CUSP Configuration Example

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Contents

Introduction

This document describes the sample CLI and GUI configuration of Cisco Unified SIP Proxy (CUSP) with debugs that match four different call routing scenarios.

Prerequisites

Requirements

Cisco recommends that you have basic knowledge of these topics:

- Session Initiation Protocol (SIP)
- Cisco Unified SIP Proxy (CUSP)

Components Used

The information in this document is based on CUSP.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Configure

This section describes the configuration of four call routing scenarios.

Note: Use the Command Lookup Tool (registered customers only) in order to obtain more information on the commands used in this section.

Scenario 1

Call Flow: ***IP Phone 1 −− CME −− SIP −− CUSP −− SIP −− CUCM −− IP Phone 2***

Dial 408 202 2102 from IP Phone 1 registered to CallManager Express (CME) in order to reach IP Phone 2 registered to Cisco Unified Communications Manager (CUCM) via CUSP.

CME acts as a Public Switched Telephone Network (PSTN) in this scenario.

1. The SIP INVITE comes to CUSP from CME.

```
[DsTransportListener−2] DEBUG 2013.02.27 19:15:59:245 DsSipLlApi.Wire −
Received UDP packet on 14.128.100.169:5060 ,source 14.128.100.150:57878
INVITE sip:4082022102@14.128.100.169:5060 SIP/2.0
Via: SIP/2.0/UDP 14.128.100.150:5060;branch=z9hG4bK21F2555
Remote−Party−ID: "4082025555" <sip:4082025555@14.128.100.150>;
party=calling;screen=yes;privacy=off
From: "4082025555" <sip:4082025555@14.128.100.150>;tag=81D7430C−1D2
To: <sip:4082022102@14.128.100.169>
Date: Wed, 27 Feb 2013 19:15:59 GMT
Call−ID: F3E5F396−804811E2−9818EC62−1B7185EE@14.128.100.150
Supported: 100rel,timer,resource−priority,replaces,sdp−anat
Min−SE:  1800
Cisco−Guid: 4091813662−2152206818−2551376994−0460424686
User−Agent: Cisco−SIPGateway/IOS−12.x
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
SUBSCRIBE, NOTIFY, INFO, REGISTER
CSeq: 101 INVITE
Timestamp: 1361992559
Contact: <sip:4082025555@14.128.100.150:5060>
Expires: 180
Allow−Events: telephone−event
Max−Forwards: 69
Content−Type: application/sdp
Content−Disposition: session;handling=required
Content−Length: 410

v=0
o=CiscoSystemsSIP−GW−UserAgent 1007 629 IN IP4 14.128.100.150
s=SIP Call
c=IN IP4 14.128.100.150
t=0 0
m=audio 16930 RTP/AVP 18 101
c=IN IP4 14.128.100.150
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone−event/8000
a=fmtp:101 0−16
m=video 17954 RTP/AVP 97
c=IN IP4 14.128.100.150
b=TIAS:1000000
a=rtpmap:97 H264/90000
a=fmtp:97 profile−level−id=42801E;packetization−mode=0

−−− end of packet −−−
```

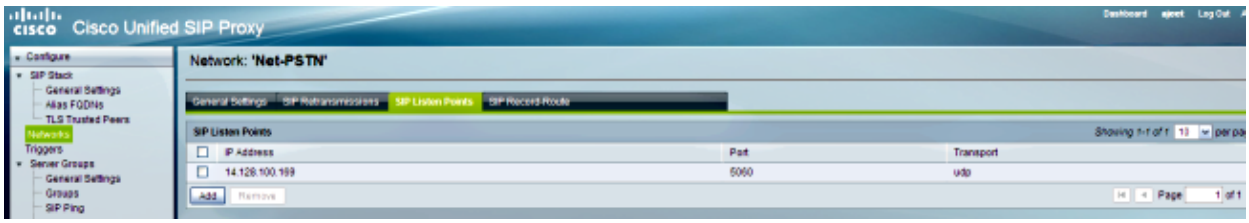
2. The call is accepted to the network (Net−PSTN) configuration that matches.

   CLI

```
sip listen Net-PSTN udp 14.128.100.169 5060

 !
sip network Net-PSTN standard
  no non-invite-provisional
 allow-connections
 retransmit-count invite-client-transaction 3
  retransmit-count invite-server-transaction 5
 retransmit-count non-invite-client-transaction 3
  retransmit-timer T1 500
  retransmit-timer T2 4000
  retransmit-timer T4 5000
  retransmit-timer TU1 5000
  retransmit-timer TU2 32000
  retransmit-timer clientTn 64000
  retransmit-timer serverTn 64000
  tcp connection-setup-timeout 1000
  udp max-datagram-size 1500
  end network
!
```

GUI



DEBUG

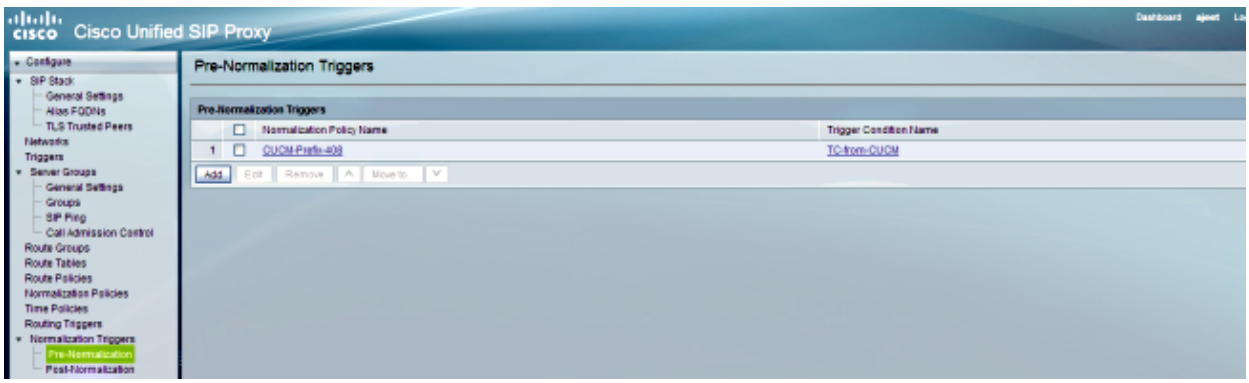
```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250
conditions.RegexCondition - inNetwork='Net-PSTN'
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250
conditions.RegexCondition - IN_NETWORK: Net-PSTN
```

3. The Pre-Normalization sequence is executed.

CLI

```
trigger pre-normalization sequence 1 policy CUCM-Prefix-408
condition TC-from-CUCM
```

GUI



DEBUG

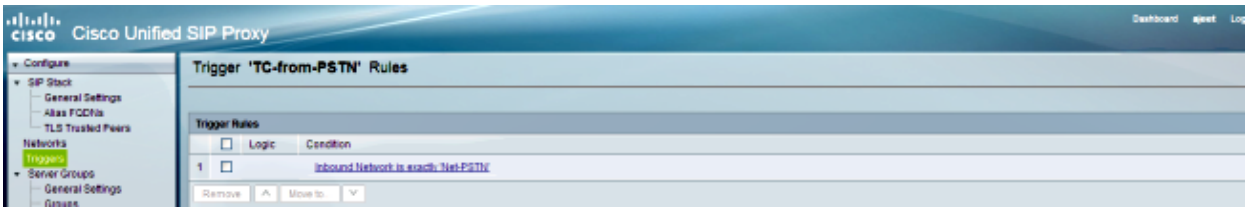
```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 util.Normalization -
Entering Normalization(moduleRequest:pre-normalize)
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 conditions.RegexCondition -
inNetwork='Net-PSTN'
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 conditions.RegexCondition -
IN_NETWORK: Net-PSTN
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 conditions.AbstractRegexCondition -
pattern(^\QNet-CUCM\E$), toMatch(Net-PSTN) returning false
[REQUESTI.12] INFO  2013.02.27 19:15:59:250 util.Normalization -
skipping pre-normalize, due to either no trigger is configured or triggers
did not evaluate to true or is configured to by-pass
```

4. The Trigger Condition (TC−from−PSTN) is matched.

CLI

```
!
trigger condition TC-from-PSTN
 sequence 1
  in-network ^\QNet-PSTN\E$
  end sequence
 end trigger condition
!
```

GUI



DEBUG

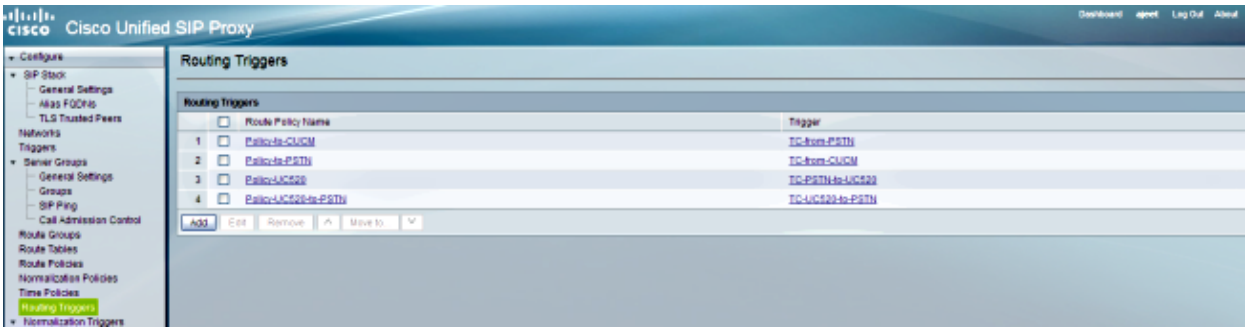
```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 conditions.RegexCondition -
inNetwork='Net-PSTN'
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 conditions.RegexCondition -
IN_NETWORK: Net-PSTN
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:250 conditions.AbstractRegexCondition -
pattern(^\QNet-PSTN\E$), toMatch(Net-PSTN) returning true
```

5. The Routing Trigger configuration is checked in order to find the Route Policy (Policy−to−CUCM) that matches based on the Trigger Condition (TC−from−PSTN).

CLI

```
trigger routing sequence 1 policy Policy-to-CUCM condition TC-from-PSTN
```

GUI



DEBUG

```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 triggers.ModuleTrigger -
ModuleTrigger.eval() action<Policy-to-CUCM> actionParameter<>
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 triggers.ModuleTrigger -
ModuleTrigger.eval() got the policy, executing it ...
```

6. The Route Policy (Policy−to−CUCM) configuration is checked in order to find the Route Table (RT−CUCM) that matches.

CLI

```
!
policy lookup Policy-to-CUCM
 sequence 100 RT-CUCM request-uri uri-component user
  modify-key 4082022102 1111
  rule exact
  end sequence
 end policy
!
```

GUI

DEBUG

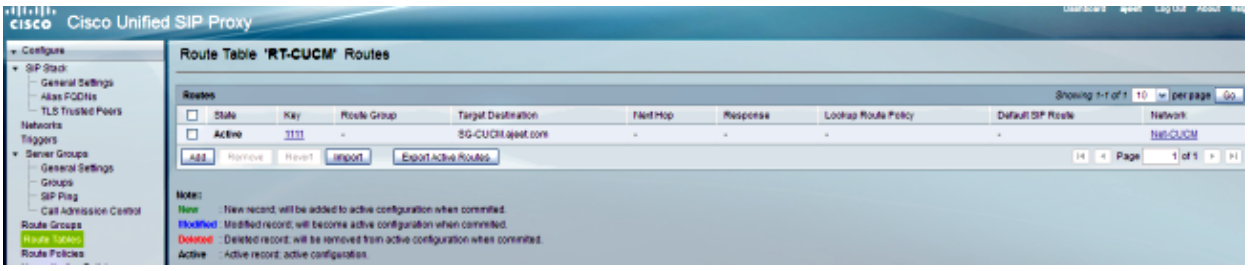
```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.XCLPrefix –
Entering getKeyValue()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.FieldSelector –
getUriPart: URI – sip:4082022102@14.128.100.169:5060 part 6
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.FieldSelector –
Requested field 45
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.FieldSelector –
 Returning key 4082022102
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.FieldSelector –
 Retrieved Modifier  RegexModifier: match= 4082022102, replace=
1111, ignore case= false
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.FieldSelector –
Input field: 4082022102
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:251 nrs.FieldSelector –
 Modified field: 1111
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 nrs.XCLPrefix –
Leaving getKeyValue()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 modules.XCLLookup –
 table=RT–CUCM, key=1111
[REQUESTI.12] INFO  2013.02.27 19:15:59:252 modules.XCLLookup –
 table is RT–CUCM
```

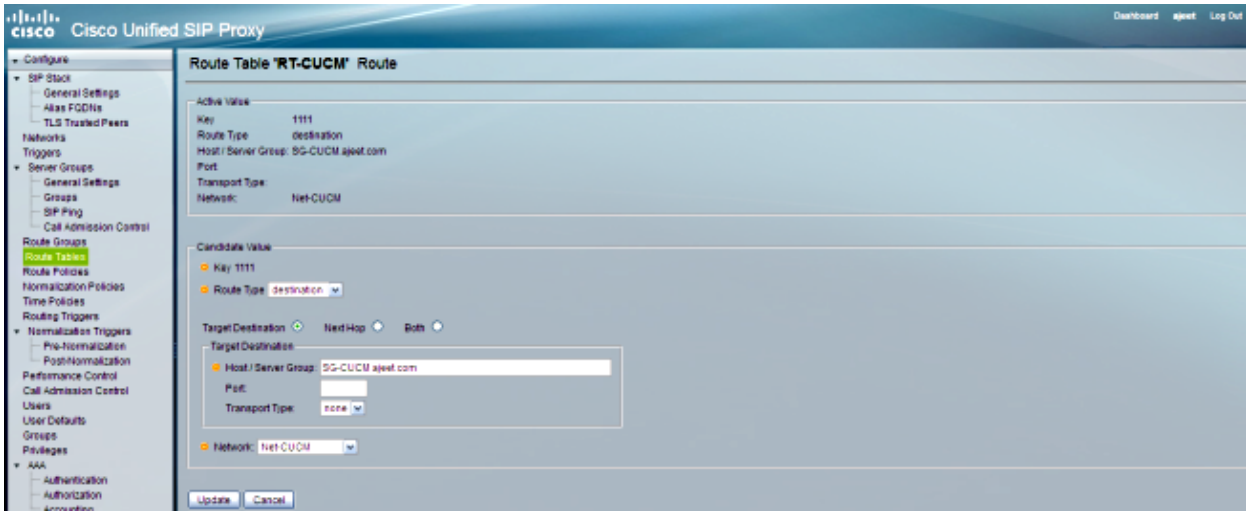
7. The Route Table (RT–CUCM) configuration is checked in order to find the Target Destination (SG–CUCM.ajeet.com).

CLI

```
!
route table RT–CUCM
 key 1111 target–destination SG–CUCM.ajeet.com Net–CUCM
 end route table
!
```

GUI





DEBUG

```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 routingtables.RoutingTable –
Entering lookup()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 routingtables.RoutingTable –
Looking up 1111 in table RT–CUCM with rule exact and modifiers=none
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 routingtables.RoutingTable –
Entering applyModifiers()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 routingtables.RoutingTable –
Leaving applyModifiers(), returning 1111
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 routingtables.RoutingTable –
Leaving lookup()
[REQUESTI.12] INFO  2013.02.27 19:15:59:252 nrs.XCLPrefix –
NRS Routing decision is: RouteTable:RT–CUCM, RouteKey:1111,
TargetDestination:SG–CUCM.ajeet.com, Network:Net–CUCM
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 loadbalancer.LBFactory –
Entering createLoadBalancer()
[REQUESTI.12] INFO  2013.02.27 19:15:59:252 loadbalancer.LBFactory –
lbtype is 3(call–id)
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 loadbalancer.LBFactory –
Leaving createLoadBalancer()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 nrs.XCLPrefix –
Stored NRSAlgResult=isFound=true, isFailure=false, Response=–1,
Routes=[Ruri: SG–CUCM.ajeet.com, Route: null, Network: Net–CUCM,
q–value=1.0radvance=[502, 503]], PolicyAdvance=null
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 nrs.NRSAlgResult –
set policyAdvance as specified in route=RouteTable:RT–CUCM, RouteKey:1111,
TargetDestination:SG–CUCM.ajeet.com, Network:Net–CUCM
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:252 nrs.NRSAlgResult –
no policyAdvance specified in route
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:253 nrs.NRSAlgResult –
set policyAdvance as specified in algorithm={lookupkeymodifier=
[ RegexModifier: match= 4082022102, replace= 1111, ignore case= false],
lookuprule=0, lookupfield=45, lookuplenght=–1, lookuptable=RT–CUCM,
sequence=100, algorithm=1}
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:253 nrs.NRSAlgResult –
no policyAdvance specified in algorithm
```

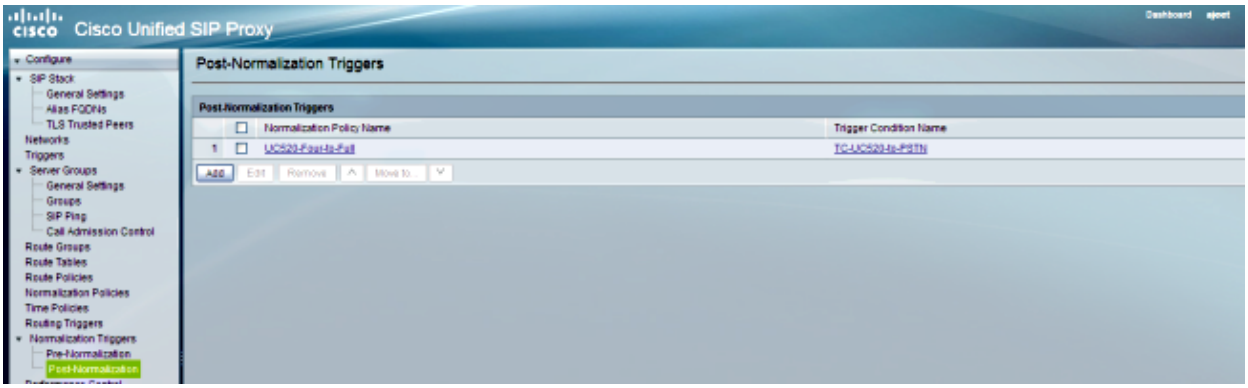
8. The Post−Normalization Sequence is executed.

Note: This scenario does not use Post−Normalization, which is why Post−Normalization is skipped in the debugs.

CLI

```
trigger post-normalization sequence 1 policy
UC520-Four-to-Full condition TC-UC520-to-PSTN
```

GUI



DEBUG

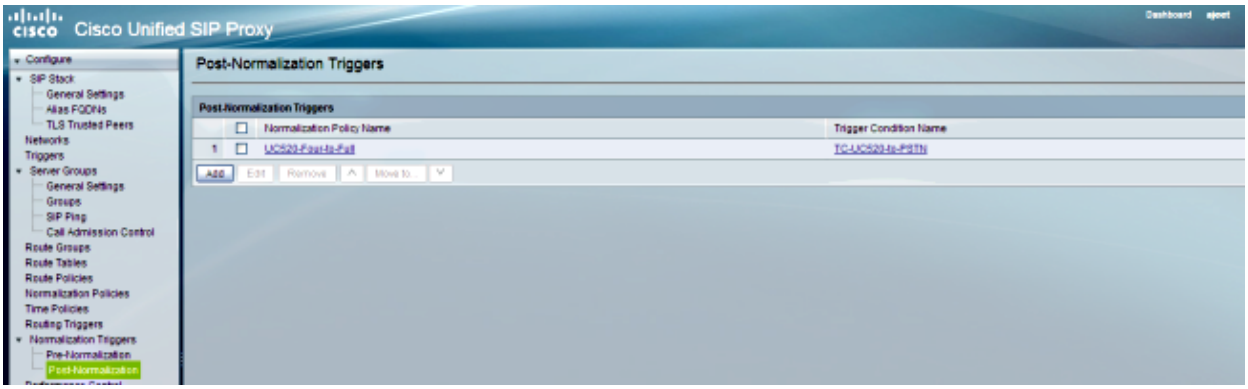
```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 util.Normalization -
Entering Normalization(moduleRequest:post-normalize)
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 conditions.RegexCondition -
inNetwork='Net-PSTN'
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 conditions.RegexCondition -
IN_NETWORK: Net-PSTN
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 conditions.AbstractRegexCondition -
pattern(^\QNet-From-UC520\E$), toMatch(Net-PSTN) returning false
[REQUESTI.12] INFO  2013.02.27 19:15:59:254 util.Normalization -
skipping post-normalize, due to either no trigger is configured or triggers
did not evaluate to true or is configured to by-pass
```

9. The Server Group configuration is checked in order to find the element IP address, and the call is routed to the best route possible based on the Q-value and Weight configuration.

CLI

```
!
server-group sip group SG-CUCM.ajeet.com Net-CUCM
 element ip-address 14.128.64.191 5060 udp q-value 1 weight 50
 element ip-address 14.128.64.192 5060 udp q-value 1.0 weight 100
 failover-resp-codes 503
 lbtype global
 ping
 end server-group
!
```

GUI



DEBUG

```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 loadbalancer.LBFactory -
Entering createLoadBalancer()
[REQUESTI.12] INFO  2013.02.27 19:15:59:254 loadbalancer.LBFactory -
lbtype is 0(global)
[REQUESTI.12] INFO  2013.02.27 19:15:59:254 loadbalancer.LBFactory -
Default lbtype is 3(call-id)
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 loadbalancer.LBFactory -
Leaving createLoadBalancer()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 loadbalancer.LBBase -
Entering getServer()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 loadbalancer.LBBase -
Entering initializeDomains()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 servergroups.
ServerGlobalStateWrapper - Net-CUCM:14.128.64.191:5060:1
numTries=2--->isServerAvailable(): true
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:254 servergroups.
ServerGlobalStateWrapper - Net-CUCM:14.128.64.192:5060:1
numTries=2--->isServerAvailable(): true
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 servergroups.AbstractNextHop -
Entering compareDomainNames()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 servergroups.AbstractNextHop -
Leaving compareDomainNames()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 loadbalancer.LBBase -
Leaving initializeDomains()
[REQUESTI.12] INFO  2013.02.27 19:15:59:255 loadbalancer.LBHashBased -
list of elements in order on which load balancing is done :
{reSgElementWeight=50, reSgElementSgName=SG-CUCM.ajeet.com,
reSgElementTransport=UDP, reSgElementQValue=1.0, reSgElementPort=5060,
reSgElementHost=14.128.64.191}, {reSgElementWeight=100, reSgElementSgName=
SG-CUCM.ajeet.com, reSgElementTransport=UDP, reSgElementQValue=1.0,
reSgElementPort=5060, reSgElementHost=14.128.64.192},
 [REQUESTI.12] INFO  2013.02.27 19:15:59:255 loadbalancer.LBHashBased -
Hashing on F3E5F396-804811E2-9818EC62-1B7185EE@14.128.100.150
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 loadbalancer.DsHashAlgorithm -
Entering selectIndex()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 loadbalancer.DsHashAlgorithm -
Leaving selectIndex()
[REQUESTI.12] INFO  2013.02.27 19:15:59:255 loadbalancer.LBHashBased -
Index selected 0
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 servergroups.AbstractNextHop -
Entering compareDomainNames()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 servergroups.AbstractNextHop -
Leaving compareDomainNames()
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 loadbalancer.LBBase -
Server group SG-CUCM.ajeet.com selected {reSgElementWeight=50,
reSgElementSgName=SG-CUCM.ajeet.com, reSgElementTransport=UDP,
reSgElementQValue=1.0, reSgElementPort=5060, reSgElementHost=14.128.64.191}
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:255 loadbalancer.LBBase -
```

```
Leaving getServer()
```

10. The SIP INVITE is sent to the selected element.

```
[REQUESTI.12] DEBUG 2013.02.27 19:15:59:256 DsSipLlApi.Wire -
Sending UDP packet on 14.128.100.169:32771, destination 14.128.64.191:5060
INVITE sip:4082022102@SG-CUCM.ajeet.com SIP/2.0
Via: SIP/2.0/UDP 14.128.100.169:5061;branch=z9hG4bK.ToYJFeKMyfZGySv.gcLjg~~231
Via: SIP/2.0/UDP 14.128.100.150:5060;branch=z9hG4bK21F2555
Max-Forwards: 68
To: <sip:4082022102@14.128.100.169>
From: "4082025555" <sip:4082025555@14.128.100.150>;tag=81D7430C-1D2
Contact: <sip:4082025555@14.128.100.150:5060>
Expires: 180
Remote-Party-ID: "4082025555" <sip:4082025555@14.128.100.150
>;party=calling;screen=yes;privacy=off
Call-ID: F3E5F396-804811E2-9818EC62-1B7185EE@14.128.100.150
CSeq: 101 INVITE
Content-Length: 410
Date: Wed, 27 Feb 2013 19:15:59 GMT
Supported: 100rel,timer,resource-priority,replaces,sdp-anat
Min-SE: 1800
Cisco-Guid: 4091813662-2152206818-2551376994-0460424686
User-Agent: Cisco-SIPGateway/IOS-12.x
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
 SUBSCRIBE, NOTIFY, INFO, REGISTER
Timestamp: 1361992559
Allow-Events: telephone-event
Content-Type: application/sdp
Content-Disposition: session;handling=required

v=0
o=CiscoSystemsSIP-GW-UserAgent 1007 629 IN IP4 14.128.100.150
s=SIP Call
c=IN IP4 14.128.100.150
t=0 0
m=audio 16930 RTP/AVP 18 101
c=IN IP4 14.128.100.150
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-16
m=video 17954 RTP/AVP 97
c=IN IP4 14.128.100.150
b=TIAS:1000000
a=rtpmap:97 H264/90000
a=fmtp:97 profile-level-id=42801E;packetization-mode=0
```

Note: Some devices, such as CUCM, validate the Uniform Resource Identifier (URI) of requests before they process them, which means that the end device might need to be configured with the Fully Qualified Domain Name (FQDN) in order to allow for this.

In the case of CUCM, ***CUCM > System > Enterprise Parameter > Clusterwide Domain Configuration > Cluster Fully Qualified Domain Name*** should be the same as the server group name.

Scenario 2

Call Flow: ***IP Phone 1 −− CUCM −− SIP −− CUSP −− SIP −− CME −− IP Phone 2***

Dial 202 2222 from IP Phone 2. 408 should be prefixed with Pre−Normalization in order to reach IP Phone 1.

CME acts as PSTN in this scenario.

1. The SIP INVITE comes to CUSP from CUCM.

```
[DsTransportListener−0] DEBUG 2013.02.28 00:34:03:370 DsSipLlApi.Wire −
Received UDP packet on 14.128.100.169:5061 ,source 14.128.64.192:5060
INVITE sip:2022222@14.128.100.169:5061 SIP/2.0
Via: SIP/2.0/UDP 14.128.64.192:5060;branch=z9hG4bK18012ae333f
From: "SJ Phone 1" <sip:2001@14.128.64.192>;
tag=534264~c1b77ee1−4af9−4a41−aed3−3846cd699427−49616146
To: <sip:2022222@14.128.100.169>
Date: Thu, 28 Feb 2013 00:34:03 GMT
Call−ID: 8be55500−12e1a5fb−ab−c040800e@14.128.64.192
Supported: timer,resource−priority,replaces
Min−SE:  1800
User−Agent: Cisco−CUCM8.6
Allow: INVITE, OPTIONS, INFO, BYE, CANCEL, ACK, PRACK, UPDATE,
 REFER, SUBSCRIBE, NOTIFY
CSeq: 101 INVITE
Expires: 180
Allow−Events: presence, kpml
Supported: X−cisco−srtp−fallback,X−cisco−original−called
Call−Info: <sip:14.128.64.192:5060>
;method="NOTIFY;Event=telephone−event;Duration=500"
Cisco−Guid: 2347062528−0000065536−0000000107−3225452558
Session−Expires:  1800
P−Asserted−Identity: "SJ Phone 1" <sip:2001@14.128.64.192>
Remote−Party−ID: "SJ Phone 1" <sip:2001@14.128.64.192>
;party=calling;screen=yes;privacy=off
Contact: <sip:2001@14.128.64.192:5060>
Max−Forwards: 70
Content−Length: 0

−−− end of packet −−−
```

2. The call is accepted on the network (Net−CUCM) configuration that matches.

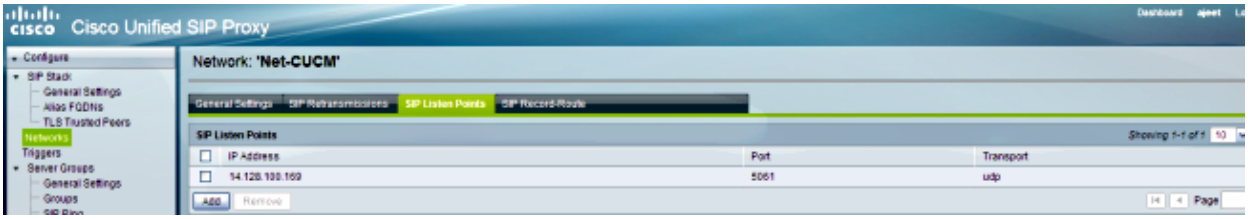
CLI

```
sip listen Net−CUCM udp 14.128.100.169 5061

!
sip network Net−CUCM standard
 no non−invite−provisional
 allow−connections
 retransmit−count invite−client−transaction 3
 retransmit−count invite−server−transaction 5
 retransmit−count non−invite−client−transaction 3
 retransmit−timer T1 500
 retransmit−timer T2 4000
 retransmit−timer T4 5000
 retransmit−timer TU1 5000
 retransmit−timer TU2 32000
 retransmit−timer clientTn 64000
 retransmit−timer serverTn 64000
 tcp connection−setup−timeout 1000
 udp max−datagram−size 1500
 end network
```

```
!
```

GUI



DEBUG

```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:373 conditions.RegexCondition –
inNetwork='Net–CUCM'
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:373 conditions.RegexCondition –
IN_NETWORK: Net–CUCM
```

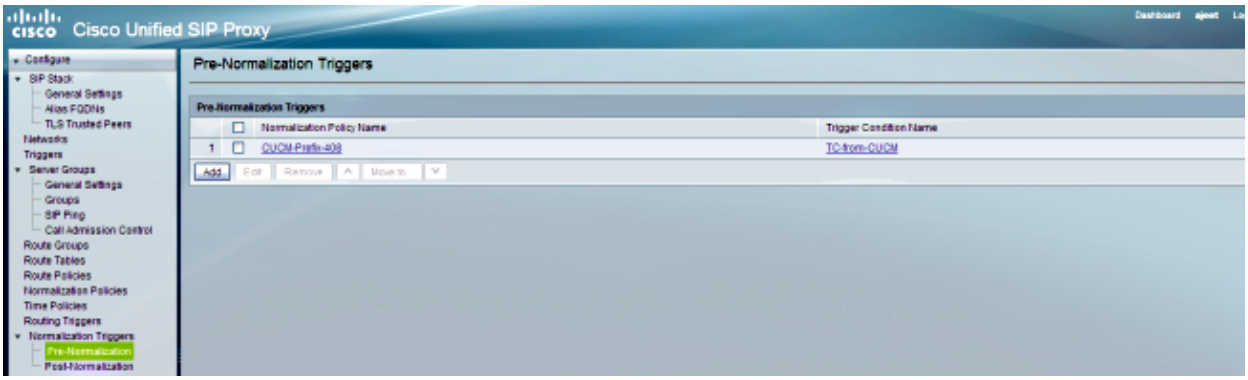
3. The Pre–Normalization sequence is executed.

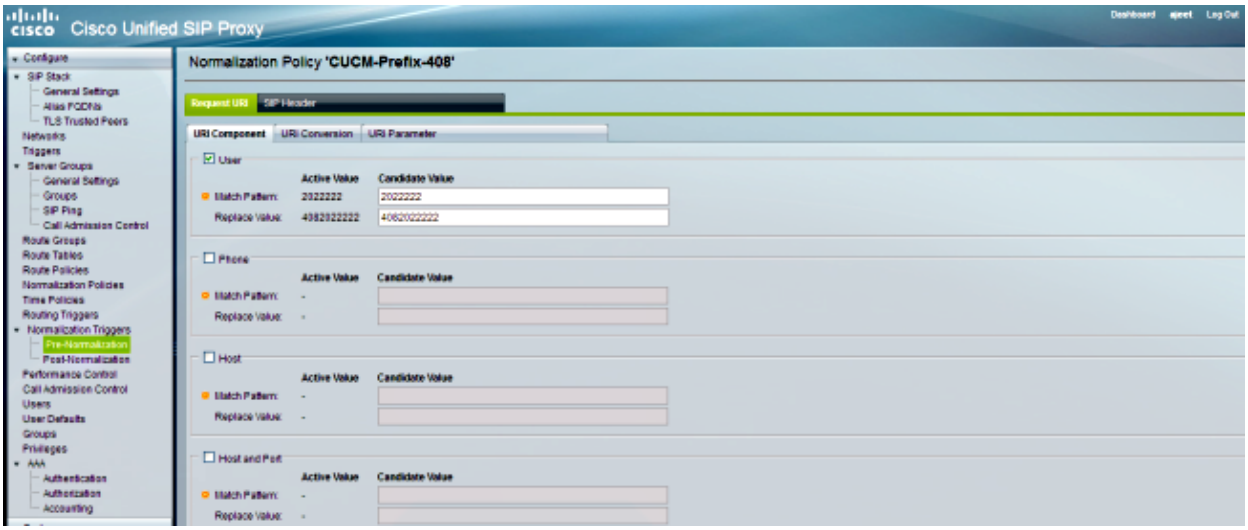
CLI

```
trigger pre–normalization sequence 1 policy CUCM–Prefix–408
condition TC–from–CUCM
```

```
!
policy normalization CUCM–Prefix–408
 uri–component update request–uri user 2022222 4082022222
 end policy
!
```

GUI





DEBUG

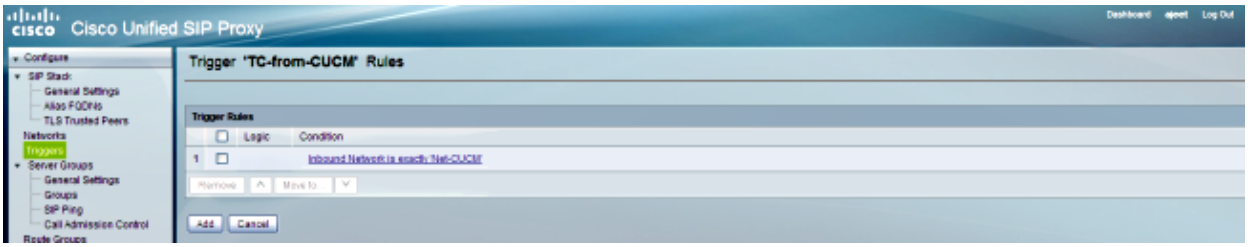
```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:373 util.Normalization -
Entering Normalization(moduleRequest:pre-normalize
)[REQUESTI.12] DEBUG 2013.02.28 00:34:03:373 conditions.RegexCondition -
inNetwork='Net-CUCM'
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:373 conditions.RegexCondition -
IN_NETWORK: Net-CUCM
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.AbstractRegexCondition -
pattern(^\QNet-CUCM\E$), toMatch(Net-CUCM) returning true
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 triggers.ModuleTrigger -
ModuleTrigger.eval() action<CUCM-Prefix-408> actionParameter<>
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 triggers.ModuleTrigger -
ModuleTrigger.eval() got the policy, executing it ...
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 normalization.
URIComponentNormalizationAlgorithm - normalizing request-uri
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 normalization.
URIComponentNormalizationAlgorithm -
updating user/phone of the sip:2022222@14.128.100.169:5061 to 4082022222
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 util.Normalization -
 Leaving Normalization.normalize()
```

4. The Trigger Condition (TC-from-CUCM) is matched.

CLI

```
!
trigger condition TC-from-CUCM
 sequence 1
  in-network ^\QNet-CUCM\E$
  end sequence
 end trigger condition
!
```

GUI



DEBUG

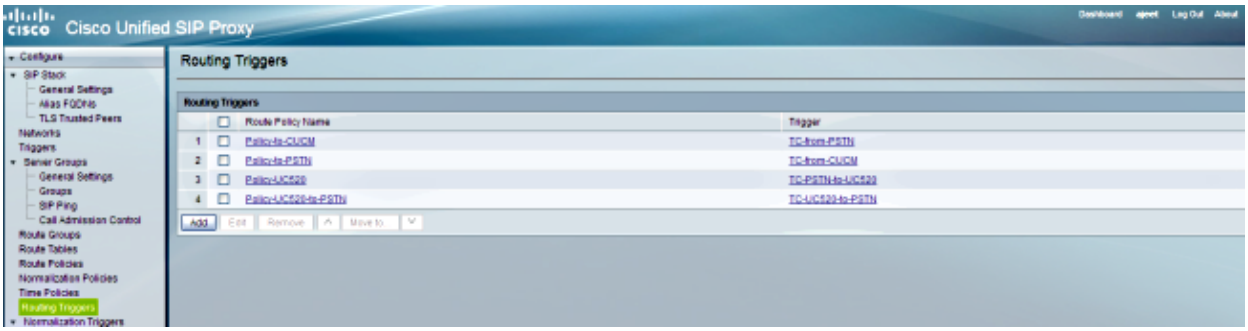
```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.RegexCondition -
inNetwork='Net-CUCM'
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.RegexCondition -
IN_NETWORK: Net-CUCM
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.AbstractRegexCondition -
pattern(^\QNet-CUCM\E$), toMatch(Net-CUCM) returning true
```

5. The Routing Trigger configuration is checked in order to discover the Route Policy (Policy−to−PSTN) that matches based on the Trigger Condition (TC−from−CUCM).

CLI

```
trigger routing sequence 2 policy Policy-to-PSTN condition TC-from-CUCM
```

GUI



DEBUG

```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.RegexCondition -
inNetwork='Net-CUCM'
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.RegexCondition -
IN_NETWORK: Net-CUCM
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:374 conditions.AbstractRegexCondition -
pattern(^\QNet-CUCM\E$), toMatch(Net-CUCM) returning true
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 triggers.ModuleTrigger -
ModuleTrigger.eval() action<Policy-to-PSTN> actionParameter<>
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 triggers.ModuleTrigger -
ModuleTrigger.eval() got the policy, executing it ...
```

6. The Route Policy (Policy−to−PSTN) configuration is checked in order to find the Route Table (RT−PSTN) that matches.

CLI

```
!
policy lookup Policy-to-PSTN
 sequence 100 RT-PSTN request-uri uri-component user
```

```
  rule exact
  end sequence
 end policy
!
```

GUI

DEBUG

```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 nrs.XCLPrefix -
Entering getKeyValue()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 nrs.FieldSelector -
getUriPart: URI - sip:4082022222@14.128.100.169:5061 part 6
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 nrs.FieldSelector -
Requested field 45
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 nrs.FieldSelector -
Returning key 4082022222
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 nrs.XCLPrefix -
Leaving getKeyValue()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:375 modules.XCLLookup -
table=RT-PSTN, key=4082022222
[REQUESTI.12] INFO  2013.02.28 00:34:03:376 modules.XCLLookup -
table is RT-PSTN
```

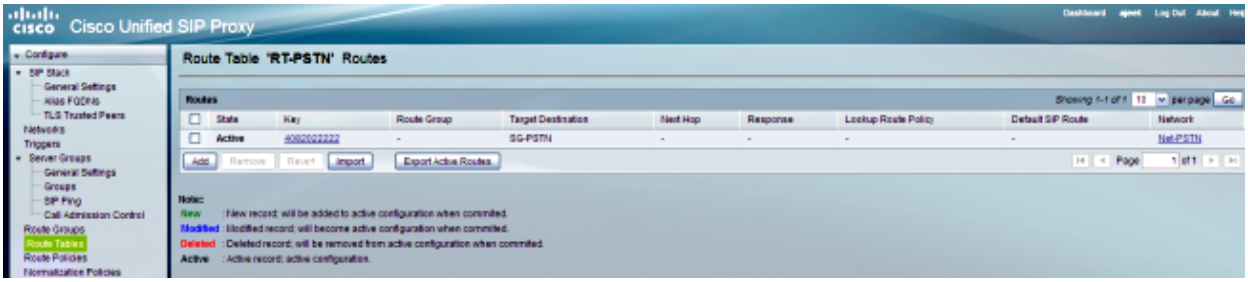
7. The Route Table (RT−PSTN) configuration is checked in order to find the Target Destination (SG−PSTN).

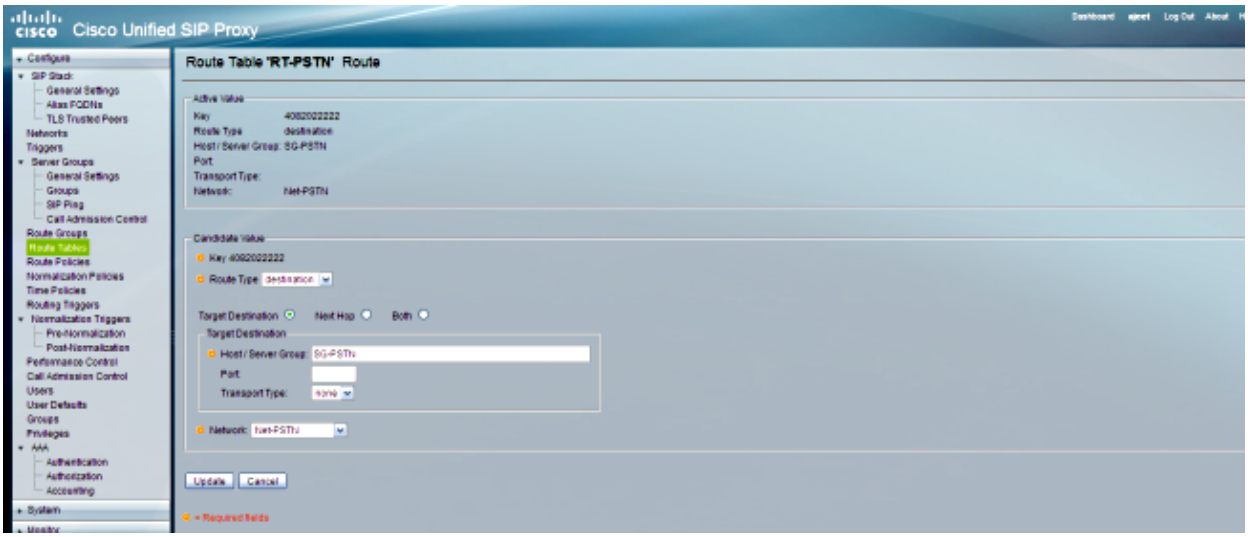
CLI

```
!
route table RT-PSTN
 key 4082022222 target-destination SG-PSTN Net-PSTN
 end route table
```

!

GUI





DEBUG

```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 routingtables.RoutingTable –
Entering lookup()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 routingtables.RoutingTable –
Looking up 4082022222 in table RT–PSTN with rule exact and modifiers=none
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 routingtables.RoutingTable –
Entering applyModifiers()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 routingtables.RoutingTable –
Leaving applyModifiers(), returning 4082022222
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 routingtables.RoutingTable –
Leaving lookup()
[REQUESTI.12] INFO  2013.02.28 00:34:03:376 nrs.XCLPrefix –
NRS Routing decision is: RouteTable:RT–PSTN, RouteKey:4082022222,
TargetDestination:SG–PSTN, Network:Net–PSTN
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 loadbalancer.LBFactory –
Entering createLoadBalancer()
[REQUESTI.12] INFO  2013.02.28 00:34:03:376 loadbalancer.LBFactory –
lbtype is 3(call–id)
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 loadbalancer.LBFactory –
Leaving createLoadBalancer()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 nrs.XCLPrefix –
Stored NRSAlgResult=isFound=true, isFailure=false, Response=–1,
Routes=[Ruri: SG–PSTN, Route: null, Network: Net–PSTN, q–value=1.
0radvance=[502, 503]], PolicyAdvance=null
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 nrs.NRSAlgResult –
```

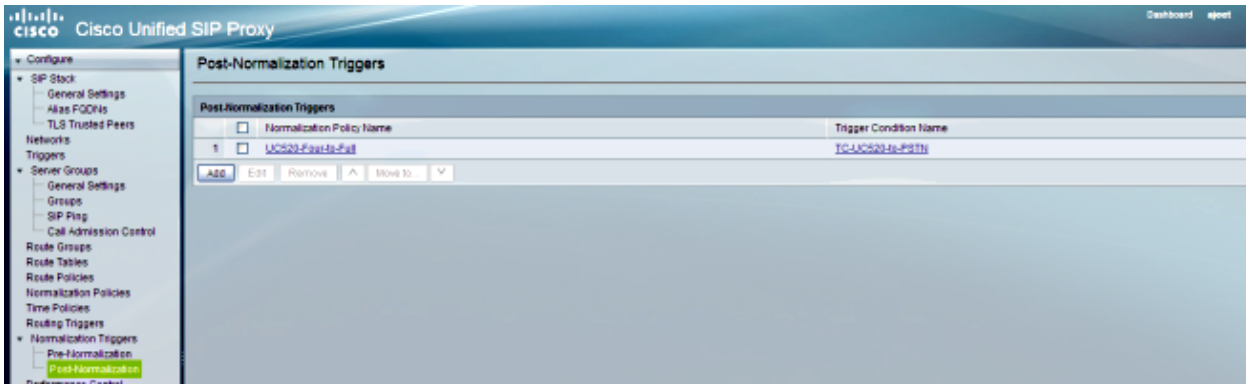
```
set policyAdvance as specified in route=RouteTable:RT-PSTN, RouteKey:4082022222,
TargetDestination:SG-PSTN, Network:Net-PSTN
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 nrs.NRSAlgResult -
no policyAdvance specified in route
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 nrs.NRSAlgResult -
set policyAdvance as specified in algorithm={lookuprule=0, lookupfield=45,
lookuplenght=-1, lookuptable=RT-PSTN, sequence=100, algorithm=1}
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:376 nrs.NRSAlgResult -
no policyAdvance specified in algorithm
```

8. The Post-Normalization Sequence is executed.

CLI

```
trigger post-normalization sequence 1 policy UC520-Four-to-Full
condition TC-UC520-to-PSTN
!
```

GUI



DEBUG

```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 util.Normalization -
Entering Normalization(moduleRequest:post-normalize)
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 conditions.RegexCondition -
inNetwork='Net-CUCM'
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 conditions.RegexCondition -
IN_NETWORK: Net-CUCM
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 conditions.AbstractRegexCondition -
pattern(^\QNet-From-UC520\E$), toMatch(Net-CUCM) returning false
[REQUESTI.12] INFO  2013.02.28 00:34:03:378 util.Normalization -
skipping post-normalize, due to either no trigger is configured or triggers
did not evaluate to true or is configured to by-pass
```

9. The Server Group (SG-PSTN) configuration is checked in order to find the element IP address, and the call is routed to the best route possible based on the Q-value and Weight configuration.

CLI

```
!
server-group sip group SG-PSTN Net-PSTN
 element ip-address 14.128.100.150 5060 udp q-value 1.0 weight 0
 failover-resp-codes 503
 lbtype global
 ping
 end server-group
!
```

GUI

DEBUG

```
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 loadbalancer.LBFactory -
Entering createLoadBalancer()
[REQUESTI.12] INFO  2013.02.28 00:34:03:378 loadbalancer.LBFactory -
lbtype is 0(global)
[REQUESTI.12] INFO  2013.02.28 00:34:03:378 loadbalancer.LBFactory -
Default lbtype is 3(call-id)
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 loadbalancer.LBFactory -
Leaving createLoadBalancer()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 loadbalancer.LBBase -
Entering getServer()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 loadbalancer.LBBase -
Entering initializeDomains()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 servergroups.
ServerGlobalStateWrapper - Net-PSTN:14.128.100.150:5060:1 numTries=
2--->isServerAvailable(): true
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 loadbalancer.LBBase -
Leaving initializeDomains()
[REQUESTI.12] INFO  2013.02.28 00:34:03:378 loadbalancer.LBHashBased -
list of elements in order on which load balancing is done :
{reSgElementWeight=0, reSgElementSgName=SG-PSTN, reSgElementTransport=UDP,
reSgElementQValue=1.0, reSgElementPort=5060, reSgElementHost=14.128.100.150}
, [REQUESTI.12] DEBUG 2013.02.28 00:34:03:378 servergroups.AbstractNextHop -
Entering compareDomainNames()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:379 servergroups.AbstractNextHop -
Leaving compareDomainNames()
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:379 loadbalancer.LBBase -
Server group SG-PSTN selected {reSgElementWeight=0, reSgElementSgName=SG-PSTN,
reSgElementTransport=UDP, reSgElementQValue=1.0, reSgElementPort=5060,
reSgElementHost=14.128.100.150}
[REQUESTI.12] DEBUG 2013.02.28 00:34:03:379 loadbalancer.LBBase -
Leaving getServer()
```

10. The SIP INVITE is sent to the selected element.

```
[CT_CALLBACK.13] DEBUG 2013.02.28 00:34:06:260 DsSipLlApi.Wire -
Sending UDP packet on 14.128.100.169:32772, destination 14.128.64.192:
5060SIP/2.0 200 OK
Via: SIP/2.0/UDP 14.128.64.192:5060;branch=z9hG4bK18012ae333f
To: <sip:2022222@14.128.100.169>;tag=82FA7450-F53
From: "SJ Phone 1" <sip:2001@14.128.64.192>
;tag=534264~c1b77ee1-4af9-4a41-aed3-3846cd699427-49616146
Contact: <sip:4082022222@14.128.100.150:5060>
Require: timer
Remote-Party-ID: <sip:4082022222@14.128.100.150>
;party=called;screen=no;privacy=off
Call-ID: 8be55500-12e1a5fb-ab-c040800e@14.128.64.192
CSeq: 101 INVITE
Content-Length: 276
Date: Thu, 28 Feb 2013 00:34:03 GMT
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
SUBSCRIBE, NOTIFY, INFO, REGISTER
```

```
Allow-Events: telephone-event
Supported: replaces
Supported: sdp-anat
Supported: timer
Server: Cisco-SIPGateway/IOS-12.x
Session-Expires: 1800;refresher=uac
Content-Type: application/sdp
Content-Disposition: session;handling=required

v=0
o=CiscoSystemsSIP-GW-UserAgent 6810 2753 IN IP4 14.128.100.150
s=SIP Call
c=IN IP4 14.128.100.150
t=0 0
m=audio 16862 RTP/AVP 18 101
c=IN IP4 14.128.100.150
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-16
a=ptime:20
```

Scenario 3

Call Flow: ***IP Phone 1 -- CME 1 -- SIP -- CUSP -- SIP -- CME 2 -- IP Phone 2***

Dial 4001 or 4002 from IP Phone 1 in order to reach extensions on IP Phone 2.

CME 2 is UC520 in this scenario and CME 1 acts as PSTN.

1. The SIP INVITE comes to CUSP from CME 1 (PSTN).

```
[DsTransportListener-3] DEBUG 2013.02.28 05:28:57:360 DsSipLlApi.Wire -
Received UDP packet on 14.128.100.169:5062 ,source 14.128.100.150:56578
INVITE sip:4002@14.128.100.169:5062 SIP/2.0
Via: SIP/2.0/UDP 14.128.100.150:5060;branch=z9hG4bK2292567
Remote-Party-ID: <sip:85224044444@14.128.100.150>
;party=calling;screen=no;privacy=off
From: <sip:85224044444@14.128.100.150>;tag=84086F7C-10B8
To: <sip:4002@14.128.100.169>
Date: Thu, 28 Feb 2013 05:28:57 GMT
Call-ID: 9559E957-809E11E2-9856EC62-1B7185EE@14.128.100.150
Supported: 100rel,timer,resource-priority,replaces,sdp-anat
Min-SE:  1800
Cisco-Guid: 2446255913-2157842914-2555505762-0460424686
User-Agent: Cisco-SIPGateway/IOS-12.x
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
 SUBSCRIBE, NOTIFY, INFO, REGISTER
CSeq: 101 INVITE
Max-Forwards: 70
Timestamp: 1362029337
Contact: <sip:85224044444@14.128.100.150:5060>
Expires: 180
Allow-Events: telephone-event
Content-Type: application/sdp
Content-Disposition: session;handling=required
Content-Length: 276

v=0
o=CiscoSystemsSIP-GW-UserAgent 3653 4016 IN IP4 14.128.100.150
s=SIP Call
c=IN IP4 14.128.100.150
t=0 0
m=audio 19202 RTP/AVP 18 101
```

```
c=IN IP4 14.128.100.150
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-16
a=ptime:20

--- end of packet ---
```

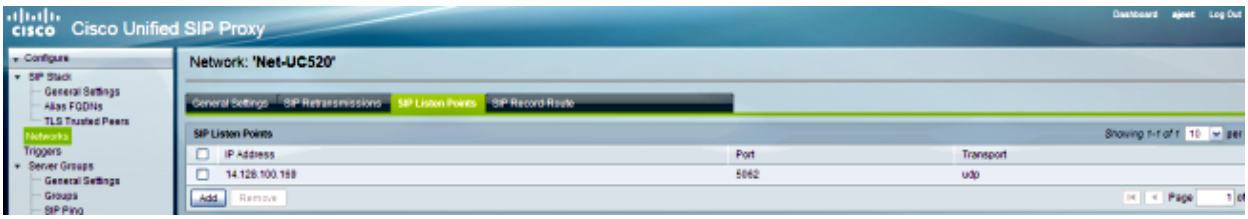
2. The call is accepted on the network (Net-UC520) configuration that matches.

CLI

```
sip listen Net-UC520 udp 14.128.100.169 5062

 !
sip network Net-From-UC520 standard
 no non-invite-provisional
 allow-connections
 retransmit-count invite-client-transaction 3
 retransmit-count invite-server-transaction 5
 retransmit-count non-invite-client-transaction 3
  retransmit-timer T1 500
  retransmit-timer T2 4000
  retransmit-timer T4 5000
  retransmit-timer TU1 5000
  retransmit-timer TU2 32000
  retransmit-timer clientTn 64000
  retransmit-timer serverTn 64000
  tcp connection-setup-timeout 1000
  udp max-datagram-size 1500
  end network
!
```

GUI



DEBUG

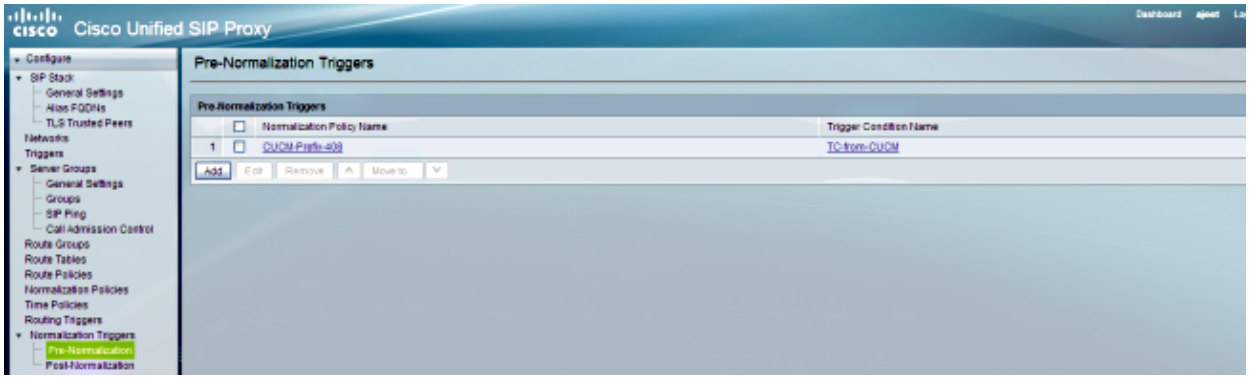
```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:362 conditions.RegexCondition -
inNetwork='Net-UC520'
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:362 conditions.RegexCondition -
IN_NETWORK: Net-UC520
```

3. The Pre-Normalization sequence is executed.

CLI

```
trigger pre-normalization sequence 1 policy CUCM-Prefix-408 condition
TC-from-CUCM
```

GUI



DEBUG

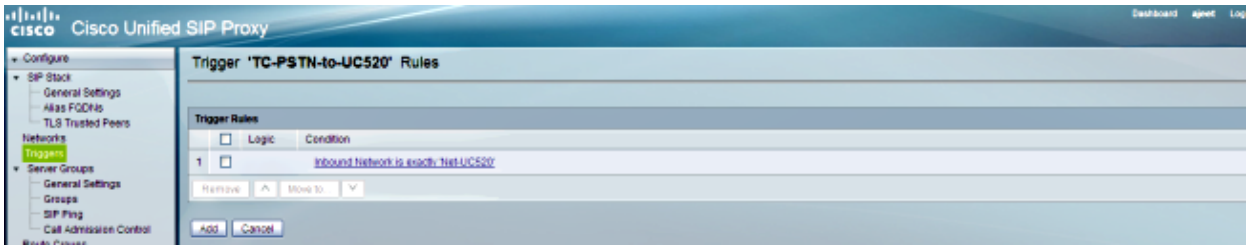
```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:362 util.Normalization -
Entering Normalization(moduleRequest:pre-normalize)
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:362 conditions.RegexCondition -
inNetwork='Net-UC520'
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:362 conditions.RegexCondition -
IN_NETWORK: Net-UC520
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:362 conditions.AbstractRegexCondition -
pattern(^\QNet-CUCM\E$), toMatch(Net-UC520) returning false
[REQUESTI.10] INFO  2013.02.28 05:28:57:362 util.Normalization -
skipping pre-normalize, due to either no trigger is configured or triggers
did not evaluate to true or is configured to by-pass
```

4. The Trigger Condition (TC-PSTN-to-UC520) is matched.

CLI

```
!
trigger condition TC-PSTN-to-UC520
 sequence 1
  in-network ^\QNet-UC520\E$
  end sequence
 end trigger condition
!
```

GUI



DEBUG

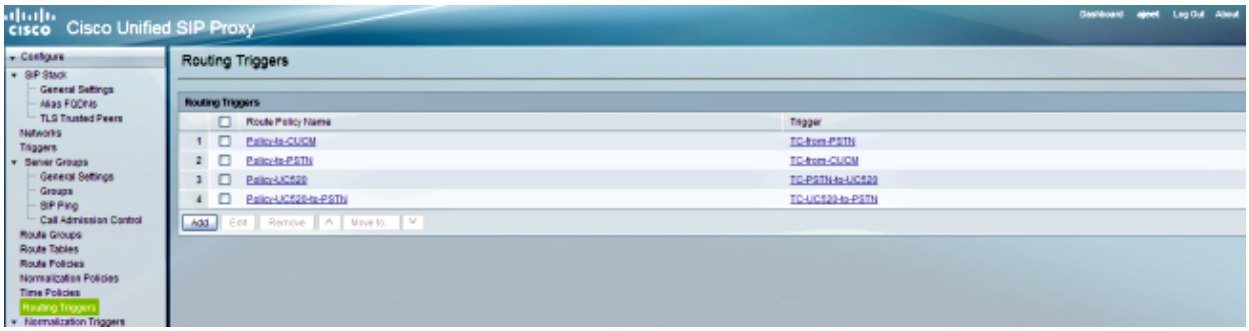
```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 conditions.RegexCondition -
inNetwork='Net-UC520'
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 conditions.RegexCondition -
IN_NETWORK: Net-UC520
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 conditions.AbstractRegexCondition -
pattern(^\QNet-UC520\E$), toMatch(Net-UC520) returning true
```

5. The Routing Trigger configuration is checked in order to find the Route Policy (Policy−UC520) that matches based on the Trigger Condition (TC−PSTN−to−UC520).

CLI

```
trigger routing sequence 3 policy Policy−UC520 condition TC−PSTN−to−UC520
```

GUI



DEBUG

```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 triggers.ModuleTrigger −
ModuleTrigger.eval() action<Policy−UC520> actionParameter<>
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 triggers.ModuleTrigger −
ModuleTrigger.eval() got the policy, executing it ...
```

6. The Route Policy (Policy−UC520) configuration is checked in order to find the Route Table (RT−UC520) that matches.

CLI

```
!
policy lookup Policy−UC520
 sequence 100 RT−UC520 request−uri uri−component user
  modify−key 400[12] 2222
  rule exact
  end sequence
 end policy
!
```

GUI

DEBUG

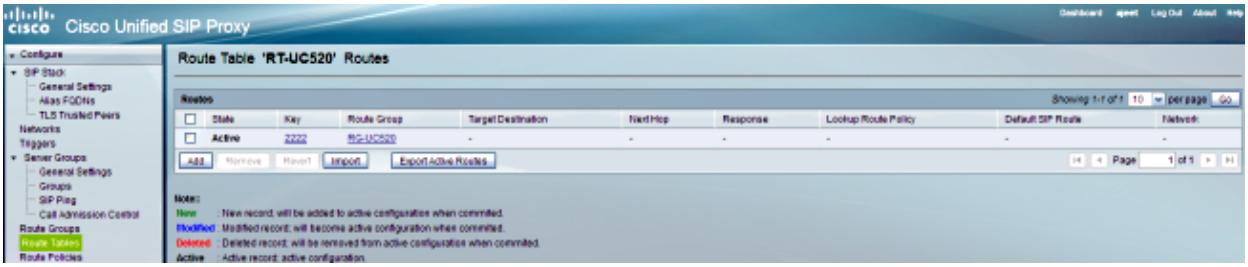
```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.XCLPrefix –
Entering getKeyValue()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.FieldSelector –
getUriPart: URI – sip:4002@14.128.100.169:5062 part 6
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.FieldSelector –
Requested field 45
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.FieldSelector –
Returning key 4002
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.FieldSelector –
Retrieved Modifier  RegexModifier: match= 400[12], replace= 2222,
ignore case= false
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.FieldSelector –
Input field: 4002
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.FieldSelector –
Modified field: 2222
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 nrs.XCLPrefix –
Leaving getKeyValue()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:363 modules.XCLLookup –
table=RT–UC520, key=2222
[REQUESTI.10] INFO  2013.02.28 05:28:57:364 modules.XCLLookup –
table is RT–UC520
```

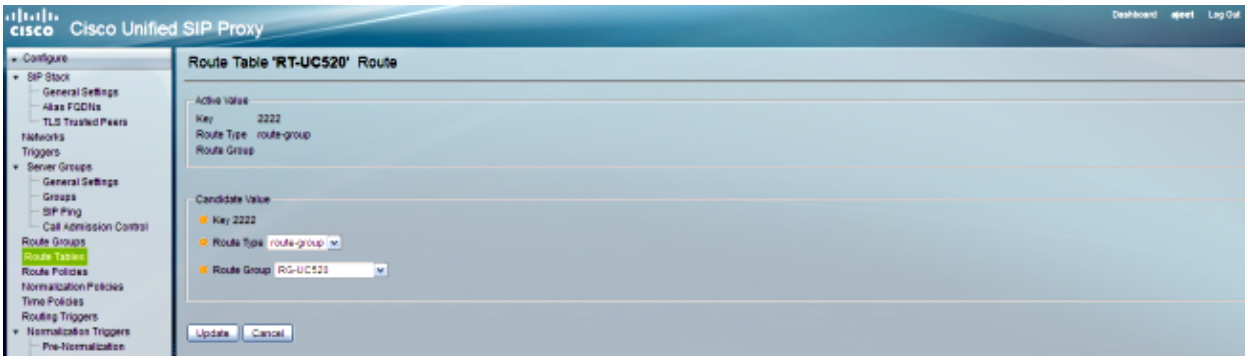
7. The Route Table (RT−UC520) configuration is checked in order to find the Target Destination (RG−UC520).

CLI

```
!
route table RT–UC520
 key 2222 group RG–UC520
 end route table
!
```

GUI





DEBUG

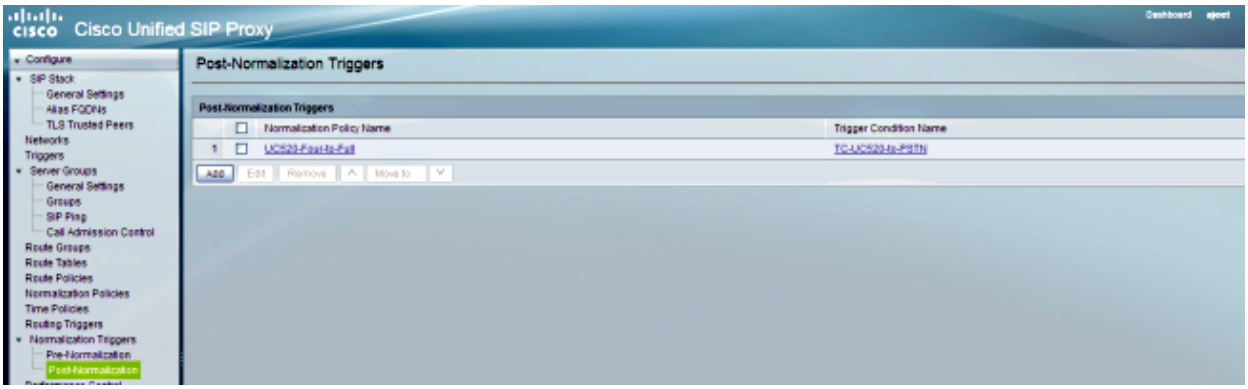
```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 routingtables.RoutingTable –
Entering lookup()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 routingtables.RoutingTable –
Looking up 2222 in table RT–UC520 with rule exact and modifiers=none
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 routingtables.RoutingTable –
Entering applyModifiers()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 routingtables.RoutingTable –
Leaving applyModifiers(), returning 2222
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 routingtables.RoutingTable –
Leaving lookup()
[REQUESTI.10] INFO  2013.02.28 05:28:57:364 nrs.XCLPrefix –
NRS Routing decision is: RouteTable:RT–UC520, RouteKey:2222, RouteGroup:RG–UC520
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 loadbalancer.LBFactory –
Entering createLoadBalancer()
[REQUESTI.10] INFO  2013.02.28 05:28:57:364 loadbalancer.LBFactory –
lbtype is 3(call–id)
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 loadbalancer.LBFactory –
Leaving createLoadBalancer()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 nrs.XCLPrefix –
Stored NRSAlgResult=isFound=true, isFailure=false, Response=–1,
Routes=[Ruri: SG–UC520, Route: null, Network: Net–UC520, q–value=1.
0radvance=[502, 503]], PolicyAdvance=null
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 nrs.NRSAlgResult –
set policyAdvance as specified in route=RouteTable:RT–UC520, RouteKey:2222,
RouteGroup:RG–UC520
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 nrs.NRSAlgResult –
no policyAdvance specified in route
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 nrs.NRSAlgResult –
set policyAdvance as specified in algorithm={lookupkeymodifier=
[ RegexModifier: match= 400[12], replace= 2222, ignore case= false],
lookuprule=0, lookupfield=45, lookuplenght=–1, lookuptable=RT–UC520,
sequence=100, algorithm=1}
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:364 nrs.NRSAlgResult –
no policyAdvance specified in algorithm
```

8. The Post–Normalization Sequence is executed.

CLI

```
trigger post–normalization sequence 1 policy UC520–Four–to–Full
condition TC–UC520–to–PSTN
```

GUI



DEBUG

```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 util.Normalization –
Entering Normalization(moduleRequest:post–normalize)
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 conditions.RegexCondition –
inNetwork='Net–UC520'
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 conditions.RegexCondition –
IN_NETWORK: Net–UC520
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 conditions.AbstractRegexCondition –
pattern(^\QNet–From–UC520\E$), toMatch(Net–UC520) returning false
[REQUESTI.10] INFO  2013.02.28 05:28:57:365 util.Normalization –
skipping post–normalize, due to either no trigger is configured or
triggers did not evaluate to true or is configured to by–pass
```

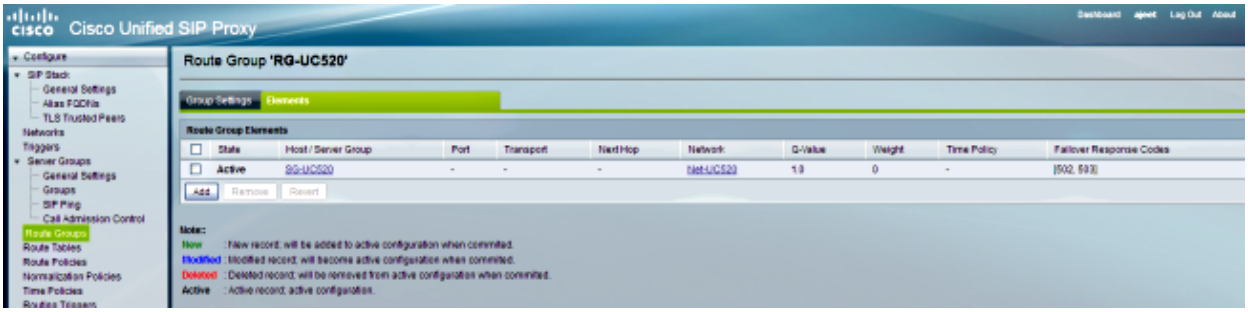
9. The Route Group configuration is checked in order to find the element IP address, and the call is routed to the best route possible based on the Q−value and Weight setting.

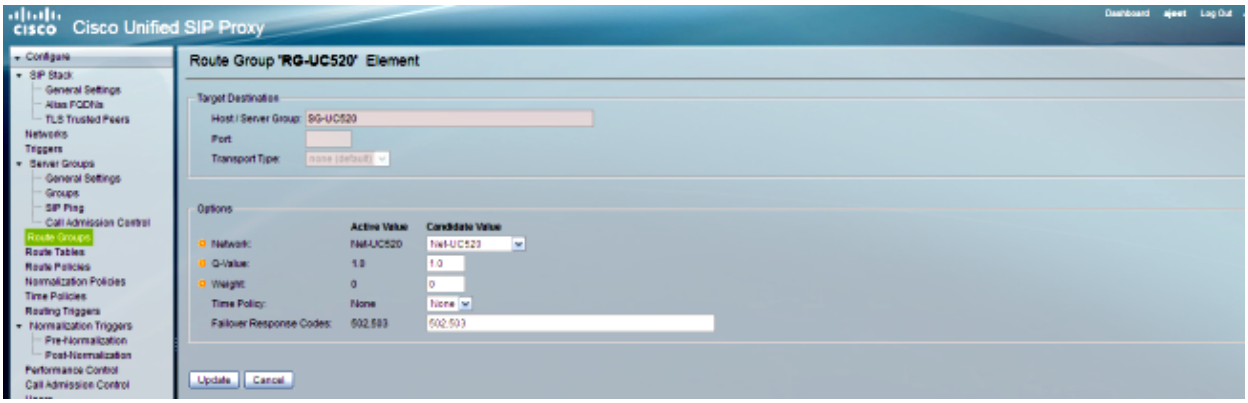
CLI

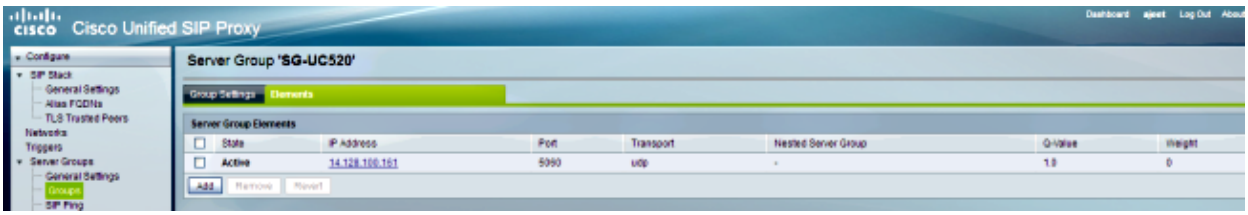
```
!
route group RG–UC520
 element target–destination SG–UC520 Net–UC520 q–value 1.0
  failover–codes 502 – 503
  weight 0
  end element
 end route
!
```

```
!
server–group sip group SG–UC520 Net–UC520
 element ip–address 14.128.100.161 5060 udp q–value 1.0 weight 0
 failover–resp–codes 503
 lbtype global
 ping
 end server–group
!
```

GUI







DEBUG

```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 loadbalancer.LBFactory –
Entering createLoadBalancer()
[REQUESTI.10] INFO  2013.02.28 05:28:57:365 loadbalancer.LBFactory –
lbtype is 0(global)
[REQUESTI.10] INFO  2013.02.28 05:28:57:365 loadbalancer.LBFactory –
Default lbtype is 3(call-id)
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 loadbalancer.LBFactory –
Leaving createLoadBalancer()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 loadbalancer.LBBase –
Entering getServer()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 loadbalancer.LBBase –
Entering initializeDomains()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:365 servergroups.
ServerGlobalStateWrapper – Net-UC520:14.128.100.161:5060:1 numTries=
2--->isServerAvailable(): true
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:366 loadbalancer.LBBase –
Leaving initializeDomains()
[REQUESTI.10] INFO  2013.02.28 05:28:57:366 loadbalancer.LBHashBased –
list of elements in order on which load balancing is done :
{reSgElementWeight=0, reSgElementSgName=SG-UC520, reSgElementTransport=UDP,
reSgElementQValue=1.0, reSgElementPort=5060, reSgElementHost=14.128.100.161},
 [REQUESTI.10] DEBUG 2013.02.28 05:28:57:366 servergroups.AbstractNextHop –
Entering compareDomainNames()
```

```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:366 servergroups.AbstractNextHop −
Leaving compareDomainNames()
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:366 loadbalancer.LBBase −
Server group SG−UC520 selected {reSgElementWeight=0, reSgElementSgName=SG−UC520,
reSgElementTransport=UDP, reSgElementQValue=1.0, reSgElementPort=5060,
reSgElementHost=14.128.100.161}
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:366 loadbalancer.LBBase −
Leaving getServer()
```

10. The SIP INVITE is sent to the selected element.

```
[REQUESTI.10] DEBUG 2013.02.28 05:28:57:367 DsSipLlApi.Wire −
Sending UDP packet on 14.128.100.169:32773, destination 14.128.100.161:5060
INVITE sip:4002@SG−UC520 SIP/2.0
Via: SIP/2.0/UDP
14.128.100.169:5062;branch=z9hG4bK.ToYJFeKMyfZGySv.gcLjg~~237
Via: SIP/2.0/UDP 14.128.100.150:5060;branch=z9hG4bK2292567
Max−Forwards: 69
To: <sip:4002@14.128.100.169>
From: <sip:85224044444@14.128.100.150>;tag=84086F7C−10B8
Contact: <sip:85224044444@14.128.100.150:5060>
Expires: 180
Remote−Party−ID: <sip:85224044444@14.128.100.150>
;party=calling;screen=no;privacy=off
Call−ID: 9559E957−809E11E2−9856EC62−1B7185EE@14.128.100.150
CSeq: 101 INVITE
Content−Length: 276
Date: Thu, 28 Feb 2013 05:28:57 GMT
Supported: 100rel,timer,resource−priority,replaces,sdp−anat
Min−SE: 1800
Cisco−Guid: 2446255913−2157842914−2555505762−0460424686
User−Agent: Cisco−SIPGateway/IOS−12.x
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
 SUBSCRIBE, NOTIFY, INFO, REGISTER
Timestamp: 1362029337
Allow−Events: telephone−event
Content−Type: application/sdp
Content−Disposition: session;handling=required

v=0
o=CiscoSystemsSIP−GW−UserAgent 3653 4016 IN IP4 14.128.100.150
s=SIP Call
c=IN IP4 14.128.100.150
t=0 0
m=audio 19202 RTP/AVP 18 101
c=IN IP4 14.128.100.150
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone−event/8000
a=fmtp:101 0−16
a=ptime:20
```

Scenario 4

Call Flow:***IP Phone 1 −− CME 1 −− SIP −− CUSP −− SIP −− CME 2 −− IP Phone 2***

Dial 4444 from IP Phone 2 which is changed to 415 240 4444 with Post−Normalization in order to reach IP Phone 1.

CME 2 is UC520 in this scenario and CME 1 acts as PSTN.

1. The SIP INVITE comes to CUSP from CME 2 (UC520).

```
[DsTransportListener−1] DEBUG 2013.02.28 07:06:57:220 DsSipLlApi.Wire −
```

```
Received UDP packet on 14.128.100.169:5063 ,source 14.128.100.161:59404
INVITE sip:4444@14.128.100.169:5063 SIP/2.0
Date: Thu, 28 Feb 2013 07:09:20 GMT
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
SUBSCRIBE, NOTIFY, INFO, REGISTER
From: <sip:4001@14.128.100.161>;tag=256D566C-22AC
Allow-Events: telephone-event
Supported: 100rel,timer,resource-priority,replaces,sdp-anat
Min-SE:  1800
Remote-Party-ID: <sip:4001@14.128.100.161>
;party=calling;screen=no;privacy=off
Cisco-Guid: 2598740490-2158760418-2150671243-2598404062
Timestamp: 1362035360
Content-Length: 543
User-Agent: Cisco-SIPGateway/IOS-12.x
To: <sip:4444@14.128.100.169>
Contact: <sip:4001@14.128.100.161:5060>
Expires: 180
Content-Type: multipart/mixed;boundary=uniqueBoundary
Call-ID: 9B62C157-80AC11E2-8035A38B-9AE07FDE@14.128.100.161
Via: SIP/2.0/UDP 14.128.100.161:5060;branch=z9hG4bK21E82
CSeq: 101 INVITE
Max-Forwards: 70
Mime-Version: 1.0

--uniqueBoundary
Content-Type: application/sdp
Content-Disposition: session;handling=required

v=0
o=CiscoSystemsSIP-GW-UserAgent 3418 2914 IN IP4 14.128.100.161
s=SIP Call
c=IN IP4 14.128.100.161
t=0 0
m=audio 17618 RTP/AVP 18 101
c=IN IP4 14.128.100.161
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-16
a=ptime:20

--uniqueBoundary
Content-Type: application/gtd
Content-Disposition: signal;handling=optional

IAM,
GCI,9ae5a20a80ac11e28030a38b9ae07fde

--- end of packet ---
```

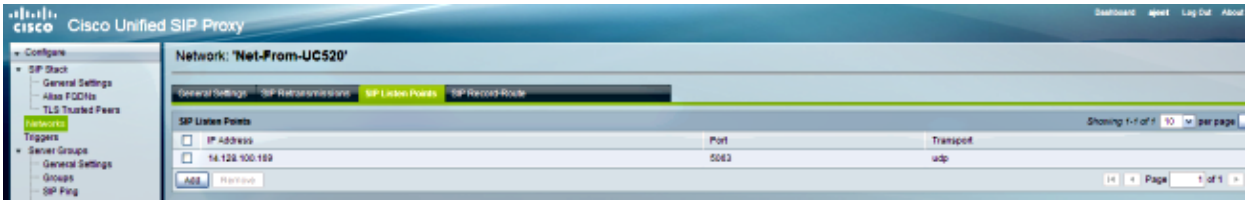
2. The call is accepted on the network (Net-From-UC520) configuration that matches.

CLI

```
sip listen Net-From-UC520 udp 14.128.100.169 5063
 !
sip network Net-From-UC520 standard
  no non-invite-provisional
  allow-connections
 retransmit-count invite-client-transaction 3
  retransmit-count invite-server-transaction 5
  retransmit-count non-invite-client-transaction 3
  retransmit-timer T1 500
 retransmit-timer T2 4000
  retransmit-timer T4 5000
```

```
  retransmit-timer TU1 5000
  retransmit-timer TU2 32000
  retransmit-timer clientTn 64000
  retransmit-timer serverTn 64000
  tcp connection-setup-timeout 1000
  udp max-datagram-size 1500
  end network
!
```

GUI



DEBUG

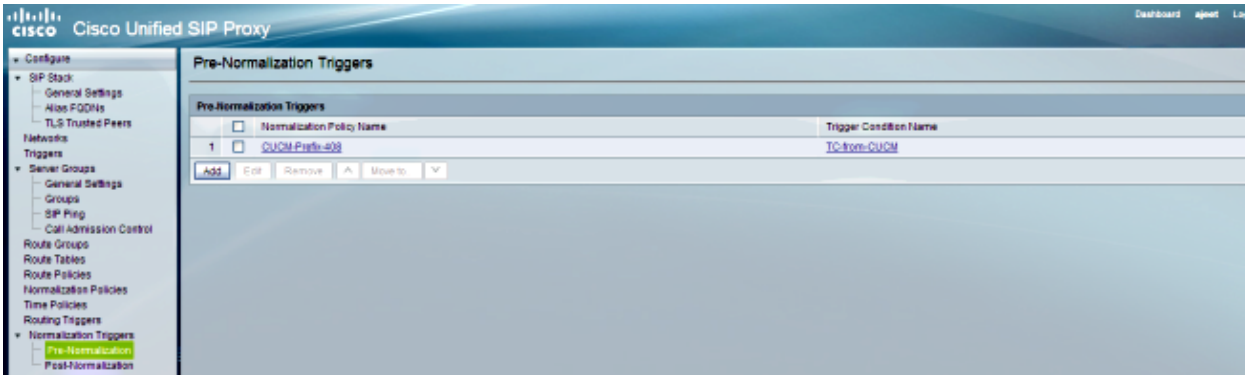
```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.RegexCondition -
inNetwork='Net-From-UC520'
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.RegexCondition -
IN_NETWORK: Net-From-UC520
```

3. The Pre-Normalization sequence is executed.

CLI

```
trigger pre-normalization sequence 1 policy CUCM-Prefix-408 condition
TC-from-CUCM
```

GUI



DEBUG

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 util.Normalization -
Entering Normalization(moduleRequest:pre-normalize)
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.RegexCondition -
inNetwork='Net-From-UC520'
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.RegexCondition -
IN_NETWORK: Net-From-UC520
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.AbstractRegexCondition -
pattern(^\QNet-CUCM\E$), toMatch(Net-From-UC520) returning false
[REQUESTI.5] INFO  2013.02.28 07:06:57:229 util.Normalization -
```

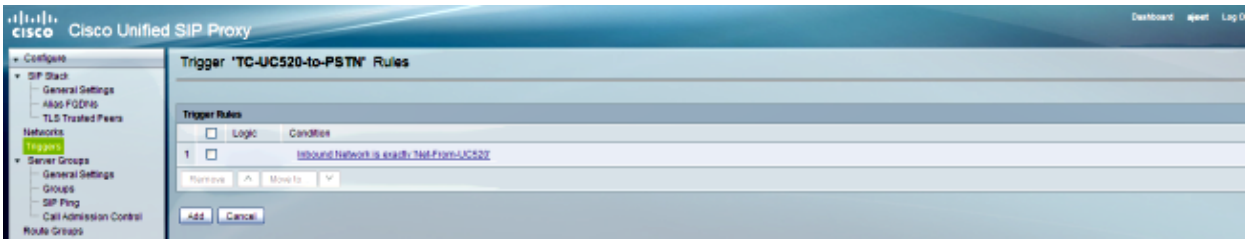
```
skipping pre-normalize, due to either no trigger is configured or triggers
did not evaluate to true or is configured to by-pass
```

4. The Trigger Condition (TC−UC520−to−PSTN) is matched.

CLI

```
!
trigger condition TC-UC520-to-PSTN
 sequence 1
   in-network ^\QNet-From-UC520\E$
 end sequence
 end trigger condition
!
```

GUI



DEBUG

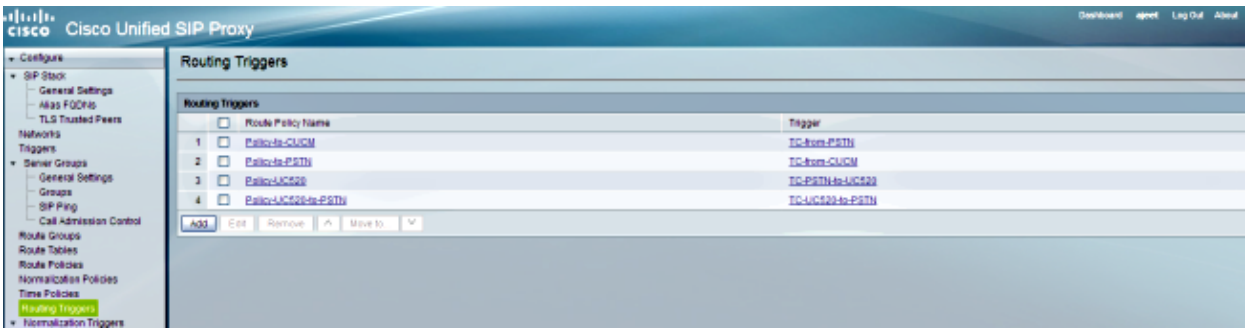
```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.RegexCondition -
inNetwork='Net-From-UC520'
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:229 conditions.RegexCondition -
IN_NETWORK: Net-From-UC520
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 conditions.AbstractRegexCondition -
pattern(^\QNet-From-UC520\E$), toMatch(Net-From-UC520) returning true
```

5. The Routing Trigger configuration is checked in order to find the Route Policy (Policy−UC520−to−PSTN) that matches based on the Trigger Condition (TC−UC520−to−PSTN).

CLI

```
trigger routing sequence 4 policy Policy-UC520-to-PSTN condition
TC-UC520-to-PSTN
```

GUI



DEBUG

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 triggers.ModuleTrigger -
```

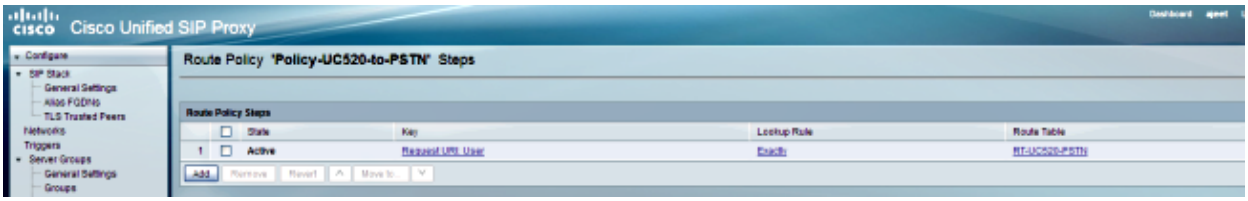
```
ModuleTrigger.eval() action<Policy−UC520−to−PSTN> actionParameter<>
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 triggers.ModuleTrigger −
ModuleTrigger.eval() got the policy, executing it ...
```

6. The Route Policy (Policy−UC520−to−PSTN) configuration is checked in order to find the Route Table (RT−UC520−PSTN) that matches.

CLI

```
!
policy lookup Policy−UC520−to−PSTN
 sequence 100 RT−UC520−PSTN request−uri uri−component user
  modify−key 4444 3333
  rule exact
  end sequence
 end policy
!
```

GUI



DEBUG

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.XCLPrefix −
Entering getKeyValue()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.FieldSelector −
getUriPart: URI − sip:4444@14.128.100.169:5063 part 6
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.FieldSelector −
Requested field 45
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.FieldSelector −
Returning key 4444
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.FieldSelector −
Retrieved Modifier  RegexModifier: match= 4444, replace= 3333,
ignore case= false
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.FieldSelector −
Input field: 4444
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.FieldSelector −
Modified field: 3333
```

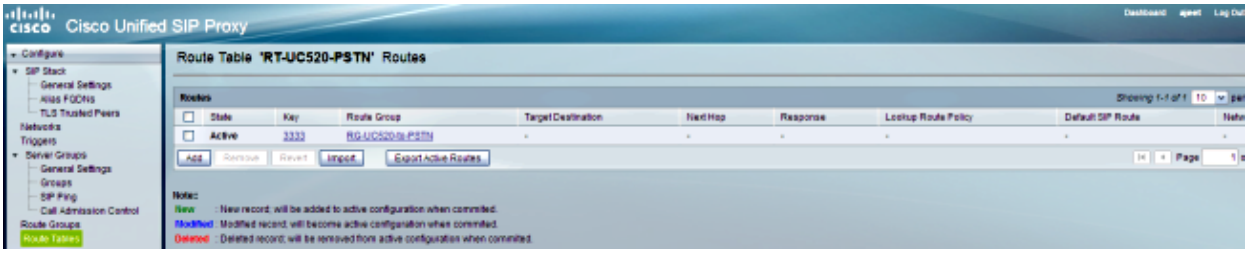
```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 nrs.XCLPrefix –
Leaving getKeyValue()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 modules.XCLLookup –
table=RT–UC520–PSTN, key=3333
[REQUESTI.5] INFO  2013.02.28 07:06:57:230 modules.XCLLookup –
table is RT–UC520–PSTN
```

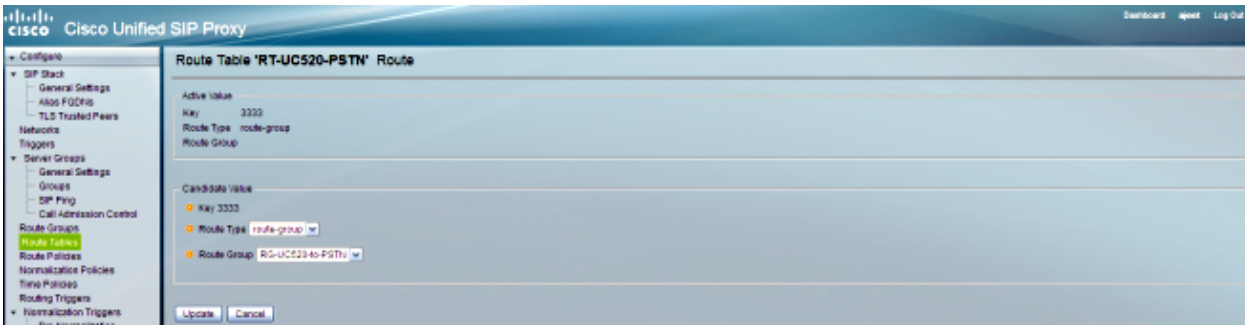
7. The Route Table (RT−UC520−PSTN) configuration is checked in order to find the Target Destination (RG−UC520).

CLI

```
!
route table RT–UC520–PSTN
  key 3333 group RG–UC520–to–PSTN
 end route table
!
```

GUI





DEBUG

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:230 routingtables.RoutingTable –
Entering lookup()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 routingtables.RoutingTable –
Looking up 3333 in table RT–UC520–PSTN with rule exact and modifiers=none
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 routingtables.RoutingTable –
Entering applyModifiers()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 routingtables.RoutingTable –
Leaving applyModifiers(), returning 3333
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 routingtables.RoutingTable –
Leaving lookup()
[REQUESTI.5] INFO  2013.02.28 07:06:57:231 nrs.XCLPrefix –
NRS Routing decision is: RouteTable:RT–UC520–PSTN, RouteKey:3333,
RouteGroup:RG–UC520–to–PSTN
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 loadbalancer.LBFactory –
Entering createLoadBalancer()
[REQUESTI.5] INFO  2013.02.28 07:06:57:231 loadbalancer.LBFactory –
lbtype is 3(call–id)
```

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 loadbalancer.LBFactory –
Leaving createLoadBalancer()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.XCLPrefix –
Stored NRSAlgResult=isFound=true, isFailure=false, Response=–1,
Routes=[Ruri: 14.128.100.150, Route: null, Network: Net–From–UC520,
q–value=1.0radvance=[502, 503]], PolicyAdvance=null
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.NRSAlgResult –
set policyAdvance as specified in route=RouteTable:RT–UC520–PSTN,
RouteKey:3333, RouteGroup:RG–UC520–to–PSTN
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.NRSAlgResult –
no policyAdvance specified in route
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.NRSAlgResult –
set policyAdvance as specified in algorithm={lookupkeymodifier=
[ RegexModifier: match= 4444, replace= 3333, ignore case= false],
lookuprule=0, lookupfield=45, lookuplenght=–1, lookuptable=RT–UC520–PSTN,
sequence=100, algorithm=1}
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.NRSAlgResult –
no policyAdvance specified in algorithm
```

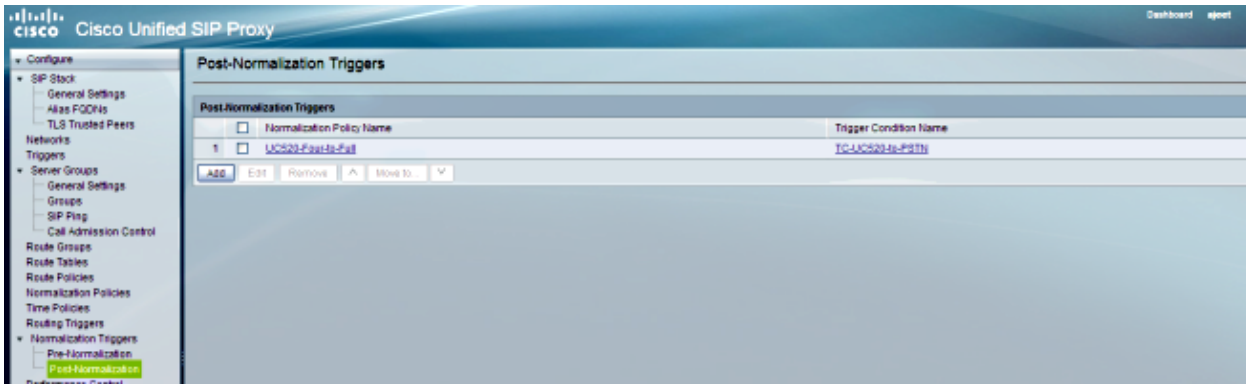
8. The Post–Normalization sequence is executed.

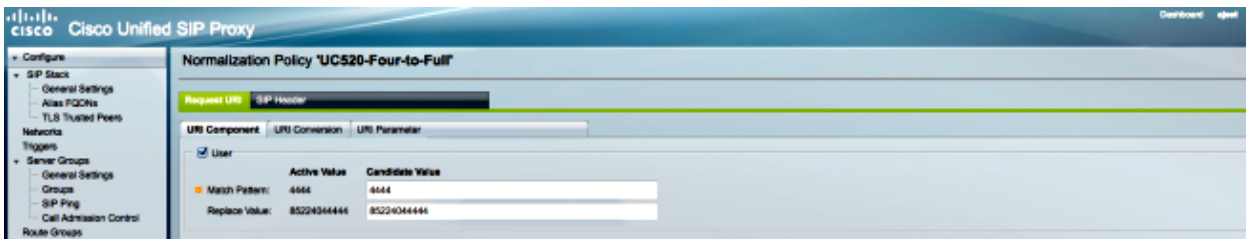
CLI

```
trigger post–normalization sequence 1 policy UC520–Four–to–Full
condition TC–UC520–to–PSTN

!
policy normalization UC520–Four–to–Full
 uri–component update request–uri user 4444 85224044444
 end policy
!
```

GUI





DEBUG

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 util.Normalization –
```

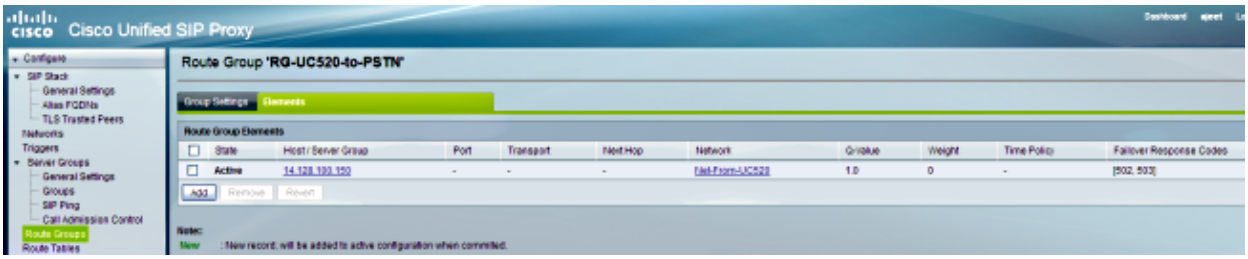
```
Entering Normalization(moduleRequest:post-normalize)
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 conditions.RegexCondition -
inNetwork='Net-From-UC520'
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 conditions.RegexCondition -
IN_NETWORK: Net-From-UC520
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 conditions.AbstractRegexCondition -
pattern(^\QNet-From-UC520\E$), toMatch(Net-From-UC520) returning true
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 triggers.ModuleTrigger -
ModuleTrigger.eval() action<UC520-Four-to-Full> actionParameter<>
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 triggers.ModuleTrigger -
ModuleTrigger.eval() got the policy, executing it ...
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 normalization.URIComponentNormalizationAlgorith
normalizing request-uri
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 normalization.URIComponentNormalizationAlgorith
updating user/phone of the sip:4444@14.128.100.150 to 85224044444
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 util.Normalization -
Leaving Normalization.normalize()
```

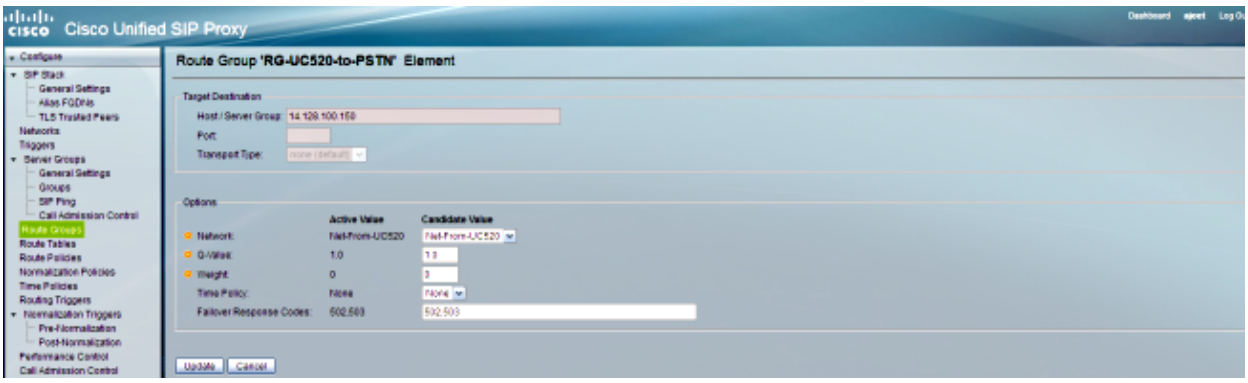
9. The Route Group configuration is checked in order to find the element IP address, and the call is routed to the best route possible based on the Q-value and Weight setting.

CLI

```
!
route group RG-UC520-to-PSTN
 element target-destination 14.128.100.150 Net-From-UC520 q-value 1.0
  failover-codes 502 - 503
   weight 0
  end element
 end route
!
```

GUI





DEBUG

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 loadbalancer.LBBase −
Entering getServer()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 loadbalancer.LBBase −
Entering initializeDomains()
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.NRSRoutes −
routes before applying time policies: [Ruri: 14.128.100.150,
Route: null, Network: Net−From−UC520, q−value=1.0radvance=[502, 503]]
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 nrs.NRSRoutes −
routes after applying time policies: [Ruri: 14.128.100.150, Route:
null, Network: Net−From−UC520, q−value=1.0radvance=[502, 503]]
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:231 loadbalancer.LBBase −
Leaving initializeDomains()
[REQUESTI.5] INFO  2013.02.28 07:06:57:231 loadbalancer.LBHashBased −
list of elements in order on which load balancing is done : Ruri:
14.128.100.150, Route: null, Network: Net−From−UC520, q−value=
1.0radvance=[502, 503],
 [REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 loadbalancer.LBBase −
Server group route−sg selected Ruri: 14.128.100.150, Route: null,
Network: Net−From−UC520, q−value=1.0radvance=[502, 503]
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:232 loadbalancer.LBBase −
Leaving getServer()
```

10. The SIP INVITE is sent to the selected element.

```
[REQUESTI.5] DEBUG 2013.02.28 07:06:57:233 DsSipLlApi.Wire −
Sending UDP packet on 14.128.100.169:32770, destination 14.128.100.150:5060
INVITE sip:85224044444@14.128.100.150 SIP/2.0
Via: SIP/2.0/UDP
14.128.100.169:5063;branch=z9hG4bK.ToYJFeKMyfZGySv.gcLjg~~238
Via: SIP/2.0/UDP 14.128.100.161:5060;branch=z9hG4bK21E82
Max−Forwards: 69
To: <sip:4444@14.128.100.169>
From: <sip:4001@14.128.100.161>;tag=256D566C−22AC
Contact: <sip:4001@14.128.100.161:5060>
Expires: 180
Remote−Party−ID: <sip:4001@14.128.100.161>
;party=calling;screen=no;privacy=off
Call−ID: 9B62C157−80AC11E2−8035A38B−9AE07FDE@14.128.100.161
CSeq: 101 INVITE
Content−Length: 543
Date: Thu, 28 Feb 2013 07:09:20 GMT
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER,
 SUBSCRIBE, NOTIFY, INFO, REGISTER
Allow−Events: telephone−event
Supported: 100rel,timer,resource−priority,replaces,sdp−anat
Min−SE: 1800
Cisco−Guid: 2598740490−2158760418−2150671243−2598404062
Timestamp: 1362035360
User−Agent: Cisco−SIPGateway/IOS−12.x
Content−Type: multipart/mixed;boundary=uniqueBoundary
MIME−Version: 1.0

−−uniqueBoundary
Content−Type: application/sdp
Content−Disposition: session;handling=required

v=0
o=CiscoSystemsSIP−GW−UserAgent 3418 2914 IN IP4 14.128.100.161
s=SIP Call
c=IN IP4 14.128.100.161
t=0 0
m=audio 17618 RTP/AVP 18 101
c=IN IP4 14.128.100.161
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=rtpmap:101 telephone−event/8000
a=fmtp:101 0−16
```

```
a=ptime:20

--uniqueBoundary
Content-Type: application/gtd
Content-Disposition: signal;handling=optional

IAM,
GCI,9ae5a20a80ac11e28030a38b9ae07fde
```

Configuration for All Four Scenarios

Here is the complete CUSP configuration for all four call scenarios described in this document:

```
ajeesing-cusp-8.5.3(cusp)# show configuration active verbose
 Building CUSP configuration...
!
server-group sip global-load-balance call-id
server-group sip retry-after 0
server-group sip element-retries udp 2
server-group sip element-retries tls 1
server-group sip element-retries tcp 1
sip dns-srv
 enable
 no naptr
 end dns
!
no sip header-compaction
!
sip logging
sip max-forwards 70
sip network Net-CUCM standard
 no non-invite-provisional
 allow-connections
 retransmit-count invite-client-transaction 3
  retransmit-count invite-server-transaction 5
 retransmit-count non-invite-client-transaction 3
 retransmit-timer T1 500
 retransmit-timer T2 4000
 retransmit-timer T4 5000
 retransmit-timer TU1 5000
 retransmit-timer TU2 32000
 retransmit-timer clientTn 64000
 retransmit-timer serverTn 64000
 tcp connection-setup-timeout 1000
  udp max-datagram-size 1500
  end network
!
sip network Net-From-UC520 standard
 no non-invite-provisional
 allow-connections
 retransmit-count invite-client-transaction 3
 retransmit-count invite-server-transaction 5
 retransmit-count non-invite-client-transaction 3
 retransmit-timer T1 500
 retransmit-timer T2 4000
 retransmit-timer T4 5000
 retransmit-timer TU1 5000
 retransmit-timer TU2 32000
 retransmit-timer clientTn 64000
 retransmit-timer serverTn 64000
 tcp connection-setup-timeout 1000
 udp max-datagram-size 1500
 end network
!
sip network Net-PSTN standard
```

```
 no non-invite-provisional
 allow-connections
 retransmit-count invite-client-transaction 3
 retransmit-count invite-server-transaction 5
  retransmit-count non-invite-client-transaction 3
 retransmit-timer T1 500
 retransmit-timer T2 4000
 retransmit-timer T4 5000
 retransmit-timer TU1 5000
 retransmit-timer TU2 32000
 retransmit-timer clientTn 64000
 retransmit-timer serverTn 64000
 tcp connection-setup-timeout 1000
 udp max-datagram-size 1500
 end network
!
sip network Net-UC520 standard
 no non-invite-provisional
 allow-connections
 retransmit-count invite-client-transaction 3
 retransmit-count invite-server-transaction 5
 retransmit-count non-invite-client-transaction 3
 retransmit-timer T1 500
 retransmit-timer T2 4000
 retransmit-timer T4 5000
 retransmit-timer TU1 5000
 retransmit-timer TU2 32000
 retransmit-timer clientTn 64000
 retransmit-timer serverTn 64000
 tcp connection-setup-timeout 1000
 udp max-datagram-size 1500
 end network
!
sip overload reject retry-after 0
sip peg-counting 2 86400
sip privacy service
sip queue message
 drop-policy head
 low-threshold 80
 size 2000
 thread-count 20
 end queue
!
sip queue radius
 drop-policy head
 low-threshold 80
 size 2000
 thread-count 20
 end queue
!
sip queue request
 drop-policy head
 low-threshold 80
 size 2000
 thread-count 20
 end queue
!
sip queue response
 drop-policy head
 low-threshold 80
 size 2000
 thread-count 20
 end queue
!
sip queue st-callback
 drop-policy head
```

```
 low-threshold 80
 size 2000
 thread-count 10
 end queue
!
sip queue timer
 drop-policy none
 low-threshold 80
 size 2500
 thread-count 8
 end queue
!
sip queue xcl
 drop-policy head
 low-threshold 80
 size 2000
 thread-count 2
 end queue
!
route recursion
!
sip tcp connection-timeout 30
sip tcp max-connections 256
!
no sip tls
!
trigger condition TC-PSTN-to-UC520
 sequence 1
  in-network ^\QNet-UC520\E$
  end sequence
 sequence 2
  in-network ^\QNet-CUCM\E$
  end sequence
 end trigger condition
!
trigger condition TC-UC520-to-PSTN
 sequence 1
  in-network ^\QNet-From-UC520\E$
  end sequence
 end trigger condition
!
trigger condition TC-from-CUCM
 sequence 1
  in-network ^\QNet-CUCM\E$
  end sequence
 end trigger condition
!
trigger condition TC-from-PSTN
 sequence 1
  in-network ^\QNet-PSTN\E$
  end sequence
 sequence 2
  in-network ^\QNet-CUCM\E$
  message request
  end sequence
 end trigger condition
!
trigger condition mid-dialog
 sequence 1
  mid-dialog
  end sequence
 end trigger condition
!
accounting
 no enable
 no client-side
```

```
 no server-side
 end accounting
!
server-group sip group SG-CUCM.ajeet.com Net-CUCM
 element ip-address 14.128.64.191 5060 udp q-value 1 weight 50
  element ip-address 14.128.64.192 5060 udp q-value 1.0 weight 100
  failover-resp-codes 503
 lbtype global
 ping
 end server-group
!
server-group sip group SG-PSTN Net-PSTN
 element ip-address 14.128.100.150 5060 udp q-value 1.0 weight 0
  failover-resp-codes 503
 lbtype global
 ping
 end server-group
!
server-group sip group SG-UC520 Net-UC520
 element ip-address 14.128.100.161 5060 udp q-value 1.0 weight 0
 failover-resp-codes 503
 lbtype global
 ping
 end server-group
!
route group RG-UC520
 element target-destination SG-UC520 Net-UC520 q-value 1.0
  failover-codes 502 - 503
  weight 0
  end element
 end route
!
route group RG-UC520-to-PSTN
 element target-destination 14.128.100.150 Net-From-UC520 q-value 1.0
  failover-codes 502 - 503
  weight 0
  end element
 end route
!
route table RT-CUCM
 key 1111 target-destination SG-CUCM.ajeet.com Net-CUCM
 end route table
!
route table RT-PSTN
 key 4082022222 target-destination SG-PSTN Net-PSTN
 end route table
!
route table RT-UC520
 key 2222 group RG-UC520
 end route table
!
route table RT-UC520-PSTN
 key 3333 group RG-UC520-to-PSTN
 end route table
!
policy normalization CUCM-Prefix-408
 uri-component update request-uri user 2022222 4082022222
 end policy
!
policy normalization UC520-Four-to-Full
 uri-component update request-uri user 4444 85224044444
 end policy
!
policy lookup Policy-UC520
 sequence 100 RT-UC520 request-uri uri-component user
  modify-key 400[12] 2222
```

```
  rule exact
  end sequence
 end policy
!
policy lookup Policy-UC520-to-PSTN
 sequence 100 RT-UC520-PSTN request-uri uri-component user
  modify-key 4444 3333
  rule exact
  end sequence
 end policy
!
policy lookup Policy-to-CUCM
 sequence 100 RT-CUCM request-uri uri-component user
  modify-key 4082022102 1111
  rule exact
  end sequence
 end policy
!
policy lookup Policy-to-PSTN
 sequence 100 RT-PSTN request-uri uri-component user
  rule exact
  end sequence
 end policy
!
trigger routing sequence 1 policy Policy-to-CUCM condition
TC-from-PSTN
trigger routing sequence 2 policy Policy-to-PSTN condition
TC-from-CUCM
trigger routing sequence 3 policy Policy-UC520 condition
TC-PSTN-to-UC520
trigger routing sequence 4 policy Policy-UC520-to-PSTN condition
TC-UC520-to-PSTN
trigger pre-normalization sequence 1 policy CUCM-Prefix-408
condition TC-from-CUCM
trigger post-normalization sequence 1 policy UC520-Four-to-Full
condition TC-UC520-to-PSTN
!
server-group sip ping-options Net-CUCM 14.128.100.169 4001
 method OPTIONS
 ping-type proactive 2500
 timeout 2000
 end ping
!
server-group sip global-ping
sip cac session-timeout 720
sip cac Net-CUCM 14.128.64.191 5060 udp limit -1
sip cac Net-CUCM 14.128.64.192 5060 udp limit -1
sip cac Net-PSTN 14.128.100.150 5060 udp limit -1
sip cac Net-UC520 14.128.100.161 5060 udp limit -1
!
no sip cac
!
sip listen Net-CUCM udp 14.128.100.169 5061
sip listen Net-From-UC520 udp 14.128.100.169 5063
sip listen Net-PSTN udp 14.128.100.169 5060
sip listen Net-UC520 udp 14.128.100.169 5062
!
call-rate-limit 200
!
end
ajeesing-cusp-8.5.3(cusp)#
```

Verify

There is currently no verification procedure available for this configuration.

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

Related Information

- ***CLI Configuration Guide for Cisco Unified SIP Proxy Release 8.5***
- ***GUI Administration Guide for Cisco Unified SIP Proxy Release 8.5***
- ***CUSP Call Processing***
- ***Technical Support & Documentation − Cisco Systems***

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