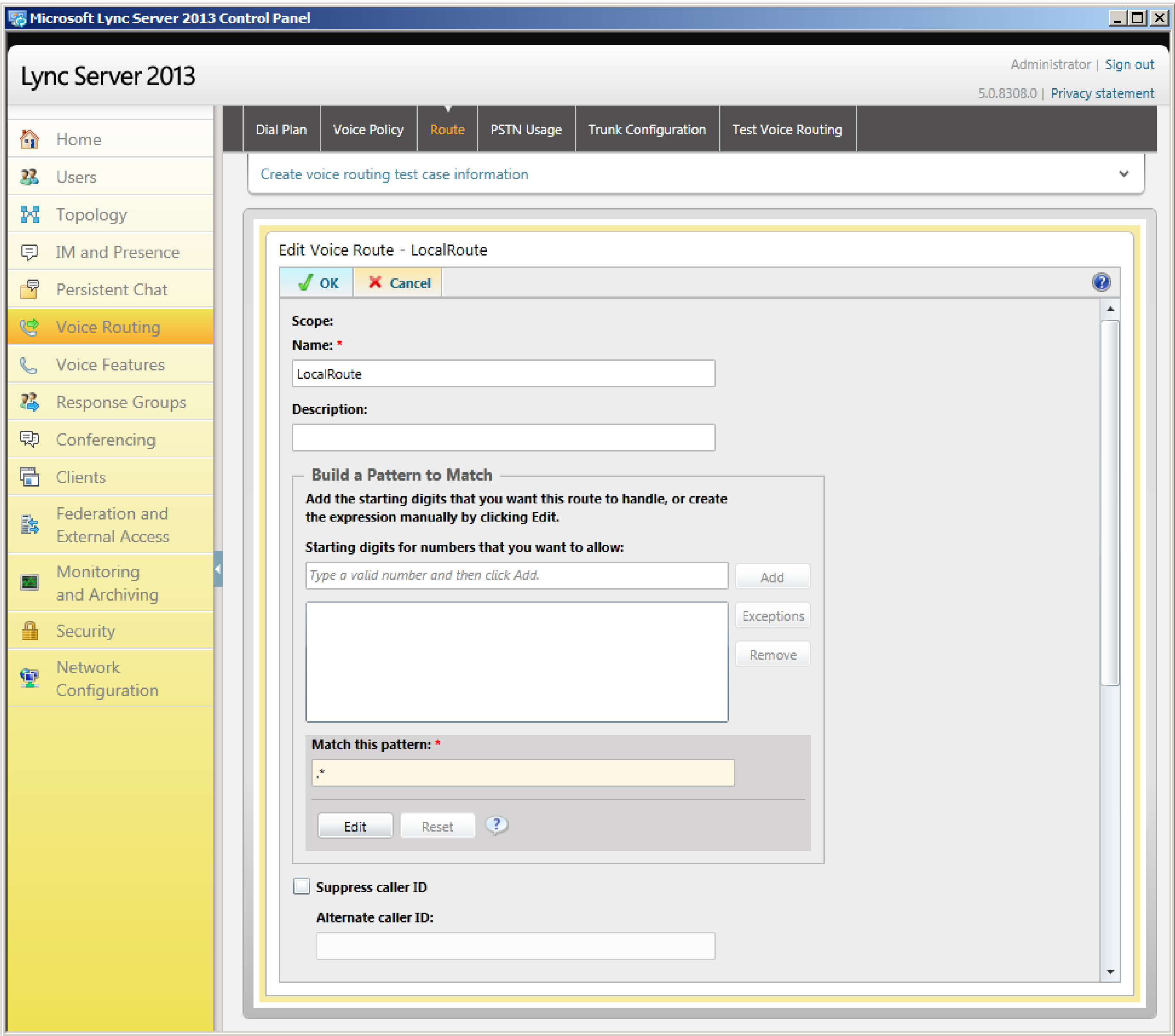

Figure 7. Lync Control Panel - Route (1/2)

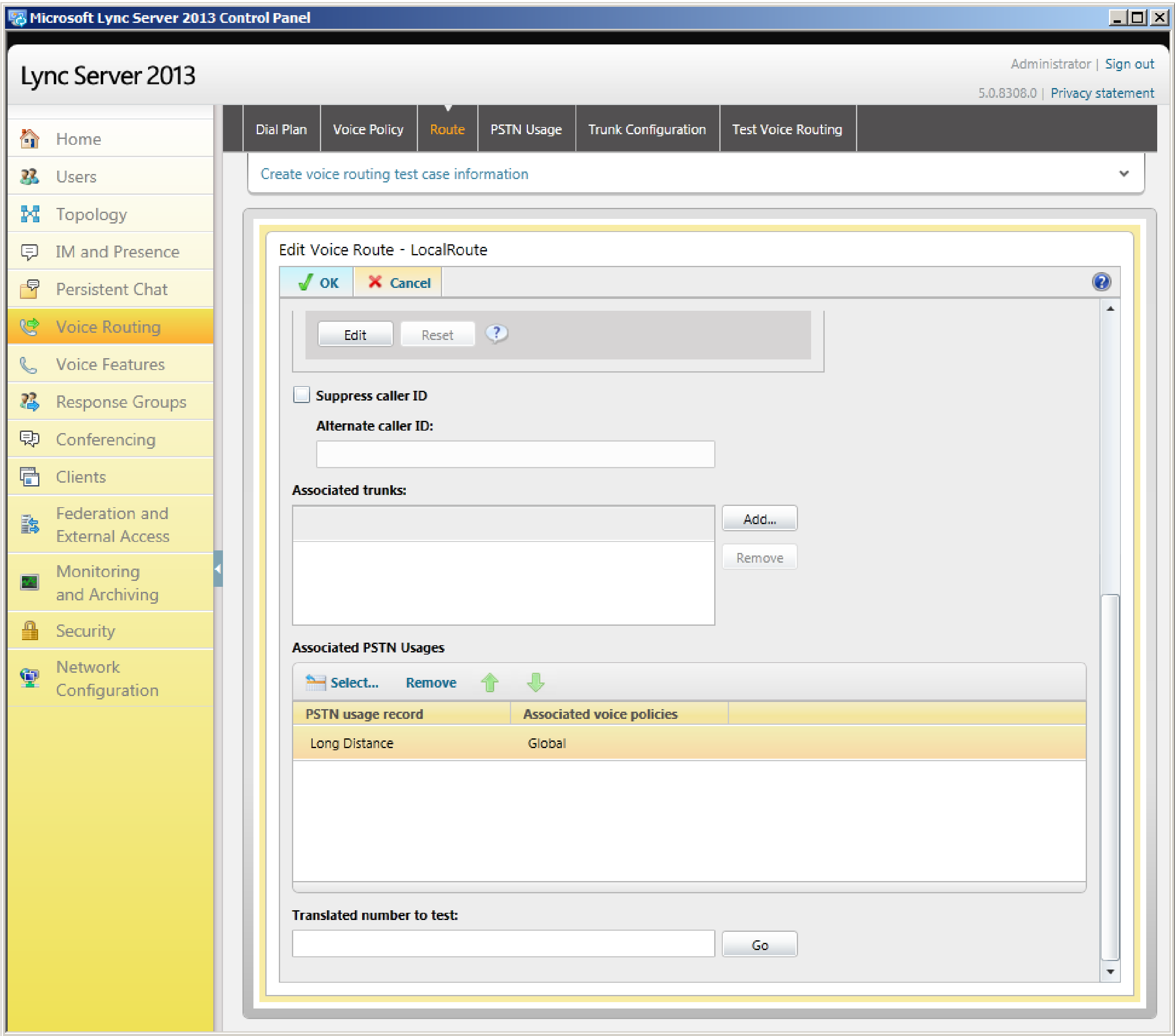

Figure 8. Lync Control Panel - Route (2/2)

Lync Control panel: Trunk Configuration

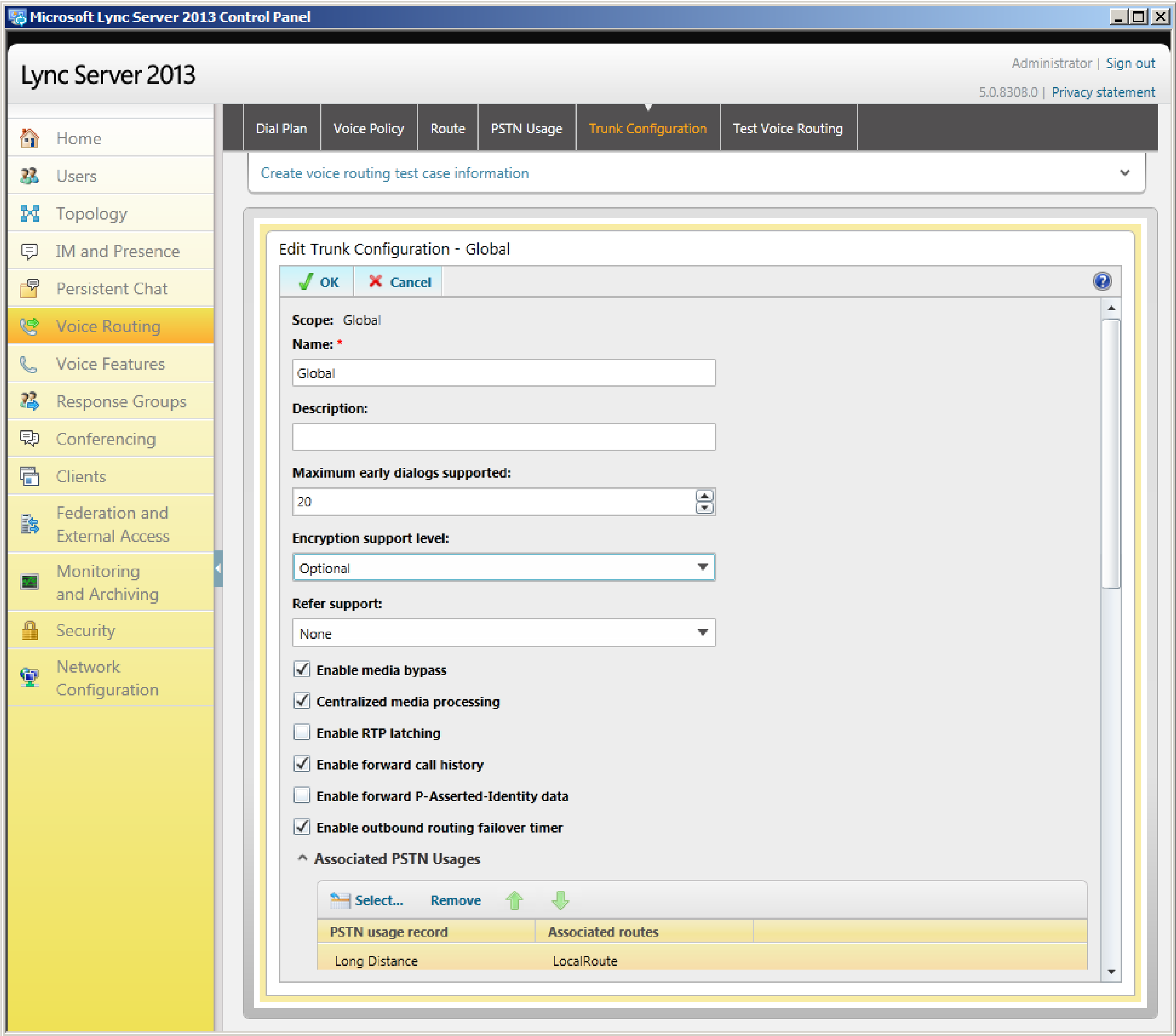

Figure 9. Lync Control Panel - Trunk Configuration

Acronyms

Acronym	Definitions
SIP	Session Initiation Protocol
MGCP	Media Gateway Control Protocol
SCCP	Skinny Client Control Protocol
CUCM	Cisco Unified Communications Manager
CUBE	Cisco Unified Border Element

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Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters

Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 317 7777
Fax: +65 317 7799

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