

Alcatel-Lucent OXO Connect R2



March 1, 2018

Introduction

This document is intended to support you with the integration of XC-API into an existing environment of the Alcatel-Lucent OXO Connect. In the following sections we describe the essential configuration steps for SIP trunking to allow optimal interworking of both, the XC-API and the Alcatel-Lucent OXO Connect. Though being based on the Alcatel-Lucent OXO Connect R2 series, this document is applicable with other versions given a few adjustments.

At this point we suppose that the Alcatel-Lucent OXO Connect environment and the physical or virtual application server is available and accessible through the network. Application server in this context mean, a server with a recent available Microsoft Windows operating system with latest updates and patches included. Further, that the XC-API and the CAPI 2.0 voice or fax application is properly installed.

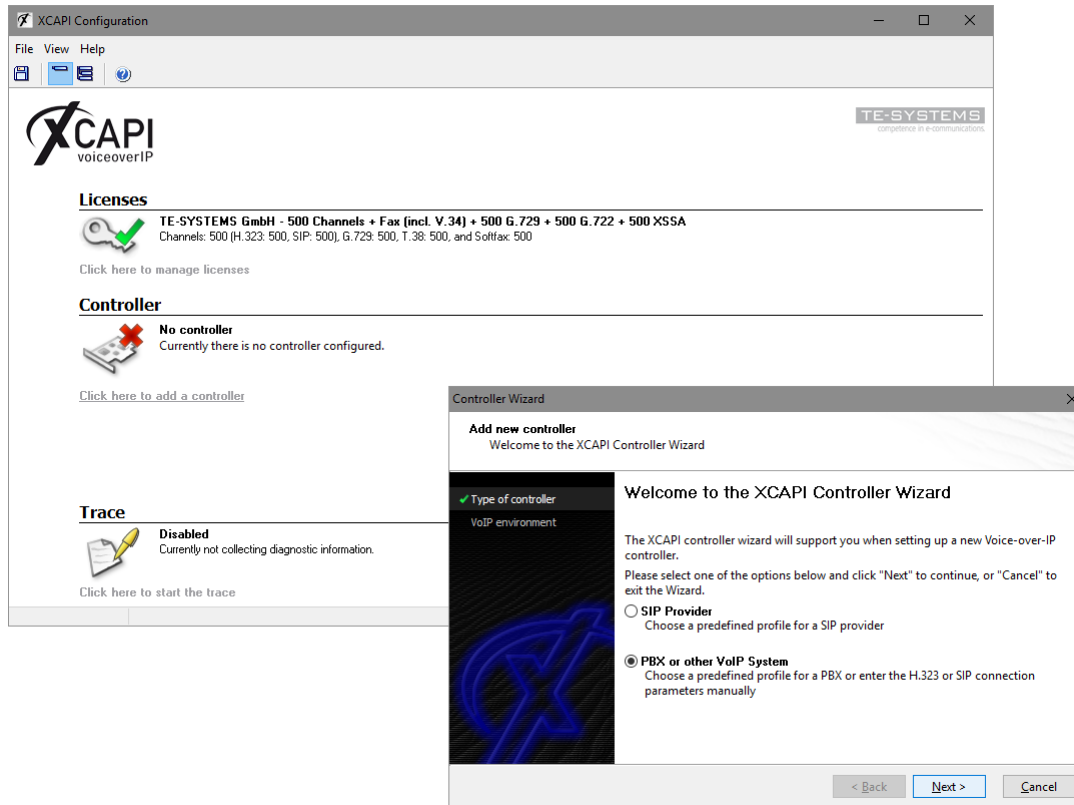
Independent of the deployed application, the SIP trunk configuration can be tested with the XC-API's included test application (xtest.exe) that is available within the XC-API's installation folder (by default `\\Program Files (x86)\\TE-SYSTEMS\\XC-API\\`). This test tool allows to check with inbound and outbound calls, fax and testing several supplementary services.

However, we recommend to visit our [YouTube channel](#) frequently for XC-API related tutorials about licensing, the test tool, line monitor, tracing, analyzing and others. Registered [community](#) users can check about latest XC-API documents, TechNotes and versions.

XCAPI Configuration

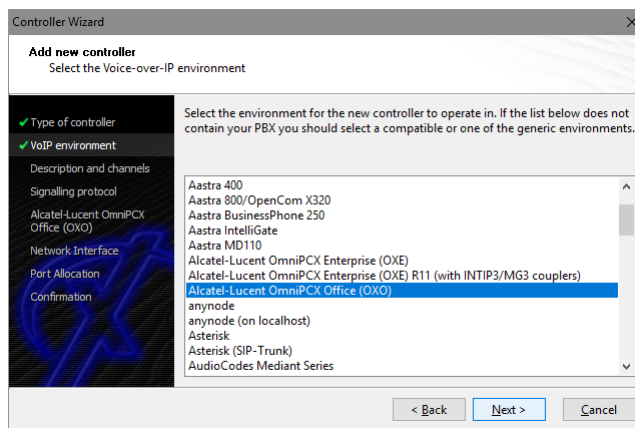
Please start up the XCAPI configuration to create a new controller assigned to the Alcatel-Lucent OXO Connect. If you've just installed the XCAPI and start the configuration tool for the first time or no controller is available at all, the XCAPI controller wizard will pop up automatically. To start up the XCAPI controller wizard manually, the hyperlink labeled **Click here to add a controller** on the main page has to be clicked.

However, select **PBX or other VoIP System** in the initial **Type of controller** dialog and proceed with the **Next** button.



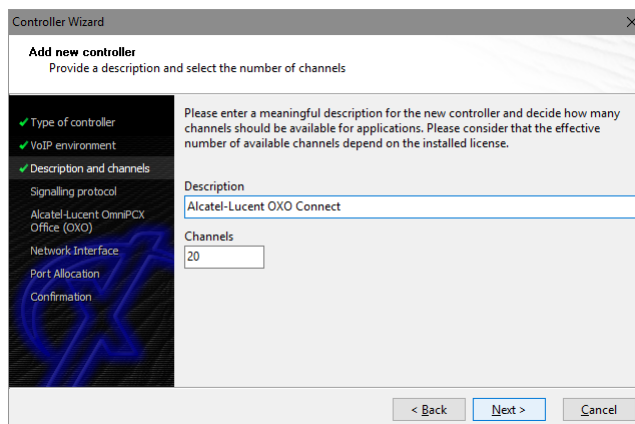
2.1 Voice-over-IP Environment

The next dialog lists some common Voice-over-IP environments. Selecting one of those will setting up the XCAPI controller with a selection of near-optimal presets and sparing you a lot of manual configuration.



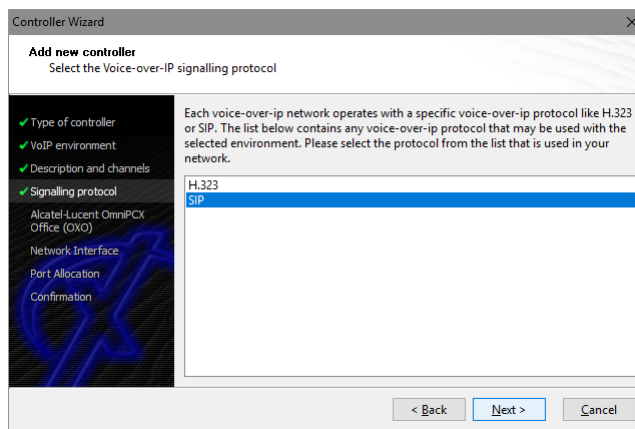
2.2 Description and Channels

When the VoIP environment was selected, the next dialog allows to set a meaningful description for the controller. Also the number of channels that the new controller will be able to provide can be set. So enter how many simultaneous connections the XCAPI controller should handle when communicating with the Alcatel-Lucent OXO Connect and the bound CAPI 2.0 application.



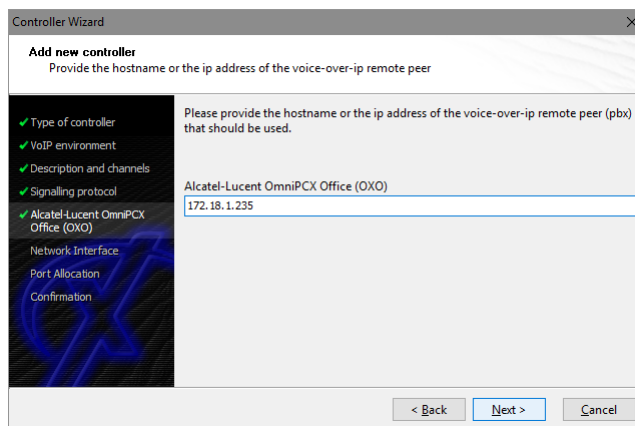
2.3 Signaling Protocol

The next dialog shows a list of signaling protocols which are supported for the given Voice-over-IP environment. According to this example the SIP protocol is selected.



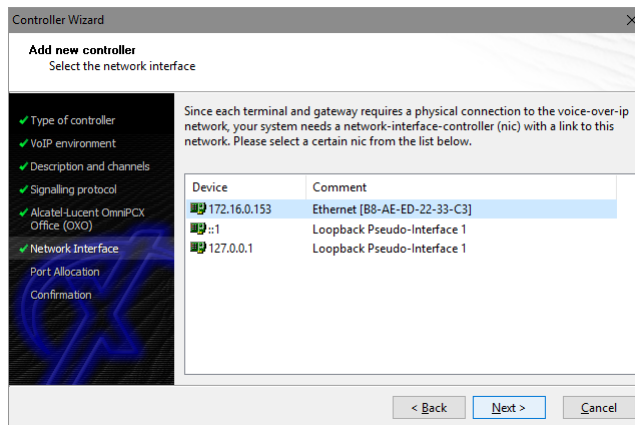
2.4 IP Address of the Alcatel-Lucent OXO Connect Gateway

Next the IP address or host name of the Alcatel-Lucent OXO Connect gateway must be provided, in this example IP address 172.18.1.235.



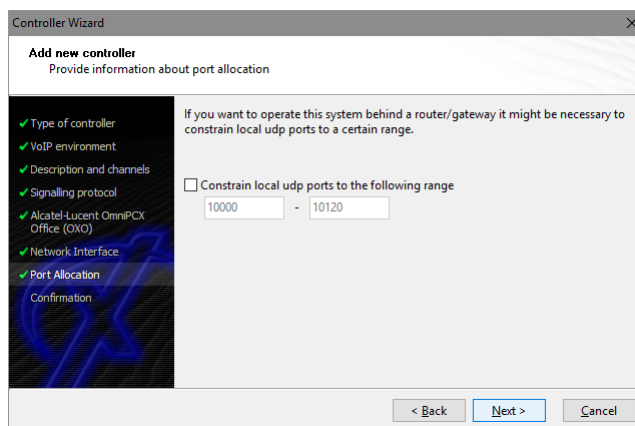
2.5 Network Interface

Afterwards, select the network interface that will be used for the inbound and outbound communications for this controller. Note that this is the XCAPI controllers used Ethernet interface which is related to the according **Gateway Parameters** of the Alcatel-Lucent OXO Connect, which is described from [page 13](#).



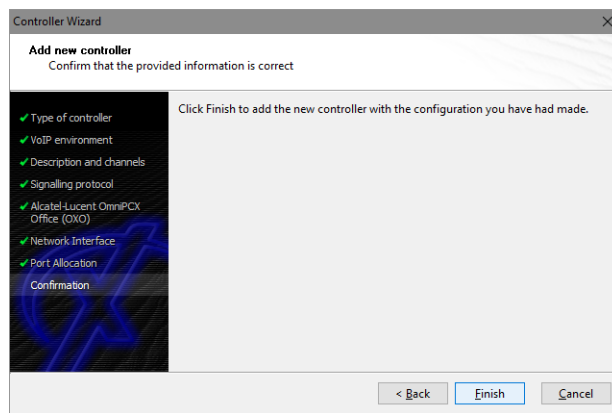
2.6 Port Allocation

On demand and in the case of any router or firewall restrictions for UDP (RTP/T.38) a port range can be specified. In this example no range will be set which allows the XCAPI controller using a random port range between 1024 and 65535.

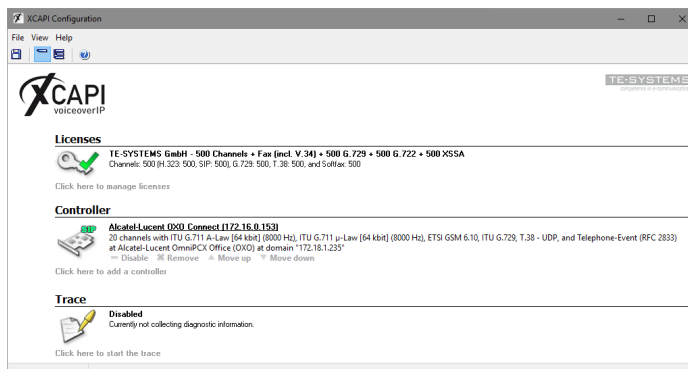


2.7 Confirmation

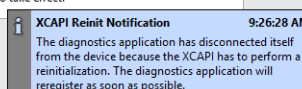
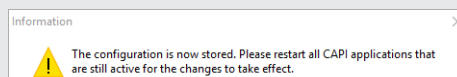
The final wizard dialog performs some checks on the configuration parameters you've made. If errors will be detected, use the **Back** button to the respective erroneous dialogs and correct them. Use the **Finish** button in order to finally create the new controller if everything is correct.



The newly created XCAPI controller for the Alcatel-Lucent OXO Connect is now listed on the main page of XCAPI configuration. Push the **Save** button and exit the configuration tool.



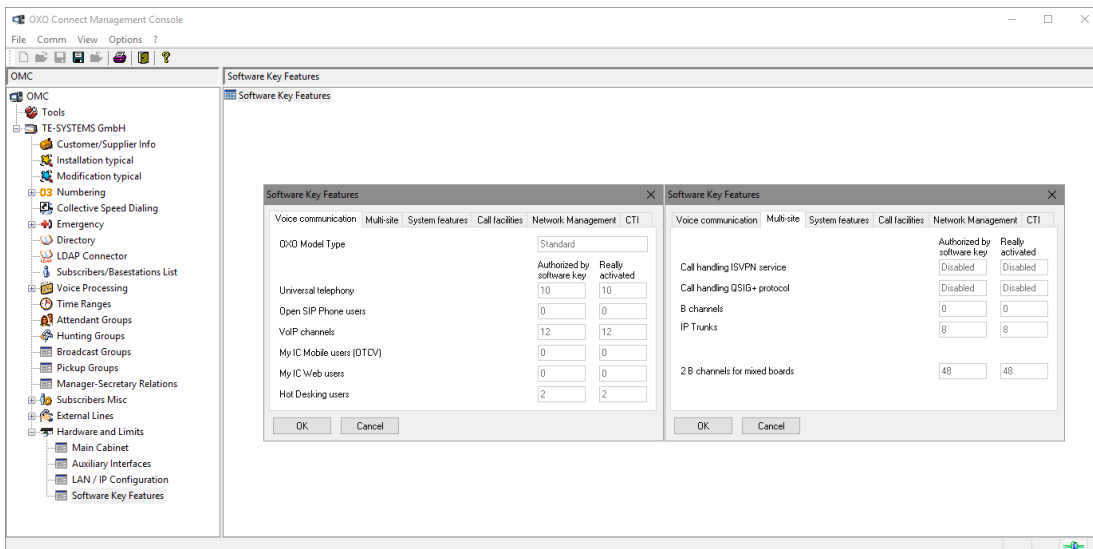
Note that the bound CAPI 2.0 application with its services must always be restarted to take effect on the XCAPI controller changes. Restarting any of the XCAPI services won't help at all. If enabled, the XCAPI diagnostic monitor pop-up with a re-initialization notification on success.



Configuring the OXO Connect Gateway

In order to establish a connection between XCAPI and the Alcatel-Lucent OXO Connect gateway, you need to setup XCAPI as VoIP trunk with appropriate settings for using line and direction channels.

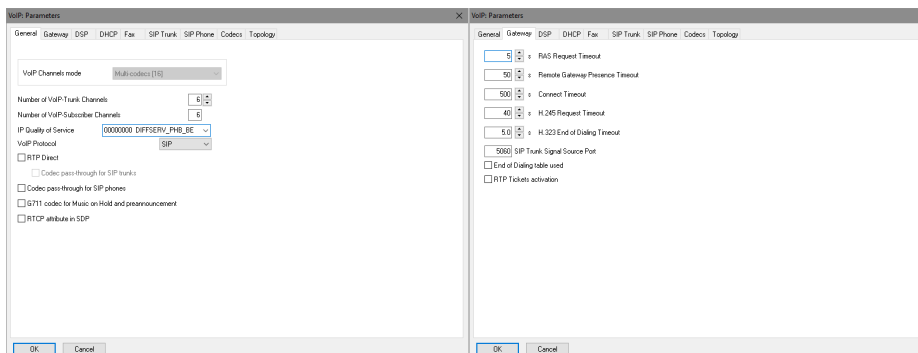
A valid amount of **IP Trunks** and **VoIP channels** which has to be allocated to XCAPI's SIP Trunk has to be available, activated and authorized via **Software Key**.



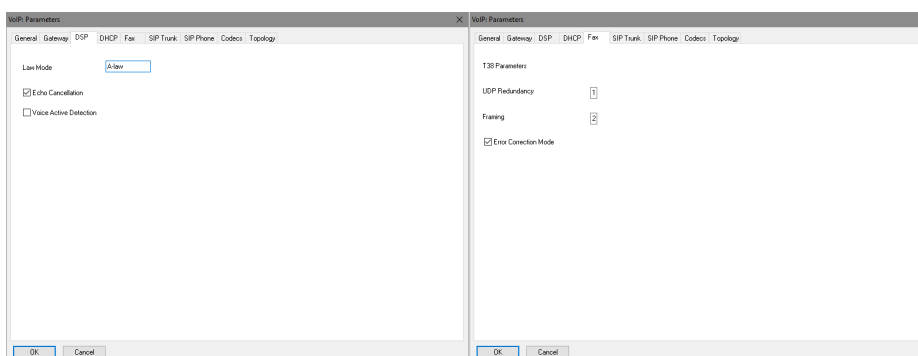
3.1 VoIP Parameters

For this example the **VOIP Parameters** are mainly used with their defaults and the focus is set to the most relevant parameters in conjunction with XCAPI and SIP trunking. However, note that the DHCP parameters are not enabled for this example and thus not shown in detail here.

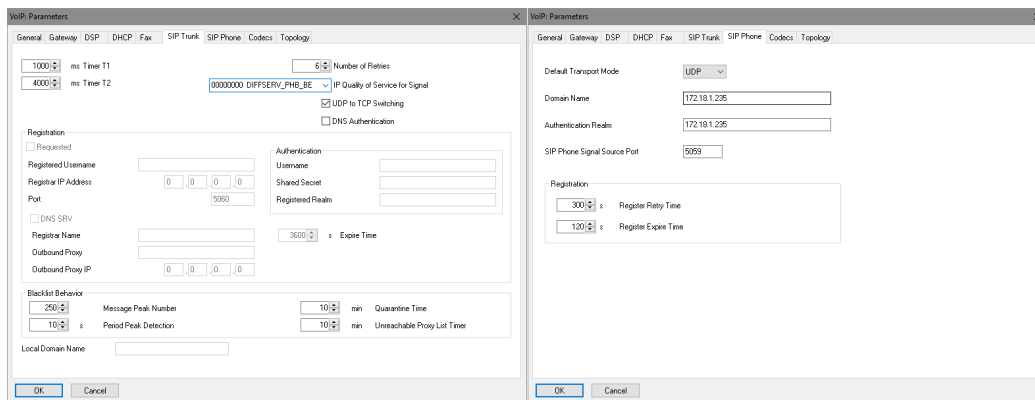
- For SIP trunking the OXO system must be enabled for the **SIP VoIP Protocol** within the **General** tab and a **Number of VoIP-Trunk channels** must be available and set.
- The **Gateway** configurations are used with the OXO given defaults. The **SIP Trunk Signal Source Port** is set to port number 5060, what is also used by default of the XCAPI controller wizard. If this port will be changed, it must be set accordingly as local listening within the XCAPI controller. If required check with **Local port for UDP/TCP** in the XCAPI controllers protocol tab of the SIP settings.



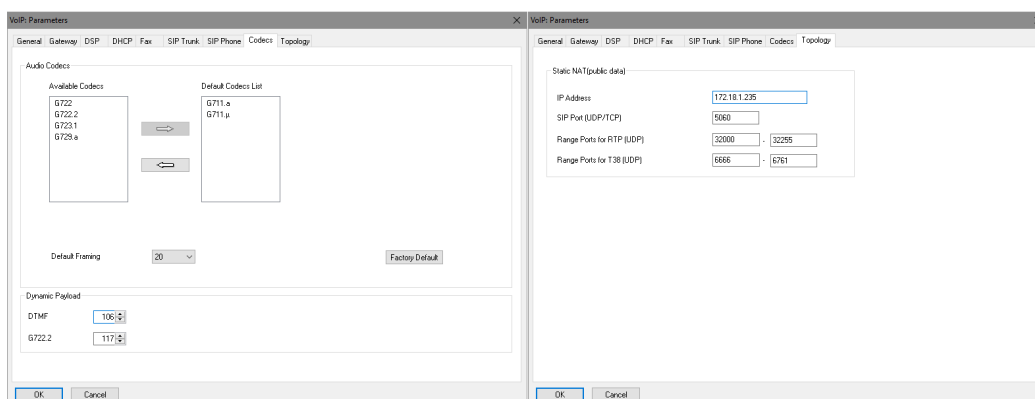
- Also the DSP settings are used with their defaults (**Echo Cancellation** enabled and **Voice Activity Detection** disabled).
- The Fax settings are only referring to the T.38 protocol, so if T.38 is used as fax method it is required and recommended enabling the **Error Correction Mode**. For additional information about fax, please check with the according chapters in the **Appendix** starting on [page 18](#).



- The **SIP Trunk** parameters are used as shown in the screenshot below. For QoS support, please check with our document **XCAPI TechNote (en) - Quality of Service** for additional information which is available in the download section of our community for registered users. The system given **Blacklist Behavior** defaults might be adjusted up to the local requirements.
- The **SIP Phone** related configurations are custom and just shown for completeness here. We are not aware about any impact of these settings in relation of XCAPI's SIP trunk configurations.



- The **Default Codecs List** is here used with G.711 codecs and a **Default Framing** of 20 milliseconds. As this are global settings, you may prefer using the OXO defaults or other customized settings. However, if using Softfax (G.711 Fax pass through) a G.711 alaw or ulaw codec must be available with a framing of 20 or 30 milliseconds. Even though SIP allows a proper codec negotiation, we recommend using conform codecs, framing and payload settings for the XCAPI SIP trunk and its controller configuration and all participating SIP and VoIP instances used in the OXO Connect environment. Some additional information can be found in the referring **Codec** and **Fax** chapters in the **Appendix** starting on [page 18](#) of this document.
- The **Topology** settings are used as shown below.



3.2 External Lines

For this example only the XCAPI related external line configurations **List of Accesses** and **List of Trunk Groups** will be reviewed. Additional configurations for the **Protocol**, **Analog Protocol Selection** or **Incoming Call Handling** dialogs might be required for local purposes.

3.2.1 List of Accesses and List Trunk Groups

The belonging **List of Accesses** and **List of Trunk Groups** configurations of the XCAPI SIP trunk is here used as shown next. Ensure that these entries are in service and the required link categories are given.

The image displays four screenshots of the XCAPI configuration interface:

- List of Accesses:** A table showing access configurations. The entry for 95-001-01 (VoIP, V001, 6 channels) is selected.
- VoIP-Trunk:** Configuration details for the selected access, including physical address (95-001-01), type (VoIP), identifier (V001), and trunk channels (6). It also shows metering counters and a checked 'Public trunk' option.
- List of Trunk Groups:** A table showing trunk group configurations. The entry for index 2 (No. 61, Type: Cyclic, Name: VoIP) is selected.
- Trunk Groups: Details:** Configuration details for the selected trunk group, showing physical address (95-001-01), access type (VoIP), identifier (V001), and trunk channels (6).

3.3 Numbering

The **Numbering** configurations for this showcase are here used as described in the following sections. Ensure that numbering plan matches the local requirements and the global defined installation numbers, also under consideration with the ARS and the XCAPI indexed SIP Public Numbering settings.

The **Installation Numbers** are here used as shown next.

Installation Numbers

Installation Number: 8195

International Prefix:

International Code: 49

Intercity Prefix:

Intercity Code: 5363

Recall Prefix:

Alternative System CLIP:

Private Installation Number:

Private Level2 Prefix:

Private Level2 Code:

Private Level1 Prefix:

Private Level1 Code:

VPN Escape Prefix to remove:

OK Cancel

3.3.1 Numbering Plans

The configurations of the **Numbering Plans** consist of the Internal, Public, Restricted and Private Numbering Plan. The VoIP trunk has to be declared as Secondary Trunk Group. Depending on your numbering you may have to declare different rules for allowing inbound and outbound calls. However, this example uses the ARS related numbering range 300-399 for SIP trunking and numbering schemas as shown next. This example doesn't use any numbering plan restrictions. The Private Numbering Plan is used as shown next.

Numbering Plans

Internal Numbering Plan | Public Numbering Plan | Restricted Public Numbering Plan | Private Numbering Plan

Function	Start	End	Base	NMT	Priv	Fax	SIP Acc. Index
Secondary Trunk Group	300	399	ARS	Keep	Yes		
Main Trunk Group	0	0	0	Drop	No		
Subscriber	110	199	110	Drop	No		
Secondary Trunk Group	300	399	ARS	Keep	Yes		
Secondary Trunk Group	454300	454399	ARS	Keep	Yes		
Secondary Trunk Group	454900	454999	ARS	Keep	Yes		
Secondary Trunk Group	61	61	1	Drop	No		
Secondary Trunk Group	800	999	ARS	Keep	Yes		

OK Cancel

3.4 Automatic Route Selection

Within the **Automatic Route Selection** configuration dialog you have to add the trunk group for the Trunk Group Lists, setting up the prefix and the according values for the SIP trunking.

3.4.1 Automatic Routing: Prefixes

The required range of dialing numbers that is here used for the XCAPI SIP trunk is used as shown next. The **Gateway Parameter Index** is set to the according entry which will be shown and described in the next section.

Activation	Network	Prefix	Ranges	Substitute	TrGpList	Called(SV/PN/H450)	User comment	Metering	Calling	Called/PP	Destination	Gateway Alive Status	Gateway Parameters Index
Yes	priv	4543	00-99	3	1	het	VoIP Trunk	Blank	default	default	SIP Gate...	Alive	1 XCAPI
Yes	priv	4503	00-99	3	1	het	VoIP Trunk	Blank	default	default	SIP Gate...	Alive	1 XCAPI
Yes	priv	454	000-9...	3	1	het		Blank	default	default	Not IP		
Yes	priv	4549	9-9	9	1	het	VoIP Trunk	Blank	default	default	Not IP		
Yes	priv	3	00-99	3	1	het	VoIP Trunk	Blank	default	default	SIP Gate...	Alive	1 XCAPI
Yes	priv	9	9-9	9	1	het	VoIP Trunk	Blank	default	default	Not IP		

3.4.2 Gateway Parameters

The XCAPI related **Gateway Parameters** details are used as follows.

Index	Index Label	IP Type	IP Address	Hostname	Domain Name
1	XCAPI	Static	172.18.0.152		

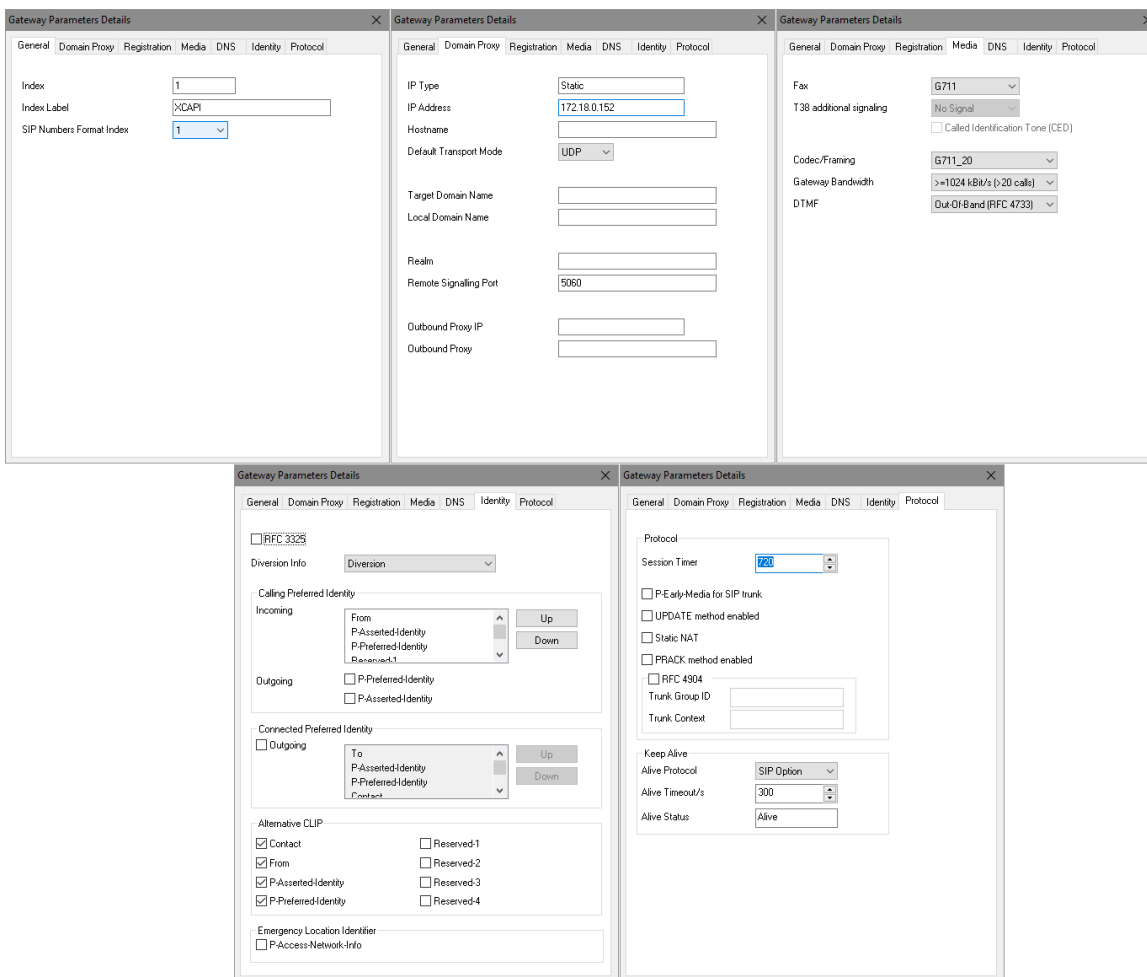
Buttons: Create, Details, Delete, Copy, Paste

The **Domain Proxy** configuration has to be related to the IP address of the XCAPI controllers bound Ethernet Interface as shown in the chapter **Network Interface** of the XCAPI controller configuration on [page 6](#). This showcase uses the **Default Transport Mode UDP** and **Remote Signaling Port 5060**.

For the **Media** settings the **Fax** method is set to **G.711**, **Codec/Framing** of 20 milliseconds and **Out-Of-Band [RFC 4733]** as **DTMF Method**. The **Gateway Bandwidth** has to be set to the local requirements and channel availability for the SIP trunk.

The **Identity** configurations can be used with their defaults.

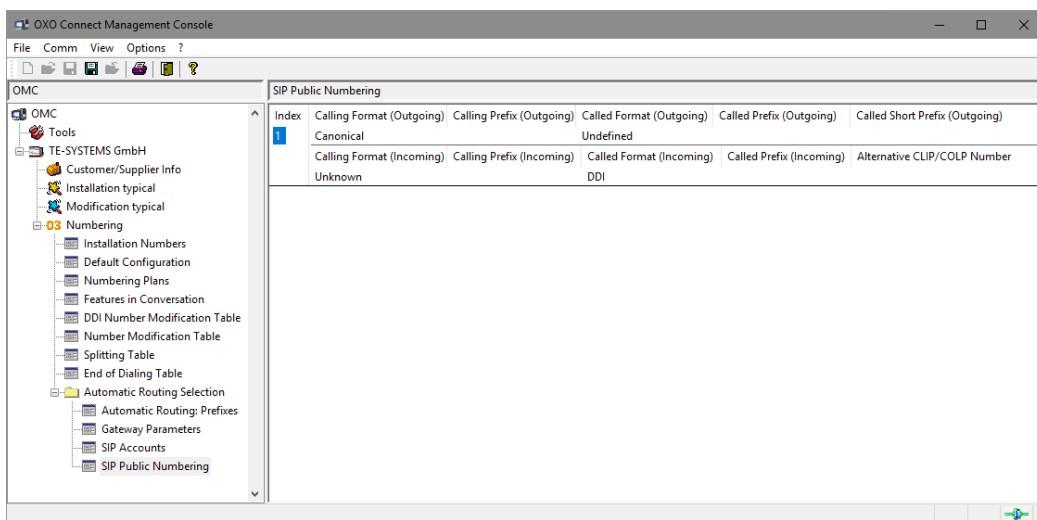
For the settings of the **Protocol** tab using the OXO's given defaults is fine, just the **Alive Protocol** must be set to **SIP Option**. Nevertheless for this showcase all protocol related settings are disabled.



For interoperability please ensure that gateway configurations and settings are supported and used conform to the ones of the XCAPI controller and other participating VoIP instances.

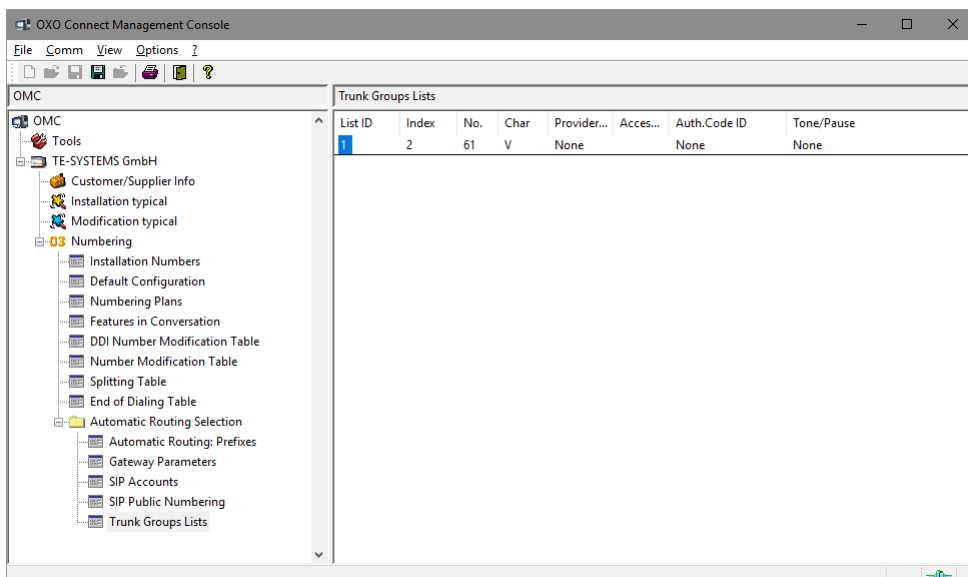
3.4.3 SIP Public Numbering

The **SIP Public Numbering** specifies the handling of the numbering format of the incoming and outgoing calls for private or public SIP numbers. For this environment the numbering (based on T2 access type for pstn interworking) is used as shown next.



3.4.4 Trunk Groups Lists

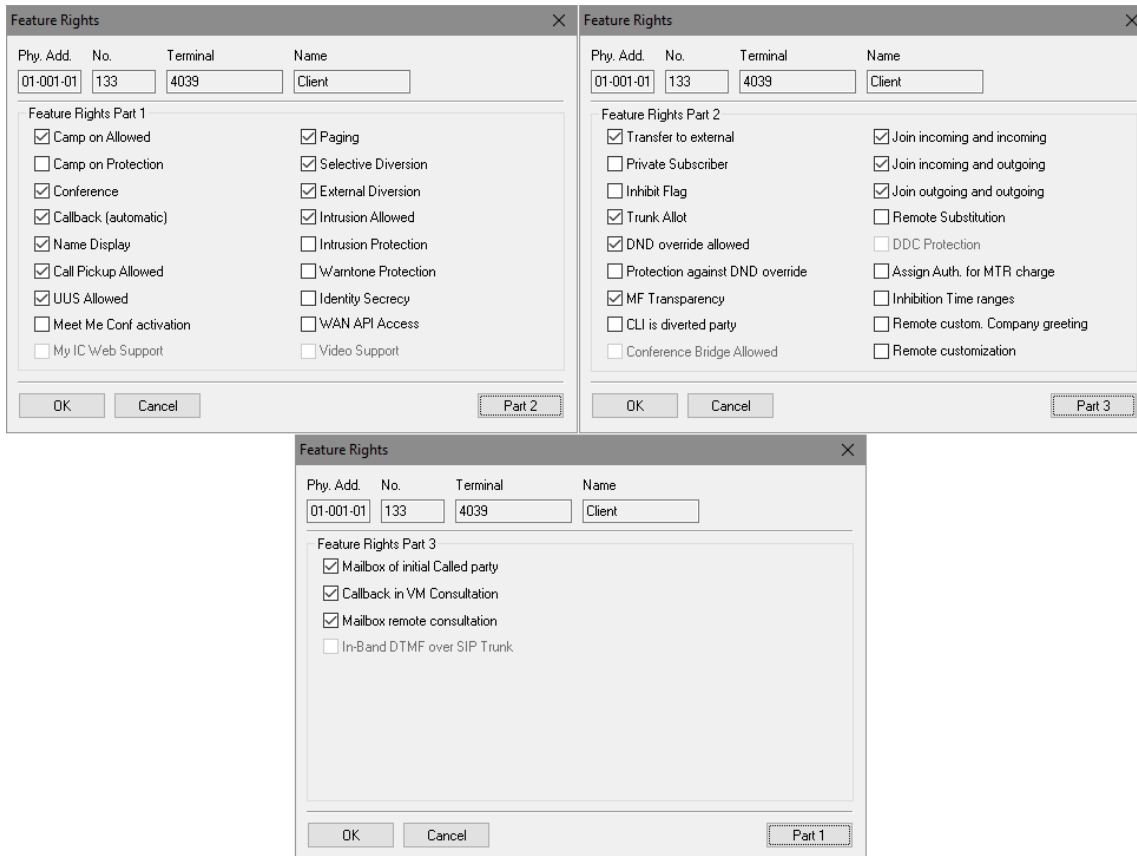
In the **Trunk Group Lists** configuration dialog you have to specify the trunk which has to be used with the ARS mechanism. This list is related to the Lists of Trunk Groups and Numbering Plans configuration.



3.5 Subscribers/Basestations List

It might be required to enable or disable phone features for specific services (for example allowing external call diversion). The screenshot below shows the settings of an Alcatel 4023 terminal used while testing the XCAPI interoperability.

Some additional information, for e.g. about redirecting numbers, can be found in the according sections of the **Appendix** chapter.

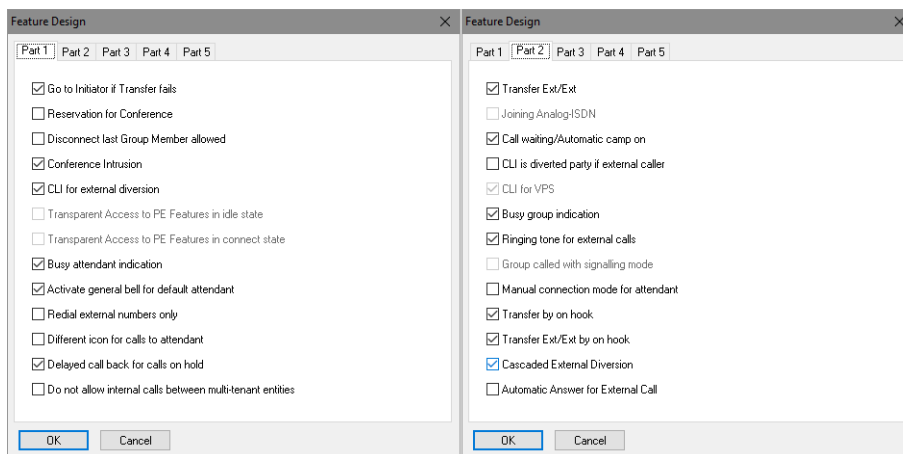


3.6 System Miscellaneous

This chapter is about **System Miscellaneous** configurations. Beside of this example used **Features Design** settings some hints about the noteworthy addresses will be given. For details please refer to the according administration and technical OXO Connect documentations.

3.6.1 Features Design

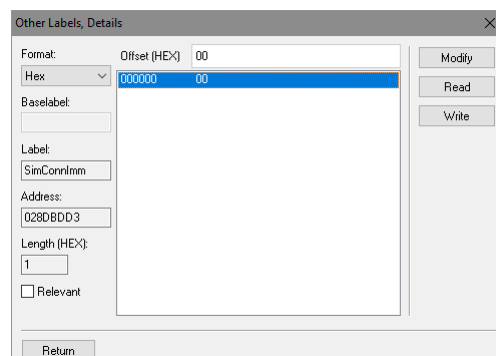
The **Features Design** configuration parts 1 and 2 are used as shown next. The omitted configuration tabs 3, 4 and 5 are not shown here in detail and used with their defaults.



3.6.2 Noteworthy Addresses

For appropriate SIP signaling please ensure that the **SimConnImm** ([System Miscellaneous] - [Memory Read/Write] - [Other Labels]) address is disable (set to 0). Some OmniPCX Office and OXO Connect releases might have this enabled by default what omits correct SIP signaling for busy lines.

Additional information and hints about **Noteworthy Addresses** can be found in the referring Alcatel-Lucent technical bulletin TC1398.

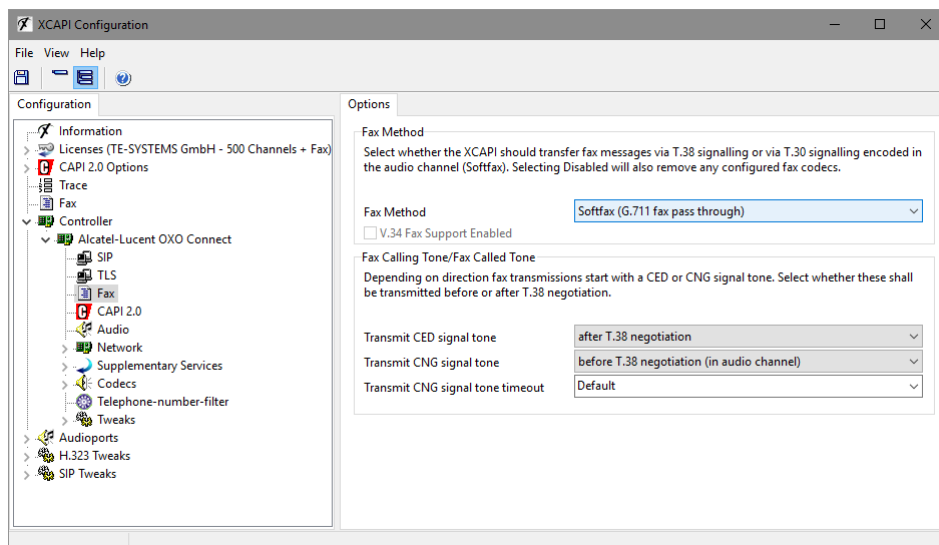


Appendix

4.1 SoftFax (G.711 fax pass through)

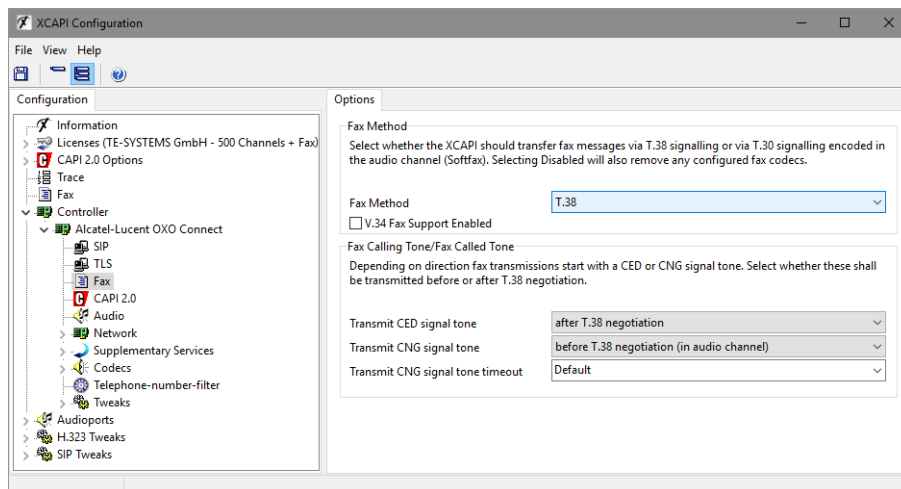
In the **SoftFax** mode, the XCAPI simulates an analog Fax device by transmitting modulated Fax-signals modem-like via audio-channels.

The **Fax** method within the gateway parameters **Media** settings are used by default with **G.711**. However, for appropriate facsimile interworking it has been ensured that those Codec, Framing, Bandwidth and DTMF settings (as shown in the chapter **Gateway Parameters** starting on [page 13](#)) are set conform to the ones of the XCAPI controller configuration and other participating SIP instances.



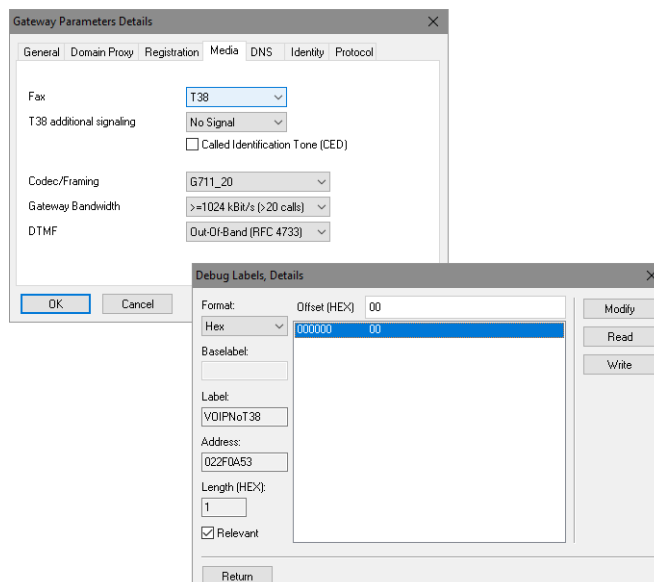
4.2 T.38

For enabling T.38 this **Fax Method** must be selected as shown below.



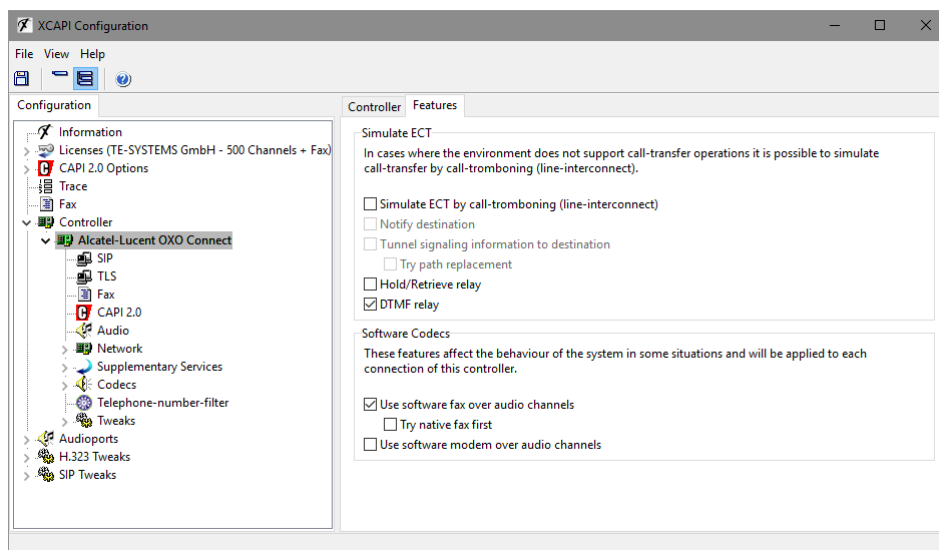
The according OXO Connect parameters must also be properly set as described next. For our T.38 interoperability tests, the OXO settings were used as follows.

The XCAPI related **Media** configurations are set to **T.38** as **Fax** method. **T38 additional signaling** was set to **No Signal** and **Called identification Tone (CED)** was disabled. The **Codec/Framing** is used with **G.711_20**. As **DTMF** method **Out-Of-Band (RFC 4733)** is used. For allowing T.38 also check with the **Debug Label** parameter **VOIPNoT38** within the [System Miscellaneous] - [Memory Read/Write] settings, which must be set to value 00. Note that a system reboot is required to get this configuration change finally enabled.



4.3 Call Transfer

For enabling call transfer via SIP refer **Simulated ECT by call-tromboning (line-interconnect)** has to be disabled within the XCAPI controller **Features** tab.



4.4 Redirecting Number

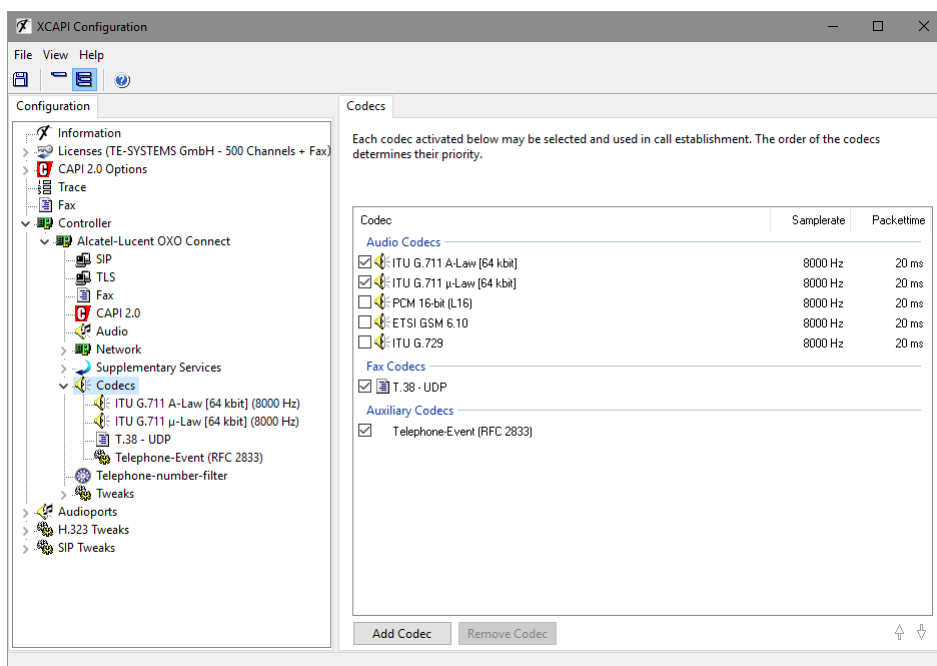
If the CAPI application has to be aware of redirecting numbers additional configurations might be taken into account. Please check with the according OXO parameters like within the feature design settings, as shown in the **Features Design** chapter starting on [page 17](#). Ensure that **CLI for external diversion** is enabled and **CLI is diverted party if external caller** is disabled.

In accordance with your CAPI application you have to enable/disable the client(s) feature rights parameter **CLI is diverted party**.

4.5 Codecs

As a general rule for codecs we recommend using conform codec settings for all involved VoIP instances. So, beside of the XCAPI controller and the according OXO Connect settings (global and trunk related), it has to be ensured that other VoIP trunks or SIP trunks towards a provider are used conform. The required codecs must be available and be used with the same frame size (framing), any transcoding should be avoided and the RFC 2833 payload should be set to the same value for all SIP instances.

In case of a SIP provider instance it is compulsory using conform and supported fax methods (T.38 or G.711).



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„OpenSSL“, developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>), written by Eric Young (eay@cryptsoft.com) and written by Tim Hudson (tjh@cryptsoft.com).

„MD2, MD4 and MD5 Message Digest Algorithms“ via source code derived from the RSA Data Security, Inc.

„RFC 4634 Secure Hash Algorithm“, via source code derived from the RFC 4634.

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