Avaya IP Office R11

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Introduction

This document is intended to support you with the integration of XCAPI into an existing environment of the Avaya IP Office. In the following sections we describe the essential configuration steps for SIP trunking to allow optimal interworking of both, the XCAPI and the Avaya IP Office. Though being based on the Avaya IP Office release R11, this document is applicable with other versions given a few adjustments.

At this point we suppose that the Avaya IP Office 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 XCAPI and the CAPI 2.0 voice or fax application is properly installed. It is also supposed that the public network access via ISDN and/or SIP is given and properly working, also in context with the custom and country dependent numberings and call routings. The same goes for the networking (LAN, WAN, DMZ, NAT, Firewall) itself as such topics are beyond the scope of this document and thus not shown here at all. Please refer to the respective manufacturer documentations, manuals and examples in such cases.

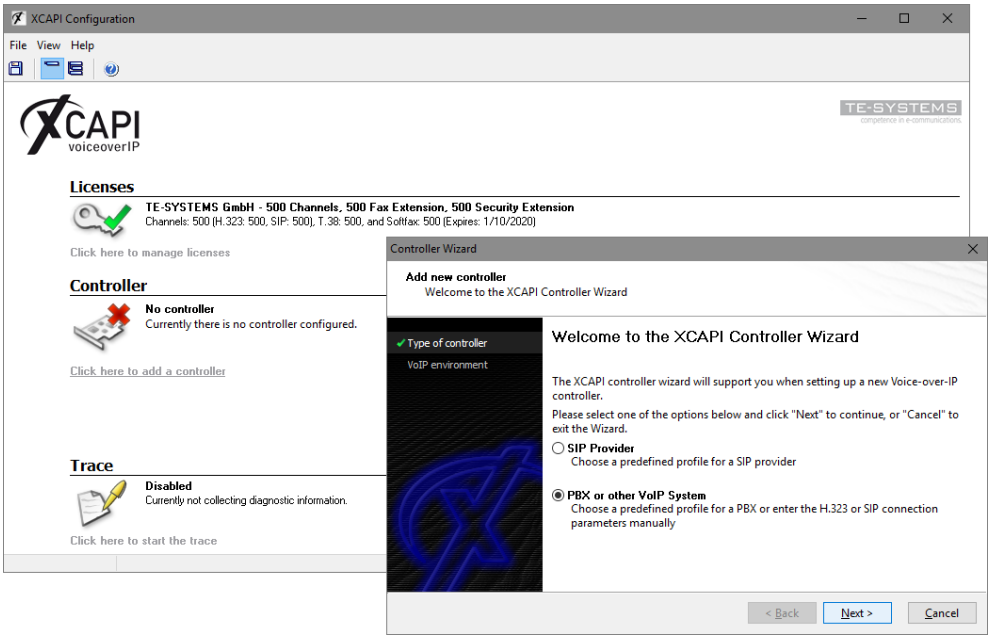
However, independent of the deployed application, the SIP connection can be tested with the XCAPI's included test application (xtest.exe) that is available within the XCAPI's installation folder (by default `\\Program Files (x86)\TE-SYSTEMS\XCAPI\`). This test tool allows to check with inbound and outbound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

We recommend to visit our YouTube channel frequently for XCAPI related tutorials about licensing, the test tool, line monitor, tracing, analyzing and others. Registered community users can check about latest documents, TechNotes and releases for XCAPI.

Please note that this example configurations are used in conjunction with a PRI\BRI line. If using a SIP carrier or other service provider related instances like a Session Border Controller, additional adjustments must be considered for all involved instances. The same goes for the interoperability in conjunction with other (SIP) lines. If available, we recommend to check with the corresponding Avaya IP Office Application Notes. If there are doubts, please check and test the required features and functions for the present VoIP environment.

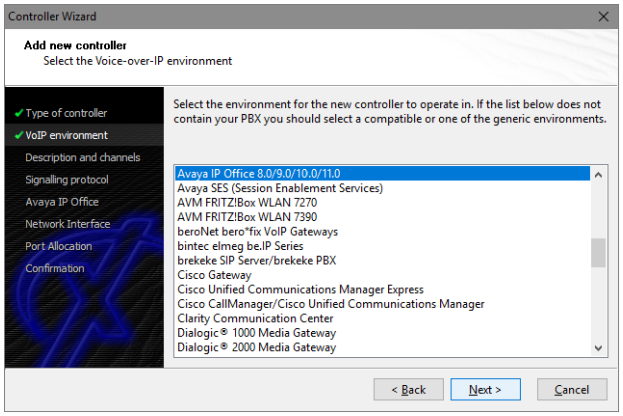
XCAPI Configuration

Please start up the XCAPI configuration to create a new controller assigned to the Avaya IP Office. 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. **Next** select **PBX or other VoIP System** in the initial **Type of controller** dialog and proceed with the **Next** button.



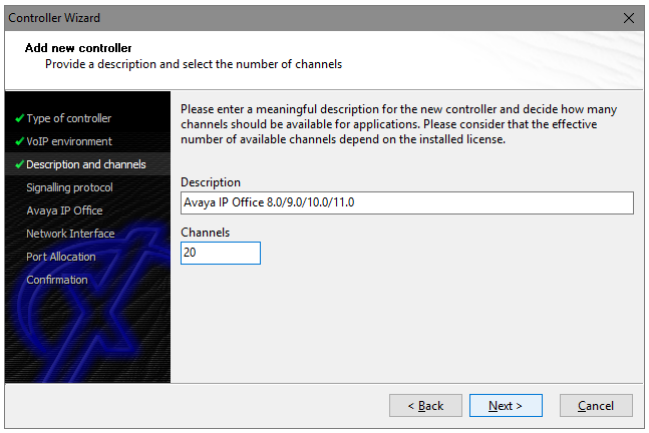
2.1 VoIP Environment

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



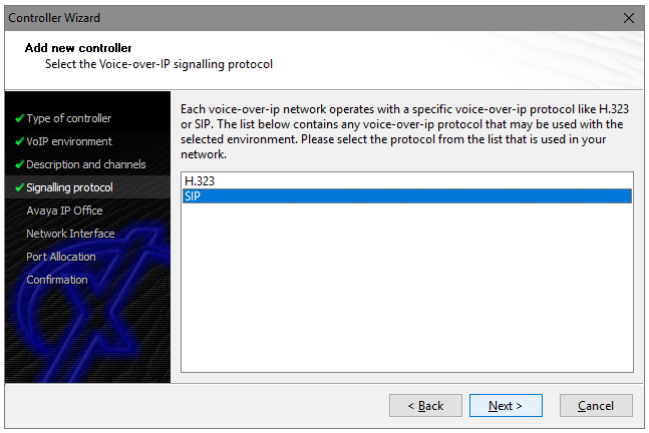
2.2 Description and Channels

When the VoIP environment was selected, the next dialog allows setting a description for the controller. Also the number of channels that the new controller will be able to provide can be set here. This controls simultaneous connections the XCAPI controller can handle when communicating with the Avaya IP Office and the bound CAPI 2.0 application.



2.3 Signaling Protocol

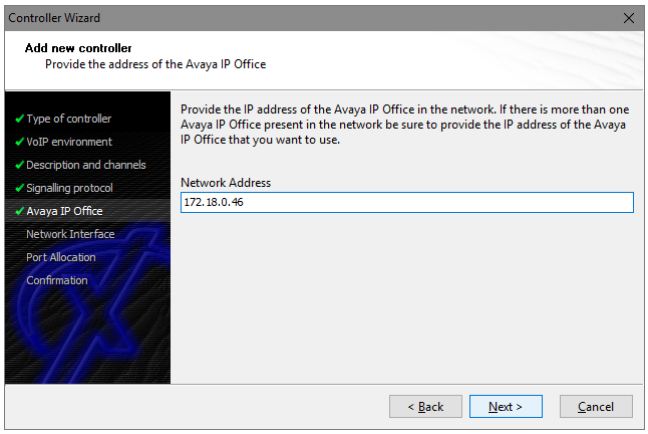
The next dialog shows a list of signaling protocols which are supported for the given Voice-over-IP environment. In this example the SIP protocol is selected.



2.4 IP Address of the Avaya IP Office

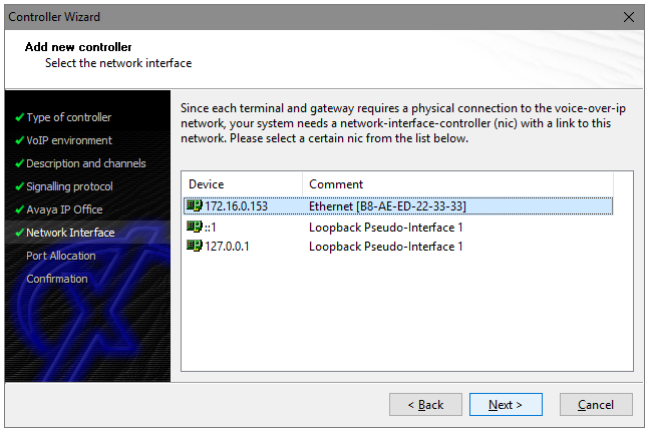
Next the IP address or host name of the Avaya IP Office LAN interface must be provided. In this example 172.18.0.46is used. The Avaya IP Office LAN configurations can be reviewed in the chapter **System Settings** from page 9.

Please note, by default XCAPI is using port 5060 for SIP UDP. If the Avaya IP Office LAN and SIP Line configurations are not using this default port, the XCAPI controller must be adjusted after running the XCAPI controller wizard.



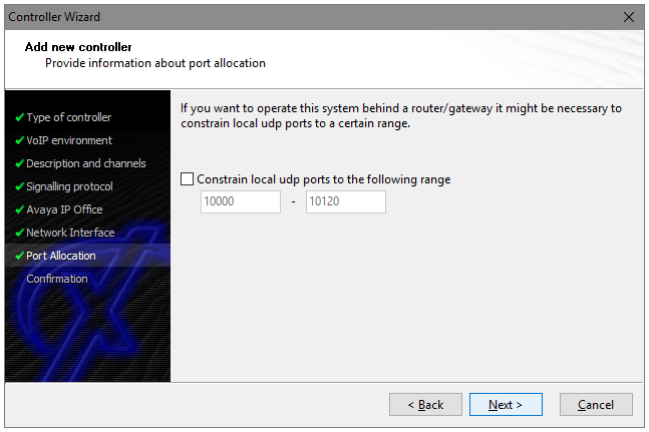
2.5 Network Interface

Afterwards, select the network interface that will control the inbound and outbound communications. Note that this is the XCAPI controller used Ethernet interface which will be leveraged for the SIP communication with the Avaya IP Office.



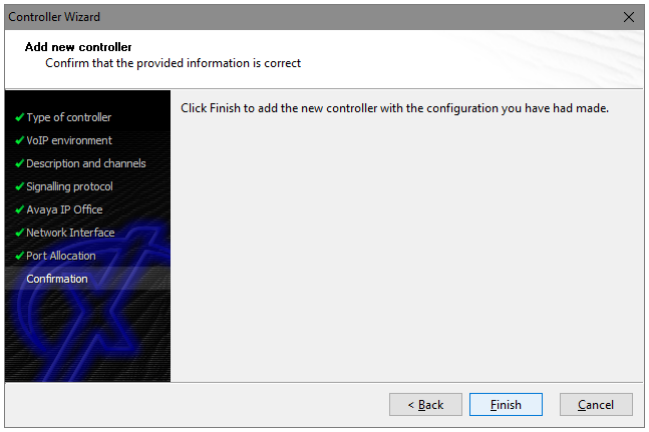
2.6 Port Allocation

If needed, a port range can be specified for any router or firewall restrictions for UDP (RTP/T.38). In this example no range will be set which allows the XCAPI controller to use a random port range between 1024 and 65535.

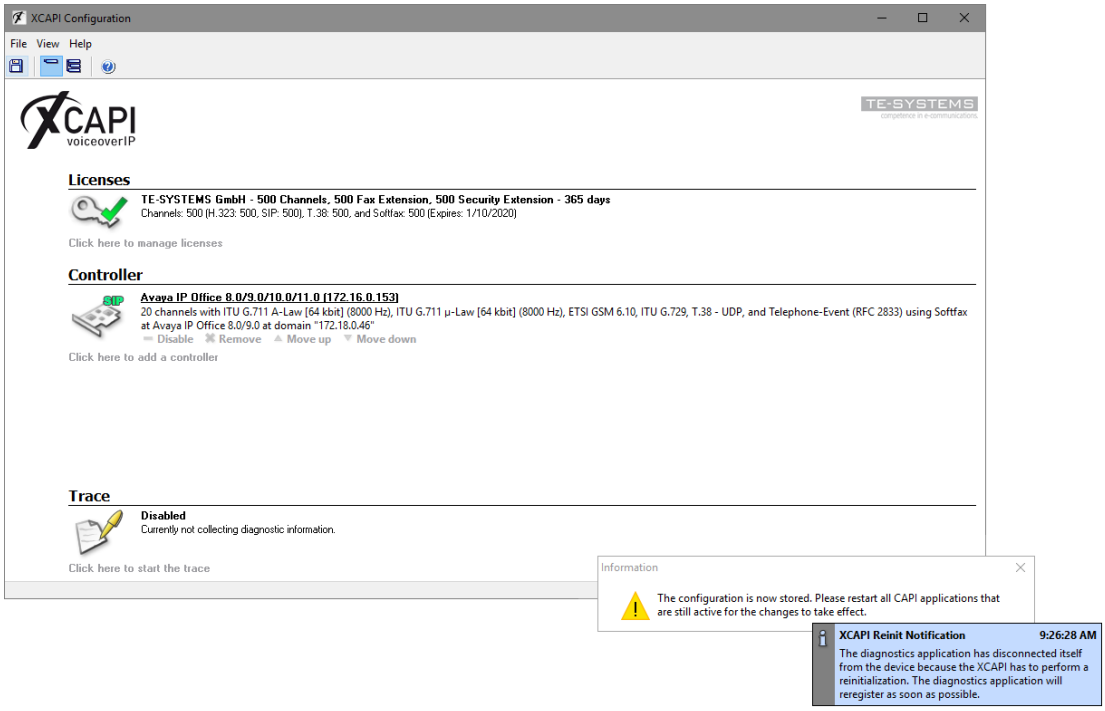


2.7 Confirmation

The final wizard dialog performs checks on the configuration parameters you've made. If errors are detected, use the **Back** button to correct the respective dialogs. Use the **Finish** button to create the new controller.



Now, the created controller is listed on the main page of XCAPI's configuration tool. Use the **save** button and exit the tool.



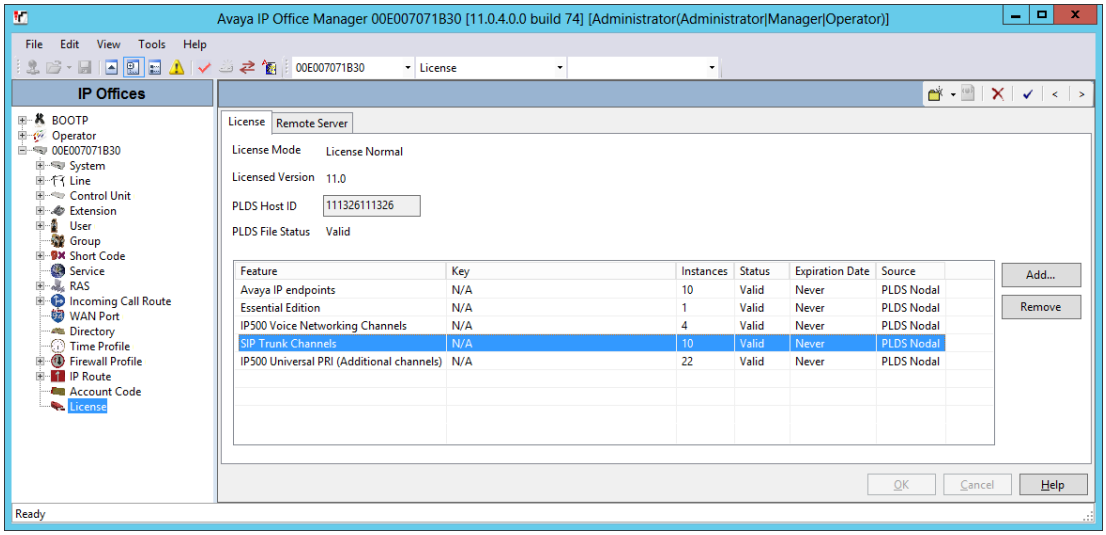
Please note that the bound CAPI 2.0 application with its services must be completely stopped and restarted for the XCAPI controller changes to take effect. Restarting any of the XCAPI services won't help at all. Alternatively the Server where XCAPI is running on can be restarted. If enabled, the XCAPI diagnostic monitor pops-up with a re-initialization notification on success. Alternatively check with the **Events** tab of the **XCAPI Line Monitor** about a configuration update notification (Event ID 20).

Configuring the Avaya IP Office

In order to establish a connection between the XCAPI and the Avaya IP Office you need to setup the XCAPI as SIP trunk with all its appropriate configurations. This example shows a basic configuration which can't be assigned one-to-one to the environment. The configuration dialogs have to be adapted to the PBX environment, hardware and CAPI application. Especially the dialing and numbering related topics such as **Short Codes**, **ARS**, **Incoming Call Route** handling and all the **Line** related settings with its configurations must reflect local conditions.

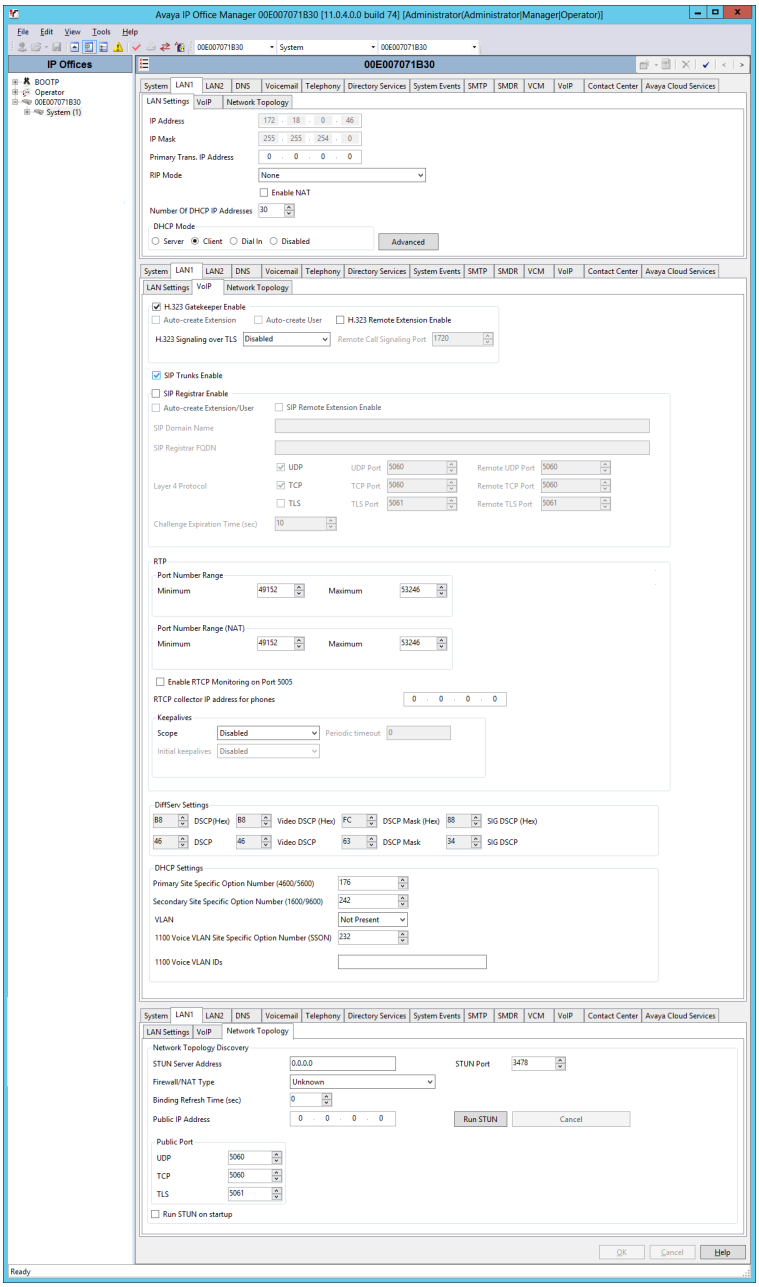
3.1 License

First, please ensure that the **Avaya IP Office SIP Trunk Channels** license key is available to allow SIP trunking.

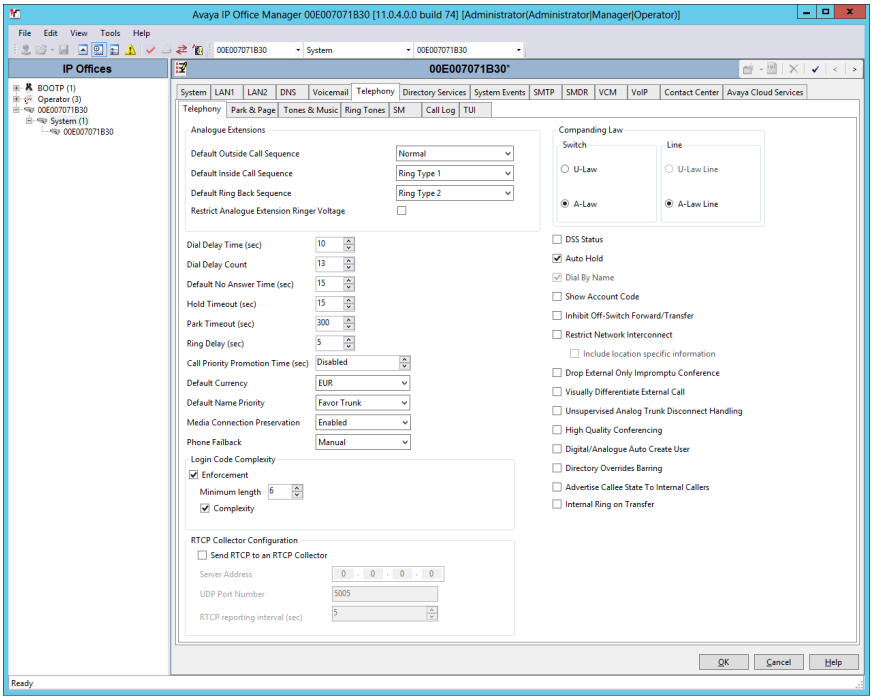


3.2 System Settings

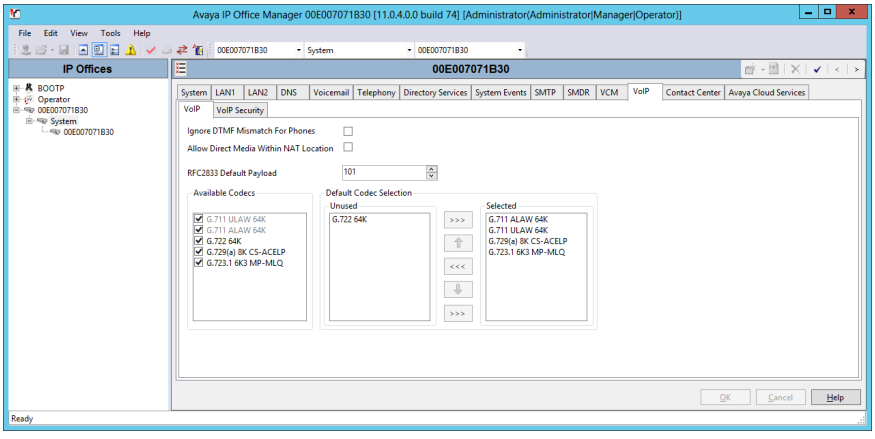
The **Avaya IP Office** LAN settings in this example are shown below. The IP address is the one that was set for the XCAPI SIP controller as shown in the chapter **IP Address of the Avaya IP Office** on page 5. Ensure that the **SIP Trunks Enable** option is set to allow SIP trunking. Ensure that the **Firewall/Nat Type** configurations are set to your local requirements, also for the LAN2 interface.



The **Telephony** settings are mostly use defaults. The **Inhibit Off-Switch Forward / Transfer** must be disabled to allow call forwarding or call transfer towards the pstn interface of the Avaya IP Office.



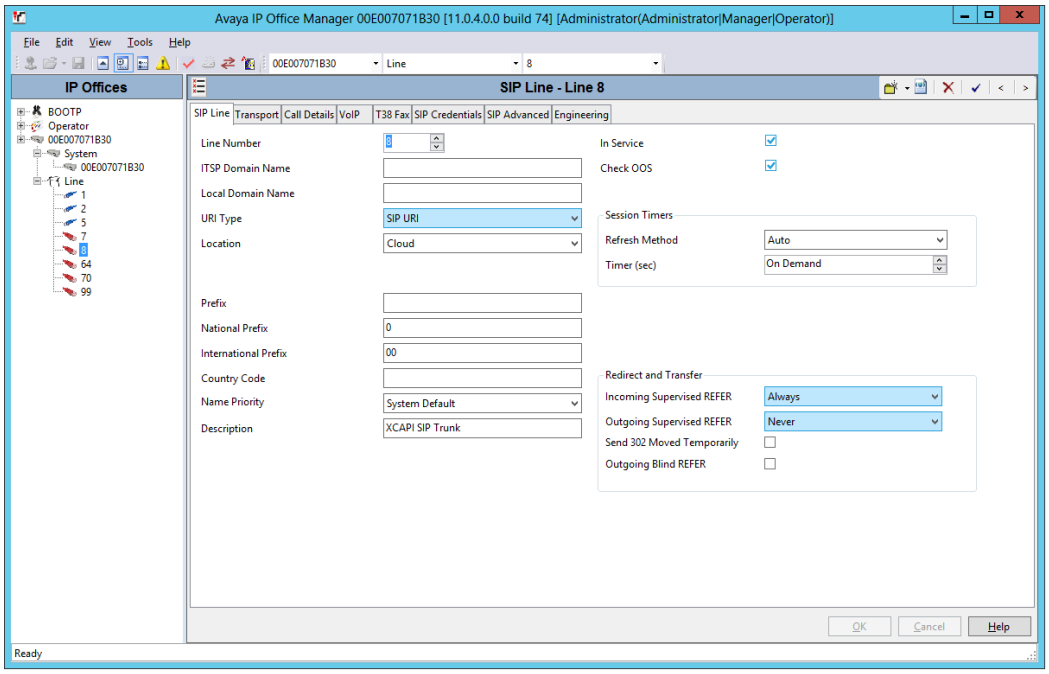
The **VoIP** defaults usually work well in conjunction with the ones of the XCAPI Avaya IP Office controller. Nevertheless, please ensure that at minimum the G.711 codecs are set and the RFC2833 Default payload value conforms to the one set in the XCAPI controller and other SIP lines. If the RFC2833 value will be changed, please change it in the XCAPI controller also, as described in the chapter DTMF on page 22. In practice, it is recommended using the same codecs and codec profiles for all participating Avaya IP Office SIP line entities.



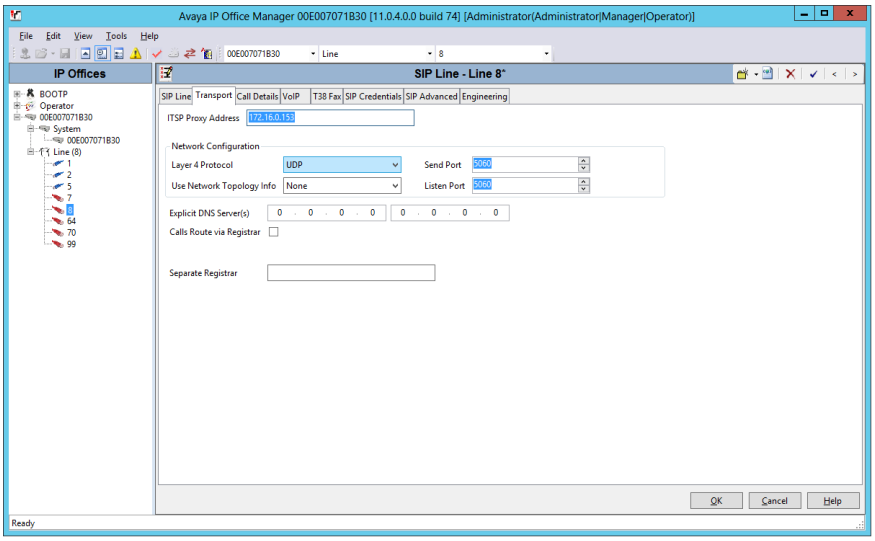
3.3 SIP Line

The XCAPI related **SIP Line** here is used as follows.

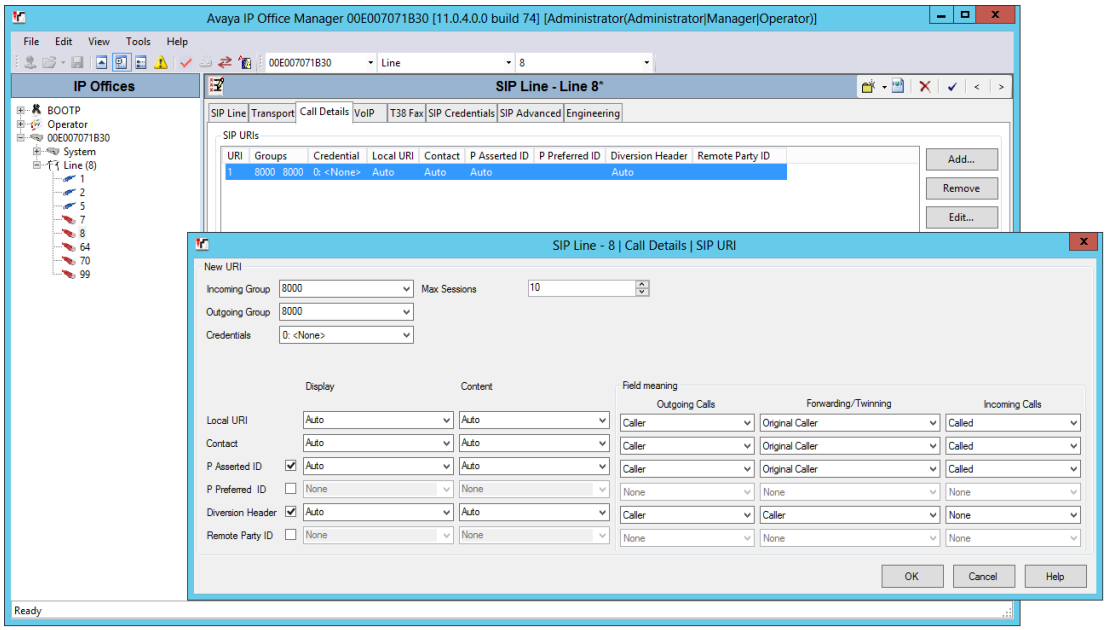
- The **ITSP Domain Name** is left blank as this allows using the provided **ITSP Proxy Address** field value that will be set in the **Transport** tab.
- **In Service** must be selected for enabling the **SIP Line**.
- **Check OOS** is also set for enabling **SIP Options** as a keep alive (heartbeat).
- **Redirect and Transfer** has to be set for allowing call transfer via SIP refer. For this **Incoming Supervised REFER** must be set to **Always** and **Outgoing Supervised REFER** must be set to **Never**.



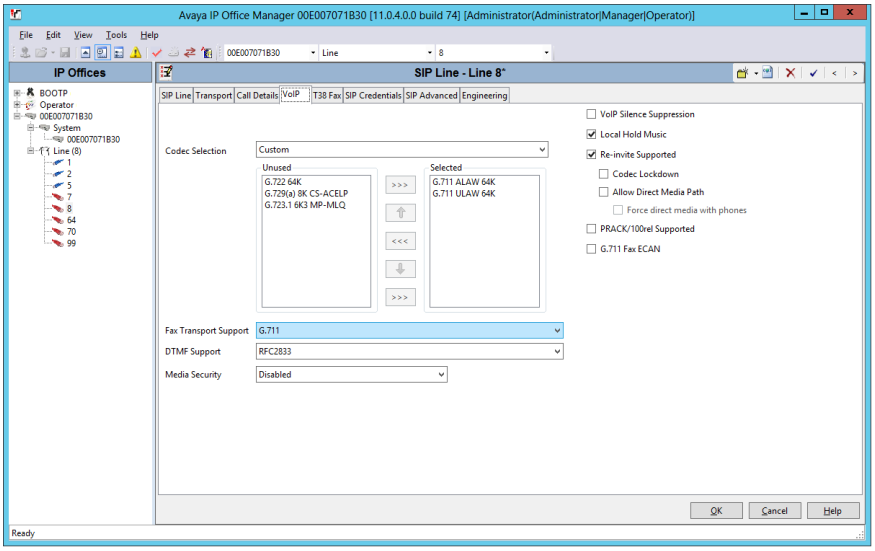
The **ITSP Proxy Address** is set to the XCAPI-Controller as shown in the chapter **Network Interface** on page 5. The **Network Configuration** values are used with their defaults (Layer 4 Protocol with UDP, send and listen Port 5060).



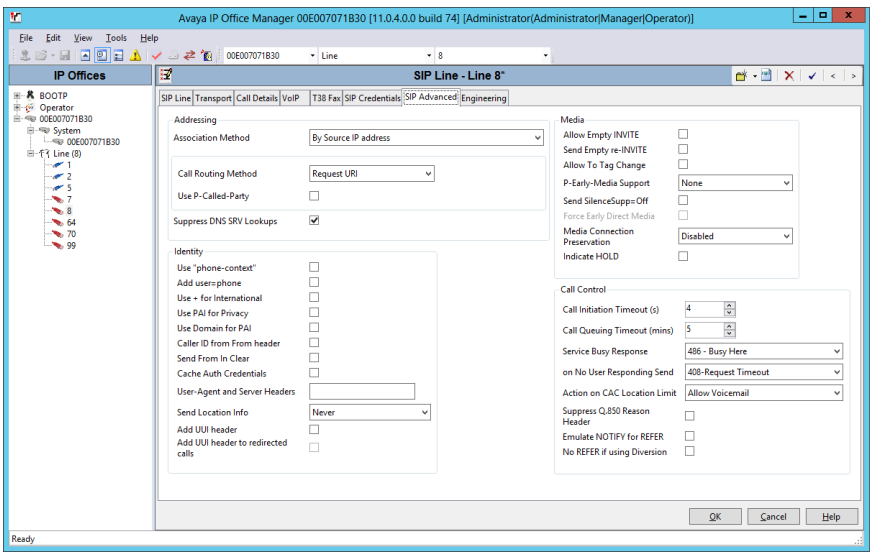
The **Call Details** of the XCAPI related SIP line are used as shown next.



The **Codec Selection** is used with a **Custom** codec selection (G.711 only). Except the **Re-Invite Supported** flag, all others parameters must be unchecked.
In reference to the XCAPI controller configurations with its defaults, the **Fax Transport Support** is using **G.711**. The **DTMF Support** is used with the **RFC2833** method. As a reminder the RFC2833 payload value is by default set to 101 for both, the XCAPI controller and the Avaya IP Office. RFC2833 related information can be found in the chapter **System Settings** on page 9 and **DTMF** on page 22. Additional information about facsimile can be reviewed in the referring fax chapters starting on page 16. Please take notice of using conform codec and payload configurations (voice, fax, dtmf) for all involved SIP line entities of the Avaya IP Office environment.

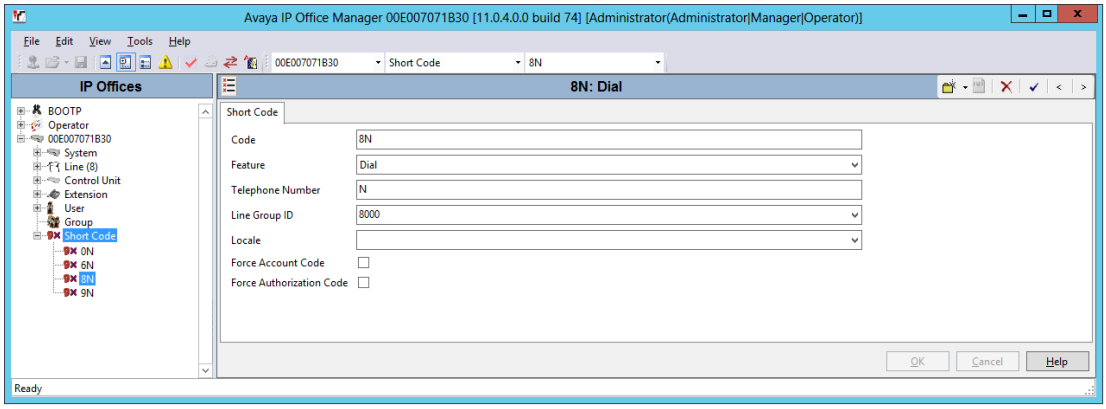


The **SIP Advanced** tab is also mainly used with its defaults, only **Suppress DNS SRV Lookups** is set.



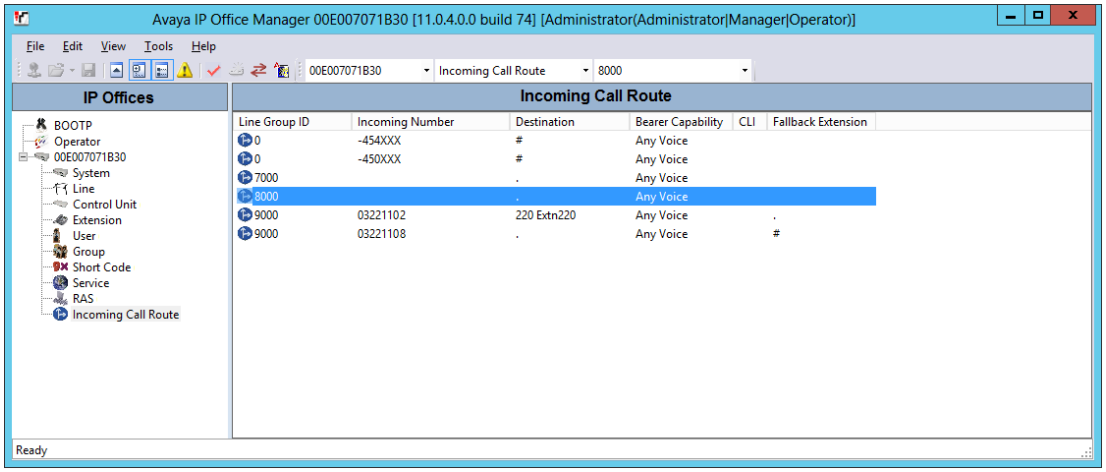
3.4 Short Codes

The XCAPI related **Short Code** is using **Code 8N, Dial Feature, Telephone Number N** and **Line Group ID 8000**.



3.5 Incoming Call Route

The **Incoming Call Route** entry for the XCAPI **SIP Line** is shown next. The dot symbol for the **Destination** value matches the **Incoming Number** field. In this example this field is blank, so any destination value will match.



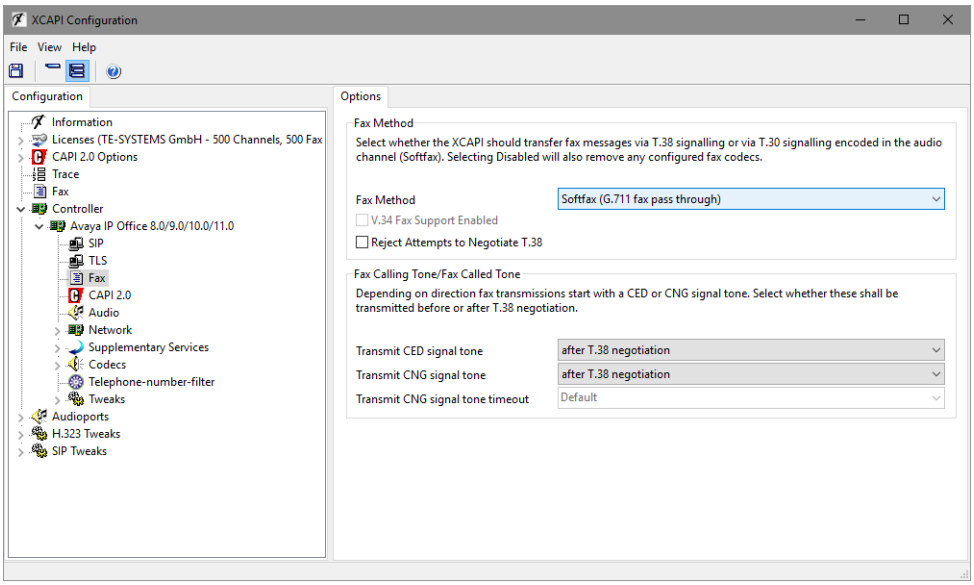
Fax

In this chapter, we are going to describe configuring the fax services for leveraging T.38 and Softfax (G.711 fax pass through). The latter is being used as default if creating the Avaya IP Office controller through XCAPI's controller wizard. For faxing to function correctly you must ensure that the Codec, Framing, Bandwidth and DTMF settings are set conform to the ones in the XCAPI controller configuration and other participating SIP instances. Take note of the following considerations and hints for choosing the fax method:

- Both, SoftFax (G.711 fax pass through) and T.38 is working well in conjunction with an Avaya IP Office BRI or PRI interface.
- If using multiple SIP instances connecting the Avaya IP Office the pstn, the supported and preferred fax method of the SIP carrier **must** be used and set to conform for all of them. If there are any doubts and if available, please check with the corresponding Avaya IP Office Application Notes.
- It is recommended to not use different Fax methods for multiple SIP line instances. The same goes for the codec selection (G.711 codecs, RFC2833 value). Ensure the settings used for all SIP line instances, conform to the ones that are supported.
- Don't use fax fallback (T.38 to G.711 fax pass through) unless it is fully supported by the SIP carrier and tested extensively in conjunction with XCAPI.
- For virtual environments, please check our documents **XCAPI TechNote (en) - VMware Virtual Machines** and **XCAPI TechNote (en) - Microsoft Hyper-V** which are available within or community download section for registered users.
- We strongly recommend using latest XCAPI versions for best results and it might be even be necessary with latest manufacturer releases and firmware versions, especially when using the T.38 fax method.

4.1 SoftFax (G.711 Fax Pass Through)

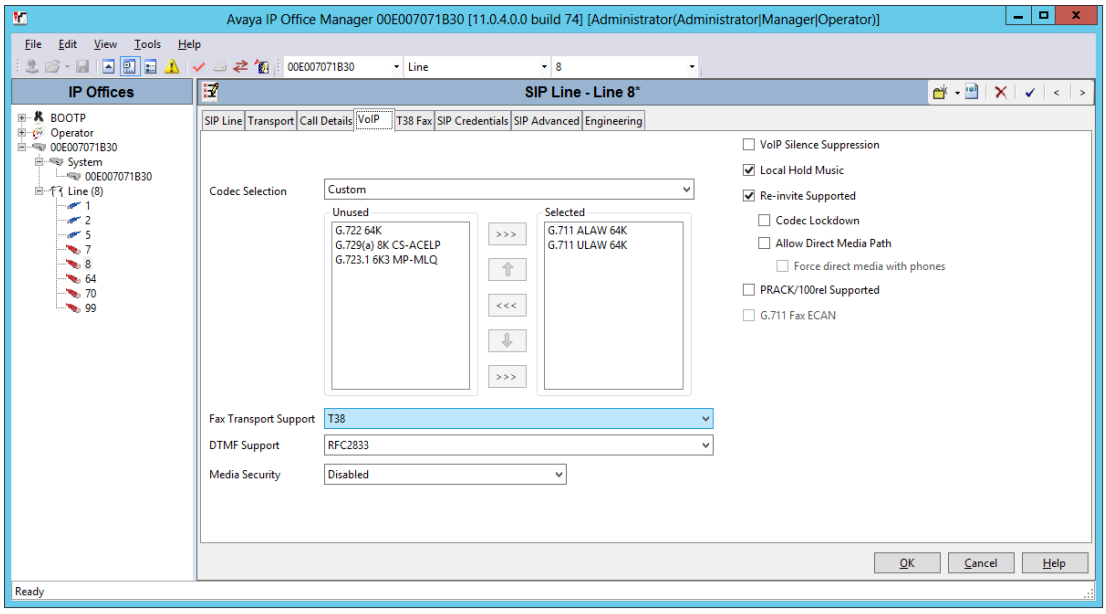
In the **SoftFax (G.711 fax pass through)** mode, XCAPI simulates an analog fax device by transmitting modulated fax signals like a modem through the established G.711 audio channels. For this **Softfax (G.711 fax pass through)** must be selected as **Fax Method**, which is set by default through the XCAPI controller wizard. Ensure that the **Fax Transport Support** within **VoIP** tab of the SIP line is enabled for **G.711** as shown in the chapter **SIP Line** starting on page 11.



When using SoftFax (G.711 fax pass through) you may have to set the BRI or PRI line short code to **Dial 3K1** for proper functionality. This dial feature sets the ISDN bearer capabilities to 3.1KHz and improves the compatibility with specific remote devices which only allows facsimile up to such bearer capability.

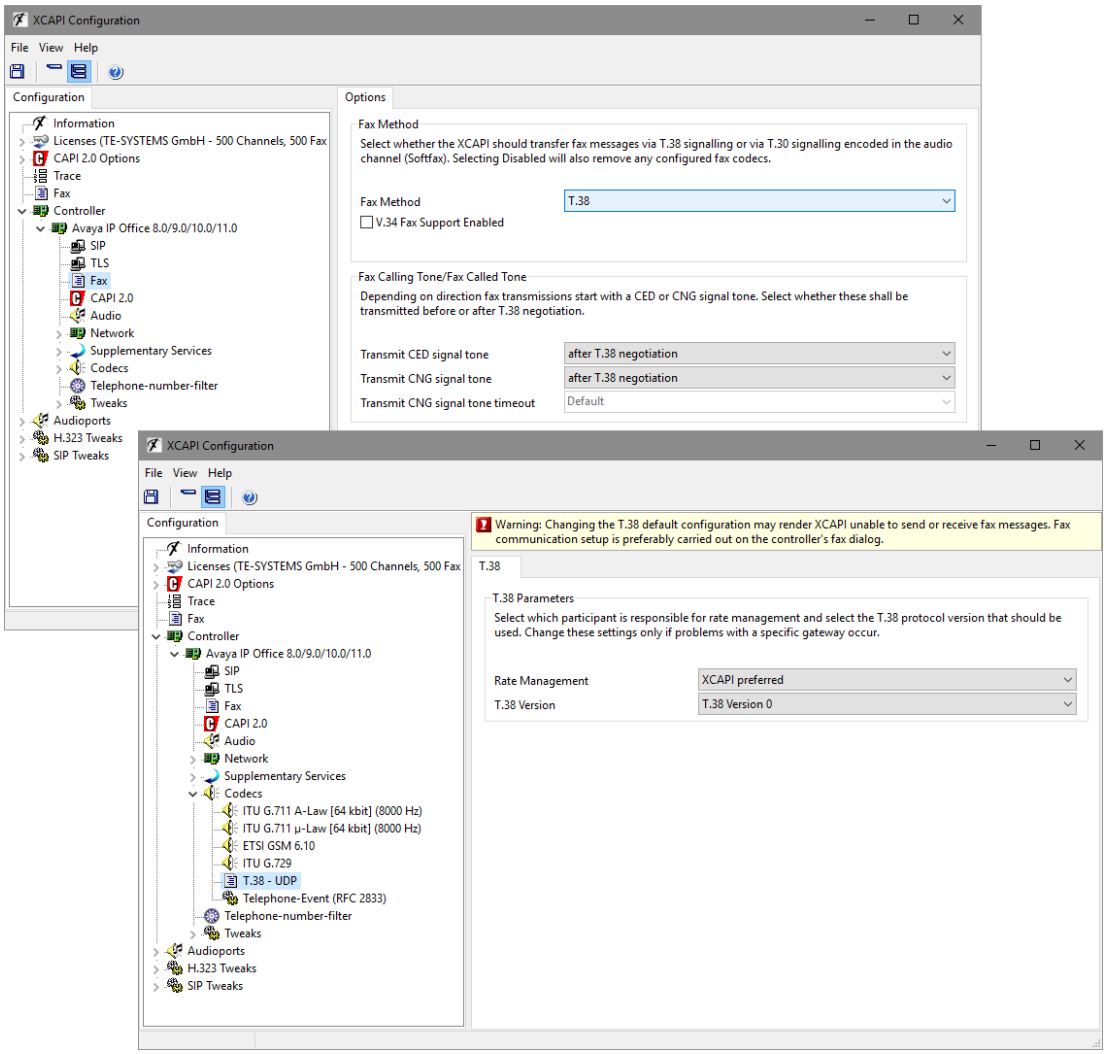
4.2 T.38

Before enabling T.38, it is mandatory to ensure that this method is supported by all participating SIP lines (such as SBC's and SIP carriers) for pstn connectivity. As mentioned in the beginning of this chapter, don't use fax fallback if any of the involved instances supports T.38 **or** G.711 fax pass through only. However, for enabling this fax method you have to select T.38 as **Fax Transport Support** method as shown next.



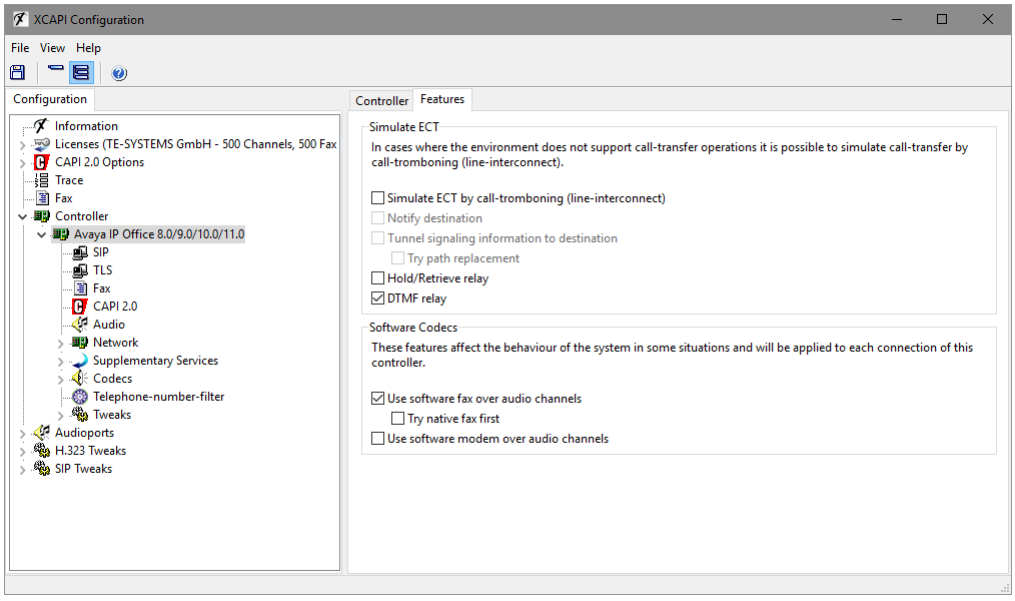
When using T.38, this fax method must also be supported and enabled for all other participating instances in between (SIP gateways, SIP provider, SBCs etc.). It is strongly recommended to avoid any kind of unnecessary transcoding (for e.g. G.711 to T.38 or vice versa) and using standard fax methods for all participating instances. For enabling T.38 this **Fax Method** must be set as shown below.

Ensure that the **T.38 - UDP** is available and enabled within the **Codecs** tab of the XCAPI controller configuration. One speech codec (in common G.711law or G.711μ-law) must be enabled for the initial call establishment. The **Fax Calling Tone/Fax Called Tone** behavior as well as the T.38 codec settings should only be adjusted after consultation.



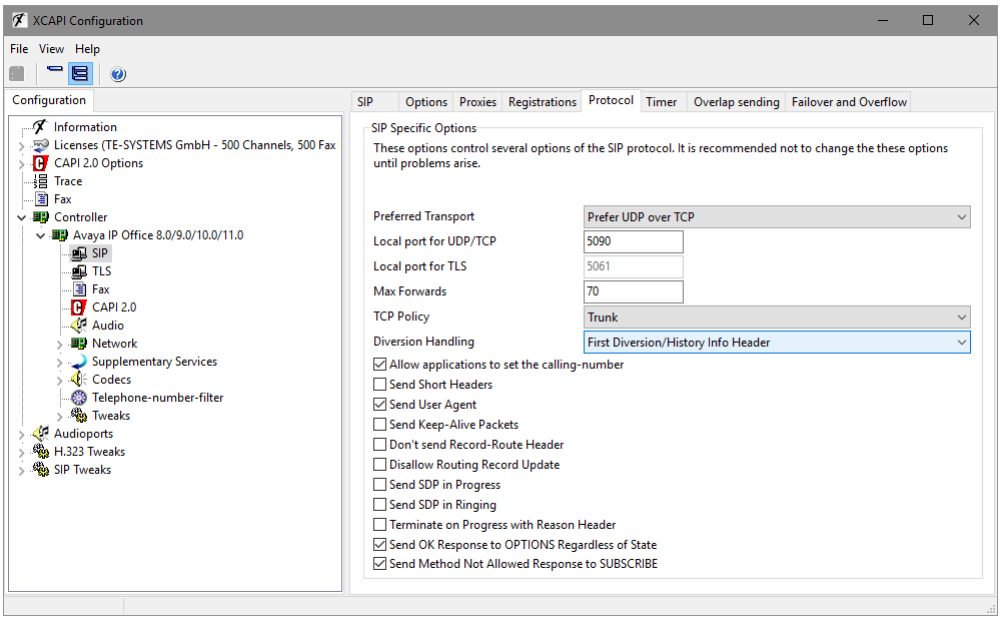
Call Transfer

For enabling call transfer via SIP refer, the **simulated ect by call-tromboning (line-interconnect)** parameter has to be disabled within the XCAPI controller **features** tab. As previously mentioned in the **SIP Line** chapter starting on page 11, **Incoming Supervised REFER** must be set to **Always**. If required you may have to disable the **Inhibit Off-Switch Forward / Transfer** parameter as mentioned in the **System Settings** chapter starting on page 9.
Depending on other call transfer or forward scenarios, parameters like **Restrict Network Interconnect** or **Analog Trunk to Trunk Connection** of the Avaya IP Office might be adjusted as well. Both parameters are located in the **Telephony** tab of the Avaya IP Office **Systems** settings which are not shown in detail here.



SIP Diversion Header

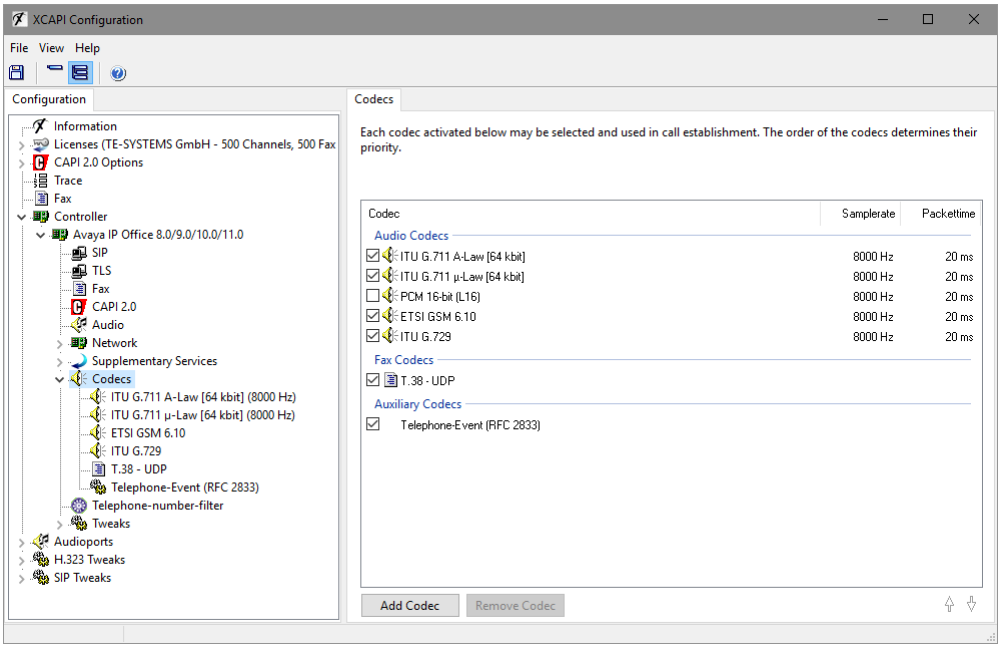
For enabling SIP diversion headers from the Avaya IP Office towards the XCAPI SIP line, the **Diversion Header** must be enabled through the **Call Details**. An example is shown in the **SIP Line** chapter starting on page 11. XCAPI detects the SIP Diversion header automatically by default. The first header will be used.



Codecs

The XCAPI controller wizard sets the codecs as shown on the screenshot below. For interoperability reasons, this might having to be adjusted. Unsupported codecs, especially in conjunction with other Avaya IP Office SIP lines, can be disabled. If your environment and region prefers the G.711ulaw, this should be moved to the top of the codec list. To do this, just mark the codec entry and use the arrow key symbols. Codec related hints are given in the chapters **System Settings** on page 9, **SIP Line** on page 11 and **Fax** on page 15.

DTMF related hints will be given in the next chapter.

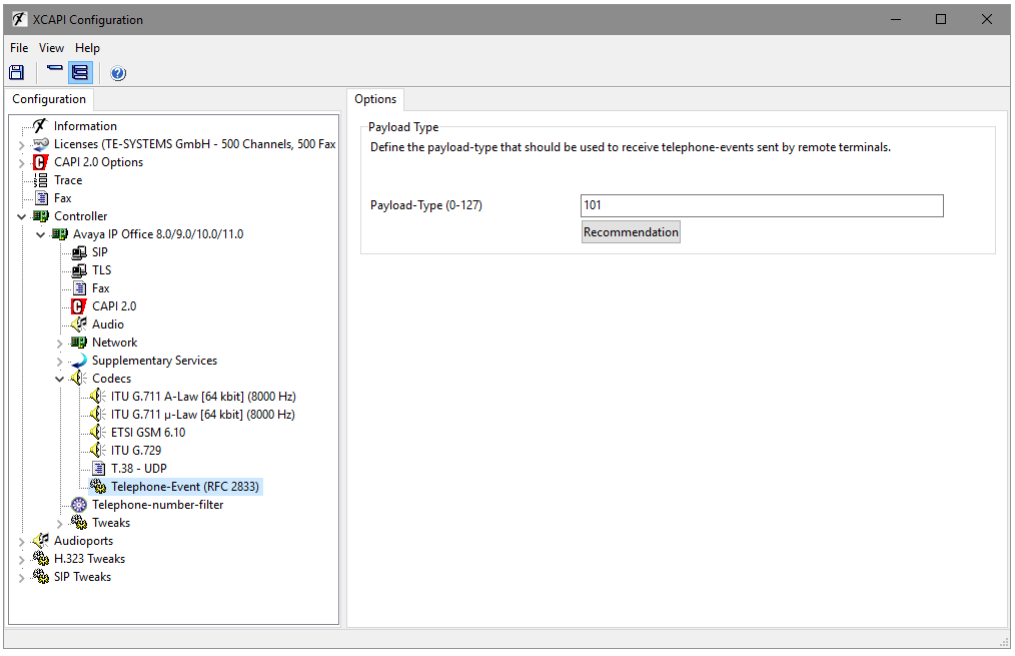


DTMF

The XCAPI controller is set and enabled for RFC2833 with payload value of 101 by default. Ensure that the corresponding Avaya IP Office SIP line for XCAPI is enabled for **RFC2833 DTMF Support** as well and that the global Avaya IP Office **RFC2833 Default Payload** value is set the same. For details please check with the **VoIP** tab of the Avaya IP Office **System Settings** as shown in the same named chapter described on page 9 and the **SIP Line** chapter on page 11.

Please note that the payload value must be set to conform for all participating SIP instances for proper functionality. The required value of the SIP carrier (or SBC) connected to the Avaya IP Office should have priority.

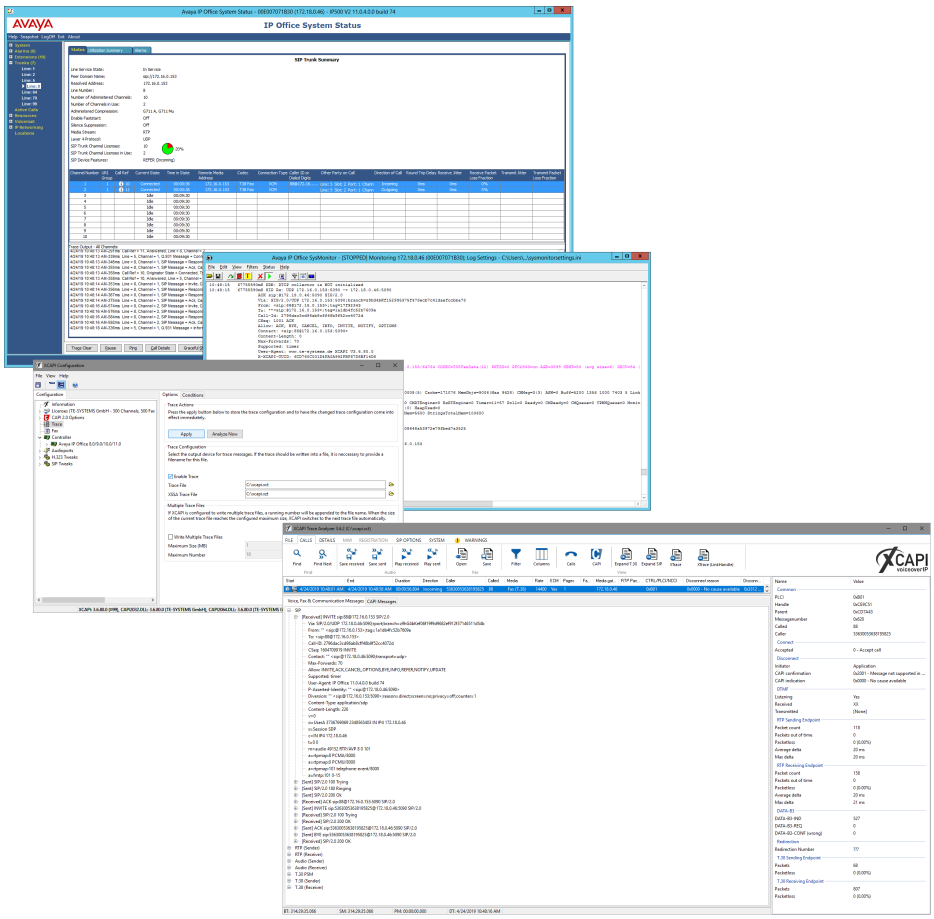
If the value is not 101, the required one should be set for the XCAPI controller



Troubleshooting

Initially we recommend checking the **Avaya IP Office** System Status for any alarms if the XCAPI related SIP trunk and the Avaya IP Office SIP line is **In Service**. Initial debugging can be check with some **Tracing** on the participating trunk lines. For in-depth analyzing, check the **Avaya IP Office SysMonitor**.

For XCAPI troubleshooting please check with an XCAPI trace. Some basic information about using the XCAPI traces will be given in the video XCAPI 08 - Create a trace in our YouTube channel. Contact our sales team for any license related questions or general questions about our products. For support requests, contact our support team with a short and precise description of the issue. Attach a trace showing the described scenario. Please provide any additional information if the infrastructure and VoIP environment is complex. An example of this would be if a connected SIP provider or other SIP instances (like an SBC) are able to provide additional logs. This gives us a more complete overview of the problem. For in-depth analyzing additional Wireshark logs might also being useful, from both, the XCAPI system and the participating Avaya IP Office lines of SIP carriers or SBC's. New e-mail requests to our support system will open a ticket and our ticket system automatically generates a reply with a ticket number. This should always be used for reference purposes. Always refer to that ticket number when doing any e-mail or phone requests.



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„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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