

Pure**Cloud**

BYOC Trunk  
Twilio Basic Setup

## Version History

Version	Date	Author	Description of major revisions
0.1	11 Jul 2018	Jerome Saint-Marc	Draft
0.2	15 Oct 2018	Jerome Saint-Marc	Twilio and BYOC Info added
0.3	16 Oct 2018	Jerome Saint-Marc	Screenshot update (doc size)

## Summary

The intent of this document is to describe the necessary configuration to connect a 3<sup>rd</sup> party SIP Trunk (TWILIO) to a PureCloud sandbox org (using the BYOC feature/option).

This document does not cover advanced SIP configuration that could be used for a production system (Number manipulation, Privacy, Resiliency).

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## Background information

### Twilio

- On “outgoing traffic” from the PureCloud infrastructure to the PSTN [*SIP INVITEs from PureCloud to Twilio – Twilio SIP Trunk as Termination*], Twilio authenticates and authorizes the traffic using IP Access Control List, or Digest Authentication, or IP Access Control List and Digest Authentication.
  - Both IP Access Control List and Digest Authentication methods can be supported with Twilio on the BYOC Trunk.
- Twilio requires E.164 format for phone numbers (with international + sign in front).

#### *Recipient*

*Recipient numbers must be in E.164 format:*

#### *Caller ID*

*Set the Caller Line Identity (CLI) in the From header using E.164 . For example: From: <sip:+447700900000@xxx.pstn.twilio.com>.*

- Additional information on SIP with Twilio
  - Network Information (Twilio Console): <https://www.twilio.com/console/sip-trunking/your-network>
    - Local Terminations Uris, IP Access Whitelist (Signling IP)
  - Use SIP with Twilio Voice - URL: <https://www.twilio.com/docs/voice/api/sip-interface>
    - Supported Audio Codecs, Twilio SIP Endpoints/Proxies (SRV records and IP Addresses), ...
  - Twilio provides global SIP Termination URI for your elastic SIP Trunk (mytrunk.pstn.twilio.com) as well as regional ones (mytrunk.pstn.us1.twilio.com, mytrunk.pstn.<region>.twilio.com).
  - Supported Media Codec – G.711/uLaw
  - DTMF Default payload is 101 (RFC 2833).

### PureCloud BYOC Cloud

- Information on BYOC Cloud can be found here:

Starting here: <https://help.mypurecloud.com/articles/about-byoc-cloud/>

And specifically:

<https://help.mypurecloud.com/articles/byoc-cloud-public-sip-ip-addresses/>

<https://help.mypurecloud.com/articles/external-trunk-settings/>

- When you configure an External Trunk in PureCloud, you will have to define a SIP Termination URI, which will be specific to your org.

This URI is leveraged to authenticate and to distribute traffic to the proper org (a.k.a. tenant) as the PureCloud SIP Proxies are shared by all tenants in a region.

See here for information on call matching: <https://help.mypurecloud.com/articles/carrier-requirements-byoc-cloud/>

Ex:

- *If your org has been created in the Western Europe region, your termination URI will be: myorgidentifier.byoc.mypurecloud.ie*
- *If your org has been created in the US region, your termination URI will be: myorgidentifier.byoc.mypurecloud.com*
- *If your org has been created in the Central Europe region, your termination URI will be: myorgidentifier.byoc.mypurecloud.de*
- *If your org has been created in the Australia region, your termination URI will be: myorgidentifier.byoc.mypurecloud.au*
- *If your org has been created in the Japan region, your termination URI will be: myorgidentifier.byoc.mypurecloud.jp*

NB: myorgidentifier is a token/name you will choose, which must be unique across tenants (ex: twilioABC for Partner ABC).

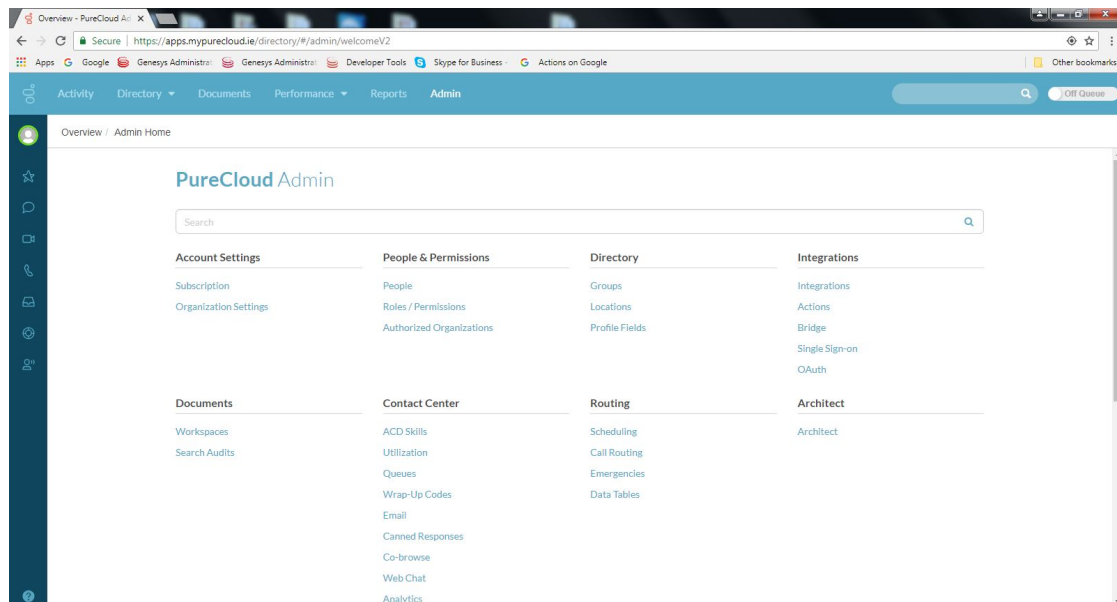
## BYOC Feature & Configuration Pre-Check

If your org is enabled for the BYOC feature/option, your configuration should already contain the following elements (by default, on org creation).

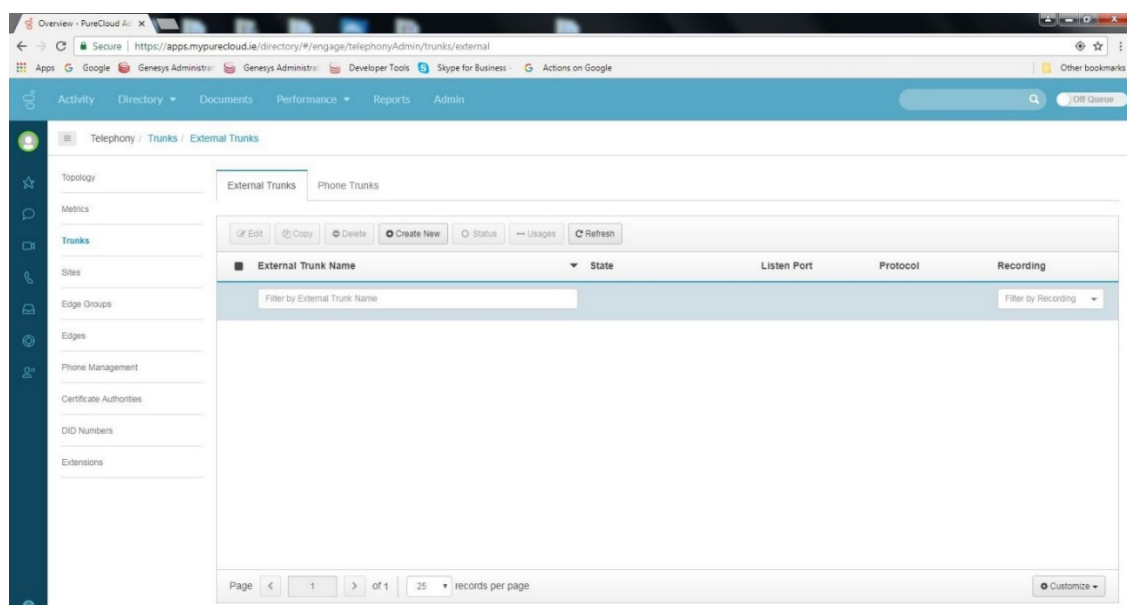
Verify it is the case and that all elements are present and are in active state.

### 1. BYOC feature

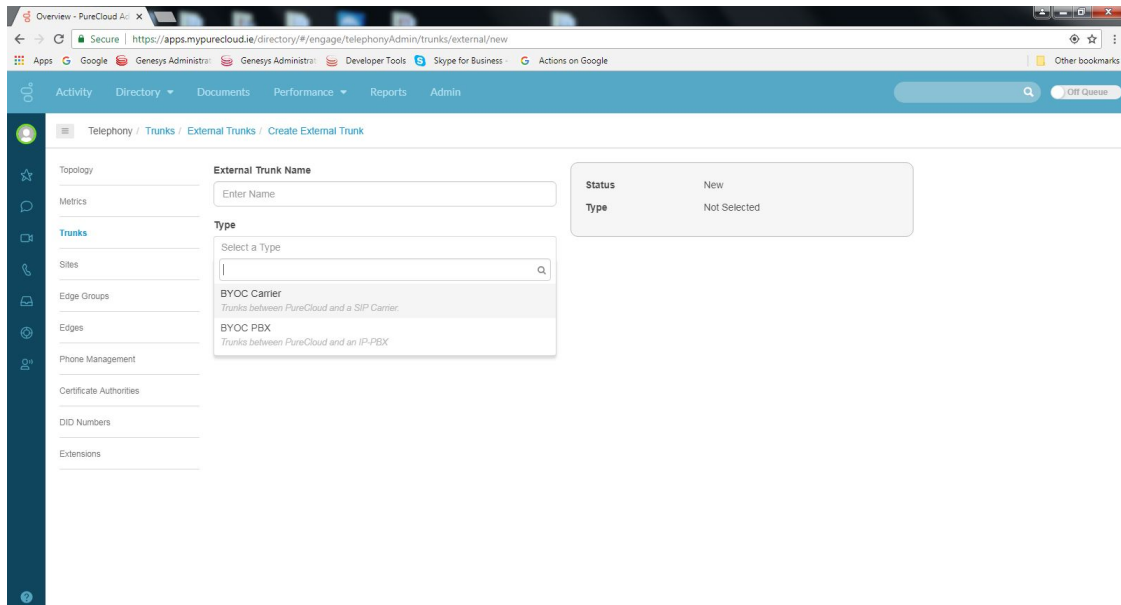
#### 1.1. Via PureCloud Admin UI



In PureCloud Admin, select **Telephony – Trunks**.



## Create a New Trunk.

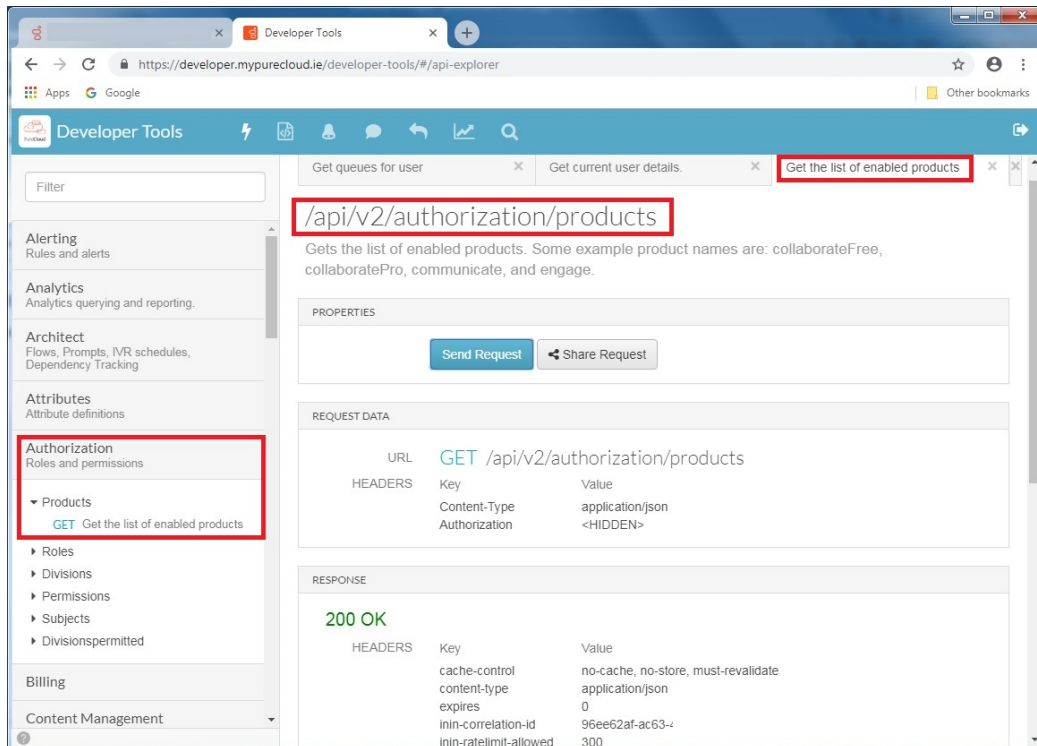


If you are prompted for a Type, displaying at least BYOC Carrier as a possible choice, your BYOC license is likely enabled.

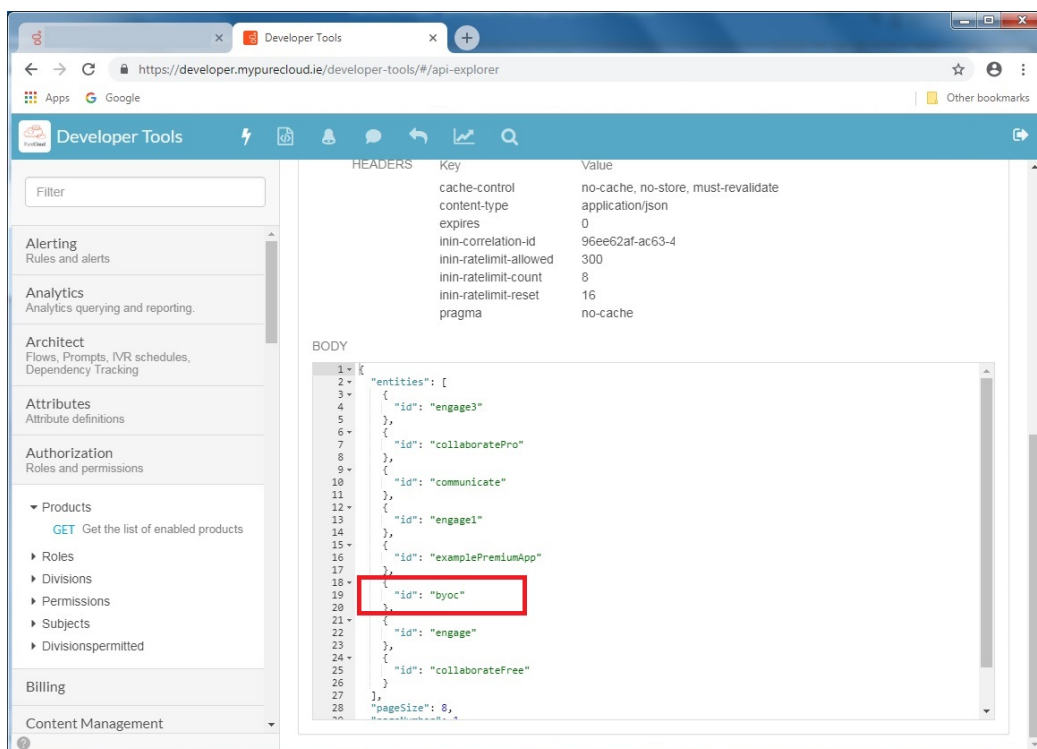
If no choice is offered (or if External SIP type is automatically selected), then the BYOC license is likely missing in your org.

### 1.2. Via API Call

As an admin, you can log on the PureCloud Developer Tools site, and using the API Explorer, you can request the list of enabled products (Authorization – Products).



Verify that “byoc” appears in the list of authorized products.



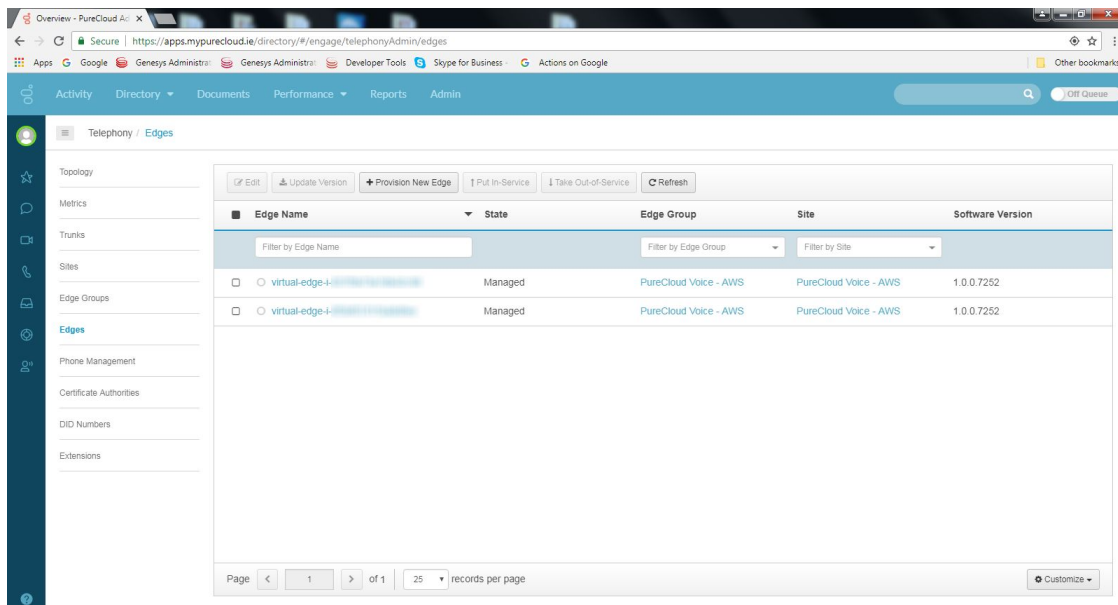
To access PureCloud Developer Tools:



- If your org has been created in the Western Europe region, the URL is:  
<https://developer.mypurecloud.ie/developer-tools/#/api-explorer>
- If your org has been created in the US region, the URL is:  
<https://developer.mypurecloud.com/developer-tools/#/api-explorer>
- If your org has been created in the Central Europe region, the URL is:  
<https://developer.mypurecloud.de/developer-tools/#/api-explorer>
- If your org has been created in the Australia region, the URL is:  
<https://developer.mypurecloud.com.au/developer-tools/#/api-explorer>
- If your org has been created in the Japan region, the URL is:  
<https://developer.mypurecloud.jp/developer-tools/#/api-explorer>

## 2. Edges

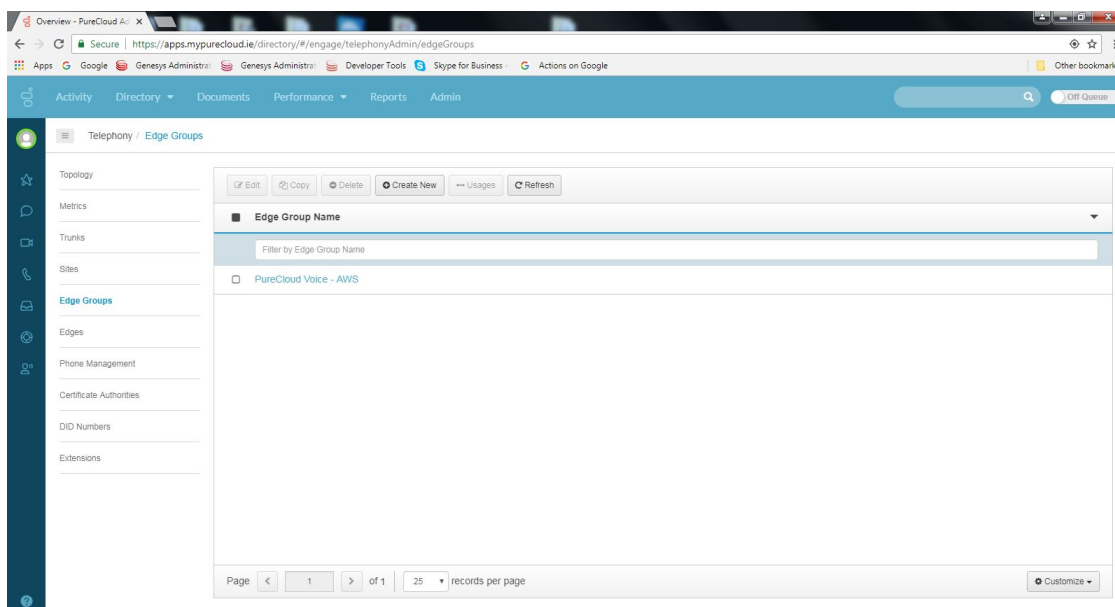
In PureCloud Admin, select **Telephony – Edges**.



You should see 2 virtual Edges, assigned to an Edge Group and to a Site (created by default in your org).

## 3. Edge Groups

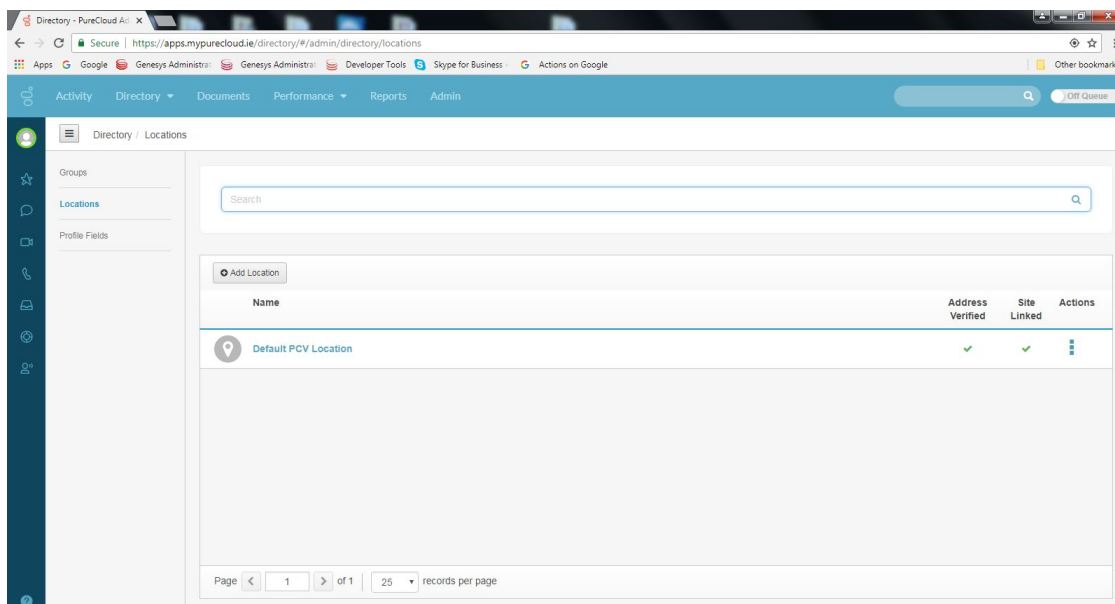
In PureCloud Admin, select **Telephony – Edge Groups**.



You should see at least 1 Edge Group. Created by default in your org: *"PureCloud Voice – AWS"* (virtual Edges assigned to this Edge Group).

## 4. Locations

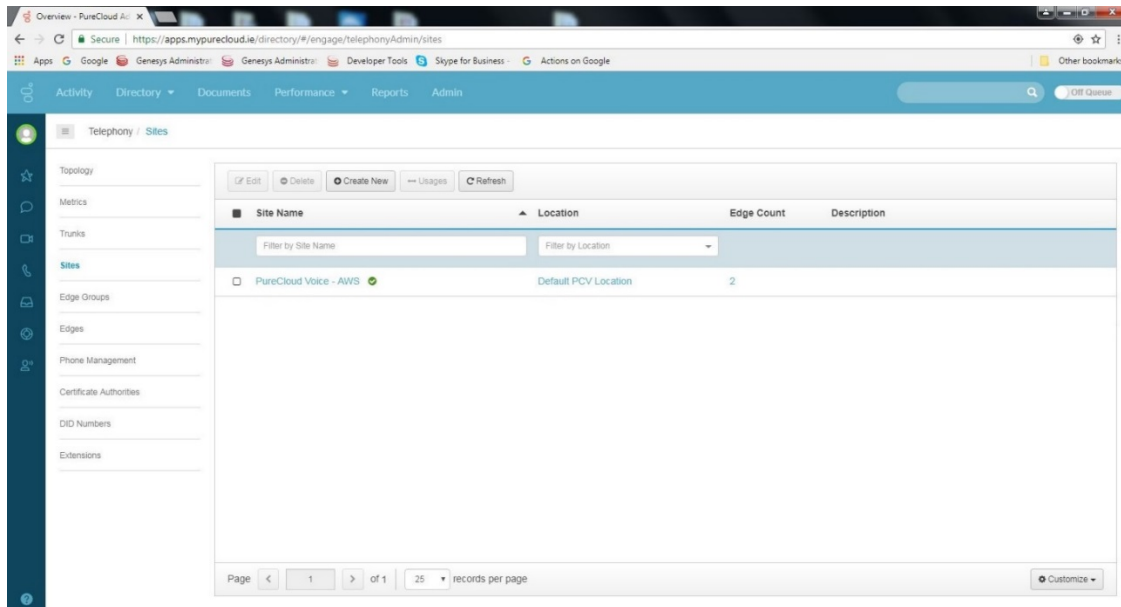
In PureCloud Admin, select **Directory – Locations**.



You should see at least 1 Location. Created by default in your org: *"Default PCV Location"*.

## 5. Sites

In PureCloud Admin, select **Telephony – Sites**.



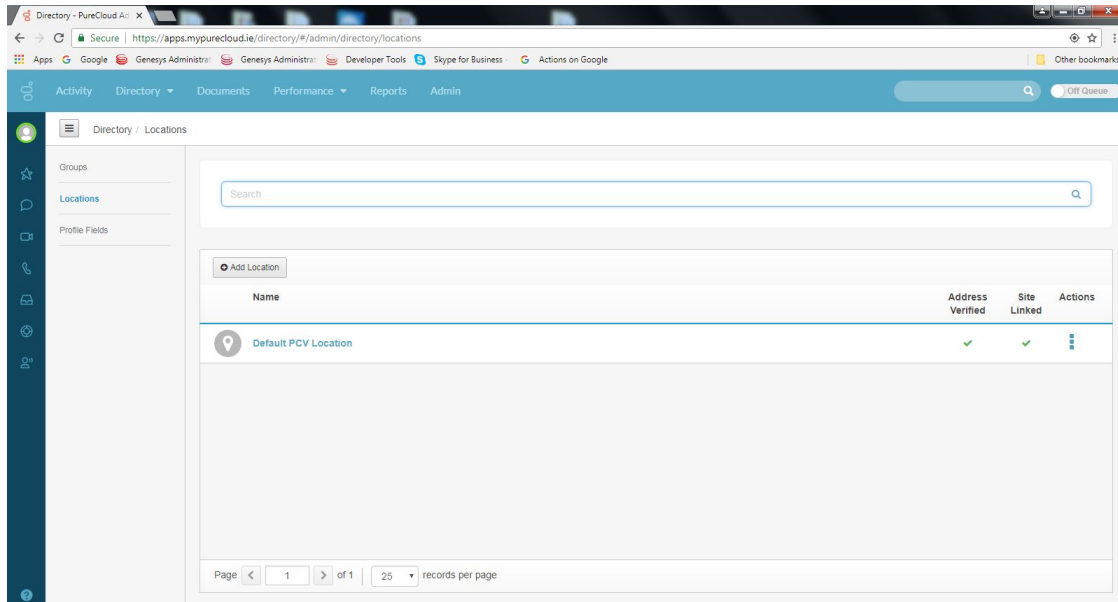
You should see at least 1 Site. Created by default in your org: “*PureCloud Voice - AWS*” (virtual Edges assigned to this Site).

## BYOC Configuration Pre-Requisites (Location & Site)

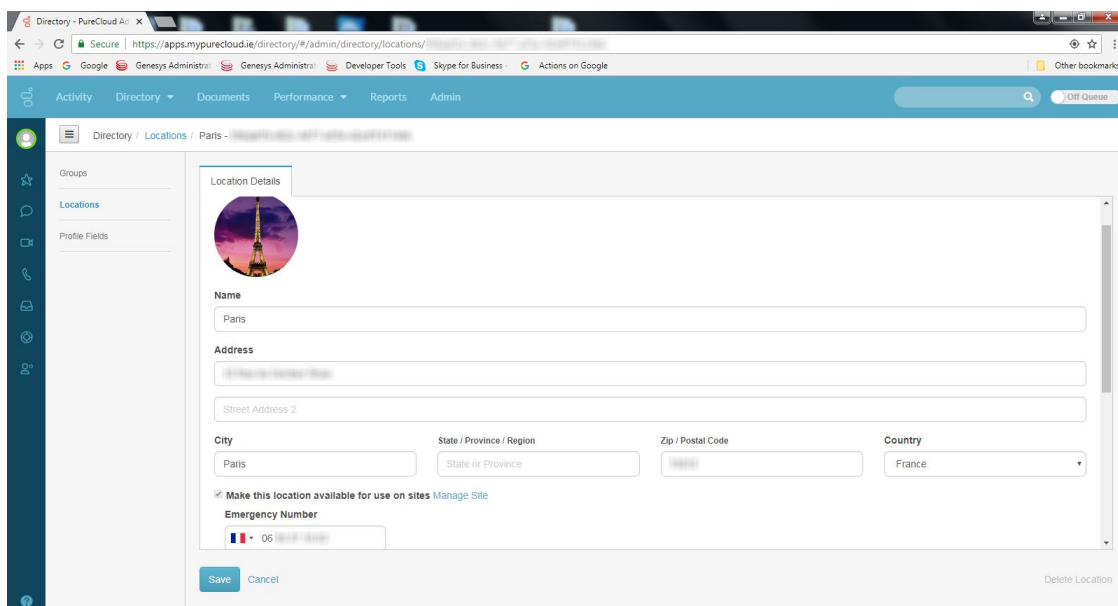
In order to properly configure and to enable your BYOC Trunk, you must have a Location and a Site defined in your PureCloud org configuration.

### 1. Location

In PureCloud Admin, select **Directory – Locations**.



Add a New Location.

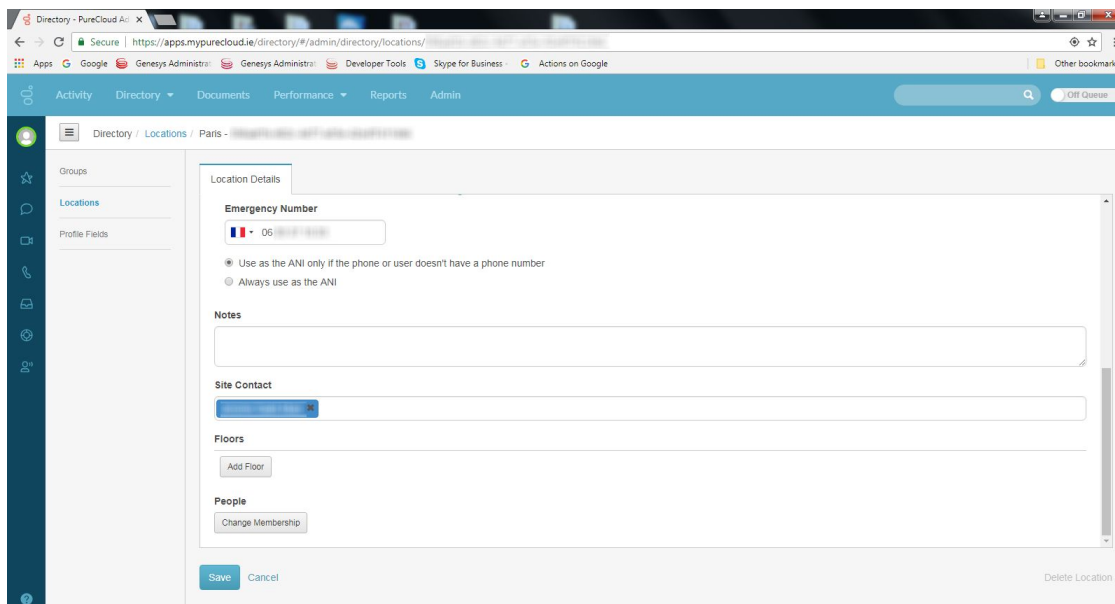


Give the location a name (ex: *Paris*).

Enter a valid address (the address will be checked by an external web service – in order for the Location to be in active state). The Country is important as it will determine which country code is used in Number Plans & Normalization (Trunk and Site configuration).

Select “Make this location available for use on sites” checkbox.

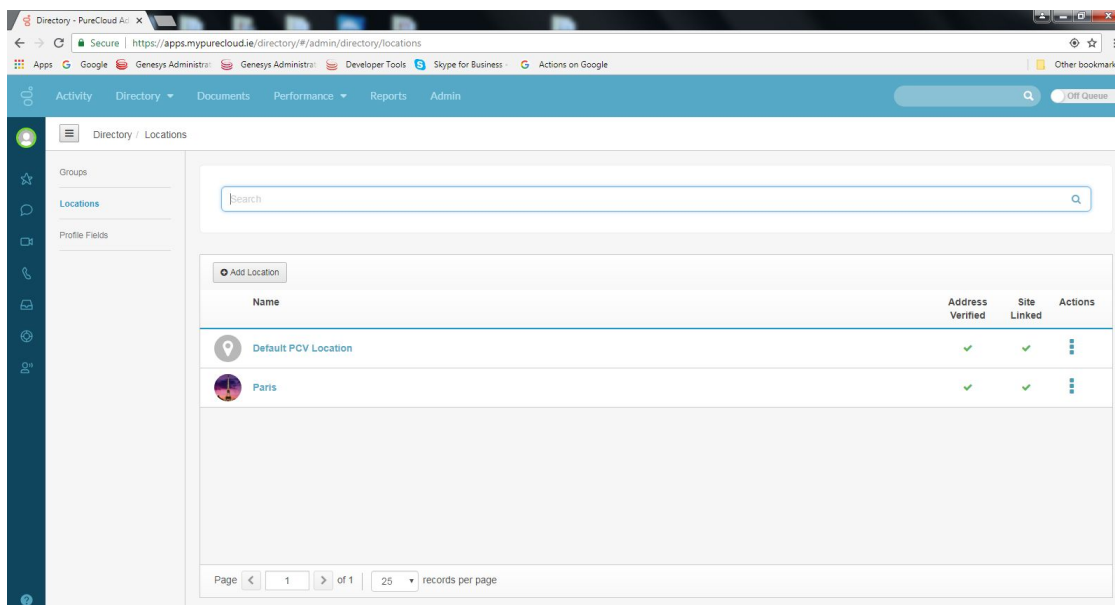
And enter an Emergency Number.



The screenshot shows the 'Location Details' form in the Genesys PureCloud Admin console. The form includes the following fields and options:

- Emergency Number:** A text field containing '06 12 34 56 78' with a dropdown menu showing the French flag.
- Options:** Two radio buttons: 'Use as the ANI only if the phone or user doesn't have a phone number' (selected) and 'Always use as the ANI'.
- Notes:** A large text area for adding notes.
- Site Contact:** A dropdown menu for selecting a site contact.
- Floors:** A section with an 'Add Floor' button.
- People:** A section with a 'Change Membership' button.
- Buttons:** 'Save' and 'Cancel' buttons at the bottom left, and a 'Delete Location' link at the bottom right.

Assign a Site Contact.



The screenshot shows the 'Locations' list in the Genesys PureCloud Admin console. The list contains two locations: 'Default PCV Location' and 'Paris'. The 'Paris' location is highlighted. The table has the following columns: Name, Address Verified, Site Linked, and Actions.

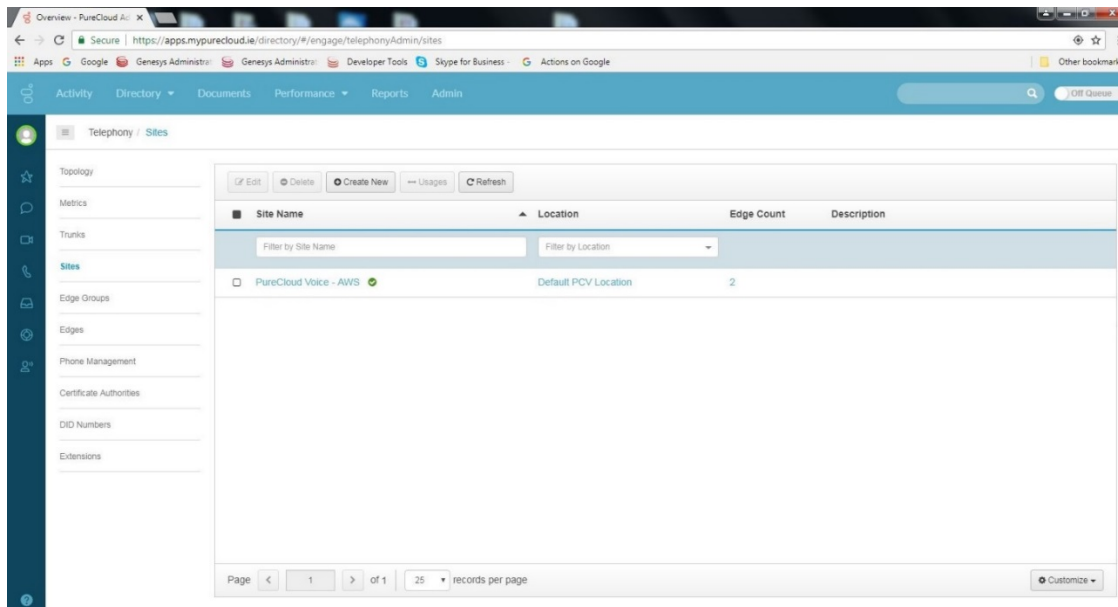
Name	Address Verified	Site Linked	Actions
Default PCV Location	✓	✓	⋮
Paris	✓	✓	⋮

At the bottom of the table, there is a pagination bar showing 'Page 1 of 1' and '25 records per page'.

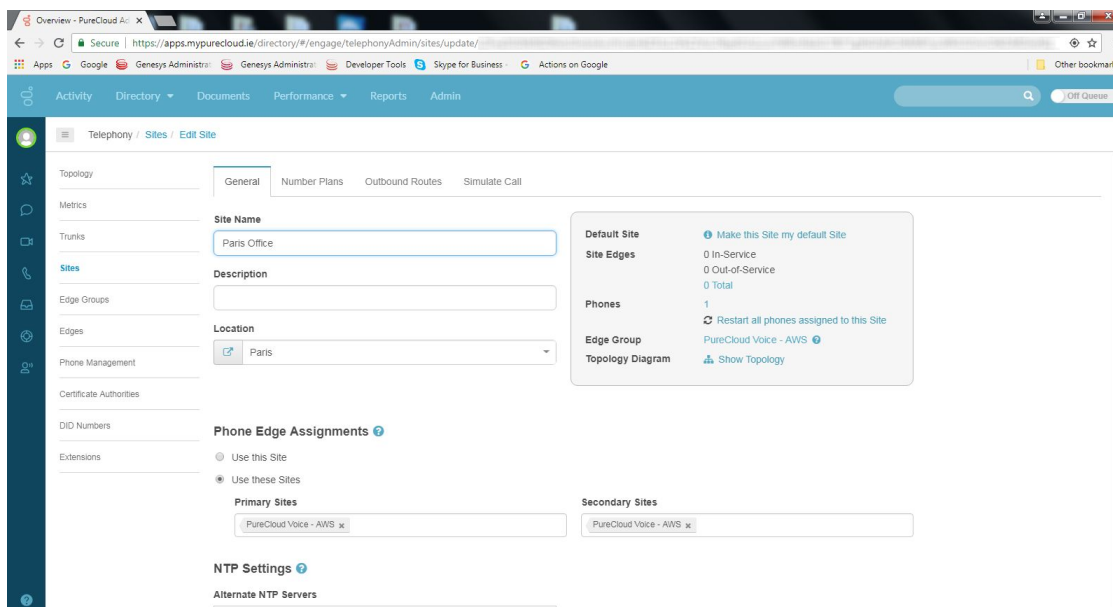
***If your Location is properly configured, and its Address has been validated by the external web service, you must see a green check on Address Verified for your new Location.***

## 2. Site

In PureCloud Admin, select **Telephony – Sites**.

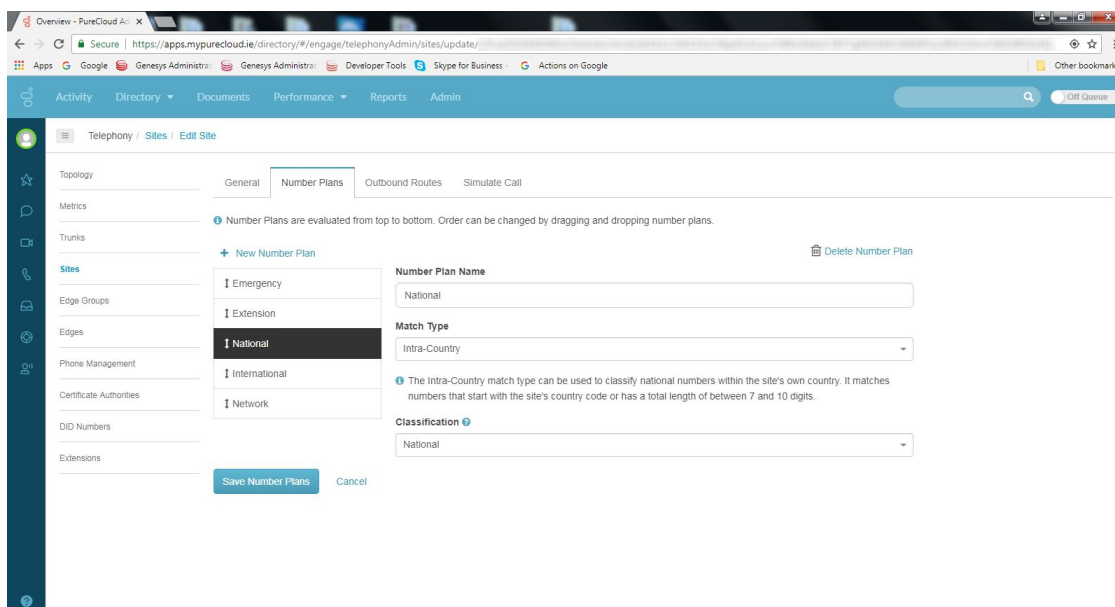


Create a New Site.



Give the site a name (ex: *Paris Office*), and assign the Location we just created (ex: *Paris*).

Under Phone Edge Assignments, select “Use these Sites”, assigning “*PureCloud Voice – AWS*” Site as Primary and Secondary Sites.



Note that when creating a new site, some default Number Plans will be added automatically.

National and International Number Plans will identify national and international numbers (based on the assigned Location Country – Ex: +33 for France) and will transform these numbers into proper E.164 format.

You can add your own customized Number Plans (RegEx) if necessary.

## Twilio

We'll assume that you have created an account on Twilio and that you have purchased at least one phone number.

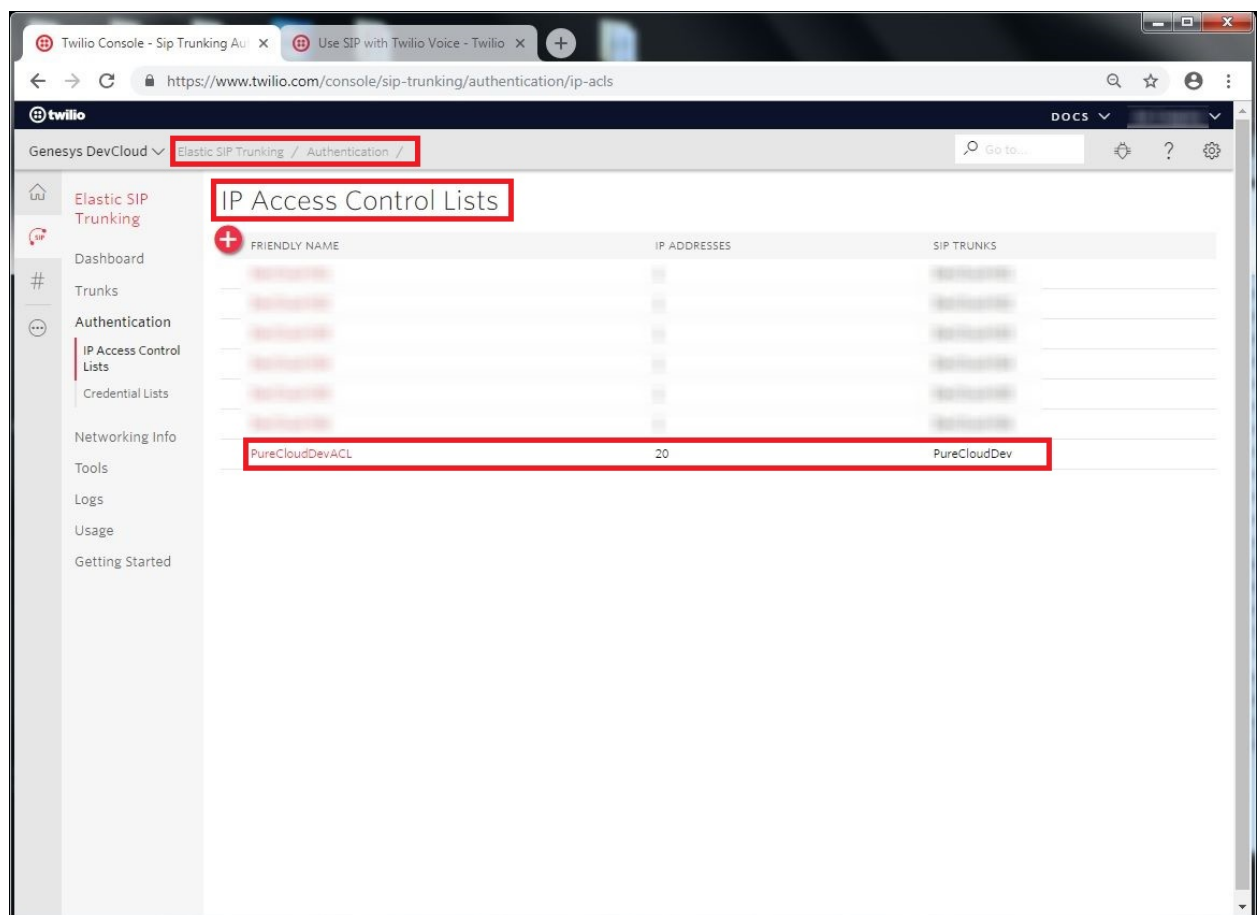
### 1. Twilio Authentication (Trunk Termination)

Twilio authenticates and authorizes the traffic using IP Access Control List, or Digest Authentication, or IP Access Control List and Digest Authentication.

#### 1.1. Define an IP Access Control List

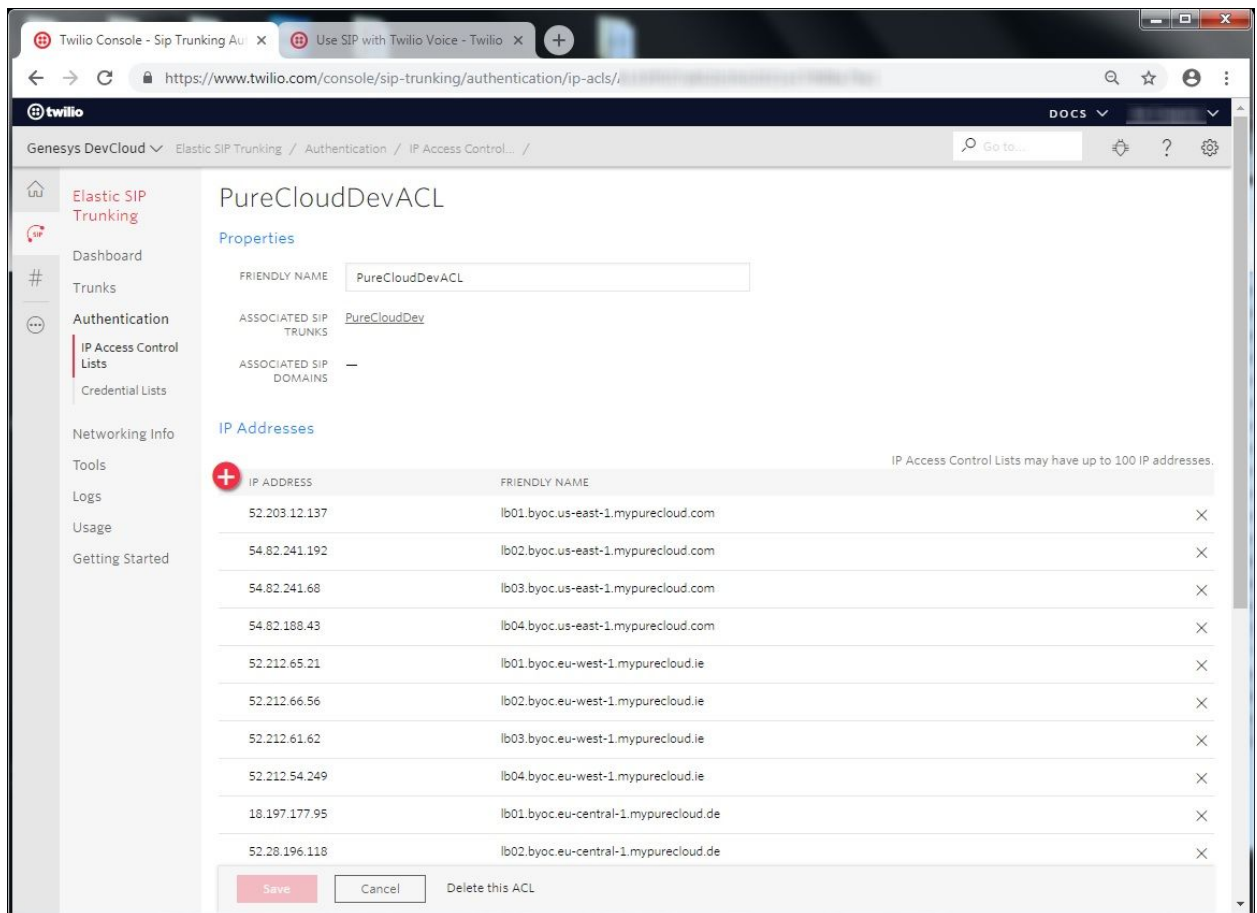
Using the Twilio console, under “Elastic SIP Trunking” – “Authentication” – “IP Access Control Lists” (<https://www.twilio.com/console/sip-trunking/authentication/ip-acls>), define an IP Access Control List, containing the PureCloud BYOC public SIP IP Addresses (<https://help.mypurecloud.com/articles/byoc-cloud-public-sip-ip-addresses/>).

The list must at least contain the PureCloud BYOC public SIP IP Addresses corresponding to your organization's region (i.e. the region on which your PureCloud organization is deployed).



Give the IP Access Control List a name (ex: *PureCloudDevACL*).

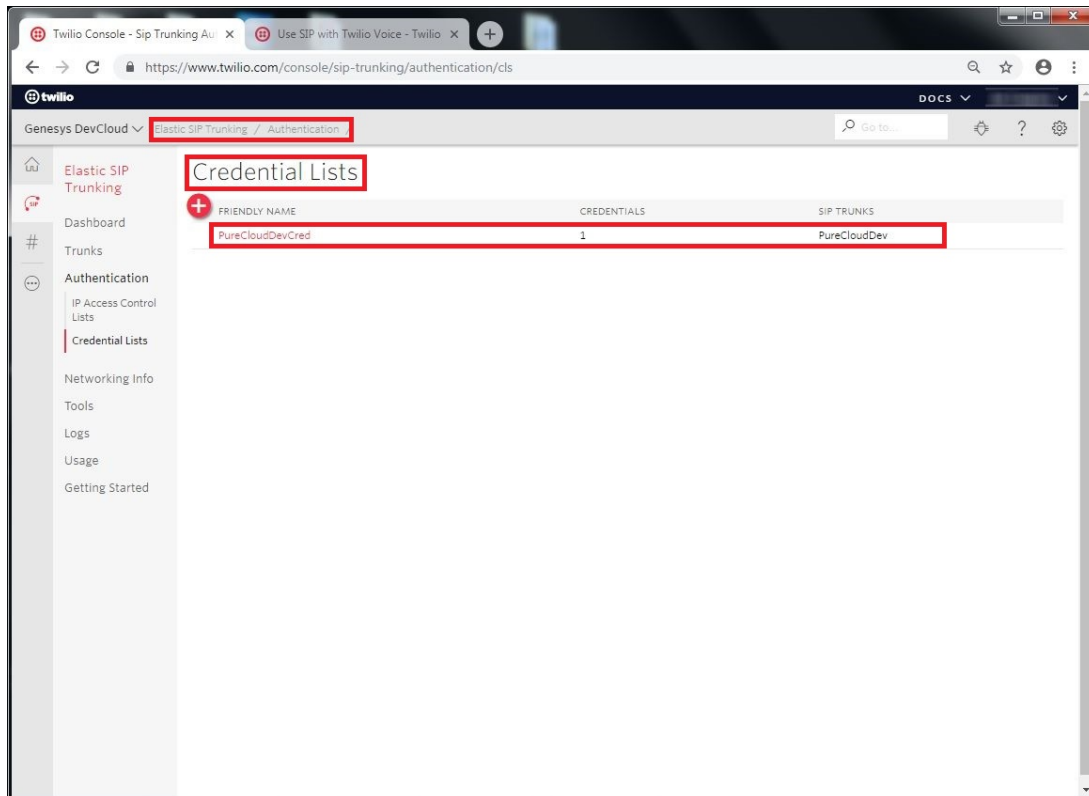




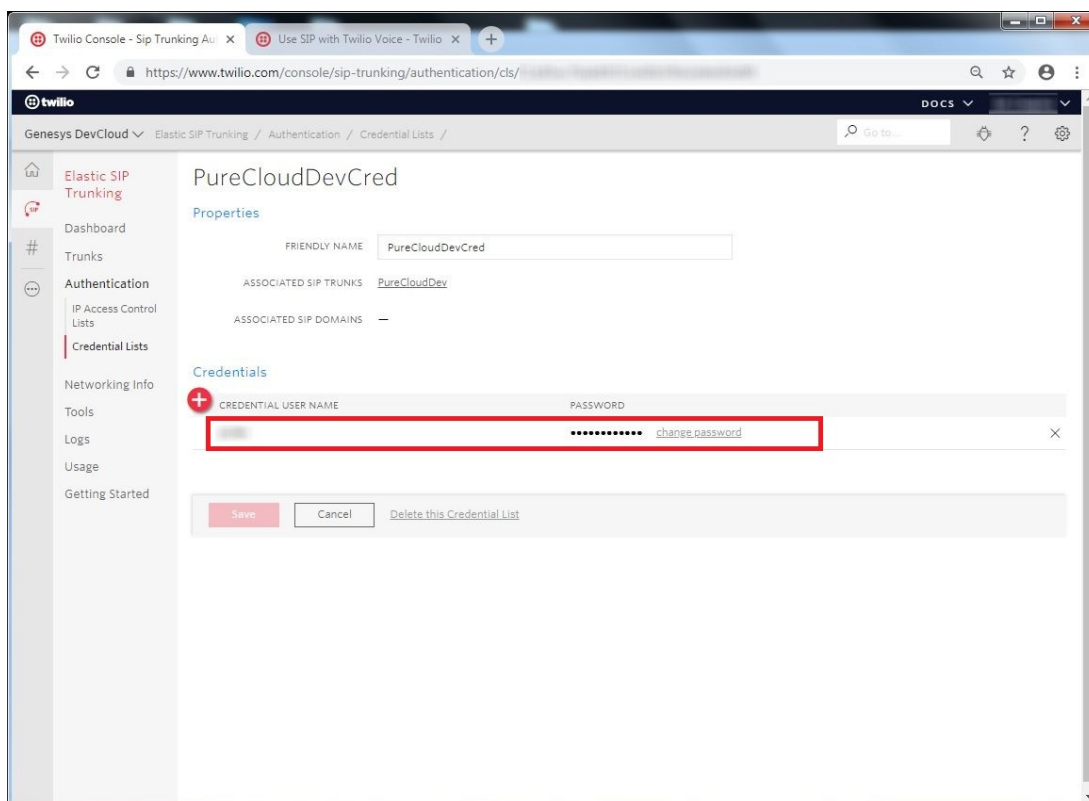
Add the PureCloud BYOC public SIP IP Addresses (<https://help.mypurecloud.com/articles/byoc-cloud-public-sip-ip-addresses/>) corresponding to your organization's region (or all of them as in the example above – for simplicity).

## 1.2. Define a Credential List

Using the Twilio console, under “Elastic SIP Trunking” – “Authentication” – “Credential Lists” (<https://www.twilio.com/console/sip-trunking/authentication/cls>), define a Credential List, with at least one credential, which will be used by the BYOC Trunk for Digest Authentication (outgoing traffic/Twilio Termination).



Give the Credential List a name (ex: *PureCloudDevCred*).



Add a credential (ex: *username = pctrunkuser – password = PCTrunkPassword2018*).

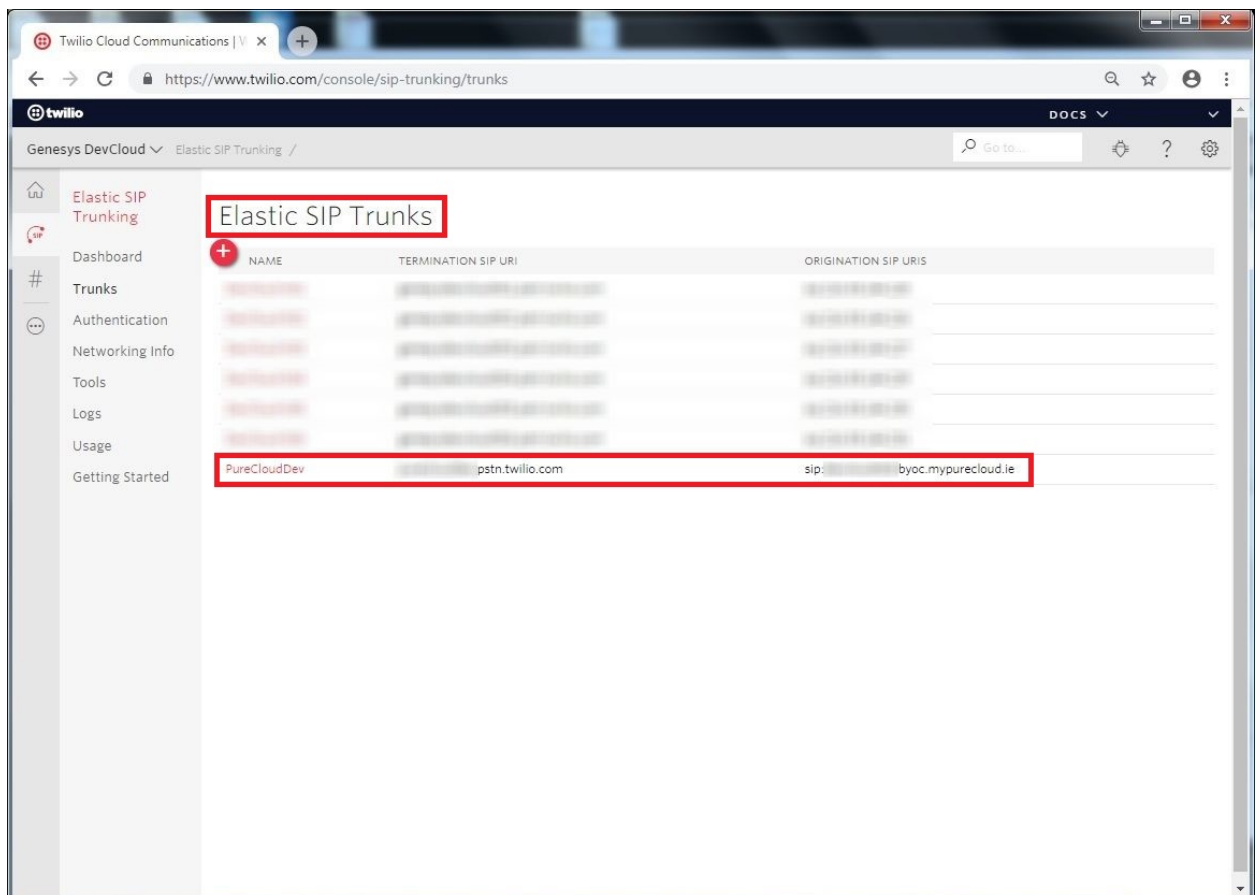
The username and password will be used during PureCloud BYOC trunk configuration (Digest Authentication in Outbound section).

## 2. Twilio Trunk (Elastic SIP Trunk)

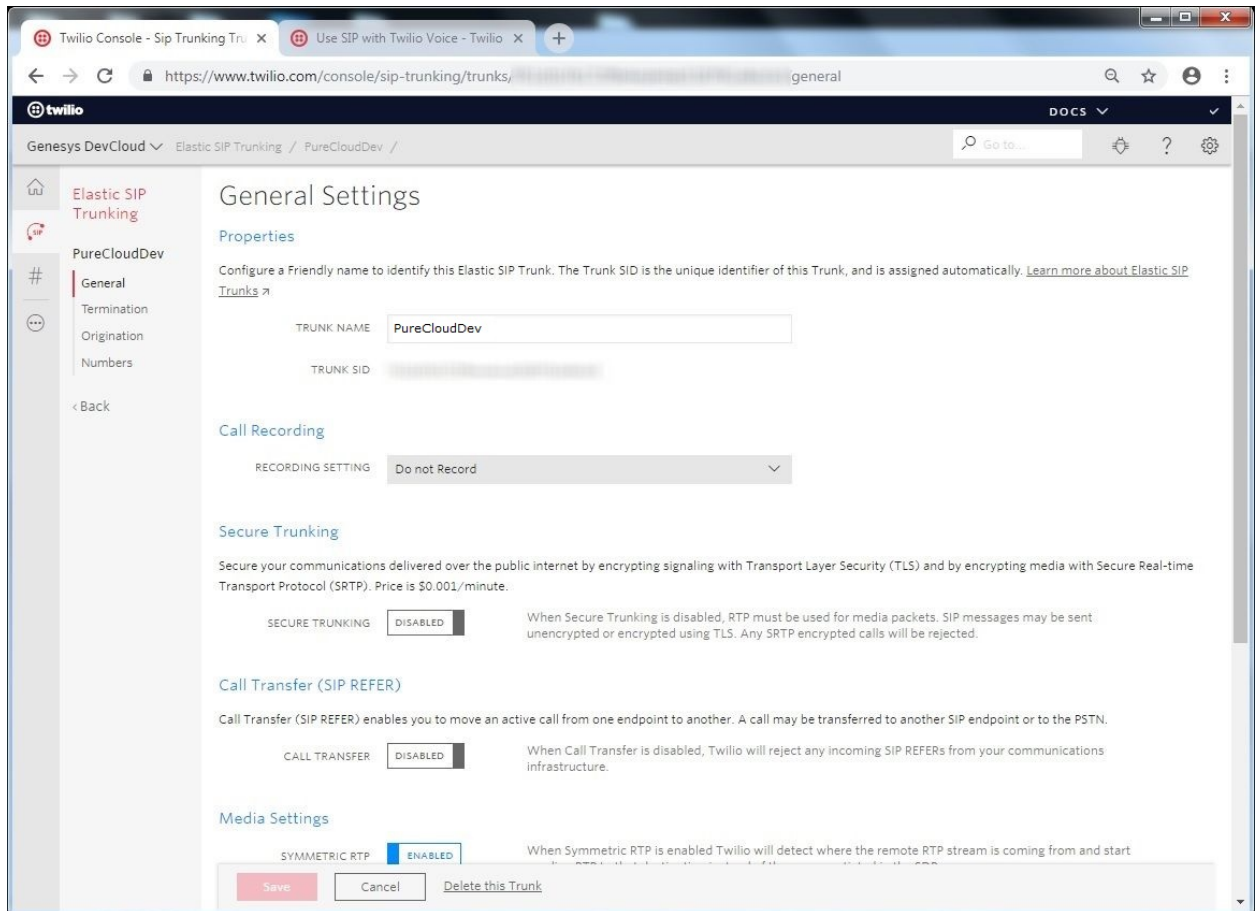
Create a new Elastic SIP Trunk with Twilio, which will interconnect with your PureCloud's infrastructure (via a BYOC Trunk).

### 2.1. Define a Trunk (to your PureCloud's organization)

Using the Twilio console, under “*Elastic SIP Trunking*” – “*Trunks*” (<https://www.twilio.com/console/sip-trunking/trunks>), define a new SIP Trunk.



Give the Trunk a friendly name (ex: *PureCloudDev*).



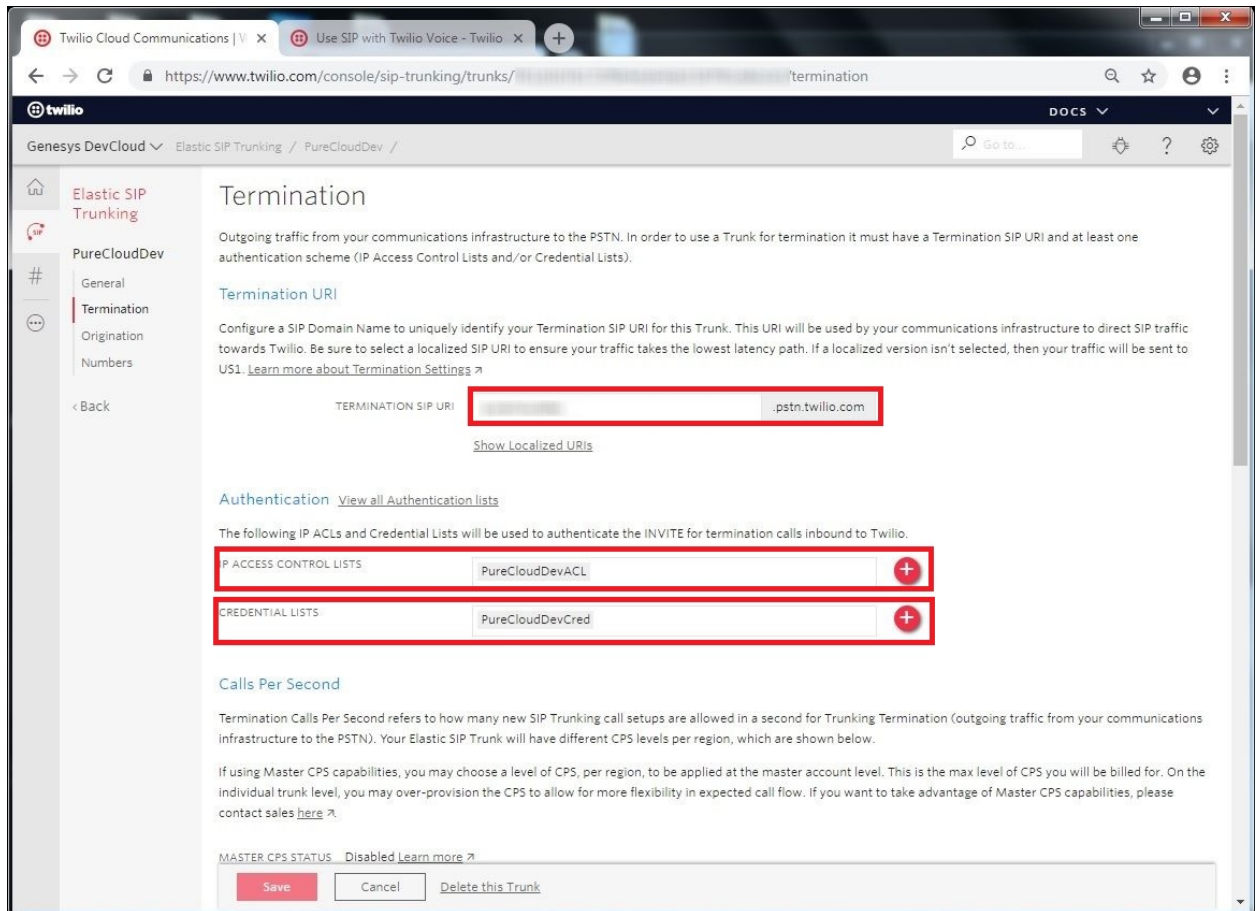
Secure Trunking is not supported yet with PureCloud BYOC Trunks. Check release notes for future updates (<https://help.mypurecloud.com/release-notes/>).

PureCloud does not trigger SIP REFER. It can only consume (receive) SIP REFER received from the Trunk.

## 2.2. Configure Trunk Termination

Under your Trunk, in the Termination tab, define the necessary settings to allow calls from PureCloud, to the PSTN, via this Twilio Trunk:

- Twilio Termination URI – i.e. *mytwilioidentifier.pstn.twilio.com* - This URI will be used by the PureCloud infrastructure to direct SIP Traffic towards Twilio.
- Authentication – Define an IP Access Control List and/or a Credential List



Define a unique Termination SIP URI for your Twilio Trunk (ex: *purecloudABC.pstn.twilio.com*). This URI (or its regional ones) will be used during PureCloud BYOC trunk configuration (SIP Server or Proxies in Outbound section).

You must enable at least one of the Authentication method on that Trunk (IP Access Control List, Credential List). In this example, we enable both of them.

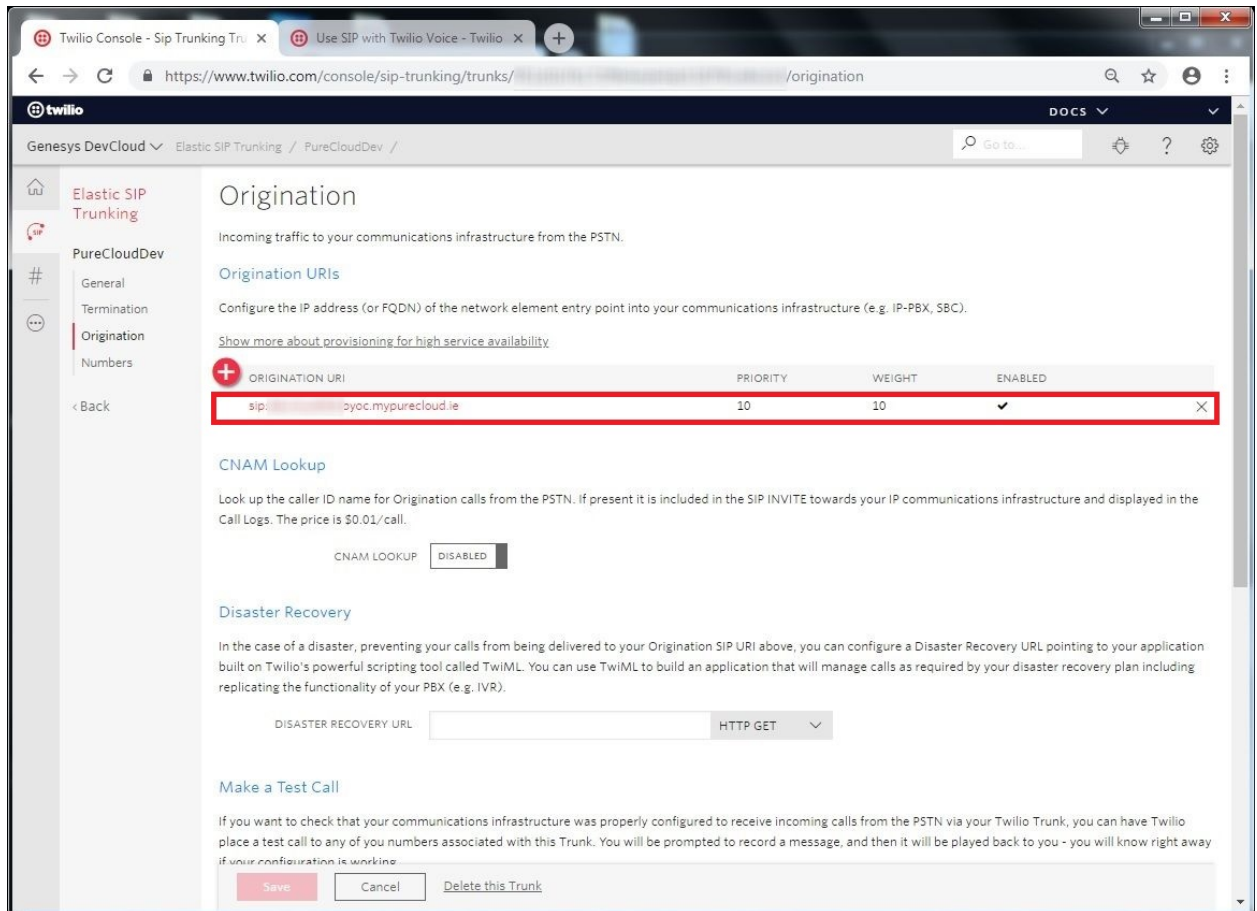
Add the *PureCloudDevACL* IP Access Control List we created earlier.

Add the *PureCloudDevCred* Credential List we created earlier.

## 2.3. Configure Trunk Origination

Under your Trunk, in the Origination tab, define to which address the incoming traffic, from the PSTN, will be directed.

- Origination URI – This URI corresponds to your BYOC Termination URI.

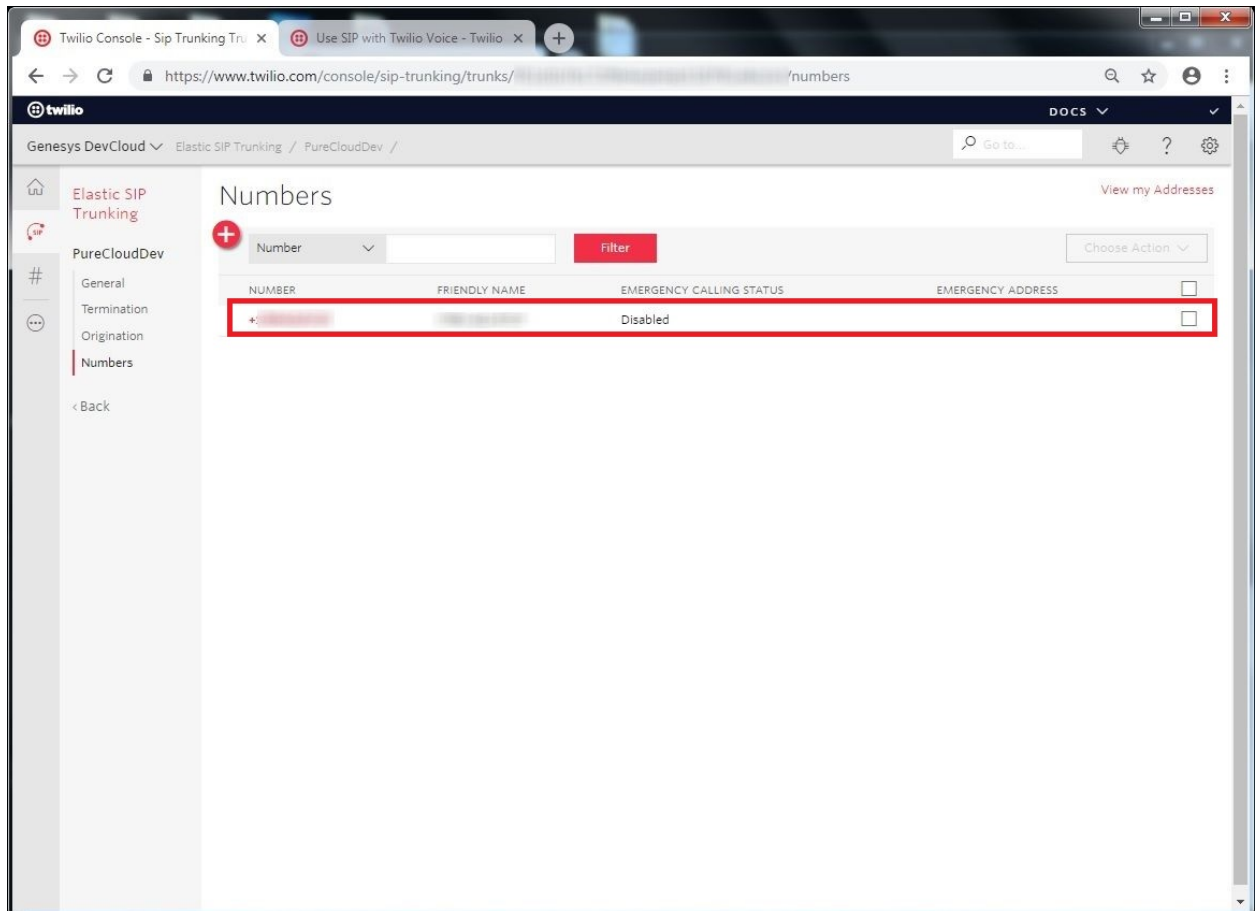


If you have already chosen an identifier for your PureCloud BYOC Trunk SIP Termination URI (ex: *twilioABC*), you can add a SIP Origination URI as follows:

- If your org has been created in the Western Europe region – *sip:twilioABC.byoc.mypurecloud.ie*
- If your org has been created in the US region – *sip:twilioABC.byoc.mypurecloud.com*
- If your org has been created in the Central Europe region – *sip:twilioABC.byoc.mypurecloud.de*
- If your org has been created in the Australia region – *sip:twilioABC.byoc.mypurecloud.au*
- If your org has been created in the Japan region – [\*sip:twilioABC.byoc.mypurecloud.jp\*](#)

## 2.4. Assign Numbers

Under your Trunk, in the Numbers tab, assign a phone number (one you have purchased).



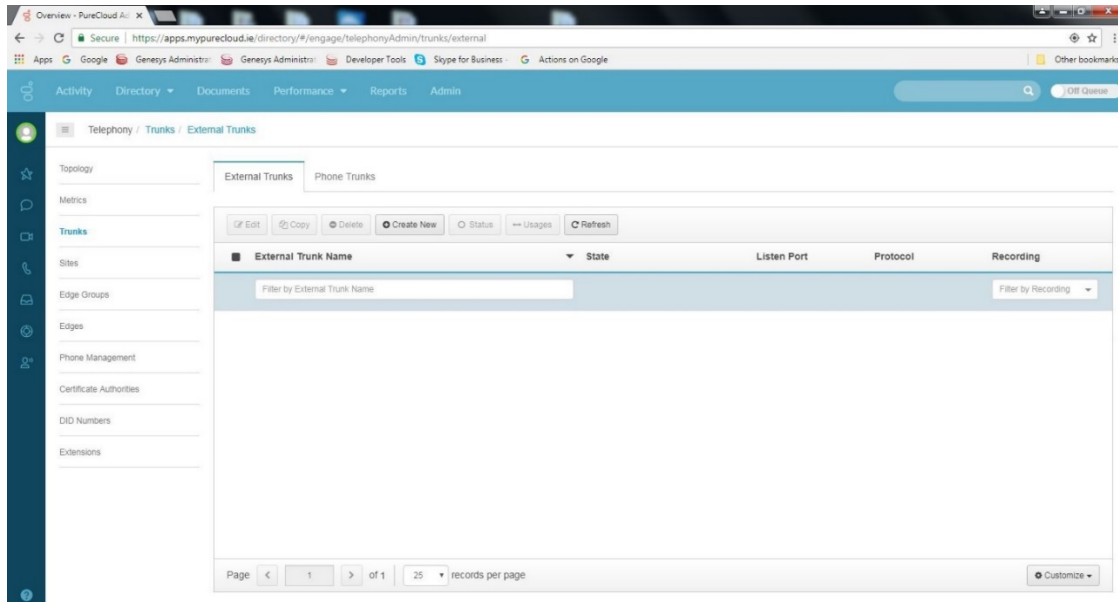
Take a note of this number – Ex: 33123456789 (France +33).



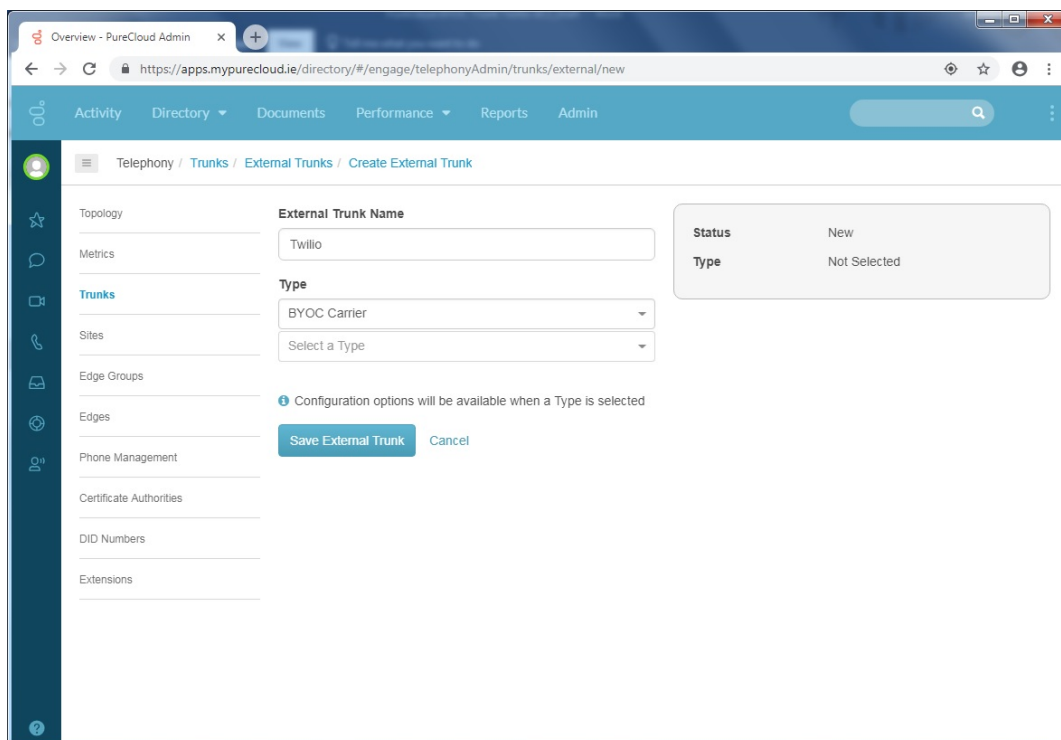
# BYOC Trunk Configuration for Twilio

## 1. Trunk

In PureCloud Admin, select **Telephony – Trunks**.

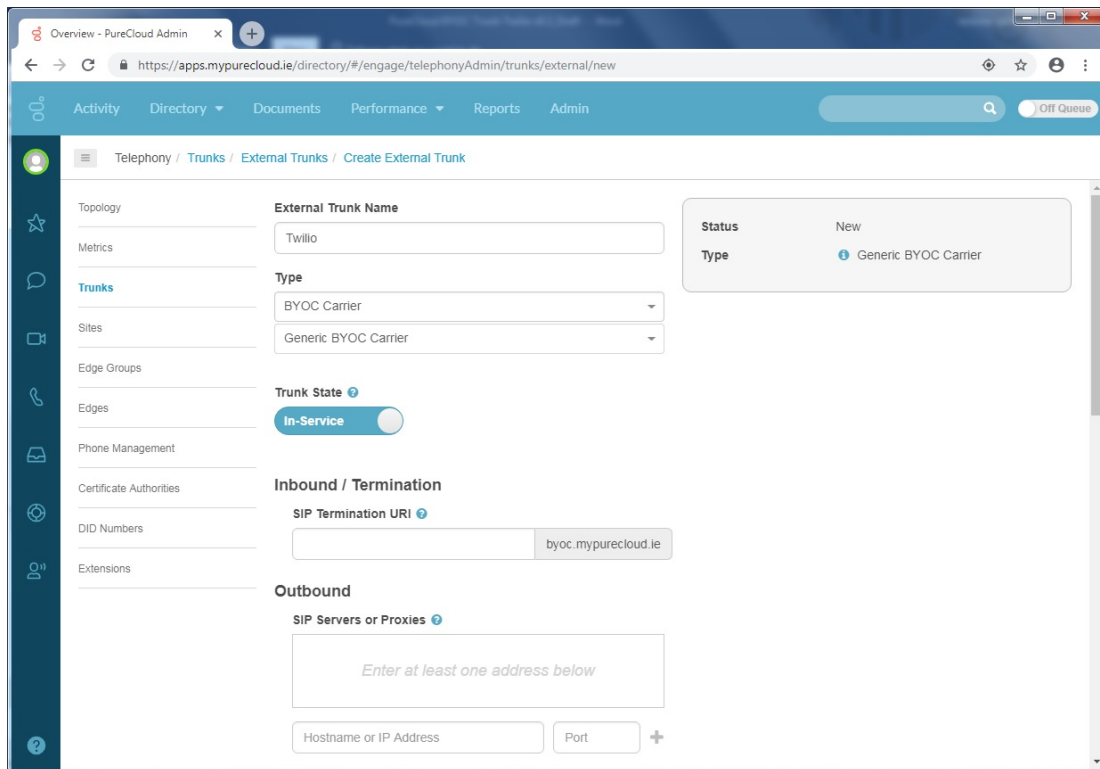


Create a New External Trunk.





Give the External Trunk a name (ex: *Twilio*).  
 Select “*BYOC Carrier*” as Type.  
 And then “*Generic BYOC Carrier*” as sub-Type.



Overview - PureCloud Admin

https://apps.mypurecloud.ie/directory/#/engage/telephonyAdmin/trunks/external/new

Activity Directory Documents Performance Reports Admin

Telephony / Trunks / External Trunks / Create External Trunk

Topology

Metrics

Trunks

Sites

Edge Groups

Edges

Phone Management

Certificate Authorities

DID Numbers

Extensions

External Trunk Name

Twilio

Type

BYOC Carrier

Generic BYOC Carrier

Trunk State

In-Service

Inbound / Termination

SIP Termination URI

byoc.mypurecloud.ie

Outbound

SIP Servers or Proxies

Enter at least one address below

Hostname or IP Address

Port

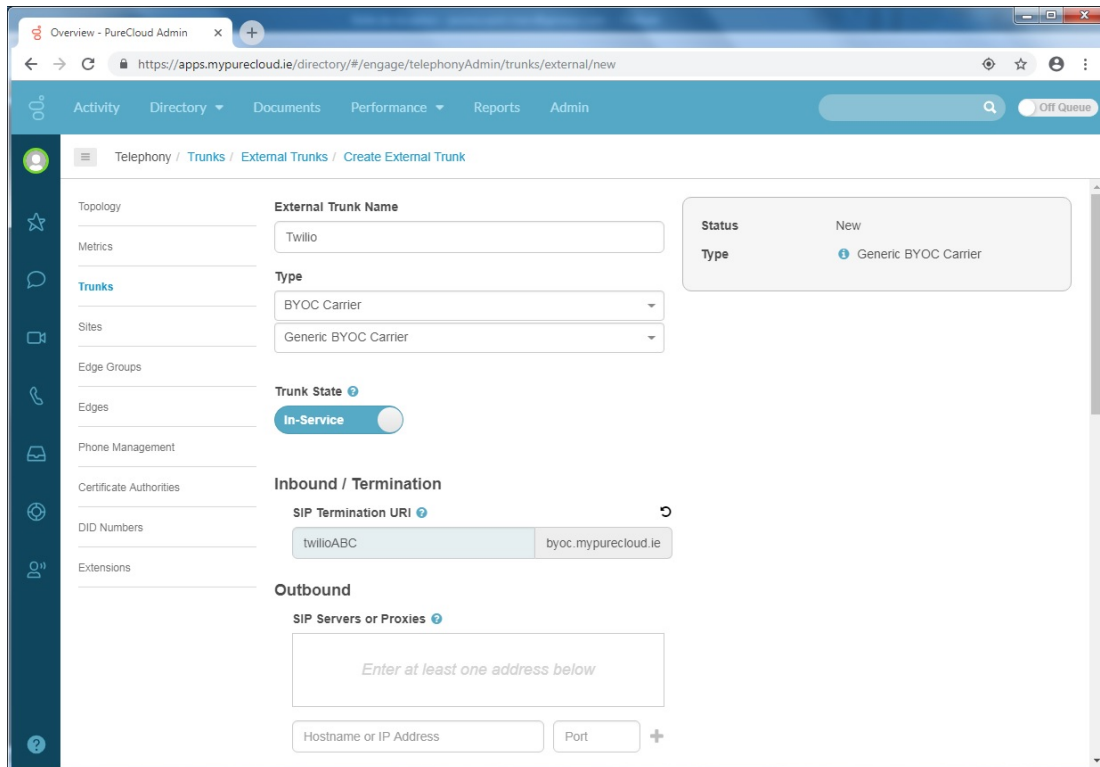
Status

New

Type

Generic BYOC Carrier

Set the Trunk State to In-Service.



Overview - PureCloud Admin

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External Trunk Name

Twilio

Type

BYOC Carrier

Generic BYOC Carrier

Trunk State

In-Service

Status

New

Type

Generic BYOC Carrier

Inbound / Termination

SIP Termination URI

twilioABC byoc.mypurecloud.ie

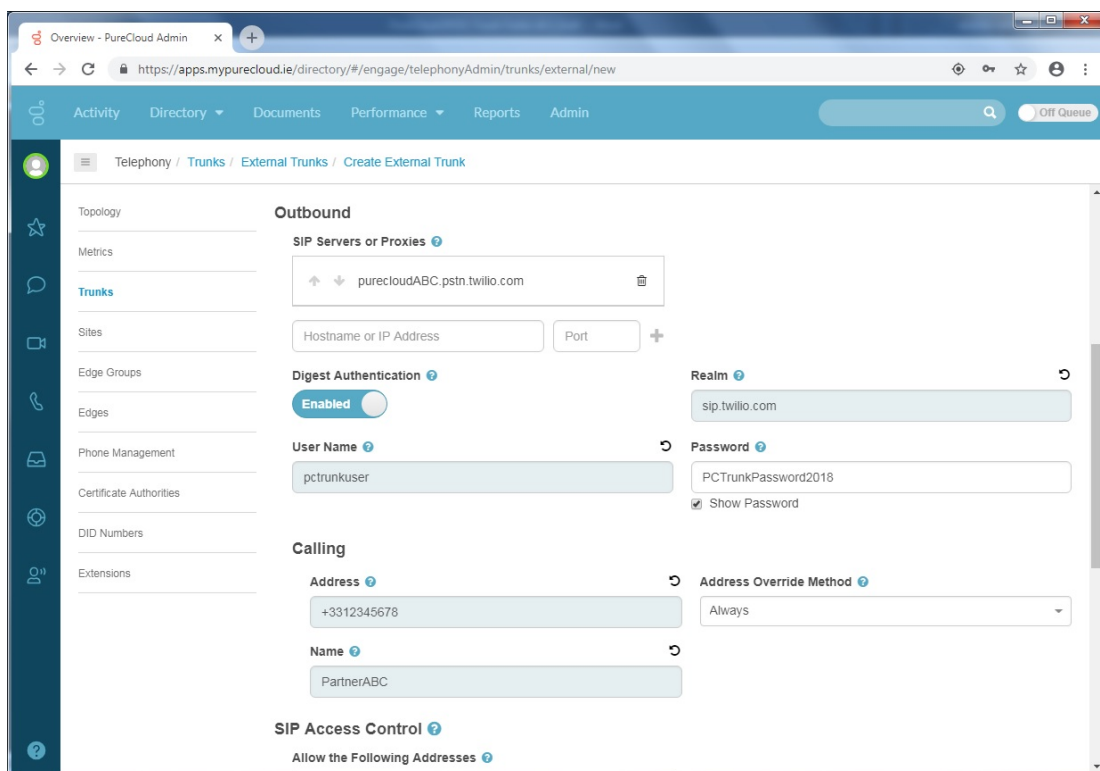
Outbound

SIP Servers or Proxies

Enter at least one address below

Hostname or IP Address Port

Enter the identifier you selected for your unique SIP Termination URI (ex: *twilioABC.byoc.mypurecloud.ie*).



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Outbound

SIP Servers or Proxies

purecloudABC.pstn.twilio.com

Hostname or IP Address Port

Digest Authentication

Enabled

User Name

pctrunkuser

Realm

sip.twilio.com

Password

PCTrunkPassword2018

Show Password

Calling

Address

+3312345678

Name

PartnerABC

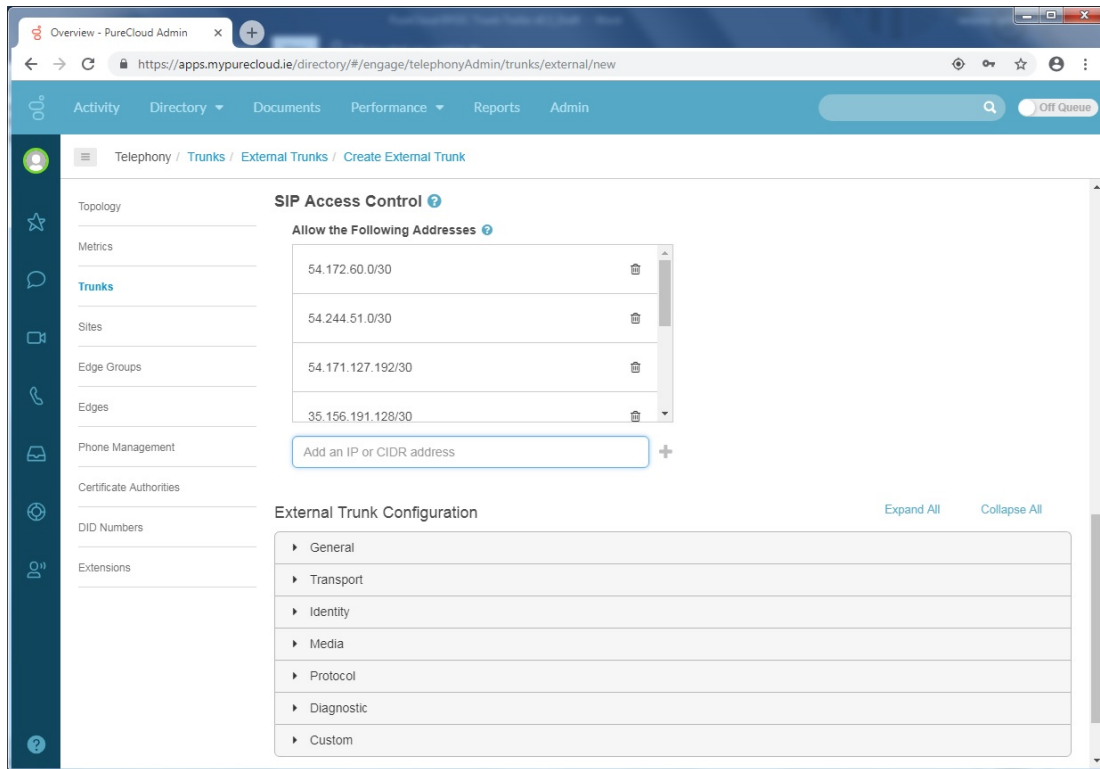
SIP Access Control

Allow the Following Addresses

### Under Outbound:

- SIP Servers or Proxies:
  - Configure the global SIP Termination URI corresponding to your Twilio Trunk.
    - purecloudABC.pstn.twilio.com
  - Or more specifically to your PureCloud org region
    - Ex: for byoc.mypurecloud.ie
      - purecloudABC.pstn.ie1.twilio.com (Ireland)
      - purecloudABC.pstn.de1.twilio.com (Frankfurt)

(see here for list of Twilio Localized Termination URIs:  
<https://www.twilio.com/console/sip-trunking/your-network>)
- Digest Authentication:
  - If you have enabled Digest Authentication (Credential List) on your Twilio Trunk.
  - Enabled Digest Authentication.
  - Set Realm to *sip.twilio.com*
  - Set User Name with the username you created in your Twilio Credential List (Ex: Username = *pctrunkuser* in *PureCloudDevCred* Credential List).
  - Set Password with the password you created in your Twilio Credential List (Ex: Password = *PCTrunkPassword2018* in *PureCloudDevCred* Credential List).
- Calling:
  - When working with a SIP Trunk provider, which provides PSTN/Carrier connectivity, the ANI provided in outbound call request (PureCloud to PSTN via Twilio) must be one of the purchased numbers. It has to be set properly on the calling party side, or can also sometimes be overridden by default by the Trunk provider.
  - Set Address with the value of one of your purchased Twilio numbers (ex: *+3312345678*).
  - Set Address Override Method to “*Always*”.
  - Set Name with any value you want (ex: *PartnerABC*). The name will be carried up to the called user device, if supported.

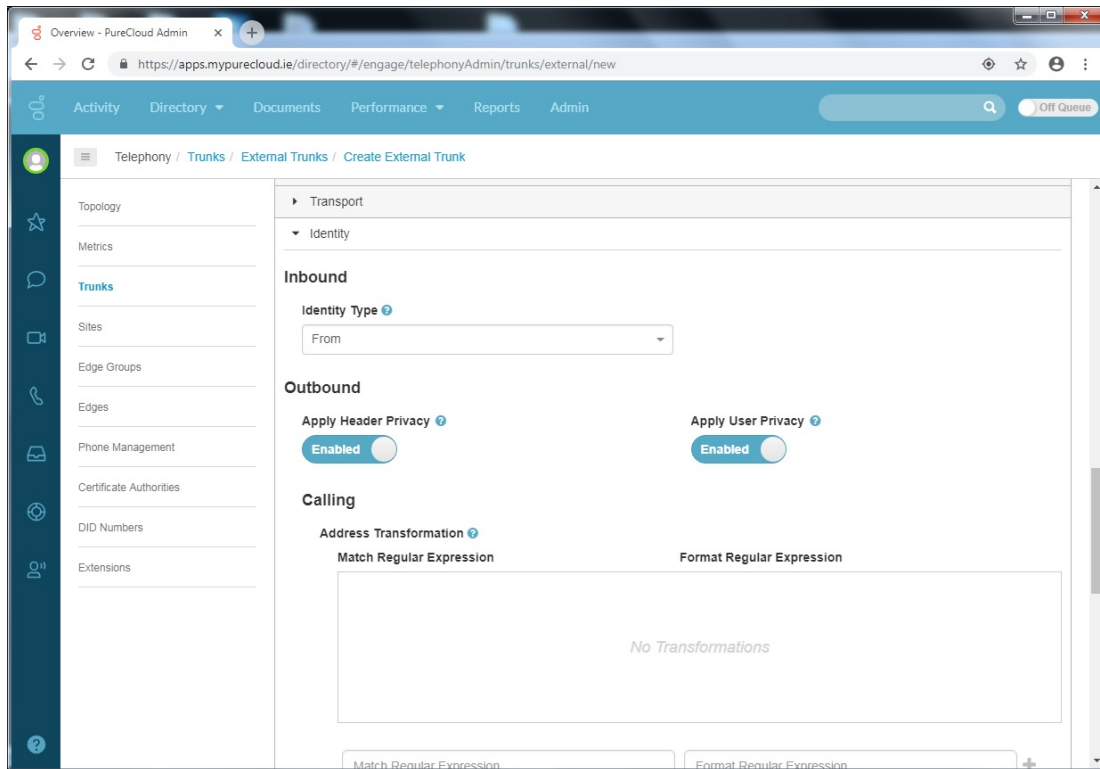


### Under SIP Access Control:

Configure the list of possible Twilio SIP Endpoints as a list of IP Addresses or as CIDR.  
(see here for list of Twilio Signaling IPs: <https://www.twilio.com/console/sip-trunking/your-network>)

Ex: As CIDRs

- 54.172.60.0/30
- 54.244.51.0/30
- 54.171.127.192/30
- 35.156.191.128/30
- 54.169.127.128/30
- 54.252.254.64/30
- 177.71.206.192/30
- 54.65.63.192/30



Overview - PureCloud Admin

https://apps.mypurecloud.ie/directory/#/engage/telephonyAdmin/trunks/external/new

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DID Numbers

Extensions

Transport

Identity

Inbound

Identity Type

From

Outbound

Apply Header Privacy

Enabled

Apply User Privacy

Enabled

Calling

Address Transformation

Match Regular Expression

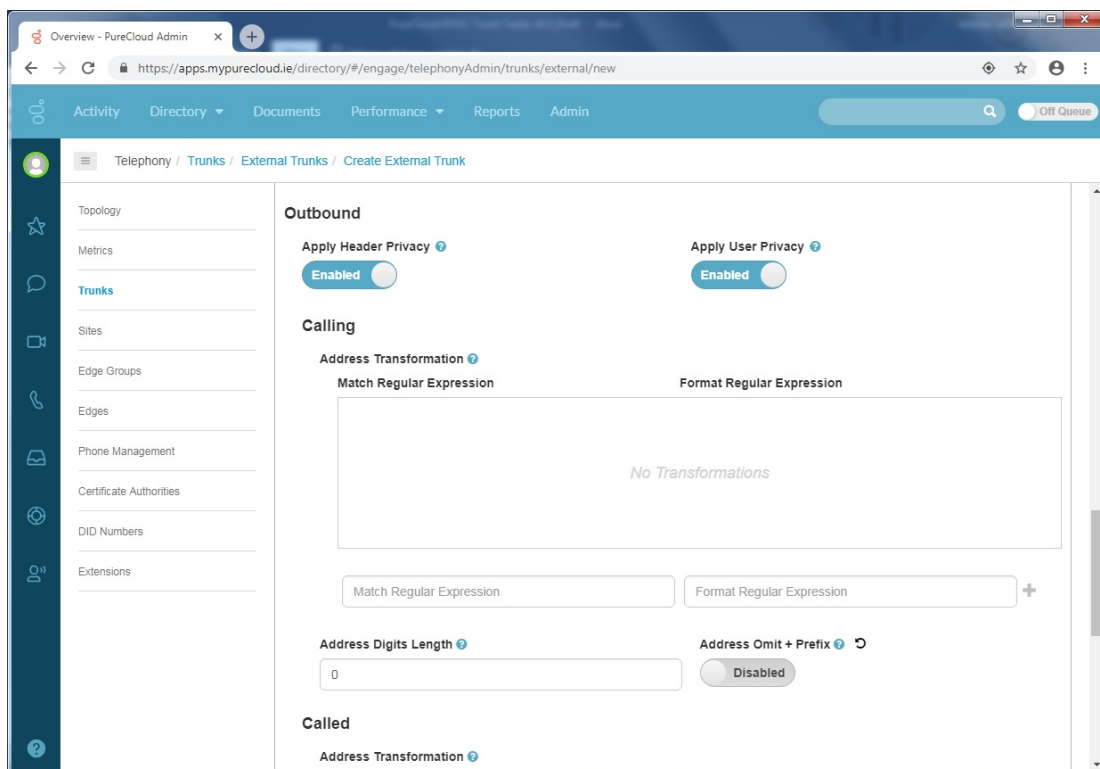
Format Regular Expression

No Transformations

Match Regular Expression

Format Regular Expression

Under External Trunk Configuration - Identity – Outbound.



Overview - PureCloud Admin

https://apps.mypurecloud.ie/directory/#/engage/telephonyAdmin/trunks/external/new

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Outbound

Apply Header Privacy

Enabled

Apply User Privacy

Enabled

Calling

Address Transformation

Match Regular Expression

Format Regular Expression

No Transformations

Match Regular Expression

Format Regular Expression

Address Digits Length

0

Address Omit + Prefix

Disabled

Called

Address Transformation

Make sure that *Calling – Address Omit + Prefix* is **Disabled** (Enabled by default).

Overview - PureCloud Admin

https://apps.mypurecloud.ie/directory/#/engage/telephonyAdmin/trunks/external/new

Activity Directory Documents Performance Reports Admin

Telephony / Trunks / External Trunks / Create External Trunk

Topology

Metrics

Trunks

Sites

Edge Groups

Edges

Phone Management

Certificate Authorities

DID Numbers

Extensions

Address Digits Length 0

Address Omit + Prefix Disabled

Called

Address Transformation

Match Regular Expression

Format Regular Expression

No Transformations

Match Regular Expression

Format Regular Expression

Address Digits Length 0

Address Omit + Prefix Disabled

Media

Protocol

Diagnostic

Make sure that *Called – Address Omit + Prefix* is **Disabled** (Enabled by default).

Overview - PureCloud Admin

https://apps.mypurecloud.ie/directory/#/engage/telephonyAdmin/trunks/external/new

Activity Directory Documents Performance Reports Admin

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Extensions

Media

DSCP Value 2E (46, 101110) EF

Media Method Normal

Preferred Codec List audio/PCMU

SRTP Cipher Suite List AES\_CM\_128\_HMAC\_SHA1\_80

Select a Codec

Select a Cipher Suite

Ringback Enabled

Disconnect on Idle RTP Enabled

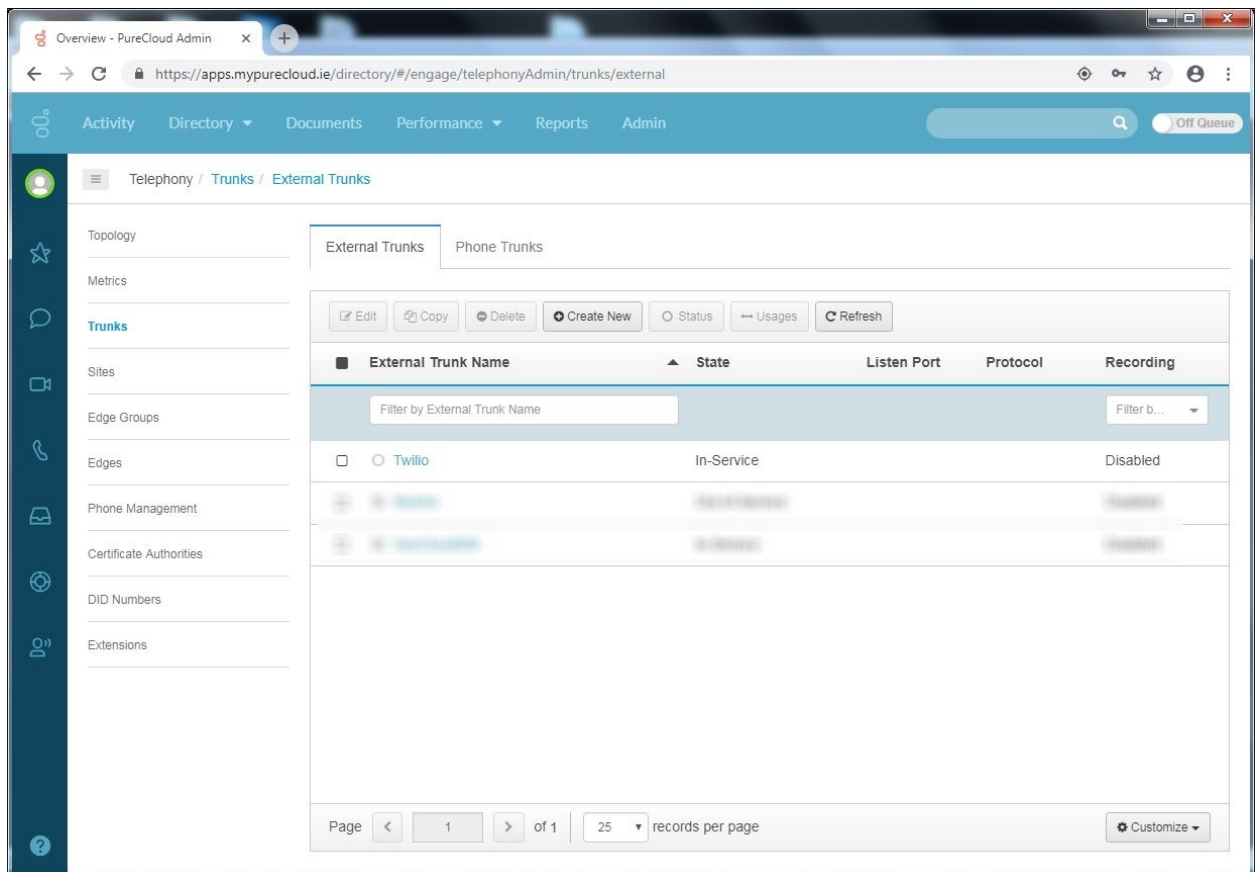
DTMF Settings

DTMF Payload 101

DTMF Method RTP Events

Recording

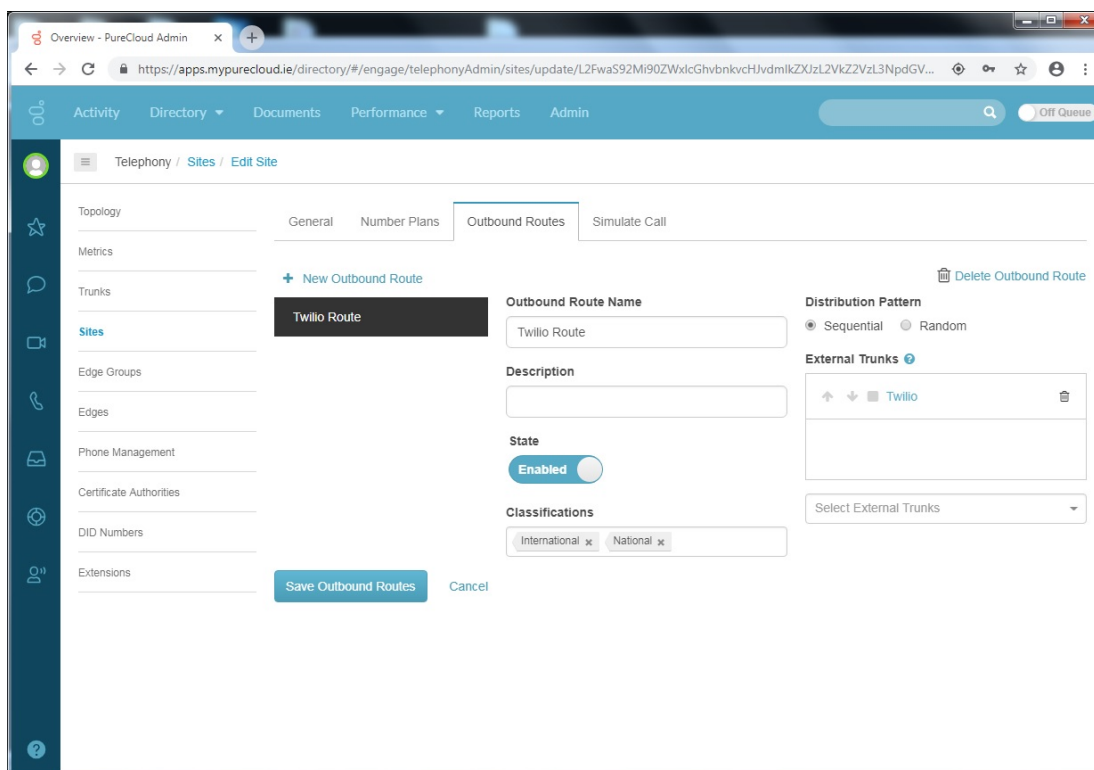
Under External Trunk Configuration – Media, you can tune the list of preferred Codecs, based on Twilio supported codecs (Ex: *G.711/uLaw*) and DTMF method [see <https://www.twilio.com/docs/voice/api/sip-interface>].



*Twilio* External Trunk should be in service.

## 2. Outbound Route

Go back to the site you have created (ex: *Paris Office*) [**Telephony – Sites**].



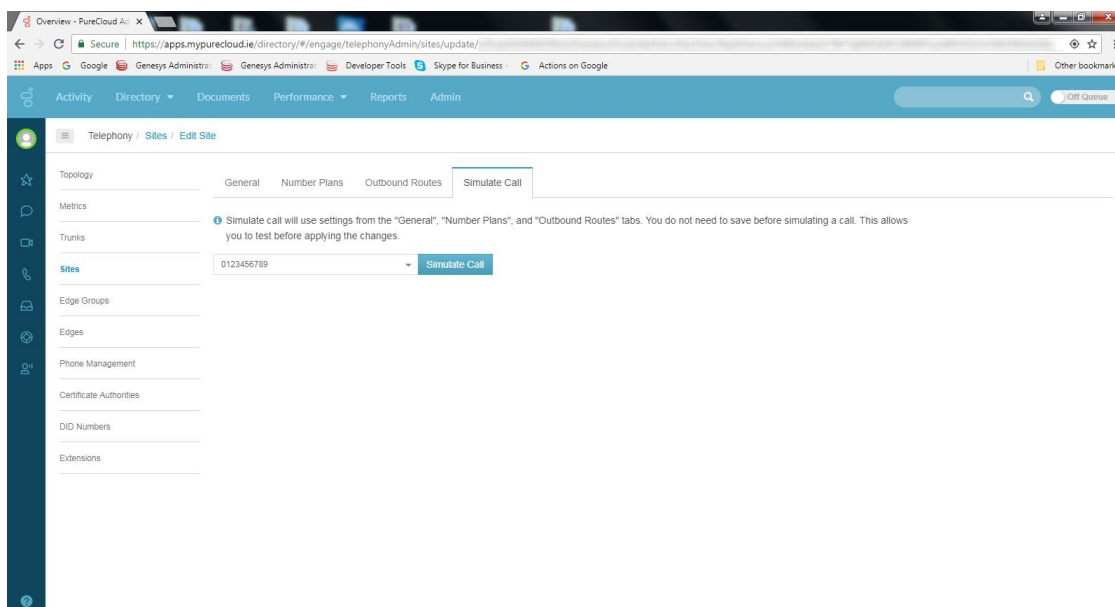
Create an Outbound Route (ex: *Twilio Route*), with Enabled *State* set, using the new *Twilio* trunk (as External Trunks), and leveraged for outbound calls to national or international numbers (Classifications matching Number Plans defined in *Site – Number Plans* tab).

### 3. Simulate Call

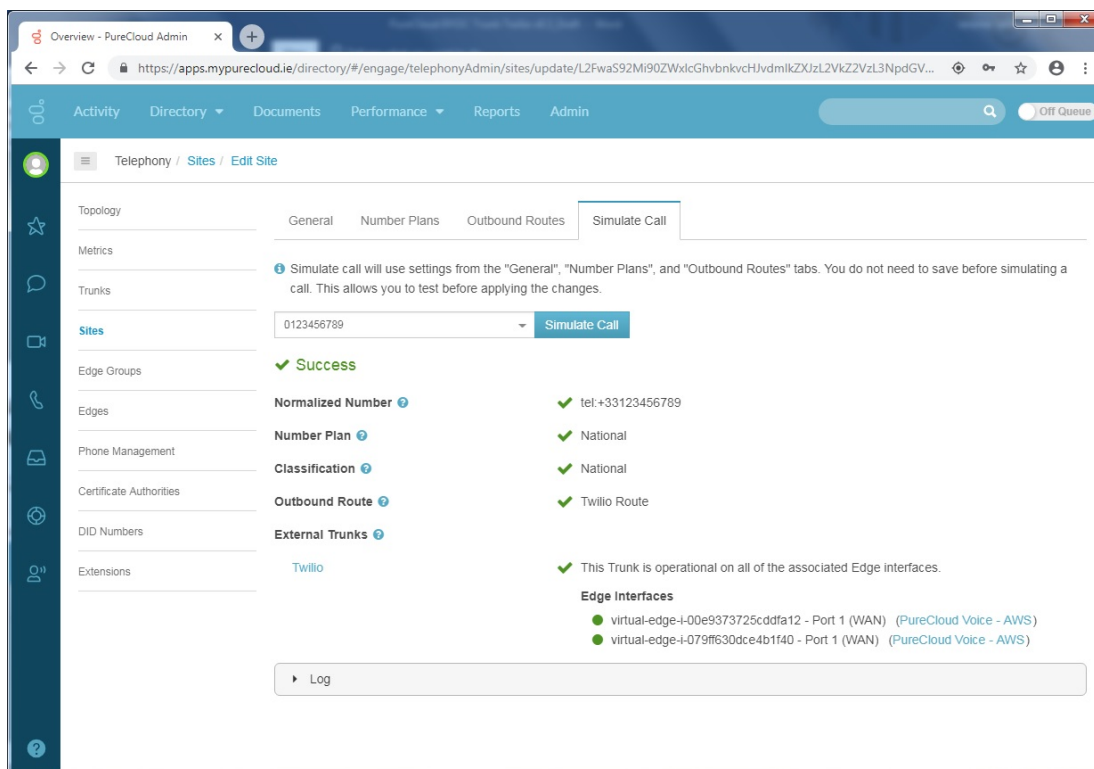
You can verify your configuration (no messages sent to the SIP Trunk Provider – this is just to check objects on PureCloud side).

Go back to the site you have created (ex: *Paris Office*) [**Telephony – Sites**].





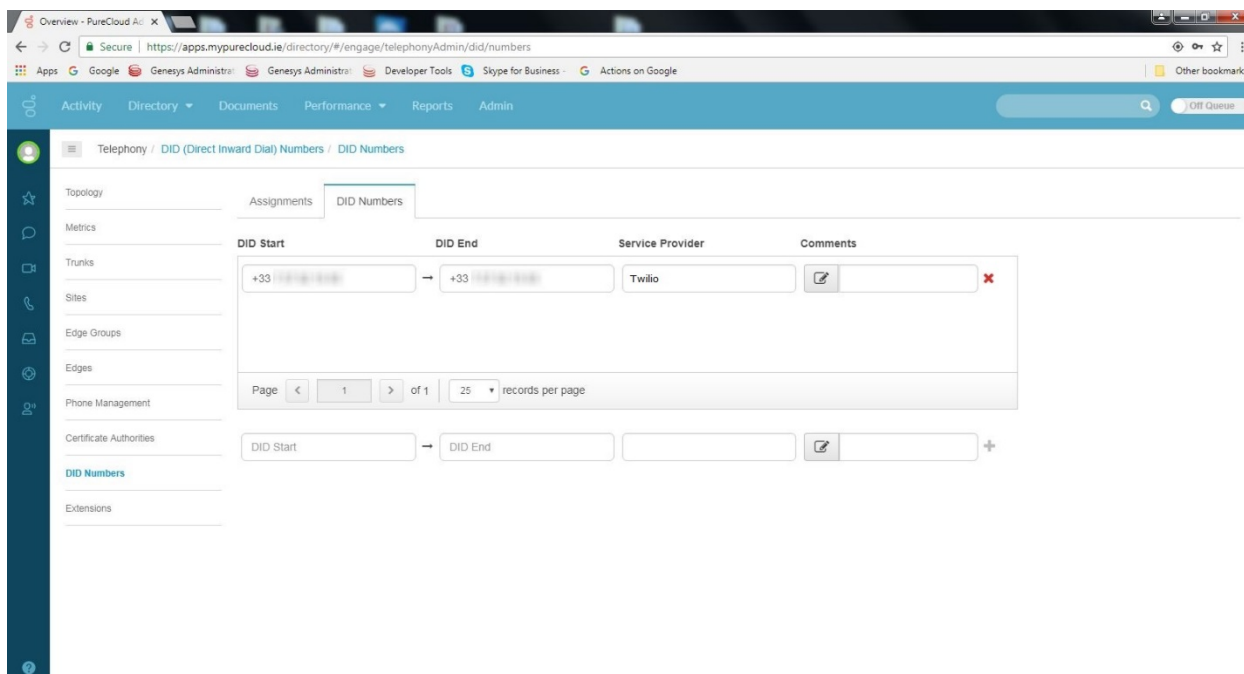
You can type a number (ex: national like 0123456789 or international like +33123456789) and simulate a call.



Result will display number after normalization and successful selection of Number Plan, Outbound Route and Virtual Edges.

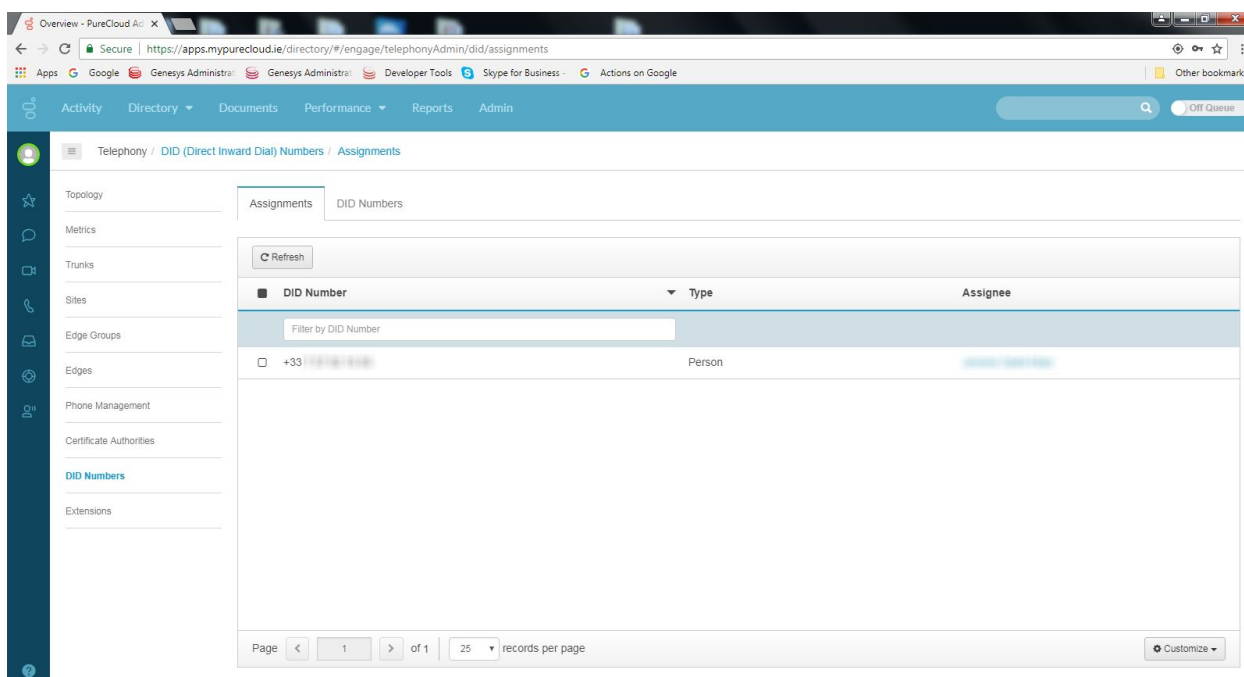
## 4. DID Numbers

In PureCloud Admin, select *Telephony – DID Numbers – DID Numbers* tab:



Configure the numbers you purchased from Twilio (ex: +33123456789).

You can then assign this number to a user (Person).



Or assign the number to an IVR Script, via *Routing – Call Routing*.

