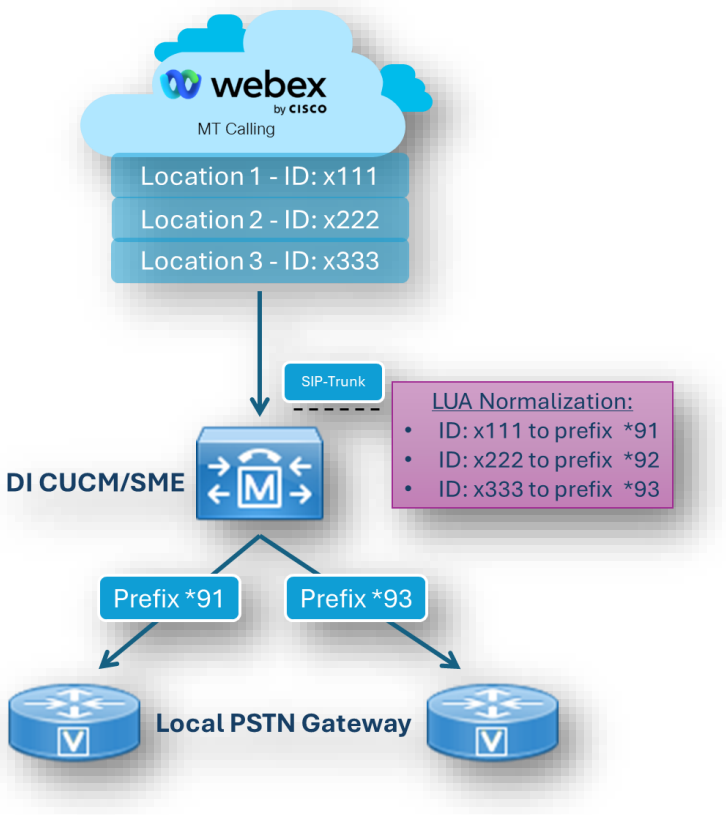
Overview

The LUA normalization script is designed for specific deployments where Webex Calling Multi-Tenant (MT) and Cisco Dedicated Instance (DI) coexist, enabling location-aware PSTN breakout through DI. While Webex MT simplifies user provisioning and central management, it is different from the traditional CUCM routing model based on Calling Search Spaces (CSS), Partitions, Translation Patterns and Route Patterns.

This document describes the call flow architecture between MT and DI for local PSTN breakouts, leveraging location-based routing via the X-Cisco-Location-Info SIP header and normalization using LUA scripting on CUCM.



Use Case Description

Customer UC User are split between MT and DI environments. It is important that some regions have centralized DI/SME/CUCM clusters with multiple registered PSTN gateways. Each MT region (e.g., APAC, EMEA, US) connects to its corresponding DI region over a single SIP trunk.

MT call routing is location-aware, determined by internal MT logic and Location IDs. This differs from DI/SME/CUCM's traditional routing model. The challenge is enabling DI/SME/CUCM to route inbound MT-originated PSTN calls to the correct regional gateway based on MT Location, not just trunk identity.

Solution Approach

To support local PSTN breakout from MT to DI/SME/CUCM with region-specific routing, our solution uses a single SIP trunk per MT region, connecting Webex MT to the DI/SME/CUCM cluster — for example, one trunk each for APAC, EMEA, and AMER. The user's location context is embedded in each SIP INVITE using

the X-Cisco-Location-Info header, which MT includes automatically. On the DI/SME/CUCM side, a LUA normalization script applied to the inbound SIP trunk reads this header, maps the Location ID to a prefix, and modifies the Called Number accordingly to enable standard CUCM dial plan routing to the correct PSTN gateway.

The script (LUA) matches the Location ID against a predefined mapping of Location IDs to digit prefixes (e.g., *91, *92, etc.). If a match is found, the script, it will modifies the Called Party Number by prepending the mapped prefix. Once the Called Number is normalized with the location-specific prefix, traditional CUCM routing logic (CSS, partitions, route patterns) is used to route the call to the correct PSTN gateway.

Example Call Flow – APAC Region

1. A user in Singapore (MT) places a call to +6512345678.
2. The call is routed within MT to the APAC SIP Trunk toward CallManager SME.
3. SIP INVITE arrives on the DI SIP trunk with:

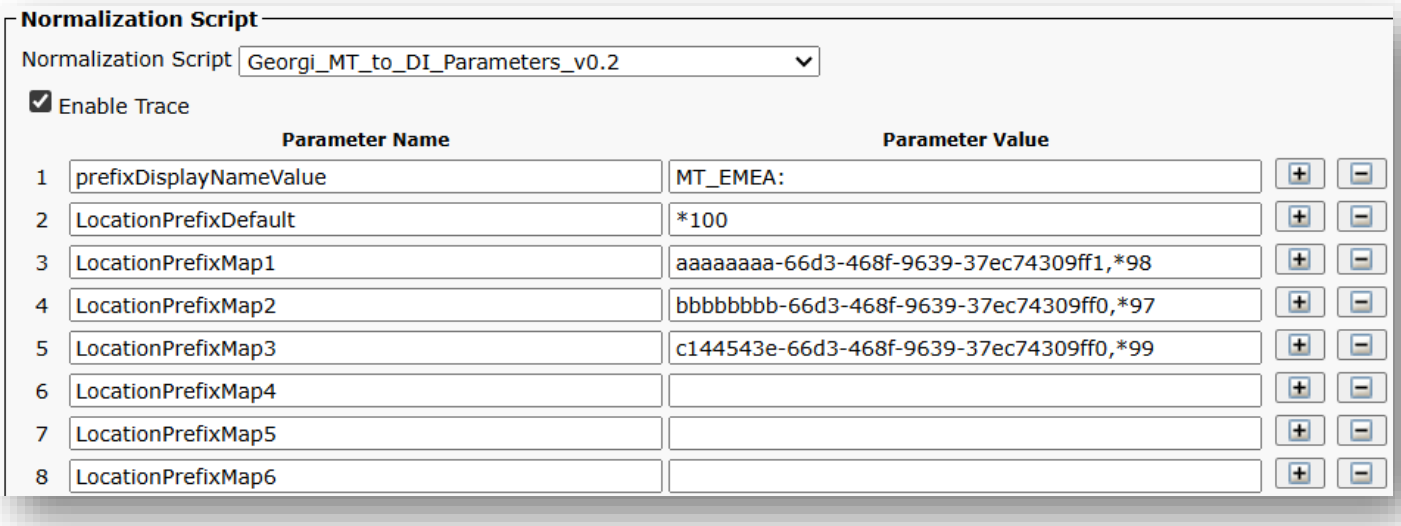
```
Request-URI: sip:+6512345678@...
  X-Cisco-Location-Info: aaaaaaaa-bbbb-cccc-dddd-eeeeeeeeeeee;country=SG
```

4. The LUA script on the SIP trunk identifies the Location ID and maps it to the prefix *99.
5. The Called Number is rewritten as ***99**6512345678.
6. CUCM uses a Translation Pattern matching *99.! to strip the prefix and route to the Singapore PSTN gateway.

Usage

1. Copy the attached script to the CUCM LUA repository.
   Device – Device Settings - SIP Normalization Scripts

2. Go to the Trunk, where the MT incoming calls are terminated (from the MT LGWs)
   Device – Trunk
   On the bottom of the Trunk Configuration page, set the LUA and the Parameters



* Parameter names are case-sensitive!

Parameters information:

The script is using *getValue(parameter-name)* to take the external parameters from the CUCM GUI (Device-Trunk). Given a parameter name, this function returns the value of the parameter. If a parameter with the specified name exists and has a value then its returns the same value. If the name exists but there is no associated value, then blank string is return (i.e. "" without the double quotes). If there is no such parameter with the specified name, nil is returned.

Table 1. LUA External Parameters (scriptParameters.getValue)

Parameter Name	Description:
prefixDisplayNameValue	It will change the Calling Name in: "From", "Remote-Party-ID", "P-Preferred-Identity", "P-Asserted-Identity" Very useful for troubleshooting and testing. On the PSTN Simulator you will receive the call with this prefix. Leave it blank if you want to stop it.
LocationPrefixMap1 - 6	For the moment, this LUA is supporting a maximum of 6 Location IDs. The Parameter Value has two components: The expected SIP X-Cisco-Location-Info and the required prefix. Location IDs can be found for your region in Control Hub - Locations. The Location-Info and the Prefix should be divided with "**,**" Example: 5 LocationPrefixMap3 c144543e-66d3-468f-9639-37ec74309ff0,*99 Where: **c144543e-66d3-468f-9639-37ec74309ff0** – is the expected MT Location ID ***99** - is the Prefix applied on the SIP URI Called Number
LocationPrefixDefault	This parameter serves as a fallback mechanism for incoming number transformation in LUA normalization script. Acts as a default prefix when location-specific mappings are not found in external Parameter - LocationPrefixMap1 to n The parameter is applied ONLY when (AND): ✓ INVITE has X-Cisco-Location-Info header (location information is present) ✓ Location ID does NOT match any configured LocationPrefixMap1-5 ✓ LocationPrefixDefault is configured (not empty) When LocationPrefixDefault is NOT Used (OR) • No X-Cisco-Location-Info header - No transformation at all • Location ID matches a specific LocationPrefixMap1-5 - Uses the specific mapping instead • LocationPrefixDefault is empty - No fallback transformation Scenario 1: INVITE with X-Cisco-Location-Info header that matches LocationPrefixMap • Uses the specific mapped prefix (e.g., LocationPrefixMap3) • LocationPrefixDefault is NOT used Scenario 2: INVITE with X-Cisco-Location-Info header but NO match in LocationPrefixMaps • Uses LocationPrefixDefault as fallback (e.g., replaces "+" with "*99") • Logs: "Using LocationPrefixDefault as fallback: *99" Scenario 3: INVITE without X-Cisco-Location-Info header • No number transformation at all • LocationPrefixDefault is NOT used

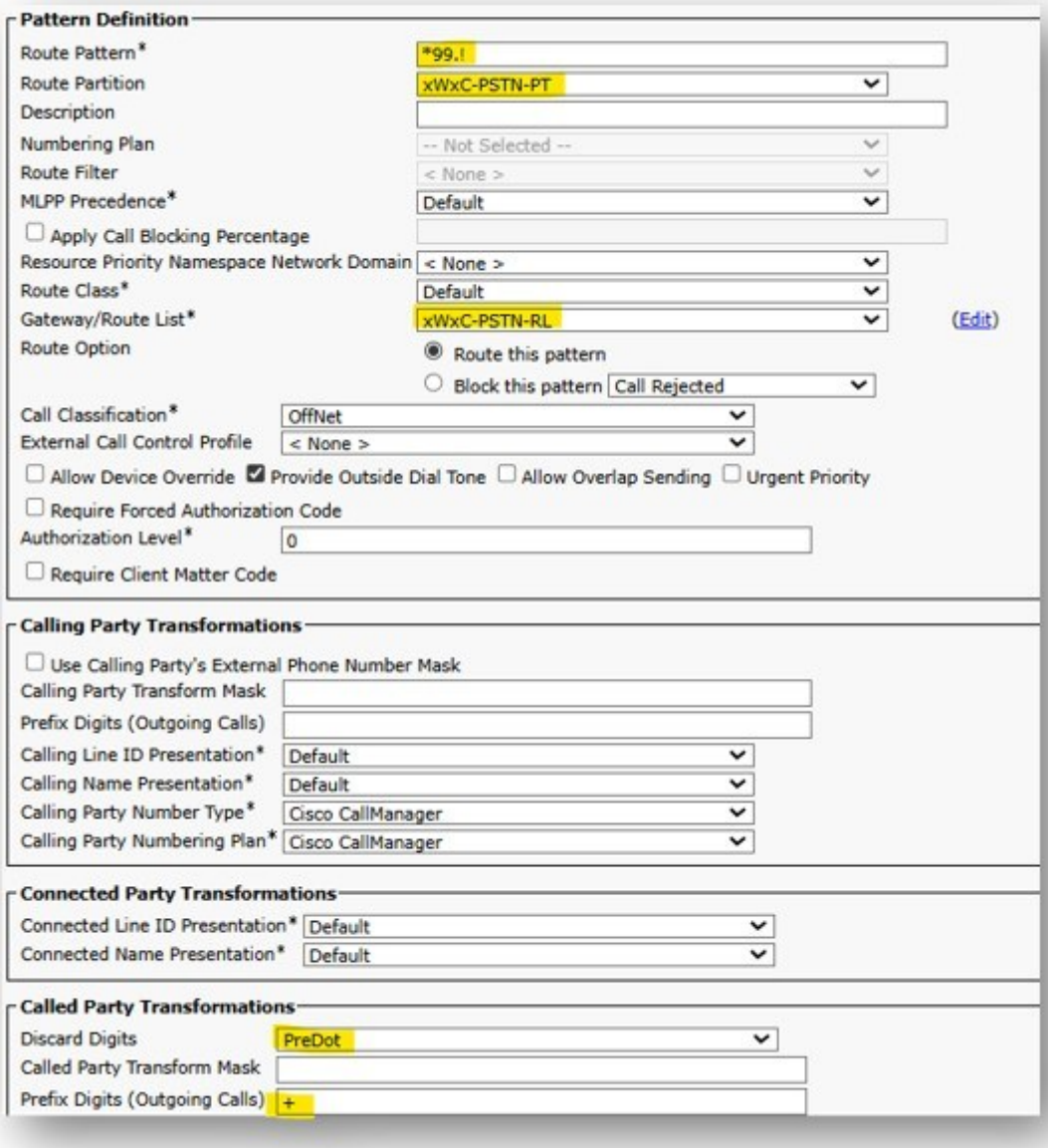
	• Logs: "X-Cisco-Location-Info header not present. Skipping RURI logic."

* Parameter names are case-sensitive!

3. Dial Plan with the new * Prefix

When you have your Parameter configuration, make sure you have the right Route Pattern, matching your Prefix. This is an example for SME.

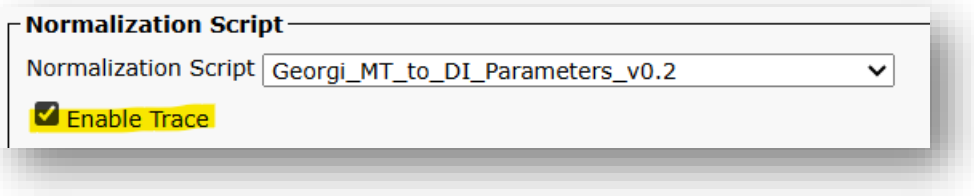
Call Routing – Route/Hunt – Route Pattern



Traces and Debugs

RTMT (Real-Time Monitoring Tool) can be used to inspect LUA trace logs and verify SIP message transformation. The LUA should provide traces of each step, visible in CUCM SDL logs

When the Trace is enabled on the trunk, then the script will put a lot of logs in the SDL. This is very helpful to "see" what is happening.



Example SDL Trace:

```
|SdlSig   |SIPNormalizeReq                    |wait                          |SIPNormalization(1,100,184,1)    |SIPHandler(1,100,183,1)
|AppInfo  |//SIPLua/Script/trace_output: --- Running Georgi's script v2 - dynamic mapping with 6 LocationPrefixMap and DefaultPrefix ---
|AppInfo  |//SIPLua/Script/trace_output: prefixDisplayNameValue: MT_EMEA_Defaut:
|AppInfo  |//SIPLua/Script/trace_output: LocationPrefixDefault: *99
|AppInfo  |//SIPLua/Script/trace_output: Applying display name prefix to all INVITEs.
|AppInfo  |//SIPLua/Script/trace_output: Modified From header: "MT_EMEA_Defaut:Georgi Dimitrov" <sip:+4989207026921@10.48.24.133>;tag=4DF712D-5E7
|AppInfo  |//SIPLua/Script/trace_output: Modified Remote-Party-ID header: "MT_EMEA_Defaut:Georgi Dimitrov" <sip:+4989207026921@10.48.24.133>;party
|AppInfo  |//SIPLua/Script/trace_output: P-Preferred-Identity header not found. Skipping.
|AppInfo  |//SIPLua/Script/trace_output: P-Asserted-Identity header not found. Skipping.
|AppInfo  |//SIPLua/Script/trace_output: Loaded LocationPrefixMap1: aaaaaaaa-66d3-468f-9639-37ec74309ff1 -> *98
|AppInfo  |//SIPLua/Script/trace_output: Loaded LocationPrefixMap2: bbbbbbbb-66d3-468f-9639-37ec74309ff0 -> *97
|AppInfo  |//SIPLua/Script/trace_output: Total location mappings loaded: 2
|AppInfo  |//SIPLua/Script/trace_output: X-Cisco-Location-Info header found: c144543e-66d3-468f-9639-37ec74309ff0;country=DE
|AppInfo  |//SIPLua/Script/trace_output: Extracted Location ID: c144543e-66d3-468f-9639-37ec74309ff0
|AppInfo  |//SIPLua/Script/trace_output: No prefix mapping found for Location ID: c144543e-66d3-468f-9639-37ec74309ff0
|AppInfo  |//SIPLua/Script/trace_output: Using LocationPrefixDefault as fallback: *99
|AppInfo  |//SIPLua/Script/trace_output: Request URI found is: sip:+4989100101@10.48.24.145:5060
|AppInfo  |//SIPLua/Script/trace_output: Called party number: +4989100101
|AppInfo  |//SIPLua/Script/trace_output: New Request URI set using default prefix to: sip:*994989100101@10.48.24.145:5060
```

Full SIP INVITE example

```
INVITE sip:+4989100101@10.48.24.145:5060 SIP/2.0
Via: SIP/2.0/UDP 10.48.24.133:5060;branch=z9hG4bK27177F
Remote-Party-ID: "Georgi Dimitrov" <sip:+4989207026921@10.48.24.133>;party=calling;screen=yes;privacy=off
From: "Georgi Dimitrov" <sip:+4989207026921@10.48.24.133>;tag=4DF712D-5E7
To: <sip:+4989100101@10.48.24.145>
Date: Wed, 16 Jul 2025 08:33:50 GMT
Call-ID: 6EDE9BB1-615611F0-8556B0B0-E5E3920A@10.48.24.133
Supported: 100rel,timer,resource-priority,replaces,sdp-anat
Min-SE:  1800
Cisco-Guid: 1860032563-1633030640-2236657840-3856896522
User-Agent: Cisco-SIPGateway/IOS-17.6.2
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER, SUBSCRIBE, NOTIFY, INFO, REGISTER
CSeq: 101 INVITE
Timestamp: 1752654830
Contact: <sip:+4989207026921@10.48.24.133:5060>
Expires: 180
Allow-Events: telephone-event
Max-Forwards: 68
Session-ID: 3e277f69df311855f1be72cfa0b8f212;remote=00000000000000000000000000000000
Recv-Info: x-broadworks-client-session-info,x-cisco-mute-status
X-Cisco-Location-Info: c144543e-66d3-468f-9639-37ec74309ff0;country=DE
X-BroadWorks-Correlation-Info: f6dc41c1-0845-4d20-9fa3-29b4ee253e74
Content-Type: application/sdp
Content-Disposition: session;handling=required
Content-Length: 770
...

00750794.000 |10:33:51.249 |SdlSig   |SIPNormalizeReq                |wait                |SIPNormalization(1,100,184,1)
|SIPHandler(1,100,183,1)        |1,100,255,3.2670^10.48.24.133^*        |*TraceFlagOverrode
00750794.001 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: --- Running Georgi's script v2 - dynamic mapping with 6
LocationPrefixMap and DefaultPrefix ---
00750794.002 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: prefixDisplayNameValue: MT_EMEA_Defaut:
00750794.003 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: LocationPrefixDefault: *99
00750794.004 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Applying display name prefix to all INVITEs.
00750794.005 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Modified From header: "MT_EMEA_Defaut:Georgi Dimitrov"
<sip:+4989207026921@10.48.24.133>;tag=4DF712D-5E7
```

```
00750794.006 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Modified Remote-Party-ID header: "MT_EMEA_Defaut:Georgi Dimitrov"
<sip:+4989207026921@10.48.24.133>;party=calling;screen=yes;privacy=off
00750794.007 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: P-Preferred-Identity header not found. Skipping.
00750794.008 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: P-Asserted-Identity header not found. Skipping.
00750794.009 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Loaded LocationPrefixMap1: aaaaaaaa-66d3-468f-9639-37ec74309ff1
-> *98
00750794.010 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Loaded LocationPrefixMap2: bbbbbbbb-66d3-468f-9639-
37ec74309ff0 -> *97
00750794.011 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Total location mappings loaded: 2
00750794.012 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: X-Cisco-Location-Info header found: c144543e-66d3-468f-9639-
37ec74309ff0;country=DE
00750794.013 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Extracted Location ID: c144543e-66d3-468f-9639-37ec74309ff0
00750794.014 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: No prefix mapping found for Location ID: c144543e-66d3-468f-9639-
37ec74309ff0
00750794.015 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Using LocationPrefixDefault as fallback: *99
00750794.016 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Request URI found is: sip:+4989100101@10.48.24.145:5060
00750794.017 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: Called party number: +4989100101
00750794.018 |10:33:51.249 |AppInfo  |//SIPLua/Script/trace_output: New Request URI set using default prefix to:
sip:*994989100101@10.48.24.145:5060
00750794.019 |10:33:51.249 |AppInfo  |//SIP/SIPNormalization/trace_sip_message: After inbound SIP Normalization msg is:
[104441,INT]

INVITE sip:*994989100101@10.48.24.145:5060 SIP/2.0
Date: Wed, 16 Jul 2025 08:33:50 GMT
Allow: INVITE, OPTIONS, BYE, CANCEL, ACK, PRACK, UPDATE, REFER, SUBSCRIBE, NOTIFY, INFO, REGISTER
Recv-Info: x-broadworks-client-session-info,x-cisco-mute-status
From: "MT_EMEA_Defaut:Georgi Dimitrov" <sip:+4989207026921@10.48.24.133>;tag=4DF712D-5E7
Allow-Events: telephone-event
Supported: 100rel,timer,resource-priority,replaces,sdp-anat
Min-SE:  1800
Remote-Party-ID: "MT_EMEA_Defaut:Georgi Dimitrov" <sip:+4989207026921@10.48.24.133>;party=calling;screen=yes;privacy=off
Cisco-Guid: 1860032563-1633030640-2236657840-3856896522
Content-Length: 770
User-Agent: Cisco-SIPGateway/IOS-17.6.2
To: <sip:+4989100101@10.48.24.145>
Contact: <sip:+4989207026921@10.48.24.133:5060>
X-Cisco-Location-Info: c144543e-66d3-468f-9639-37ec74309ff0;country=DE
Expires: 180
Session-ID: 3e277f69df311855f1be72cfa0b8f212;remote=00000000000000000000000000000000
Content-Disposition: session;handling=required
Content-Type: application/sdp
Call-ID: 6EDE9BB1-615611F0-8556B0B0-E5E3920A@10.48.24.133
X-BroadWorks-Correlation-Info: f6dc41c1-0845-4d20-9fa3-29b4ee253e74
Via: SIP/2.0/UDP 10.48.24.133:5060;branch=z9hG4bK27177F
CSeq: 101 INVITE
Max-Forwards: 68
...
```

Document Reference:

https://developer.cisco.com/site/uc-manager-sip/documents/sip_normalization_trans/

Created by:
Georgi Dimitrov
geodimit@cisco.com
17.07.2025