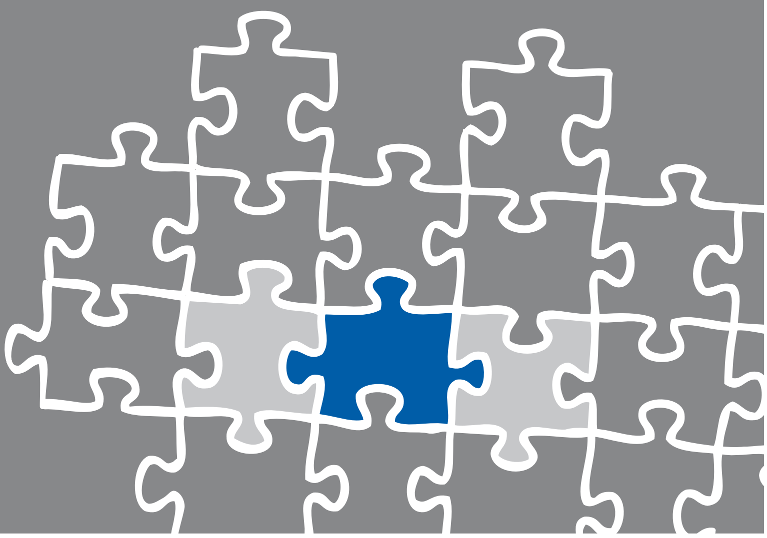
# TechNote

## Patton SmartNode Series

August 20, 2010

XCAPI voiceoverIP



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## Introduction

This document is intended to support you with the integration of the XCAPI, Version 3.3.161, into an existing environment of the Patton SmartNode. Though being based on version R5.5 of the Patton SmartNode it should be applicable to lower versions, given a few adjustments.

In the following sections we describe the essential steps of configuration to allow for optimal cooperation of both the XCAPI and the Patton SmartNode by using the SIP protocol stack. At this point we suppose that the Patton SmartNode, the hardware the XCAPI is running on and both the XCAPI and your CAPI applications are already installed properly.

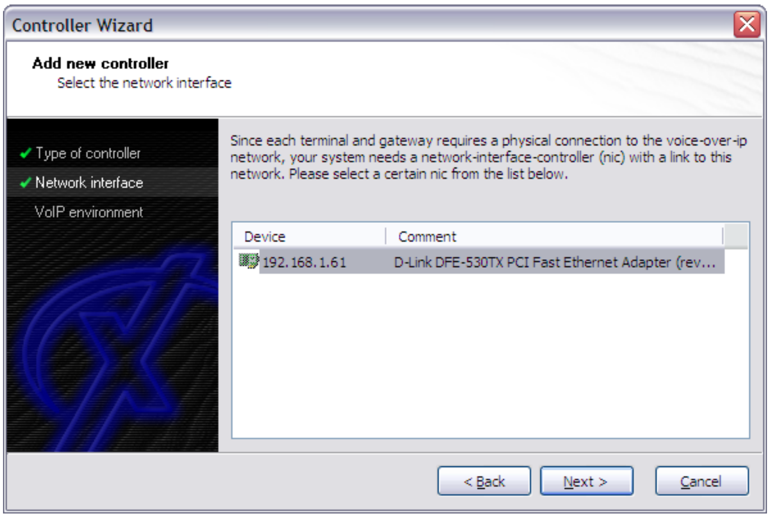
For some extended information on installation procedures please refer to the respective manuals. A short installation manual for the XCAPI is available at the XCAPI Website.

## XCAPI Configuration

Please start up the XCAPI configuration to create a new controller assigned to the Patton SmartNode. If you've just installed the XCAPI and start the configuration tool for the first time, the XCAPI Controller Wizard will pop up automatically. This will also happen if there's no controller configured at all. To start up the XCAPI Controller Wizard on your own, just click the hyperlink labelled Click here to add a controller on the main page of the XCAPI configuration tool. On the first page of the Controller Wizard please select the Add Voice-over-IP controller (VoIP) option and continue by clicking on the Next button.

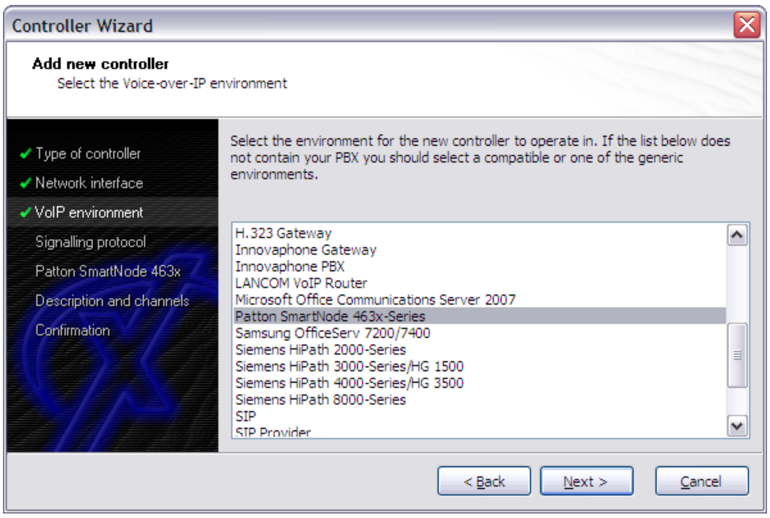
## 2.1 Network Interface

On this page of the XCAPI Controller Wizard you can select the network interface you want to bind to the XCAPI controller.



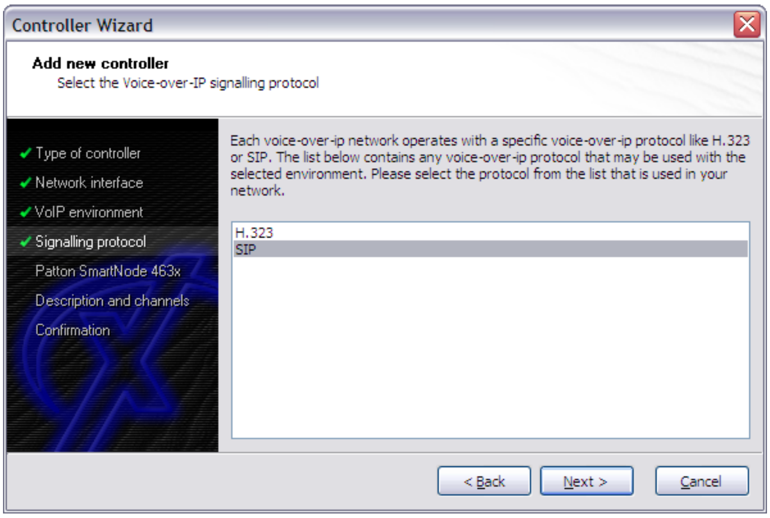

## 2.2 Voice-over-IP Environment

The next dialog of the configuration tool shows a list of some common Voice-over-IP environments. Selecting one of those will configure the XCAPI with a selection of near-optimal presets for the kind of environment you have, sparing you quite a lot of manual configuration.



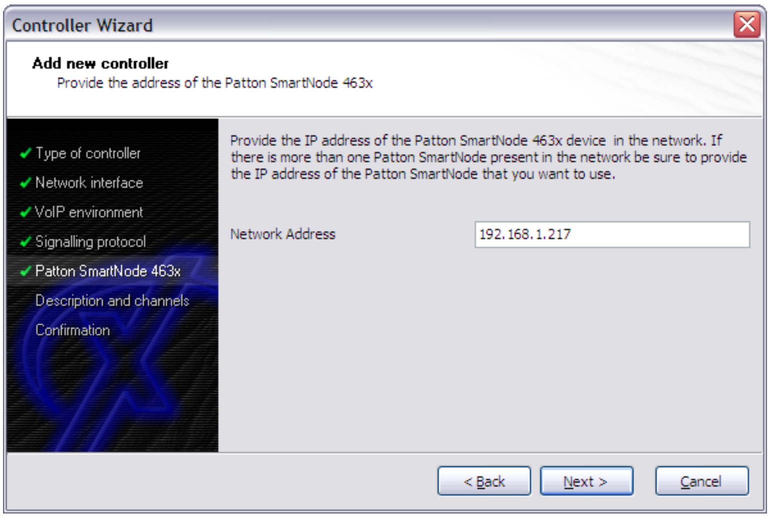
## 2.3 Signalling Protocol

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



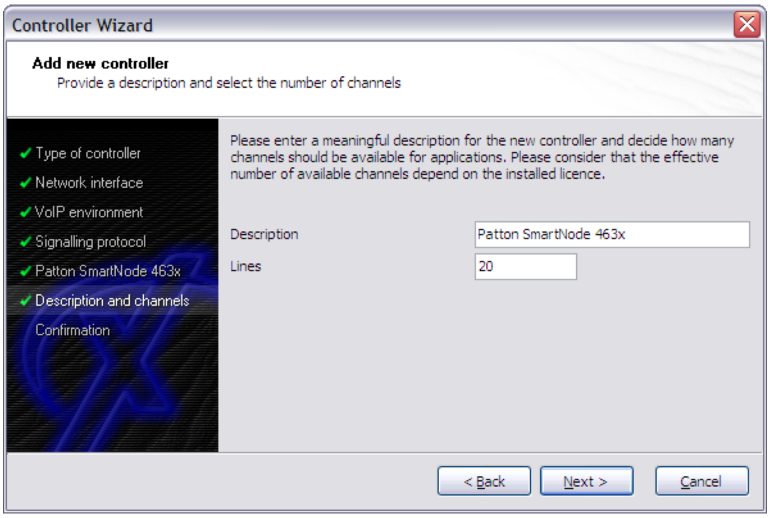

## 2.4 IP Address of the Patton SmartNode

In the dialog Network Address please provide the IP address of your Patton SmartNode.



## 2.5 Description and Channels

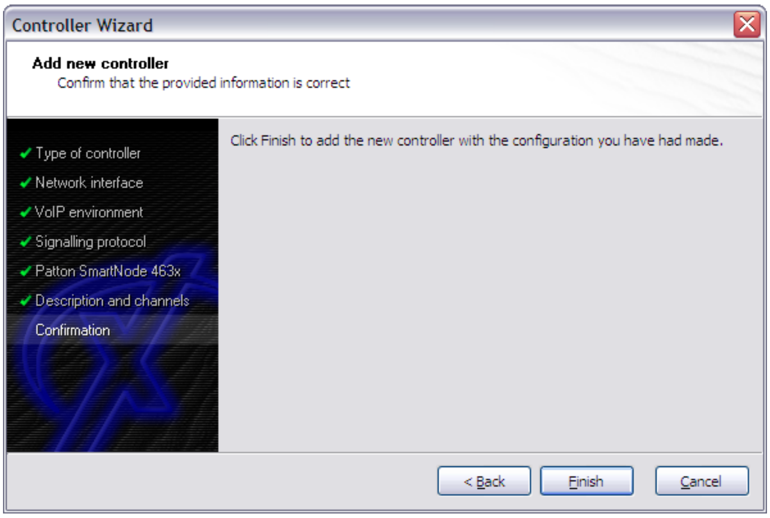
That's about all information that has to be configured with the XCAPI. The next-to-final dialog of the Controller Wizard allows you to configure a meaningful description for the controller you're going to create. This isn't really used anywhere, so you can enter a text of your choice here. This dialog, however, also allows configuring the number of channels that the new controller will be able to provide. Please enter how many simultaneous connections the XCAPI should handle when communicating with the Patton SmartNode.



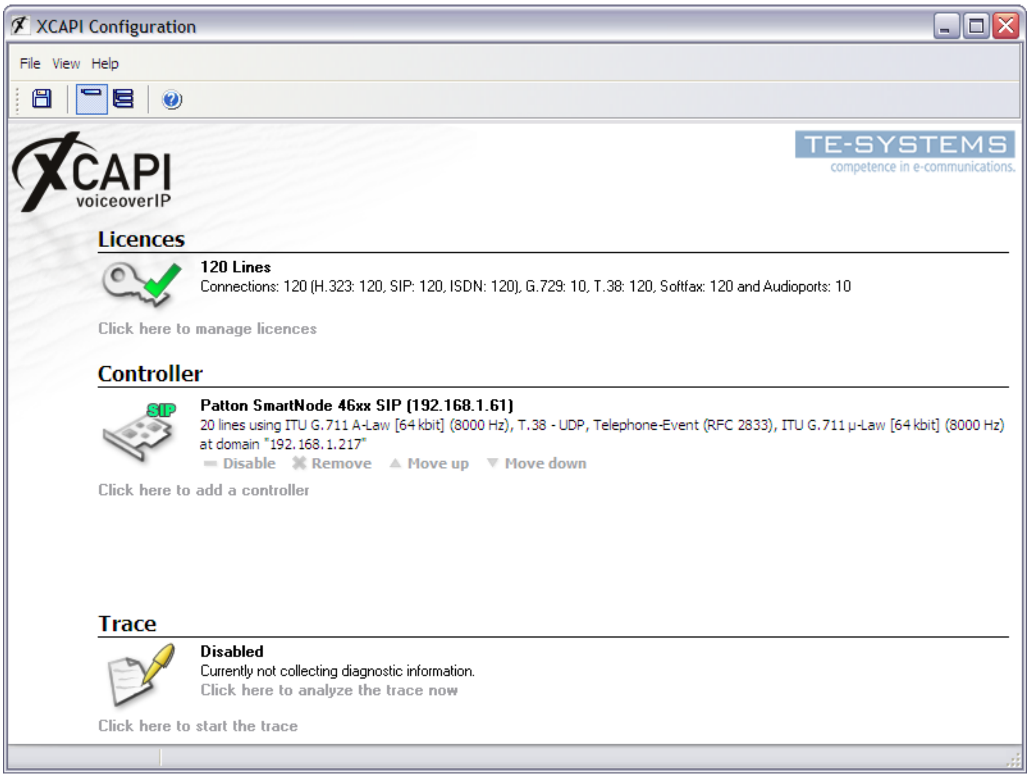

## 2.6 Confirmation

The final dialog of the Controller Wizard performs some checks on the configuration parameters you've made. If any errors are detected here, you can go back to the respective dialogs and correct the necessary input.

If everything is correct please use the Finish button in order to finally create the new controller.




The controller you've just created now will appear on the main page of the XCAPI configuration. As we're now finished with all XCAPI-related configuration tasks, please save the changes you've made and exit the configuration tool.



# Configuring the SmartNode Gateway

In order to establish the communication between the XCAPI and the Patton SmartNode using the SIP protocol, you need to create the XCAPI as a SIP interface with all its according configurations. In common, the easiest way is to customize the running configuration (running.cfg) at your local machine and uploading the modifications back again to the SmartNode gateway.

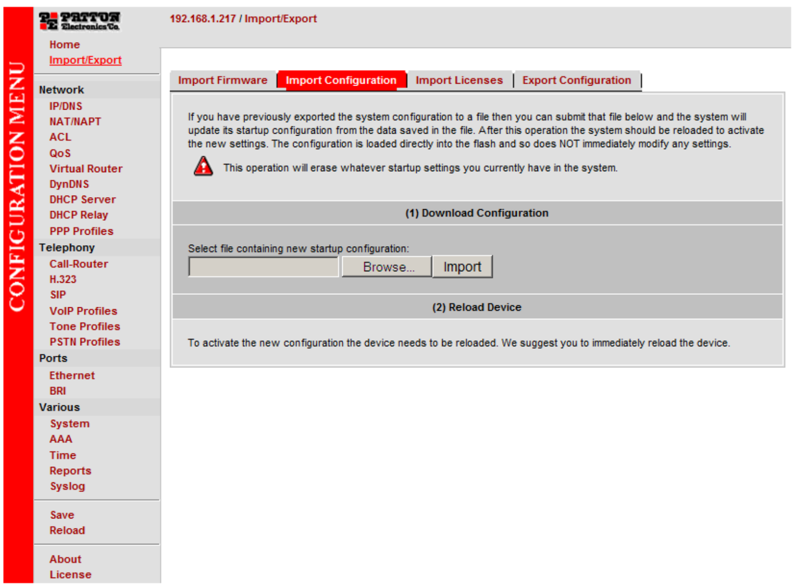
If you have any doubts, please review the SmartNode configuration guides.

However, you can find some configuration examples within our community download section based on a SmartNode 4634 using BRI ports. Convey the necessary configuration parts to your running config. Take care of the IP addresses, SIP ports, BRI/PRI ports and call routes. Keep always in mind that there might be slight differences between the CLI versions, the SmartNode models and the firmware you are using currently.

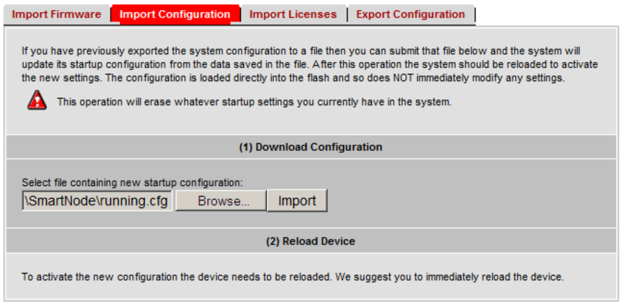
Do not import, export or edit any configuration files without having any knowledge about! Any configuration import is at your own risk!

## 3.1 Configuration Import

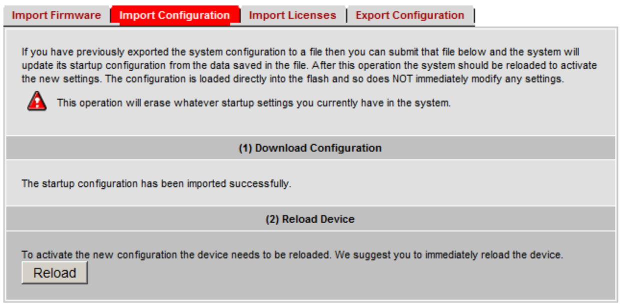
This chapter describes a customized running configuration (running.cfg) import, which can be done via the Import/Export configuration dialog. Please take notice of each dialog's instructions.



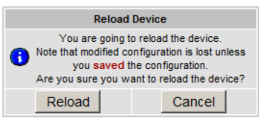
The adapted configuration file needs to be selected within Import Configuration dialog.
Use the Import button for proceeding the process.




When the startup configuration has been imported successfully you can proceed with reloading the SmartNode device.

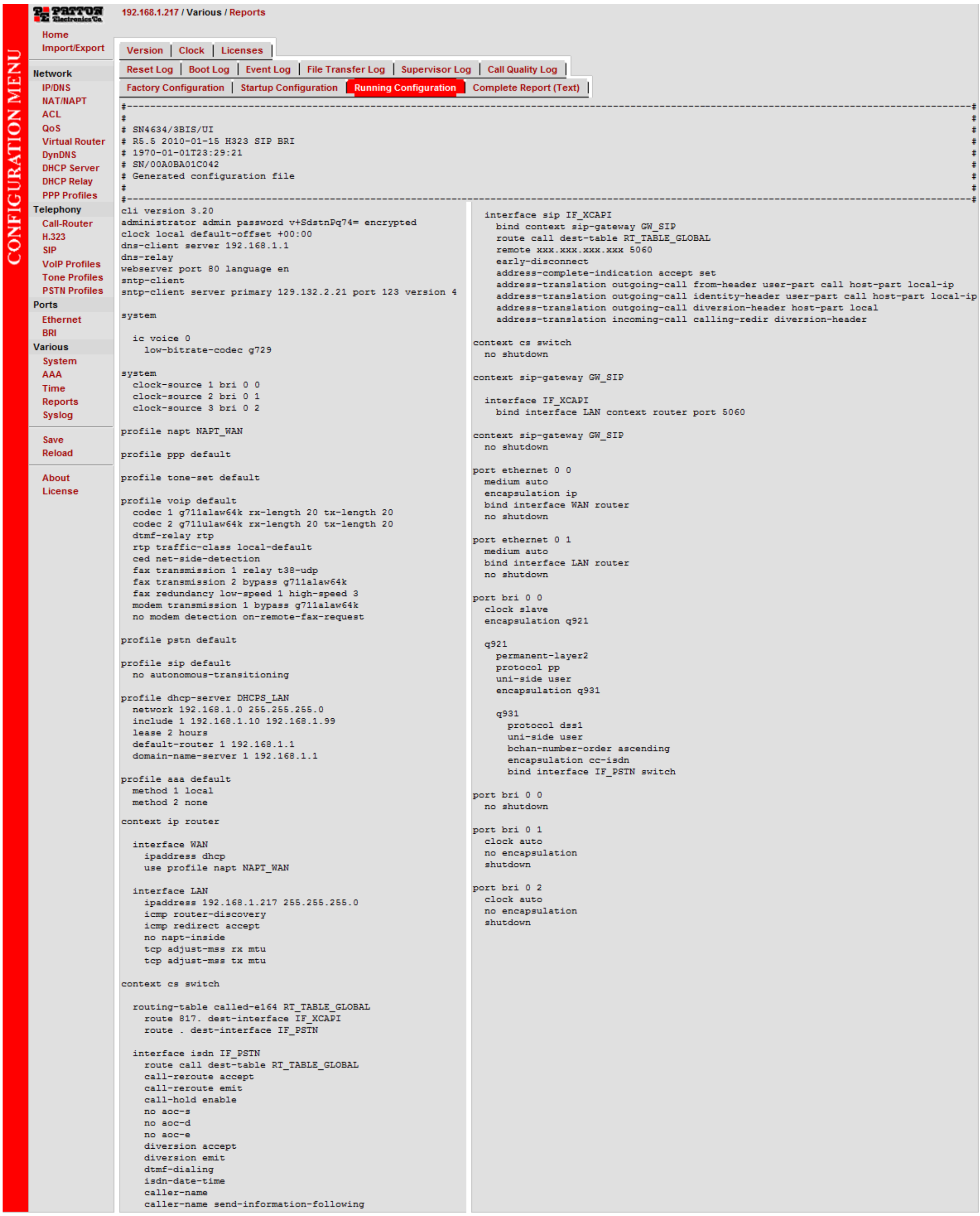



Finally you will be informed about the SmartNode saving mechanism. Invoke the reload process for running the new configuration.



## 3.2 Running Configuration

Review the running configuration to ensure that your import was successful.
The following screenshot is only a summary of the most relevant settings.



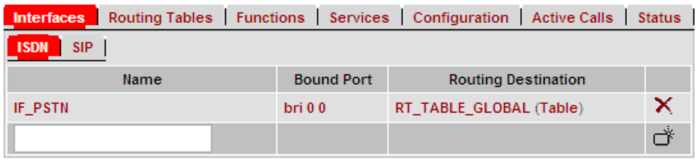

```
#----------------------------------------------------------------------------------#
#                                                                                  #
# SN4634/3BIS/UI                                                                   #
# R5.5 2010-01-15 H323 SIP BRI                                                     #
# 1970-01-01T23:29:21                                                              #
# SN/00A0BA01C042                                                                  #
# Generated configuration file                                                     #
#                                                                                  #
#----------------------------------------------------------------------------------#
cli version 3.20
administrator admin password v+SdstnPq74= encrypted
clock local default-offset +00:00
dns-client server 192.168.1.1
dns-relay
webserver port 80 language en
sntp-client
sntp-client server primary 129.132.2.21 port 123 version 4

system

  ic voice 0
    low-bitrate-codec g729

system
  clock-source 1 bri 0 0
  clock-source 2 bri 0 1
  clock-source 3 bri 0 2

profile napt NAPT_WAN

profile ppp default

profile tone-set default

profile voip default
  codec 1 g711alaw64k rx-length 20 tx-length 20
  codec 2 g711ulaw64k rx-length 20 tx-length 20
  dtmf-relay rtp
  rtp traffic-class local-default
  ced net-side-detection
  fax transmission 1 relay t38-udp
  fax transmission 2 bypass g711alaw64k
  fax redundancy low-speed 1 high-speed 3
  modem transmission 1 bypass g711alaw64k
  no modem detection on-remote-fax-request

profile pstn default

profile sip default
  no autonomous-transitioning

profile dhcp-server DHCPS_LAN
  network 192.168.1.0 255.255.255.0
  include 1 192.168.1.10 192.168.1.99
  lease 2 hours
  default-router 1 192.168.1.1
  domain-name-server 1 192.168.1.1

profile aaa default
  method 1 local
  method 2 none

context ip router

  interface WAN
    ipaddress dhcp
    use profile napt NAPT_WAN

  interface LAN
    ipaddress 192.168.1.217 255.255.255.0
    icmp router-discovery
    icmp redirect accept
    no napt-inside
    tcp adjust-mss rx mtu
    tcp adjust-mss tx mtu

context cs switch

  routing-table called-e164 RT_TABLE_GLOBAL
    route 817. dest-interface IF_XCAPI
    route . dest-interface IF_PSTN

  interface isdn IF_PSTN
    route call dest-table RT_TABLE_GLOBAL
    call-reroute accept
    call-reroute emit
    call-hold enable
    no aoc-s
    no aoc-d
    no aoc-e
    diversion accept
    diversion emit
    dtmf-dialing
    isdn-date-time
    caller-name
    caller-name send-information-following

  interface sip IF_XCAPI
    bind context sip-gateway GW_SIP
    route call dest-table RT_TABLE_GLOBAL
    remote xxx.xxx.xxx.xxx 5060
    early-disconnect
    address-complete-indication accept set
    address-translation outgoing-call from-header user-part call host-part local-ip
    address-translation outgoing-call identity-header user-part call host-part local-ip
    address-translation outgoing-call diversion-header host-part local
    address-translation incoming-call calling-redir diversion-header

context cs switch
  no shutdown

context sip-gateway GW_SIP

  interface IF_XCAPI
    bind interface LAN context router port 5060

context sip-gateway GW_SIP
  no shutdown

port ethernet 0 0
  medium auto
  encapsulation ip
  bind interface WAN router
  no shutdown

port ethernet 0 1
  medium auto
  bind interface LAN router
  no shutdown

port bri 0 0
  clock slave
  encapsulation q921

  q921
    permanent-layer2
    protocol pp
    uni-side user
    encapsulation q931

    q931
      protocol dss1
      uni-side user
      bchan-number-order ascending
      encapsulation cc-isdn
      bind interface IF_PSTN switch

port bri 0 0
  no shutdown

port bri 0 1
  clock auto
  no encapsulation
  shutdown

port bri 0 2
  clock auto
  no encapsulation
  shutdown
```

## SmartNode Configuration details

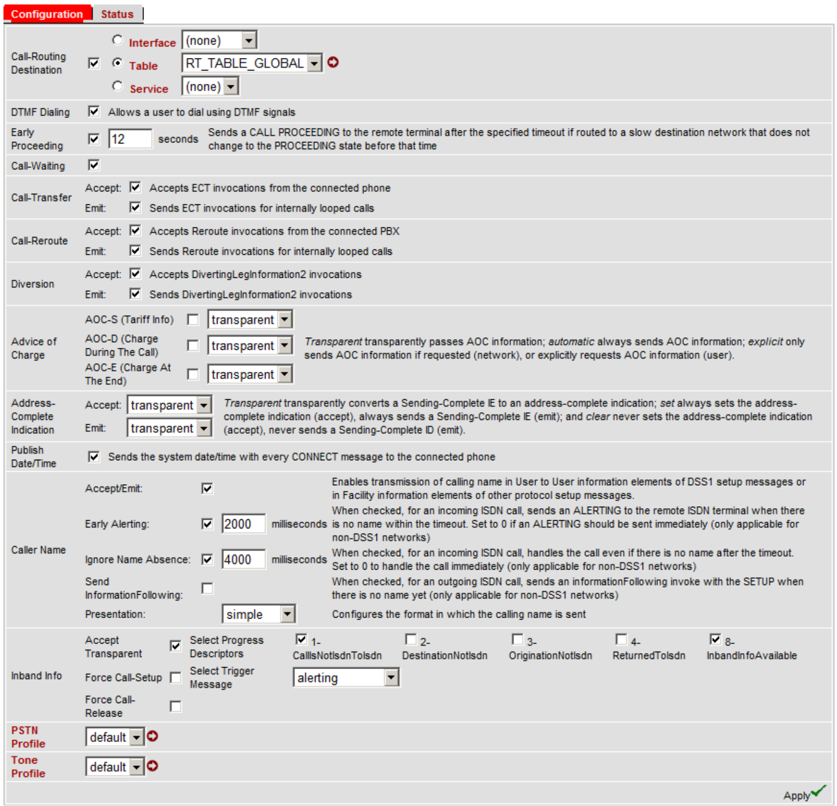
Next we show, based on the imported running.cfg file, some configuration details.
Some enhanced configurations, such as mapping tables, might be used.

### 4.1 ISDN Interface

The ISDN interface configuration is used with the default values and profiles.
The here described ISDN interface named IF_PSTN is bound to port bri 0 0, as described in the chapter BRI Port Configuration starting on page 16.

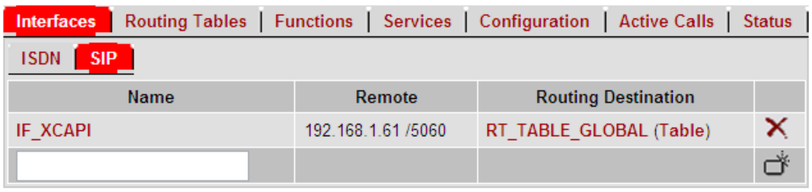



The Call-Routing Destination is related to the RT_TABLE_GLOBAL table as described in the chapter Routing and Mapping Tables starting on page 12.

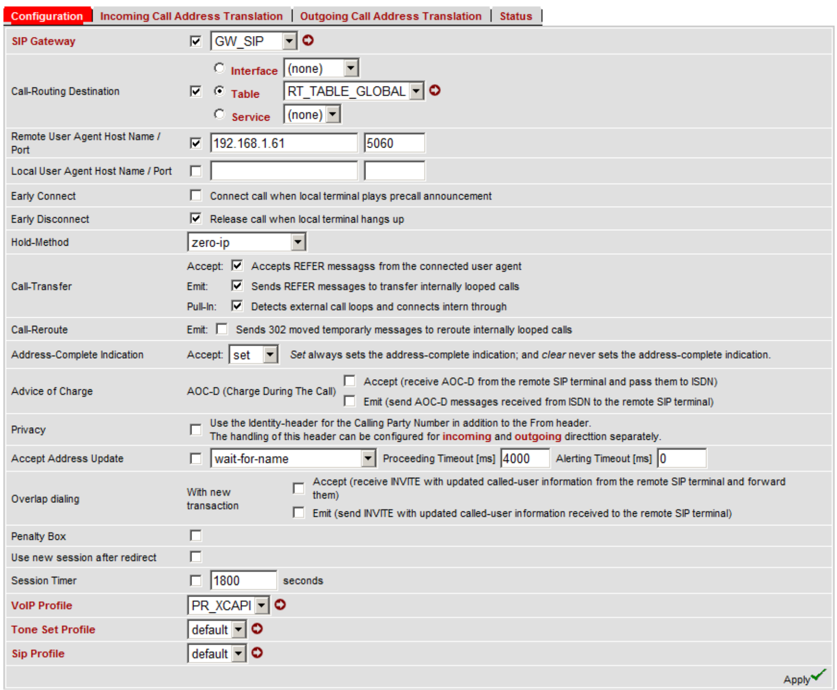


## 4.2 SIP Interface

The SIP interface, in this example named IF_XCAPI, is assigned to the IP address 192.168.1.61 by using the default SIP port 5060, which represents the application server and its properly running XCAPI. This interface is related to the SIP gateway named GW_SIP, as described in the chapter SIP Gateway on page 14. The SIP interface is also assigned to the call routing destination table RT_TABLE_GLOBAL as described in chapter Routing and Mapping Tables starting on page 12.

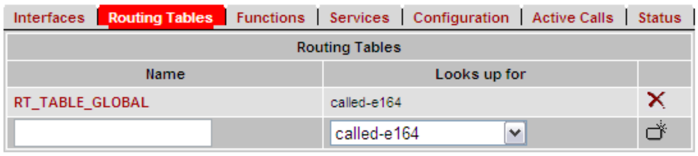



The tone set and SIP profile are used with their default values whilst the VoIP profile is related to PR_XCAPI, see chapter VoIP Profiles on page 14. The call transfer options must be configured by your needs. For this example these options are enabled. All other parameters are not set or used with their default values.



## 4.3 Routing and Mapping Tables

The routing and mapping tables for this configuration example are used as described next. The routing table, named RT_TABLE_GLOBAL, looks up for the called-e164 number for routing calls based on the called party E.164 number.

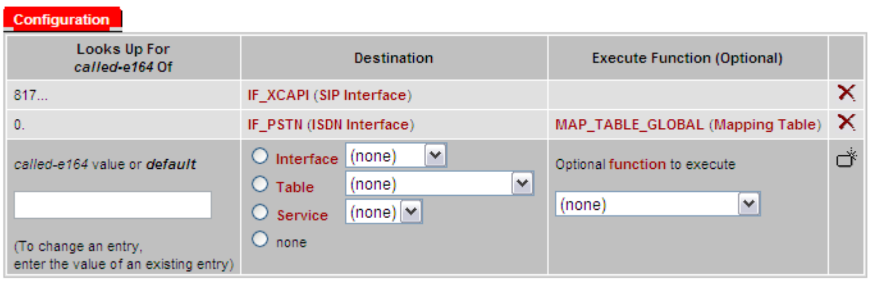

Interfaces | Routing Tables | Functions | Services | Configuration | Active Calls | Status

Routing Tables

| Name | Looks up for | |
|---|---|---|
| RT_TABLE_GLOBAL | called-e164 | |
| | called-e164 | |

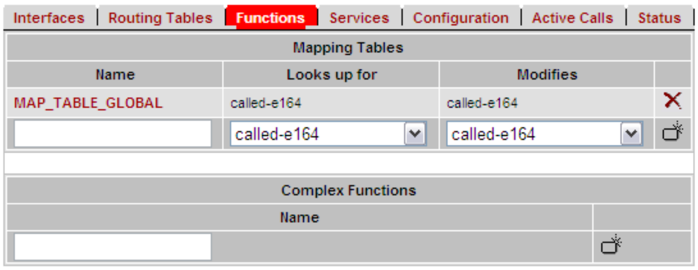
For this example, all matching numbers starting with 817 will be routed to the SIP interface destination named IF_XCAPI.

The prefix 0 is used for routing all inbound calls to the PSTN BRI interface named IF_PSTN. The related Mapping Table function, named MAP_TABLE_GLOBAL, is configured as follows.

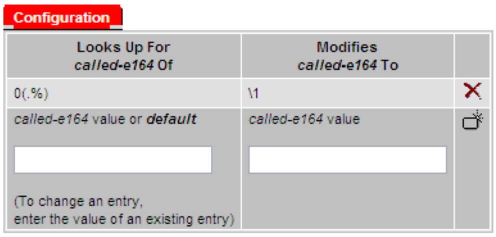

Configuration

| Looks Up For *called-e164* Of | Destination | Execute Function (Optional) | |
|---|---|---|---|
| 817... | IF_XCAPI (SIP Interface) | | |
| 0. | IF_PSTN (ISDN Interface) | MAP_TABLE_GLOBAL (Mapping Table) | |
| *called-e164* value or ***default*** (To change an entry, enter the value of an existing entry) | Interface (none) Table (none) Service (none) none | Optional function to execute (none) | |

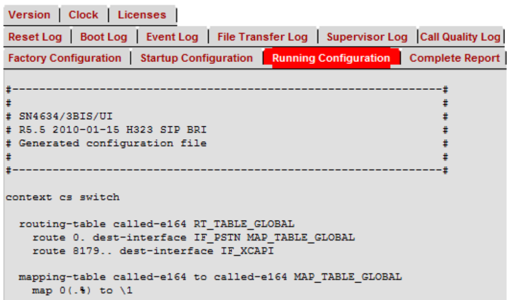
The mapping table, named MAP_TABLE_GLOBAL, looks up the called-e164 number.




The mapping table, named MAP_TABLE_GLOBAL, is used for deleting the matching PSTN prefix number 0.

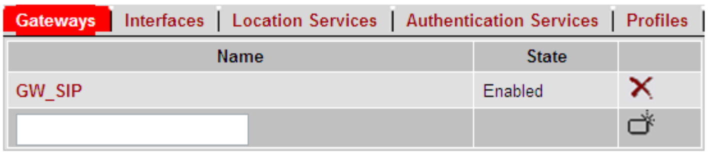



The according configuration entries are clearly arranged.

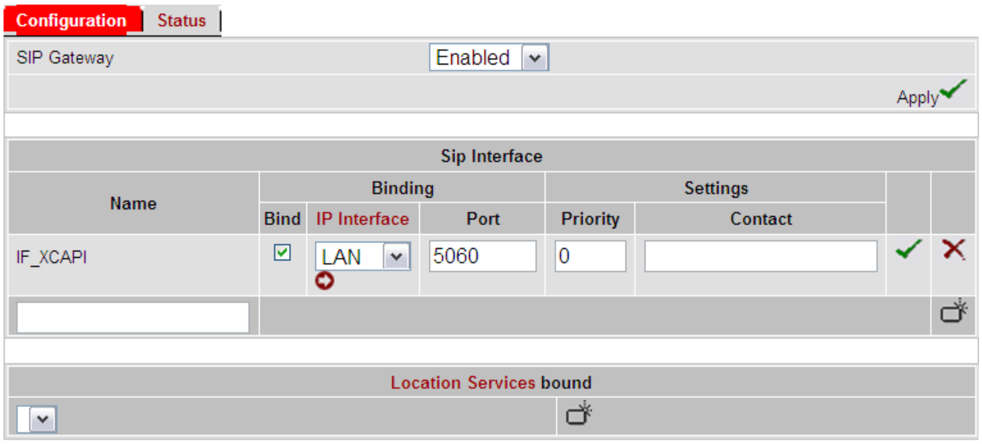


## 4.4 SIP Gateway

The SIP gateway must be enabled and related to the according XCAPI SIP interface, as described in the chapter SIP Interface on page 11.

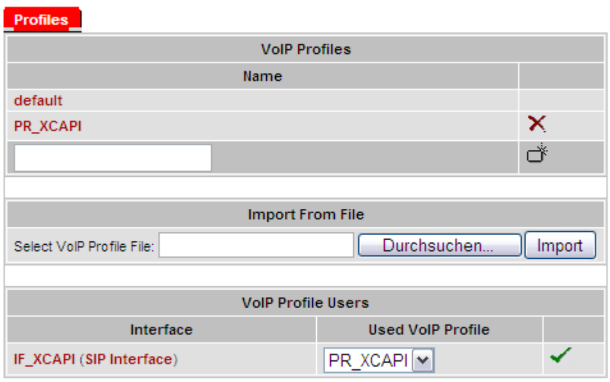



It's bound to the LAN IP interface, see chapter LAN Interface on page 18 and related to the default SIP port 5060.

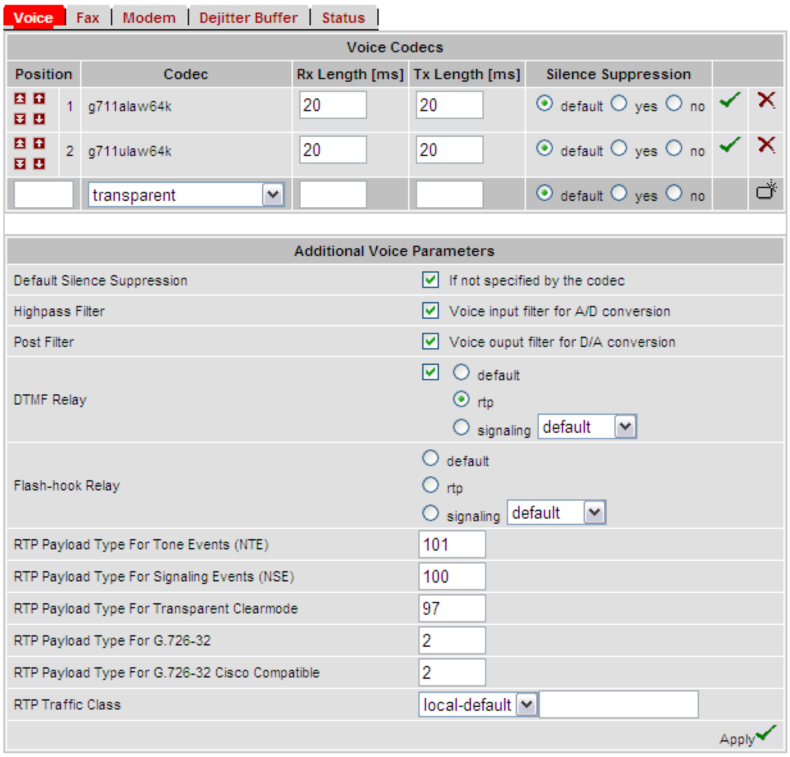



## 4.5 VoIP Profiles

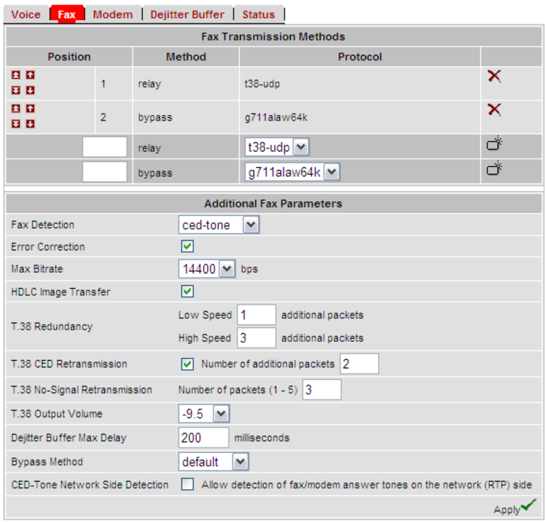
The PR_XCAPI VoIP Profile is related to the XCAPI SIP interface. Beside of the default values, the voice codecs g711alaw64k and g711ulaw64k are used with a frame size of 20ms.



Please ensure that beside of the selected voice codecs and the configuration of the additional voice parameters, the fax transmission methods and the configuration of the additional fax parameters are in accordance with the XCAPI controller configuration.

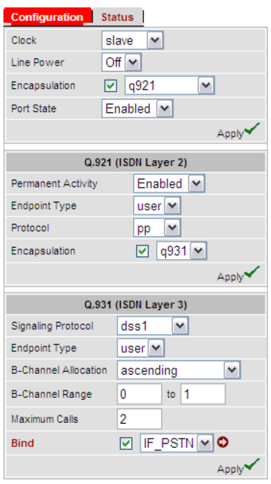


In this example, the t38-udp protocol is used for facsimile transmissions, which is also set as default fax codec within the XCAPI controller configuration. To avoid any T.38 interoperability problems, please move the t38-udp codec to the first position. Additional information can be found in the T.38 chapter starting on page 20.



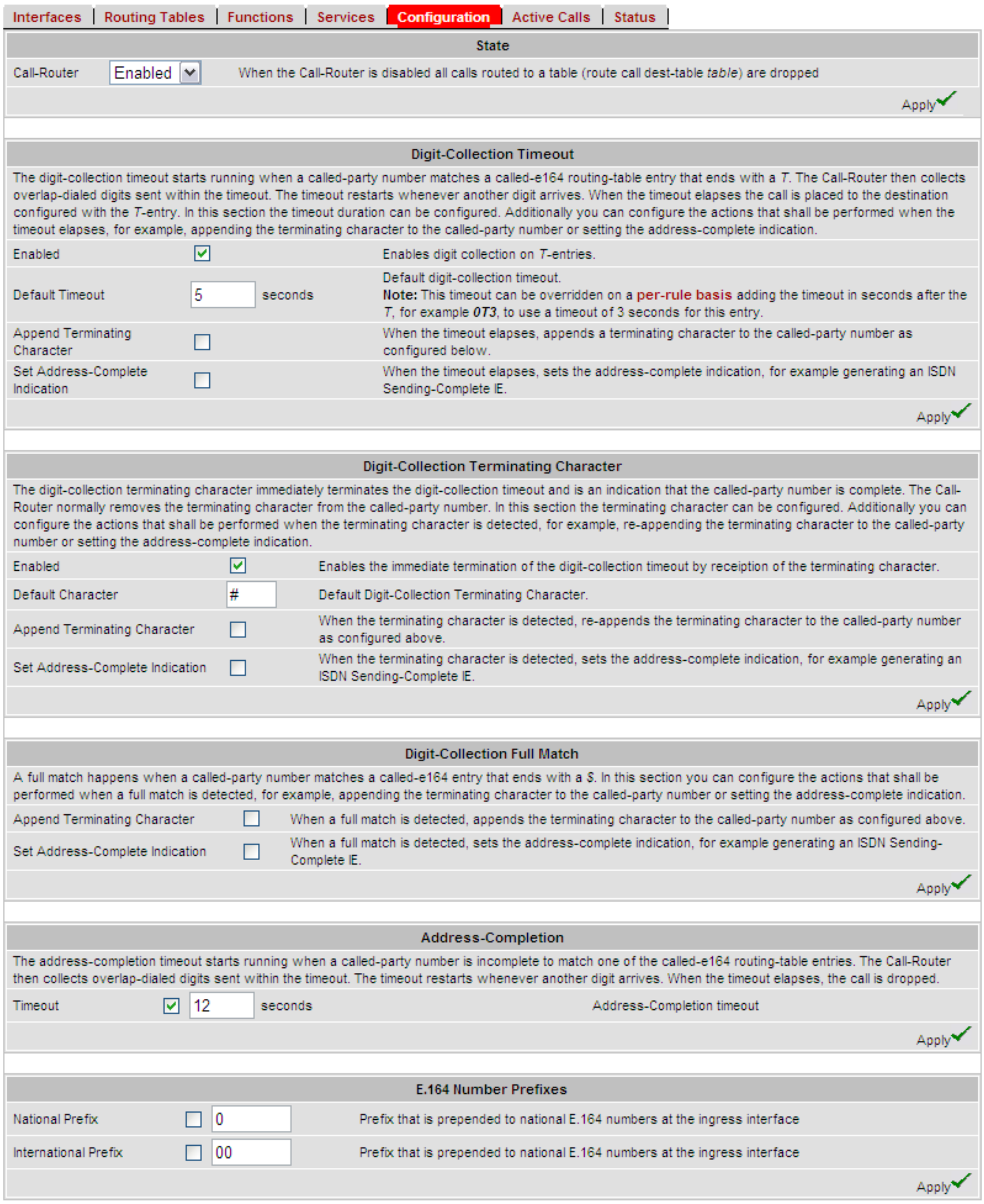

## 4.6 BRI Port Configuration

The BRI Port Configuration is not relevant for setting up any SIP trunk configuration at all and it is just shown to see this configuration example as a whole. The clock, the Q.921 and Q.931 settings must be adapted to your BRI/PRI connection. You can verify the link state within the status tab.



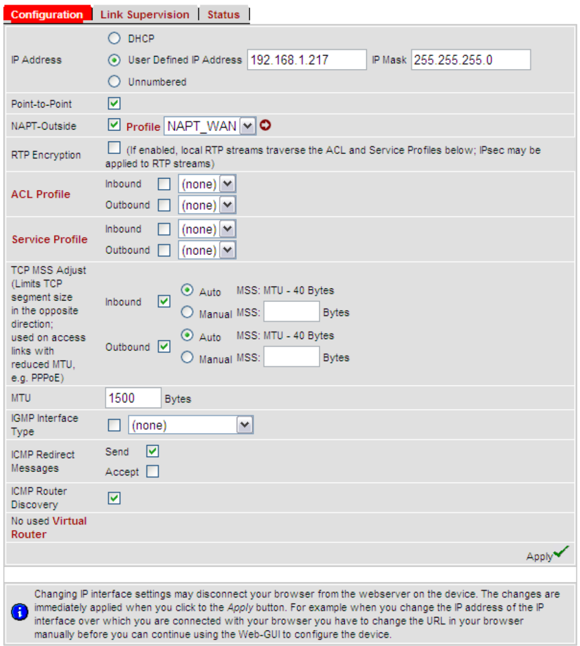
## 4.7 Call-Router Configuration

The Patton SmartNode call-router configuration is also used with the default settings.



## 4.8 LAN Interface

This SmartNode gateway is running with the user defined IP address 192.168.1.217 and configured as shown on the next screenshot.

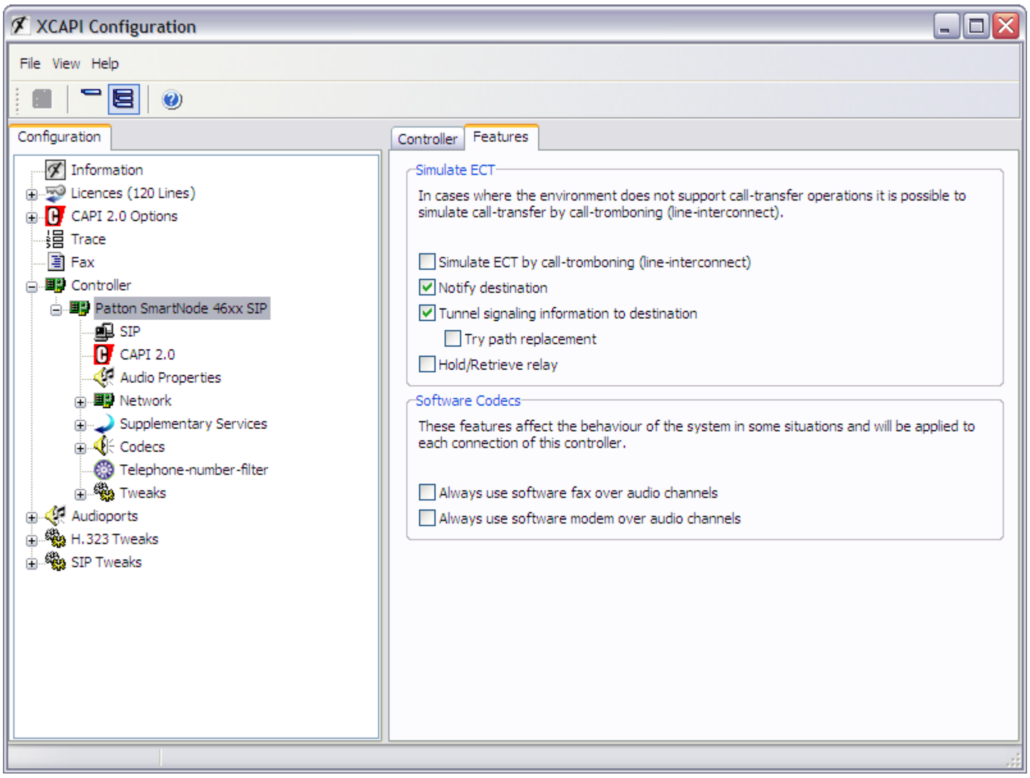


## Supplementary Services

Please review the following chapters for some information on optimal supplementary services configuration.

### 5.1 Call Transfer

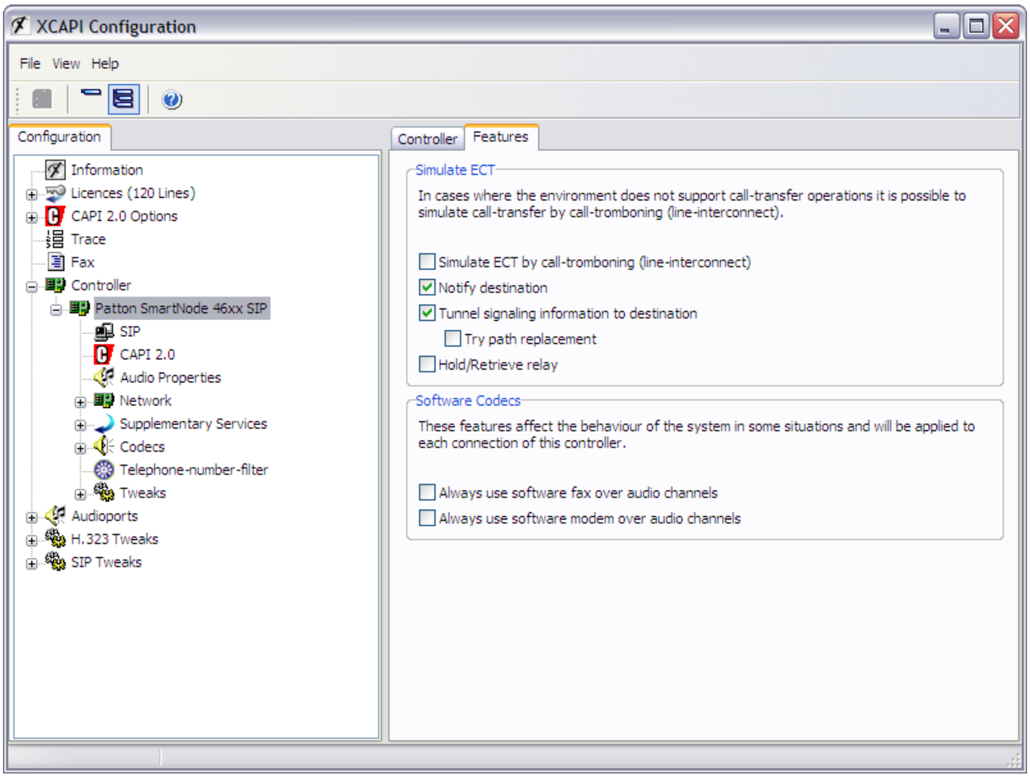
Please ensure that the Simulated ECT by call-tromboning (line-interconnect) parameter of the XCAPI controller Features dialog is not activated for supporting call transfers via the SIP refer method. You may have to adapt the according call transfer parameters of the SmartNode ISDN and SIP interface configuration, as described in the chapters ISDN and SIP Interface starting on page 10.



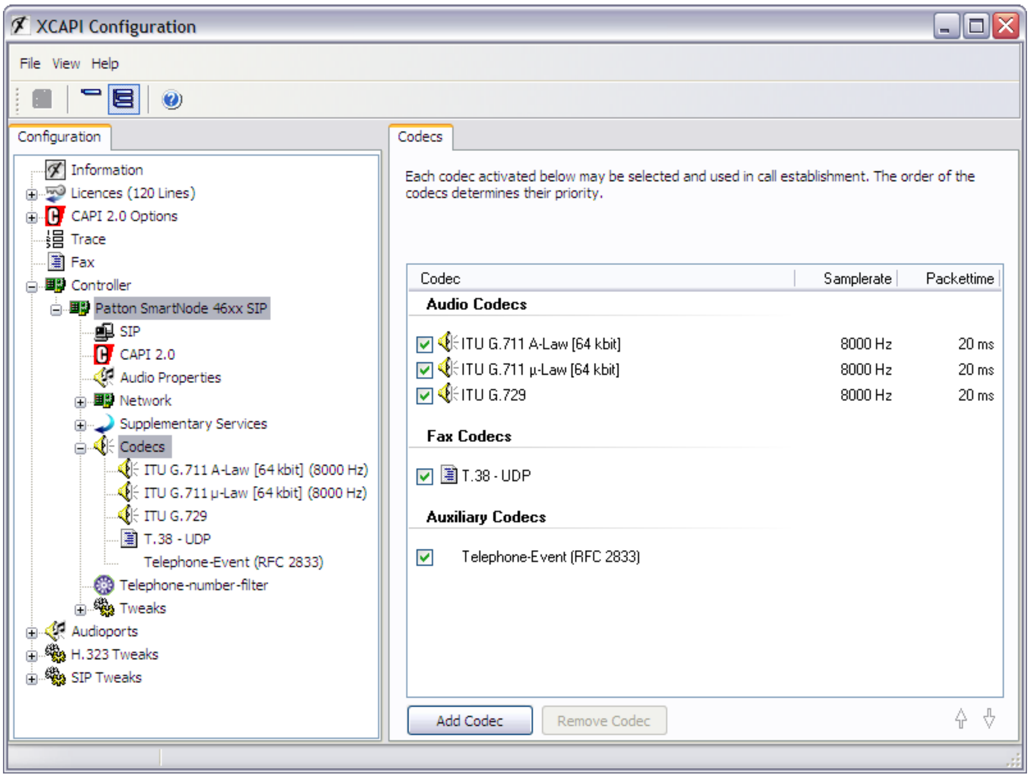
## 5.2 T.38

When using the T.38 protocol you have to enable the t38-udp method, as already described in the chapter VoIP Profiles on page 14, in the related XCAPI VoIP profile.

It is also required to disable the Always use software fax over audio channels option within the XCAPI controller Features dialog.

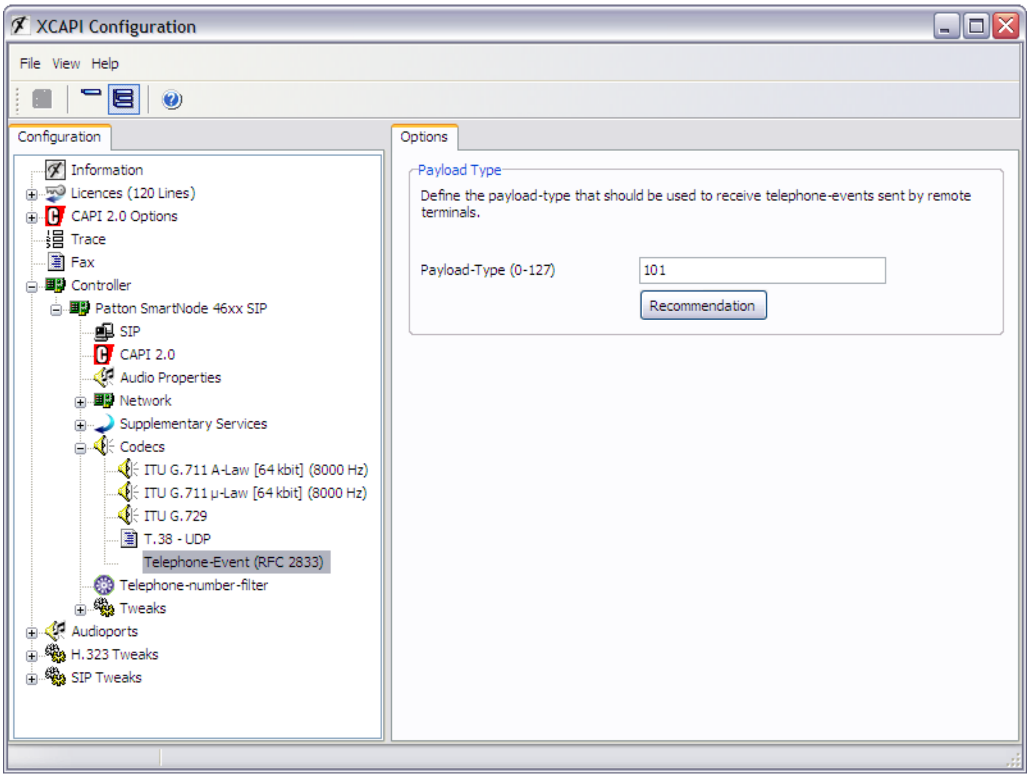


Ensure that the T.38 - UDP codec, which should be set by default when using the XCAPI controller wizard, is set and enabled.



## 5.3 DTMF

The payload type for signalling Telephone Events via RFC 2833 is by default set to value 101. For DTMF interoperability please ensure that the rtp option, as shown in the chapter VoIP Profiles starting on page 14, is selected as DTMF relay method within the Additional Voice Parameters configuration dialog, and that the RTP Payload Type For Tone Events (NTE) is also set to 101.



# Troubleshooting

Use the CLI interface via telnet connection for appropriate debugging. Please refer to the SmartWare Software Configuration Guide for detailed debug information.

## 6.1 Debug Call Routes

Next, we give you a short example about debugging your call routes. For this please login and enable the configuration mode.

```
SmartNode>enable
SmartNode#configure
SmartNode(cfg)#
```

Use the debug call-control or debug call router detail 5 command for enabling the debug output. It's recommended to verify the inbound, outbound and all other configured call routes. The following debug output shows that the dialed number 00536381950 completely matches the prefix 0. of the RT_TABLE_GLOBAL table. Afterwards the dialed number becomes mapped by the MAP_TABLE_GLOBAL definition and the call will be placed to the IF_PSTN interface which is bound to the BRI port.

```
SmartNode(cfg)#debug call-router detail 5

17:28:51  CR   > [switch] Routing-Lookup:
17:28:51  CR   >   Execute all entries in table IF_XCAPI-precall-service
17:28:51  CR   >   Find best-matching called- entry in table RT_TABLE_GLOBAL
17:28:51  CR   >     00: Prefix Timeout Expression: called-e164 of 00536381950 completely matches ^(?:0.)
17:28:51  CR   >     01: Prefix Timeout Expression: called-e164 of 00536381950 does not match ^(?:8179..)
17:28:51  CR   >     02: Prefix Timeout Expression: called-e164 of 00536381950 does not match ^(?:8178..)
17:28:51  CR   >     03: Prefix Timeout Expression: called-e164 of 00536381950 does not match ^(?:8172..)
17:28:51  CR   >     Selecting entry 0
17:28:51  CR   >   Find best-matching called- entry in table MAP_TABLE_GLOBAL
17:28:51  CR   >     00: Prefix Timeout Expression: called-e164 of 00536381950 completely matches ^(?:0(.*))
17:28:51  CR   >     Selecting entry 0
17:28:51  CR   >     Execute Expression: called-e164 changed to '0536381950'
17:28:51  CR   >   Execute all entries in table IF_PSTN-dest
17:28:51  CR   >   Execute all entries in table route-found-place-call
17:28:51  CR   >   Lookup result: Route found; place call (timeout=0)

SmartNode(cfg)#no debug call-router
```

The next debug output shows that an incoming call of the IF_PSTN interface completely matches the prefix 8179.. of the RT_TABLE_GLOBAL table. Afterwards the call of the found route becomes placed to the IF_XCAPI interface.

```
SmartNode(cfg)#debug call-router detail 5

17:39:35  CR   > [switch] Routing-Lookup:
17:39:35  CR   >   Execute all entries in table IF_PSTN-precall-service
17:39:35  CR   >   Find best-matching called- entry in table RT_TABLE_GLOBAL
17:39:35  CR   >     00: Prefix Timeout Expression: called-e164 of 817900 does not match ^(?:0.)
17:39:35  CR   >     01: Prefix Timeout Expression: called-e164 of 817900 completely matches ^(?:8179..)
17:39:35  CR   >     02: Prefix Timeout Expression: called-e164 of 817900 does not match ^(?:8178..)
17:39:35  CR   >     03: Prefix Timeout Expression: called-e164 of 817900 does not match ^(?:8172..)
17:39:35  CR   >     Selecting entry 1
17:39:35  CR   >   Execute all entries in table IF_XCAPI-dest
17:39:35  CR   >   Execute all entries in table route-found-place-call
17:39:35  CR   >   Lookup result: Route found; place call (timeout=0)

SmartNode(cfg)#no debug call-router
```

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