



## **Configuring Dialplans for the Unified Communications 500 (UC500) Platform**

The following document has details on how to configure basic and advanced dialplan options for the UC500 platform, using both the Cisco Configuration Assistant (CCA) version 1.8 and the Cisco IOS Command Line Interface (CLI).

### **Dialplan: Definition and Functionality**

A **dial plan** establishes the expected number and pattern of digits for a telephone number. This includes country codes, access codes, area codes and all combinations of digits dialed. For instance, the North American public switched telephone network (PSTN) uses a 10-digit dial plan that includes a 3-digit area code and a 7-digit telephone number. Most PBXs support variable-length dial plans that use 3 to 11 digits. Dial plans must comply with the telephone networks to which they connect.

A **dial plan** may also cover internal dialing within the PBX premises, using 2, 3 or 4 digit mapping for extensions and certain call features.

By default, CCA provisions 3 digit extensions for the following applications:

- 1xx:** Paging Groups
- 2xx:** IP phones (200 – 299)
- 3xx:** Analog phones (FXS ports)
- 4xx:** Open
- 5xx:** Hunt-group (500- 599)
- 6xx:** Open
- 7xx:** Park Slots

Also, CCA provisions the following:

- 9** PSTN access code (US)
- # Dial Terminator

On the UC500, a dialplan is provisioned via an IOS feature known as "**dial peer**". Dial peers are defined as:

- **Plain old telephone systems (POTS) dial peer** - These define the characteristics of a traditional Telephony network connection. The POTS dial peer maps a dial

string to a specific voice port on the local router/gateway. Normally, the voice port connects the router/gateway to the local public switched telephone network (PSTN), private automatic branch exchange (PBX), or telephone.

- **Voice over IP (VoIP) dial peer** - The dial peer is mapped to the IP address, Domain Name System (DNS) name, or server-type of the destination VoIP device that terminates the call. This applies to all VoIP protocols such as H.323 and SIP.

The dial peers provisioned by CCA depend on the actual physical ports present on the UC500 device (including expansion slots):

**For built in FXS ports using SCCP:** 1 - 4

**MOH Livefeed:** 5

**Inbound Dial Plan:** 6 - 49

**Outbound Dial Plan:** 50 - 999

**Outbound dialing through SIP Trunk:** 1000 - 1099

**Inbound FXS DID:** 1100 - 1999

**Cisco Unity Express (AA and VM):** 2000 - 2500

**Legacy OOB Range:** 2501 - 2999

**Inbound Call routing (DID):** 3000 - 4999

Dial peers provisioned in the 5000+ range won't conflict with the dial peers provisioned by CCA.

## Configuring Outbound Call Routing

After running the Cisco Configuration Assistant (CCA), connect to your UC500 and navigate to **Configure>Telephony>Voice>Dialplan**. The following screen will display:

Hostname: UC520

Device System Network AA & Voicemail SIP Trunk Voice Features Dial Plan Users

**System Extensions**

Number of Digits Per Extension: 3

**Outgoing Call Handling**

Numbering Plan Locale:  North American  Other

Number of Digits in Area Code: 3

Number of Digits in Local Number: 7

Digits for Placing Long Distance Call: 1

Digits for Placing International Call: 011

Access Code: 8

Emergency Numbers: 1. 911 2. [ ] 3. [ ]

When selected, the North American Dialplan displays the following default values:

**Number of Digits in Area Code:** 3

**Number of Digits in Local Number:** 7  
**Digits for placing long Distance Calls:** 1  
**Digits for placing International Calls:** 011  
**Access Code:** 9  
**Emergency Numbers:** <blank>

Although these values can be changed, the defaults should serve most customers as the PSTN dialing options in North America are fairly homogeneous.

To configure a non-US/Canada dialplan, select "**Other**". If the options presented here are not enough to satisfy your dialing requirements, additional CLI manipulation might be needed.

When using CLI, caution should be exercised to avoid conflicts with the parameters that are controlled by the CCA tool.

The following Support Wiki article provides instructions on how to access (and capture the console output) the IOS CLI:

<http://supportwiki.cisco.com/wiki/images/9/96/Telnet-hyperterminal.pdf>

### **Sample non-US/Canada Dialplan**

The following is a full working Mexican dial plan that can be used as a reference to adjust your specific dialing definitions. In Mexico, certain patterns such as cellular destinations cannot be explicitly configured by CCA. Therefore, out of band (OOB) dial peers are used to complete the configuration. The following are some of the dialplan parameters:

Secondary Dialtone Access Code: **9**  
Local Call dialing length: **10 digits**  
Long Distance Code: **01**  
International Access Code: **00**  
Emergency Calls: **060**  
Cellular Calls: **044 and 045** (notice that for these patterns, OOB dial peers are used)  
Premium Calls: **1800 and 1900** (notice that for these patterns, OOB dial peers are used)  
Operator Services: **040** (notice that for these patterns, OOB dial peers are used)

```
! OUTBOUND FXO DIAL-PEERS
!
dial-peer voice 54 pots
  corlist outgoing call-local
  description ** FXO pots dial-peer ***
  translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
  preference 5
  destination-pattern 9T
```

```
port 0/1/0
forward-digits 10
no sip-register
!
dial-peer voice 55 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901T
port 0/1/0
prefix 01
no sip-register
!
dial-peer voice 56 pots
corlist outgoing call-international
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 900T
port 0/1/0
prefix 00
no sip-register
!
dial-peer voice 57 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9060
port 0/1/0
forward-digits 3
no sip-register
!
dial-peer voice 58 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 060
port 0/1/0
forward-digits 3
no sip-register
!
dial-peer voice 5000 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9044.....
port 0/1/0
prefix 044
no sip-register
!
dial-peer voice 5001 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
```

```
destination-pattern 9045.....
port 0/1/0
prefix 045
no sip-register
!
dial-peer voice 5002 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901800.....
port 0/1/0
prefix 01800
no sip-register
!
dial-peer voice 5003 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901900.....
port 0/1/0
prefix 01900
no sip-register
!
dial-peer voice 5004 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9040
port 0/1/0
prefix 040
no sip-register
!
!
dial-peer voice 59 pots
corlist outgoing call-local
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9T
port 0/1/1
forward-digits 10
no sip-register
!
dial-peer voice 60 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901T
port 0/1/1
prefix 01
no sip-register
!
dial-peer voice 61 pots
corlist outgoing call-international
```

```
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 900T
port 0/1/1
prefix 00
no sip-register
!
dial-peer voice 62 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9060
port 0/1/1
forward-digits 3
no sip-register
!
dial-peer voice 63 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 060
port 0/1/1
forward-digits 3
no sip-register
!
dial-peer voice 5005 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9044.....
port 0/1/1
prefix 044
no sip-register
!
dial-peer voice 5006 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9045.....
port 0/1/1
prefix 045
no sip-register
!
dial-peer voice 5007 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901800.....
port 0/1/1
prefix 01800
no sip-register
!
dial-peer voice 5008 pots
```

```
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901900.....
port 0/1/1
prefix 01900
no sip-register
!
dial-peer voice 5009 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9040
port 0/1/1
prefix 040
no sip-register
!
!
dial-peer voice 64 pots
corlist outgoing call-local
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9T
port 0/1/2
forward-digits 10
no sip-register
!
dial-peer voice 65 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901T
port 0/1/2
prefix 01
no sip-register
!
dial-peer voice 66 pots
corlist outgoing call-international
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 900T
port 0/1/2
prefix 00
no sip-register
!
dial-peer voice 67 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9060
port 0/1/2
forward-digits 3
no sip-register
```

```
!
dial-peer voice 68 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 060
port 0/1/2
forward-digits 3
no sip-register
!
dial-peer voice 5010 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9044.....
port 0/1/2
prefix 044
no sip-register
!
dial-peer voice 5011 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9045.....
port 0/1/2
prefix 045
no sip-register
!
dial-peer voice 5012 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901800.....
port 0/1/2
prefix 01800
no sip-register
!
dial-peer voice 5013 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901900.....
port 0/1/2
prefix 01900
no sip-register
!
dial-peer voice 5014 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9040
port 0/1/2
prefix 040
```

```
no sip-register
!
!
dial-peer voice 69 pots
    corlist outgoing call-local
    description ** FXO pots dial-peer **
    translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
    preference 5
    destination-pattern 9T
    port 0/1/3
    forward-digits 10
    no sip-register
!
dial-peer voice 70 pots
    corlist outgoing call-domestic
    description ** FXO pots dial-peer **
    translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
    preference 5
    destination-pattern 901T
    port 0/1/3
    prefix 01
    no sip-register
!
dial-peer voice 71 pots
    corlist outgoing call-international
    description ** FXO pots dial-peer **
    translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
    preference 5
    destination-pattern 900T
    port 0/1/3
    prefix 00
    no sip-register
!
dial-peer voice 72 pots
    description ** FXO pots dial-peer **
    translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
    preference 5
    destination-pattern 9060
    port 0/1/3
    forward-digits 3
    no sip-register
!
dial-peer voice 73 pots
    description ** FXO pots dial-peer **
    translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
    preference 5
    destination-pattern 060
    port 0/1/3
    forward-digits 3
    no sip-register
!
dial-peer voice 5015 pots
    corlist outgoing call-domestic
    description ** FXO pots dial-peer **
    translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
    preference 5
    destination-pattern 9044.....
```

```
port 0/1/3
prefix 044
no sip-register
!
dial-peer voice 5016 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9045.....
port 0/1/3
prefix 045
no sip-register
!
dial-peer voice 5017 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901800.....
port 0/1/3
prefix 01800
no sip-register
!
dial-peer voice 5018 pots
corlist outgoing call-domestic
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 901900.....
port 0/1/3
prefix 01900
no sip-register
!
dial-peer voice 5019 pots
description ** FXO pots dial-peer **
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
preference 5
destination-pattern 9040
port 0/1/3
prefix 040
no sip-register
!
! AA AND VM DIAL PEERS
!
!
dial-peer voice 2000 voip
description ** cue voicemail pilot number **
destination-pattern 299
b2bua
session protocol sipv2
session target ipv4:10.1.10.1
dtmf-relay sip-notify
codec g711ulaw
no vad
!
dial-peer voice 2001 voip
```

```

description ** cue auto attendant number **
translation-profile outgoing PSTN_CallForwarding
destination-pattern 298
b2bua
session protocol sipv2
session target ipv4:10.1.10.1
dtmf-relay sip-notify
codec g711ulaw
no vad
!
dial-peer voice 2003 voip
description ** cue auto attendant PSTN number **
translation-profile outgoing AA_Profile
destination-pattern 5566778899$
b2bua
session protocol sipv2
session target ipv4:10.1.10.1
dtmf-relay sip-notify
codec g711ulaw
no vad
!
dial-peer voice 2004 pots
translation-profile incoming AA_Profile
incoming called-number 5566778899
direct-inward-dial
!
! OUTBOUND SIP TRUNK DIAL PEERS
!
dial-peer voice 1000 voip
description ** Incoming call from SIP trunk **
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
incoming called-number .%
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1001 voip
corlist outgoing call-local
description ** Outgoing call to SIP trunk (Generic SIP Trunk Provider) **
translation-profile outgoing PSTN_Outgoing
destination-pattern 9[2-9]..[2-9].....
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1002 voip
corlist outgoing call-domestic
description ** Outgoing call to SIP trunk (Generic SIP Trunk Provider) **

```

```

translation-profile outgoing PSTN_Outgoing
destination-pattern 91[2-9]..[2-9].....
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1003 voip
corlist outgoing call-international
description ** Outgoing call to SIP trunk (Generic SIP Trunk Provider) ***
translation-profile outgoing PSTN_Outgoing
destination-pattern 9011T
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1004 voip
corlist outgoing call-local
description ** 911/411 call to SIP trunk (Generic SIP Trunk Provider) ***
translation-profile outgoing PSTN_Outgoing
destination-pattern 9[2-9]11
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1005 voip
description ** Emergency outgoing call to SIP trunk ***
translation-profile outgoing OUTGOING_TRANSLATION_PROFILE
destination-pattern 9911
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1006 voip
description ** Emergency outgoing call to SIP trunk ***
translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
destination-pattern 911
voice-class codec 1

```

```

voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1007 voip
corlist outgoing call-local
description ** star code to SIP trunk **
destination-pattern *..
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
dial-peer voice 1008 voip
description ** AA from SIP Trunk **
translation-profile incoming AA_Profile
voice-class codec 1
voice-class sip dtmf-relay force rtp-nte
session protocol sipv2
session target sip-server
incoming called-number 5566778899
dtmf-relay rtp-nte
ip qos dscp cs5 media
ip qos dscp cs4 signaling
no vad
!
!
! INCOMING TO AA AND VM
!
dial-peer voice 2005 voip
description Auto Attendant from VoIP
translation-profile outgoing AA_Profile
destination-pattern 5566778899$*
b2bua
session protocol sipv2
session target ipv4:10.1.10.1
dtmf-relay sip-notify
codec g711ulaw
no vad
!
end

```

## **Configuring Deterministic Port/Trunk Selection**

By default, all local voice ports will serve as a outbound dialing backup for the SIP trunk. This means that after dialing the secondary dialtone access code plus the destination number, the SIP trunk will be tried first. If the IP call fails, then the local voice ports are

tried randomly. If a SIP trunk is not configured, then outbound calls will use the PSTN trunks in a random fashion.

This is called a *hunt group*, sometimes called *rotary group*, in which multiple dial peers are configured with the same destination pattern. Because the destination of each POTS dial peer is a single voice port to a telephony interface, hunt groups help ensure that calls get through even when a specific voice port is busy. If the UC500 is configured to hunt, it can forward a call to another voice port when one voice port is busy.

To give specific dial peers in the pool a preference over other dial peers, you can configure the preference order for each dial peer by using the **preference** command. The UC500 attempts to place a call to the dial peer with the highest preference.

The lower the preference number, the higher the priority. The highest priority is given to the dial peer with preference order 0. If the same preference is defined in multiple dial peers with the same destination pattern, a dial peer is selected randomly.

You cannot use the same preference numbers for POTS and VoIP dial peers within a hunt group. You can set a separate preference order for each dial peer type, but the preference order does not work on both at the same time. For example, you can configure preference order 0, 1, and 2 for POTS dial peers, and you can configure preference order 0, 1, and 2 for the voice-network dial peers, but the two preference orders are separate. The system resolves preference orders among POTS dial peers first.

Here is an example of FXO dial peers using preference:

```
dial-peer voice 5000 pots
destination pattern 9.T
port 0/1/0
preference 0
!
dial-peer voice 5001 pots
destination pattern 9.T
port 0/1/1
preference 1
!
dial-peer voice 5002 pots
destination pattern 9.T
port 0/1/2
preference 2
!
dial-peer voice 5003 pots
destination pattern 9.T
port 0/1/3
preference 3
```

The UC500 will attempt to place a call to the dial peer with the lowest preference (5000).

Additionally, you can change the leading digit for any VoIP or POTS dial peer, in case you want to have separate steering codes for IP calls vs. PSTN calls. All you need to do is change the `destination-pattern` accordingly. For example, the following configuration shows that 8 is used for IP calls, whereas 9 is used for PSTN (FXO) calls:

```
dial-peer voice 1001 voip
  corlist outgoing call-local
  description ** Outgoing call to SIP trunk (Generic SIP Trunk Provider) **
  translation-profile outgoing PSTN_Outgoing
  destination-pattern 8[2-9]..[2-9].....
  voice-class codec 1
  voice-class sip dtmf-relay force rtp-nte
  session protocol sipv2
  session target sip-server
  dtmf-relay rtp-nte
  ip qos dscp cs5 media
  ip qos dscp cs4 signaling
  no vad
!
dial-peer voice 54 pots
  corlist outgoing call-local
  description ** FXO pots dial-peer **
  translation-profile outgoing CALLER_ID_TRANSLATION_PROFILE
  preference 5
  destination-pattern 9T
  port 0/1/0
  forward-digits 10
  no sip-register
!
```

More detailed information about dialplan manipulation using dial peers, can be found on:

[http://www.cisco.com/en/US/docs/ios/12\\_2/voice/configuration/guide/vvfpeers.html](http://www.cisco.com/en/US/docs/ios/12_2/voice/configuration/guide/vvfpeers.html)