# Unify OpenScape 4000 V8 & V10

XCAPI voiceoverIP

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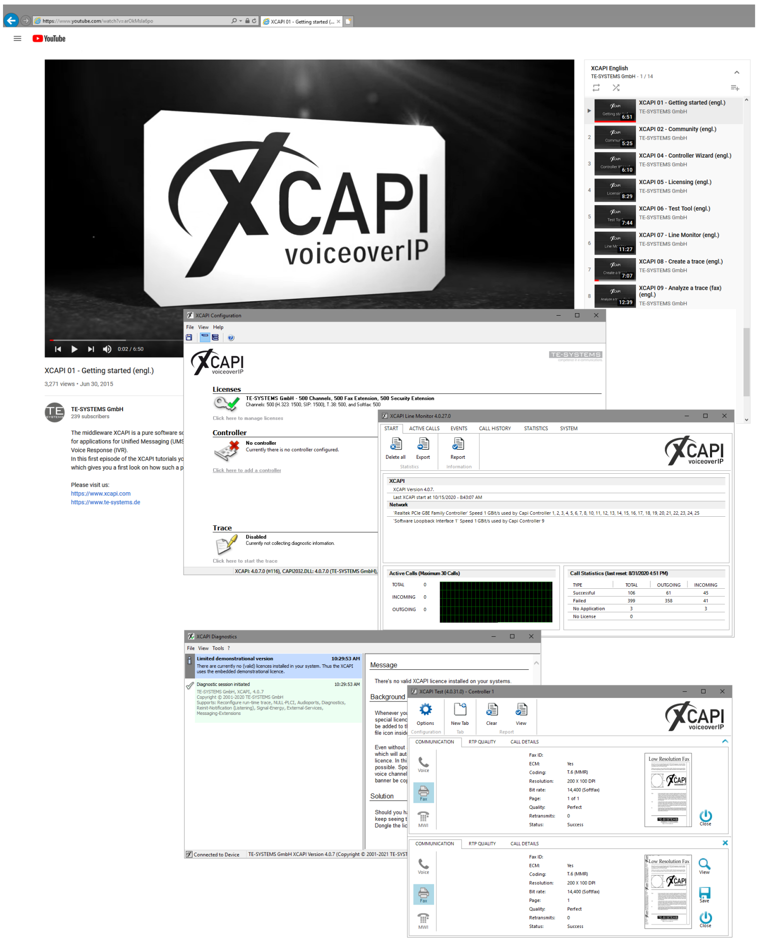
## Contents

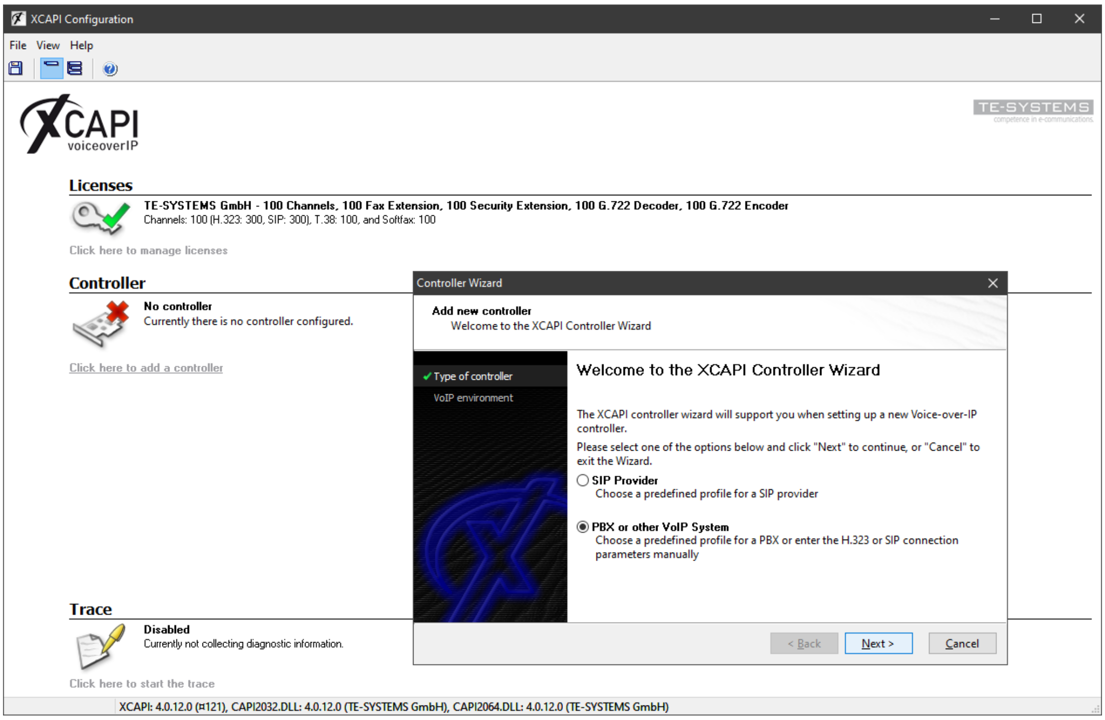
## Introduction

This document is intended to support you with the integration of XCAPI into an environment of the Unify OpenScape 4000 series. In the following sections we describe the configuration steps for SIP trunking to allow optimal performance of both, XCAPI and the Unify OpenScape 4000. Though being based on the Unify OpenScape 4000 V8 & V10 and XCAPI 3.6.95 versions, this document is applicable with other versions given a few adjustments.
At this point we assume that the Unify OpenScape 4000 environment and the physical or virtual application server is available and accessible through the network. Application server in this context means, a server with a recent installed Microsoft Windows operating system with all updates and patches included. It is important that XCAPI and the CAPI 2.0 voice or fax application is properly installed. Independent of the deployed CAPI 2.0 application, the SIP trunk configuration can initially be tested with the **xtest.exe** application which is located in the XCAPI installation folder (by default `\\Program Files (x86)\TE-SYSTEMS\XCAPI\`).
This test tool allows to check inbound and outbound calls, fax and testing several supplementary services. We recommend a visit to 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 XCAPI documents, TechNotes and versions.



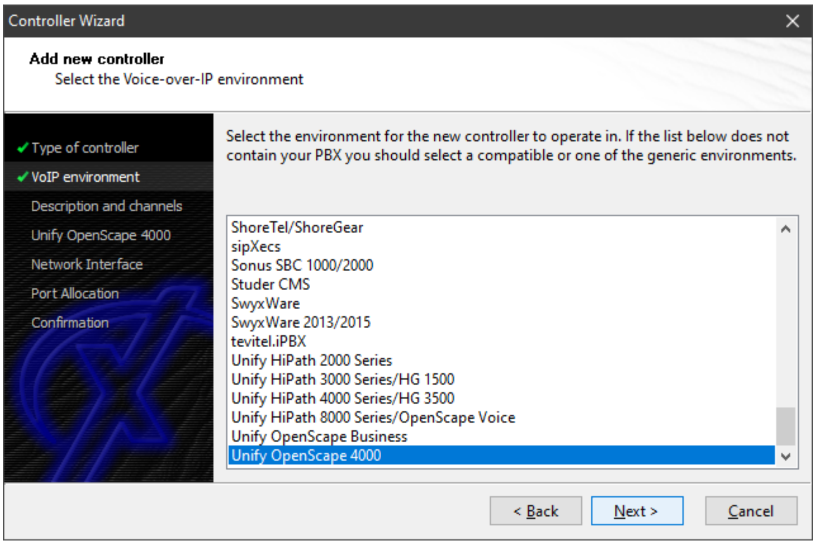
## XCAPI Configuration

Please start up the XCAPI configuration to create a new controller assigned to the Unify OpenScape 4000.
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.



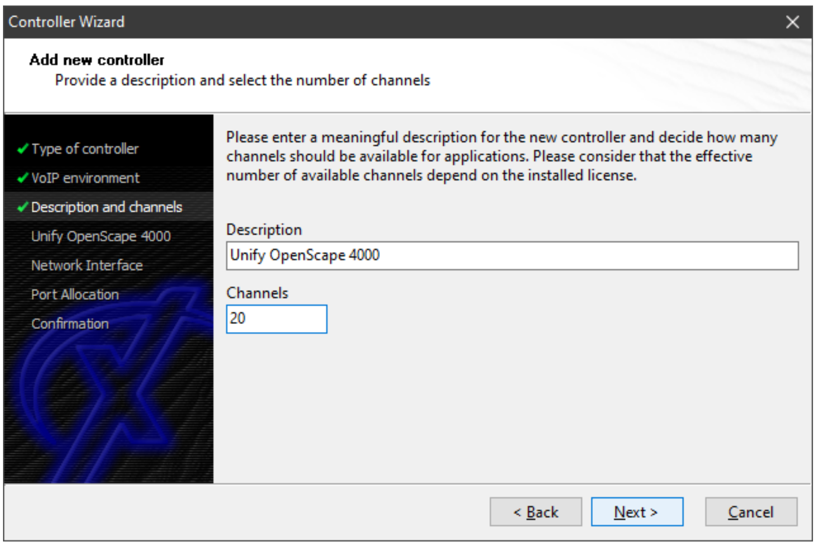
## 2.1 Voice-over-IP Environment

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



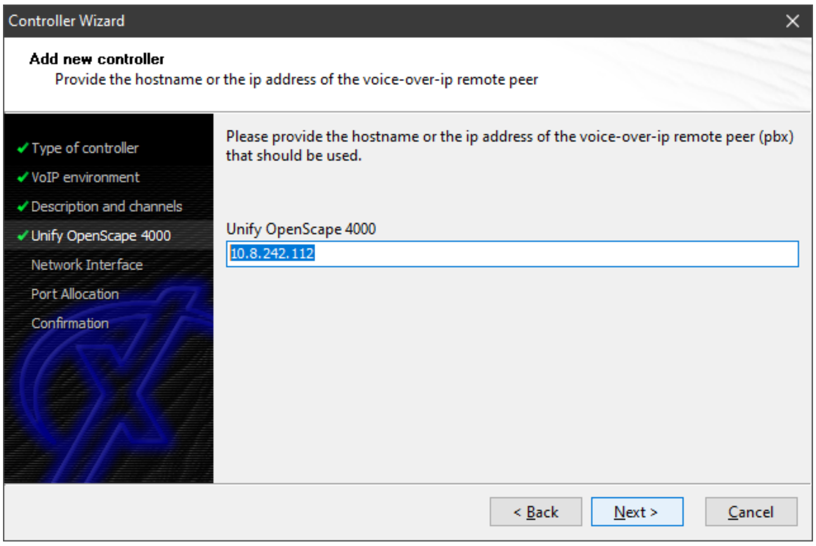

## 2.2 Description and Channels

When the VoIP environment was selected, the next dialog allows setting a name for the controller. Also the number of channels that the new controller will be able to provide can be set. Enter how many licensed simultaneous connections the XCAPI controller should handle when communicating with the Unify OpenScape 4000 and the bound CAPI application.



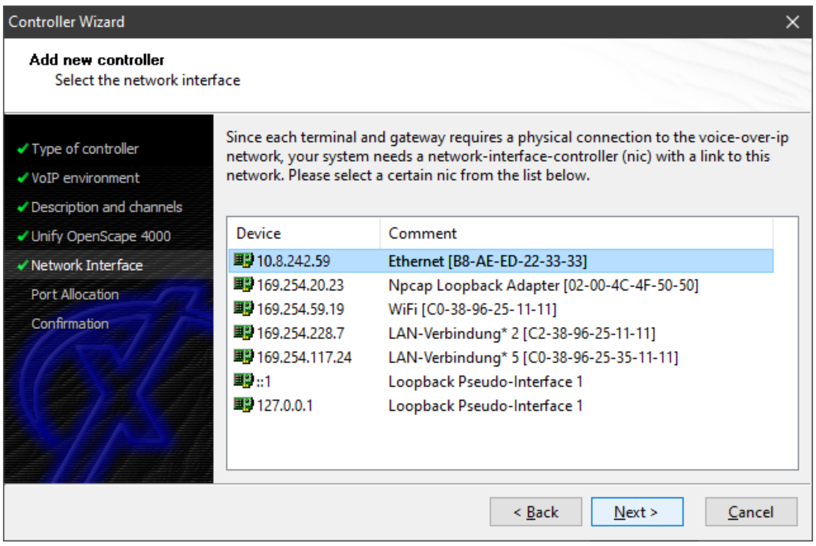
## 2.3 IP Address of the Unify OpenScape 4000

In the next wizard dialog, provide the IP address or host name of the SIP listening Ethernet interface of the Unify OpenScape 4000 gateway. The belonging Unify OpenScape 4000 gateway configurations of this example will be described in the chapter **Unify OpenScape 4000 Configuration** (sub-chapter **Configuring Mounting Locations for Modules in the SWU (BCSU)** and **Configuration of Global- and Feature-Board Data for HG3500 (CGWB)**) from page 9.
Please note that both, the XCAPI controller and the Unify OpenScape 4000, use by default the UDP port 5060 for SIP signaling.



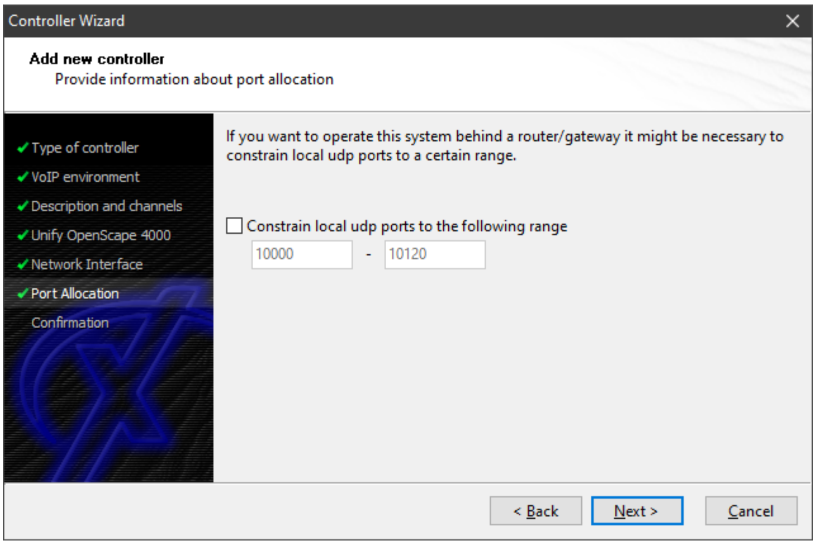

## 2.4 Network Interface

Afterwards, select the network interface that will be used for the inbound and outbound VoIP communications for this SIP controller.



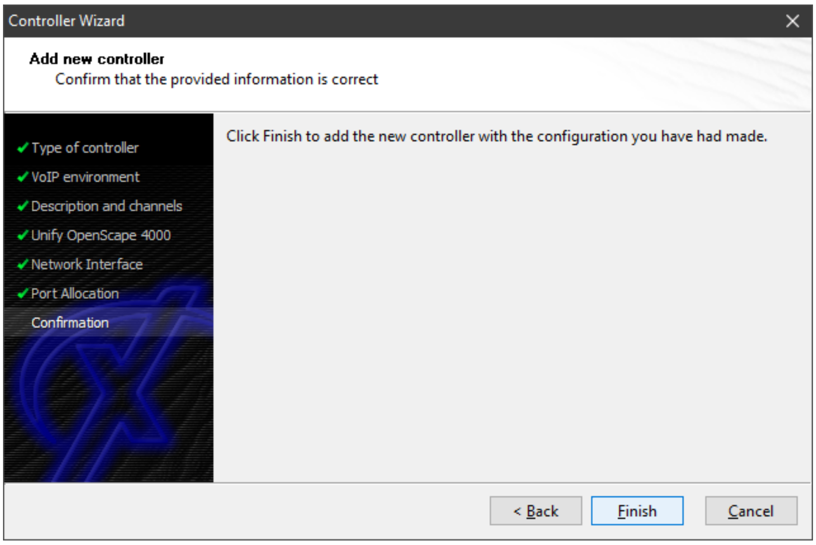
## 2.5 Port Allocation

When needed and in the case of any router or firewall restrictions for UDP (RTP/T.38) a port range can be set that will be used by the XCAPI controller for addressing the source port. If none is set here, the XCAPI controller uses a random UDP port range between 1024 and 65535.

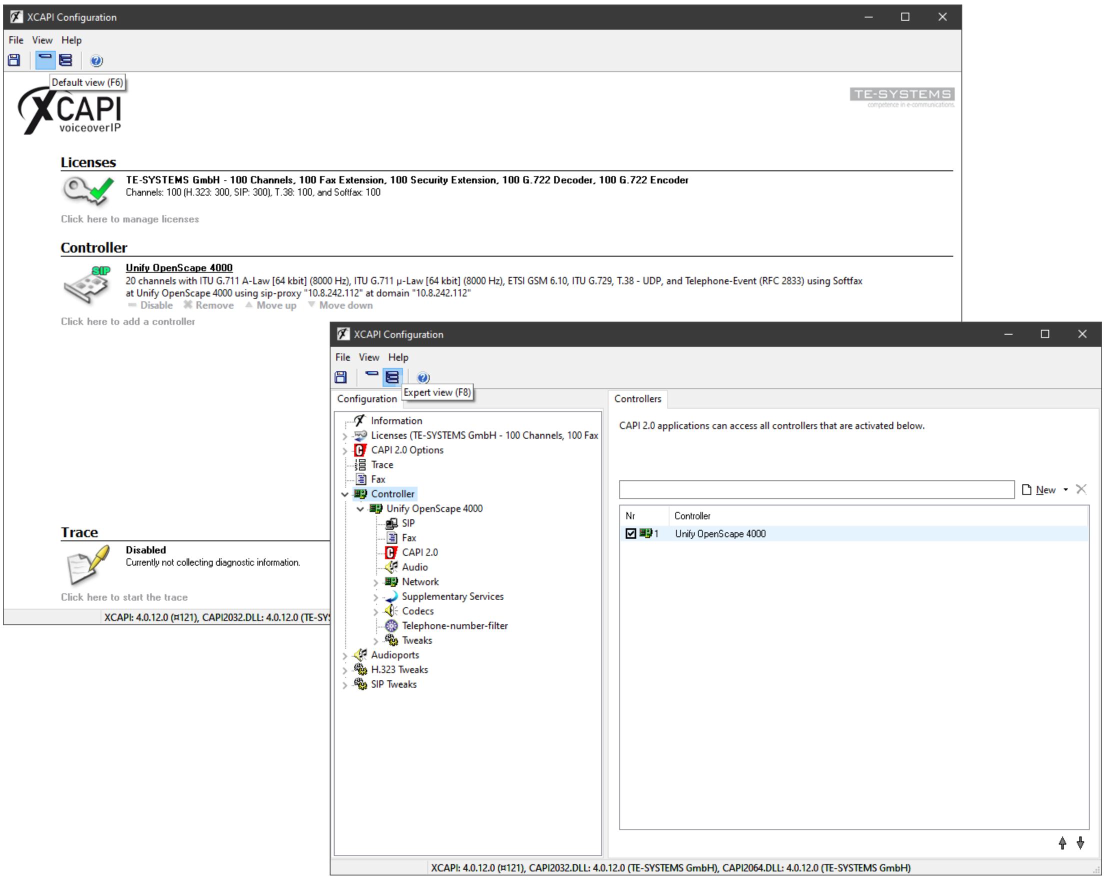



## 2.6 Confirmation

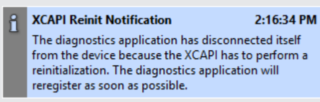
The final wizard dialog performs some checks on the configuration parameters you've made. If errors are detected, use the **Back** button to find the incorrect dialogs and correct them. Push **Finish** in order to finally create the new controller if everything is correct.



The newly created SIP controller is now listed on the **Default** and **Expert view** of XCAPI configuration tool. Use the **Save** button and exit the tool.




Note that the 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. Alternatively the Server where XCAPI is running on can be restarted. If enabled, the XCAPI diagnostic monitor pop-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).

# Unify OpenScape 4000 Configuration

In order to establish a connection between the XCAPI and the Unify OpenScape 4000 gateway, you need to setup the XCAPI as a communication gateway and configure the appropriate settings for using line- and direction channels. In this configuration example we'll use the MML (Man Machine Language) interface, its AMO (Administration and Maintenance Order) configuration dialog and the WBM (Web Based Management) for accessing and modifying the Unify OpenScape 4000 device.

For both we assume some general familiarity with. If there are doubts, please refer to the relevant documentation for further information.

## 3.1 Configuring Mounting Locations for Modules in the SWU (BCSU)

The AMO **BCSU** (Board Configuration in the Switching Unit) shows that for this example a Q2330-X module type vHG3500 with the related IP address **10.8.242.112** is used as LTU (Line Trunk Unit).

```
DISPLAY-BCSU:TYPE=TBL,LTG=1,LTU=99,SLOT=5;
H500:  AMO BCSU  STARTED

 LTG  1  LTU 99  SRCGRP 1   ALARMNO-LTU 0     SOFTGATE1000     20 PORTS USED
-----+-----------+--------+---+-+-+---+-+------------+------------+------------
     |           |        |   |S|H|AL-|N|            |            |
     | ASSIGNED  | MODULE |FCT|E|W|ARM|P| INSERTED   |    HW-     | MODULE
 PEN | MODULE    | TYPE   |ID |C|Y|NO |R| MODULE     |STATE INFO  | STATUS
-----+-----------+--------+---+-+-+---+-+------------+------------+------------
   5 | Q2330-X    vHG3500    1        0| | Q2330-X    |  1  -07 -  | READY
     +--------------------------------+-+------------+------------+------------
     | IP ADDRESS :  10.  8.242.112         B-CHANNELS : 120    BCHLCNT :  30
     | IP MODE    :  IPV4                   DHCP V4    :   NO    DHCP V6 :  NO
     | BLOCK NO   :  6                      PRERESERVED LINES ASSIGNED  :  NO
     |  1. FUNCT  : HG3550        4 LINES   B-CHANNELS : 120    BCHLCNT :  30
     +--------------------------------+-+------------+------------+------------

+----+----+---------------------------+-+------------+------------+-----------+
| NO SECURITY STATUS AVAILABLE, SINCE FEATURE SPE IS NOT ACTIVATED            |
+---------+-------------------------------------------------------------------+
AMO-BCSU -111       BOARD CONFIGURATION, SWITCHING UNIT
```

### 3.2 Configuration of Global- and Feature-Board Data for HG3500 (CGWB)

The AMO CGWB (Common Gateway Board) is used for configuring device specific parameters. The **GLOBIF**, **ASC** and **JB** parameters are used as shown below. On demand check with the appropriate Codec, DTMF and Fax chapters of this TechNote.

```
DISPLAY-CGWB:LTU=99,SLOT=5;
H500:  AMO CGWB  STARTED
-----------------------------------------------------------------------------
|  CGW BOARD DATA                                                           |
-----------------------------------------------------------------------------
|   HG3550                                                                  |
-----------------------------------------------------------------------------
|  LTU = 99       SLOT = 5       SMODE = NORMAL            POOLNO: 0        |
-----------------------------------------------------------------------------

  GLOBAL DATA AND ETHERNET INTERFACE DATA - CONFIGURABLE VALUES:
  ---------------------------------------------------------------
  IPADR      = 10 .8  .242.112         TCPP    =        (4060)
  NETMASK    = 255.255.255.0           VLAN    = NO     (NO)
  DEFRT      = 10 .8  .242.1           (0.0.0.0 = NOT CONFIGURED)
  BITRATE    =          (CHECK OS)     VLANID = 0       (0)
  PATTERN    = 213 (213)               TLSP       = 4061   (4061)
  TRPRSIP    = 60  (0)                 TRPRH323  = 0    (0)
  TRPRSIPQ   = 0   (0)                 TPRH323A  = 0    (0)
  DNSIPADR   = 10 .8  .251.103         SIPTCPP    = 5060  (5060)
  DNSIPADR2  = 0  .0  .0  .0           SIPTLSP    = 5061  (5061)
  USEWANIF   = NO   (NO)
  WPUBIP     = 0  .0  .0  .0

  ASC DATA - CONFIGURABLE VALUES:
  -------------------------------
  TOSPL     = 184   (184)     TOSSIGNL = 104   (104)
  UDPPRTLO = 29100 (29100)  UDPPRTHI = 30099 (30099)
  T38FAX    = YES   (YES)    REDRFCTN = NO    (YES)
  RFCFMOIP = YES   (NO)     RFCDTMF   = YES   (YES)

  PRIO1 :  CODEC = G711A    VAD = NO     RTP-SIZE = 20
  PRIO2 :  CODEC = G711U    VAD = NO     RTP-SIZE = 20
  PRIO3 :  CODEC = NONE     VAD = NO     RTP-SIZE = 30
  PRIO4 :  CODEC = G729     VAD = NO     RTP-SIZE = 30
  PRIO5 :  CODEC = G729A    VAD = NO     RTP-SIZE = 30
  PRIO6 :  CODEC = NONE     VAD = NO     RTP-SIZE = 20
  PRIO7 :  CODEC = G729AB   VAD = YES    RTP-SIZE = 20
  PRIO8 :  CODEC = G722     VAD = NO     RTP-SIZE = 20
  PRIO9 :  CODEC = OPUS     VAD = NO     RTP-SIZE = 20

  DSP CONFIGURATION DATA
  ----------------------
  JITBUFD   = 60    (60)  (PARAMETER IS NOT USED ANYMORE)

  JB DATA - CONFIGURABLE VALUES:
  ------------------------------
  JBMODE     = 2
  AVGDLYV    = 40  (40)
  MAXDLYV    = 120 (120) MINDLYV = 20  (20)
  PACKLOSS   = 4   (4)
  AVGDLYD    = 60  (60)  MAXDLYD = 200 (200)

AMO-CGWB -111        CONFIGURATION OF HG3500 BOARD
```

## 3.3 Trunk Groups (BUEND)

A trunk group consists of several trunks and is identified with its unique trunk group number, see option **TGRP NUMBER**. The associated XCAPI trunk group is used as shown next.

```
DISPLAY-BUEND:TGRP=6;
H500:  AMO BUEND STARTED
+------------------------------ FORMAT = L ----------------------------------+
|  TGRP NUMBER :      6   TGRP NAME    : XCAPI               MAXIMUM NO.   :   30 |
|                         CHARCON      : NEUTRAL                                  |
|  SUBGROUP NO.:      8   DEVICE TYPE  : HG3550IP            TRACENO       :    0 |
|  SEARCH MODE : DESCENDING                                  ACD THRESHOLD :    * |
|  NUMBER OF ASSOCIATED ROUTES       : 1                     PRIORITY      :    2 |
|  TDDRFLAG     :   OFF  TDDRTHRESHOLD:                     SOURCEGROUPIDX :    5 |
|  GDTRRULE     :     0      ACDPMGRP : 0                                        |
|  THE FOLLOWING TRUNKS (LTG-LTU-SLOT-CCT) HAVE BEEN ALLOCATED:                  |
+-----------------------------------------------------------------------------+
|   1-99-  5-0            1 |  1-99-  5-0            2 |  1-99-  5-0            3 |
|   1-99-  5-0            4 |  1-99-  5-0            5 |  1-99-  5-0            6 |
|   1-99-  5-0            7 |  1-99-  5-0            8 |  1-99-  5-0            9 |
|   1-99-  5-0           10 |  1-99-  5-0           11 |  1-99-  5-0           12 |
|   1-99-  5-0           13 |  1-99-  5-0           14 |  1-99-  5-0           15 |
|   1-99-  5-0           16 |  1-99-  5-0           17 |  1-99-  5-0           18 |
|   1-99-  5-0           19 |  1-99-  5-0           20 |  1-99-  5-0           21 |
|   1-99-  5-0           22 |  1-99-  5-0           23 |  1-99-  5-0           24 |
|   1-99-  5-0           25 |  1-99-  5-0           26 |  1-99-  5-0           27 |
|   1-99-  5-0           28 |  1-99-  5-0           29 |  1-99-  5-0           30 |
+-----------------------------------------------------------------------------+
```

## 3.4 Digital Trunks (TDCSU)

The AMO TDCSU (Digital Trunk Circuits in the Switching Unit) is used for the digital trunk configuration, in meaning of an ISDN Basic Rate Interface (BRI), ISDN Primary Rate Interface (PRI) and the external gateways for IP Trunking. The TDCSU configurations of the referenced SIP gateway used as follows:

```
DISPLAY-TDCSU:PEN1=1-99-005-0,FORMAT=L;
H500:  AMO TDCSU STARTED
  +----------------------- DIGITAL TRUNK (FORMAT=L) -------------------------+
  | DEV       = HG3550IP       PEN      =  1-99-005-0    TGRP     = 6           |
  |---------------------------------------------------------------------------|
  | PROTVAR   = ECMAV2         INS      = Y              SRCHMODE = DSC         |
  | COTNO     = 3              COPNO    = 3              DPLN     = 0           |
  | ITR       = 0              COS      = 4              LCOSV    = 1           |
  | LCOSD     = 1              CCT      = XCAPI          DESTNO   = 0           |
  | SEGMENT   = 8              DEDSCC   =                DEDSVC   = NONE        |
  | FACILITY  =                DITIDX   =                SRTIDX   =             |
  | TRTBL     = GDTR           SIDANI   = N              ATNTYP   = TIE         |
  | CBMATTR   = NONE           NWMUXTIM = 10             TCHARG   = N           |
  | SUPPRESS  = 0              DGTPR    =                CHIMAP   = N           |
  | ISDNIP    = 00             ISDNNP   = 0                                     |
  | PNPL2P    =                PNPL1P   =                PNPAC    =             |
  | TRACOUNT  = 30             SATCOUNT = MANY           NNO      =             |
  | ALARMNO   = 0              FIDX     = 1              CARRIER  = 1           |
  | ZONE      = EMPTY          COTX     = 3              FWDX     = 5           |
  | DOMTYPE   =                DOMAINNO =                TPROFNO  =             |
  | INIGHT    =                                          CCHDL    =             |
  | UUSCCX    = 16             UUSCCY   = 8              FNIDX    = 0           |
  | CLASSMRK  = EC & G711 & G729AOPT                     SRCGRP   = (5 )        |
  | TCCID     =                                          SECLEVEL = TRADITIO    |
  | HMUSIC    = 0              CALLTIM  = 60             WARNTIM  = 60          |
  |---------------------------------------------------------------------------|
  | BCNEG     = N              BCGR     = 1              LWPAR    =             |
  | LWPP      = 0              LWLT     = 0              LWPS     = 0           |
  | LWR1      = 0              LWR2     = 1                                     |
  | DMCALLWD  = Y              SVCDOM   =                BCHAN    =  1 && 30    |
  +---------------------------------------------------------------------------+
```

## 3.5 Trunk Routing (RICHT)

The AMO **RICHT** dialog is used for allocating access codes which are determined by the digit analysis group, the call progress state and the involved communication services (Voice, FAX and DATA). For this example the trunk routing is used as shown below.

```
DISPLAY-RICHT:MODE=LRTE,LRTE=15;
H500:  AMO RICHT STARTED
+------------------------------------------------------------------+
| LRTE = 15     NAME = XCAPI            (NEUTRAL)  LSVC = ALL      |
| DNNO =1 -1  -124 PDNNO =       0                                 |
| ROUTOPT = NO     REROUT = YES   PLB = YES    FWDBL = NO          |
| DTMFCNV = FIX     DTMFDSP = DIGITS  DTMFTEXT = DTMF              |
| DTMFPULS = PP300 BUGS = LIN  ROUTATT = NO       MAINGRP =   13   |
| EMCYRTT = NO       CONFTONE = NO   RERINGRP = NO   RTENO =   13  |
| INFO =                                                           |
| NOPRCFWD = NO                                                    |
| NITO = NO                                                        |
| CLNAMEDL = NO                                                    |
| FWDSWTCH = NO                                                    |
| LINFEMER = NO                                                    |
| NOINTRTE = NO                                                    |
+------------------------------------------------------------------+
| TGRP =   6  LDAT  XCAPI              (NEUTRAL)  SUBGROUP =    8 |
+------------------------------------------------------------------+
H23:  SVC FAX IS NOT USED FOR RICHT BRANCH CD.  VOICE IS USED
      FOR G3 FAX AND DATA FOR G4 FAX.
```

## 3.6 LCR Outdial Rule (LODR)

The AMO **LODR** is used to declare LCR Outdial rules (LODR). Those rules will be identified over the ODR numbers according to the LDAT configuration described in the chapter **LCR Routes (LDAT)** on page 13. The LCR Outdial for this example is used as shown next.

```
DISPLAY-LODR:ODR=15;
H500:  AMO LODR  STARTED
   +---------------------------------------------------------+
   |  ODR     POSITION  CMD          PARAMETER               |
   +--------+------------------------------------------------+
   |   15   |        1    NPI          ISDN                  |
   |        |        2    TON          UNKNOWN               |
   |        |        3    ECHO         1                     |
   |        |        4    ECHO         2                     |
   |        |        5    END                                |
   +--------+------------------------------------------------+
   |INFO:  XCAPI                                             |
   +---------------------------------------------------------+
```

### 3.7 LCR Routes (LDAT)

The administration of LCR routes (LROUTE) are configured within the AMO LDAT including its LCR route elements (LRTEL). Those LCR route elements specify the accumulation of the trunk groups. The LCR routes are related to a trunk group, an LCR out dial rule and a LCR authorization.
Please note that only trunks can be used which therefore have been assigned within the AMO RICHT.

```
DISPLAY-LDAT:TYPE=LCR,LROUTE=15;
H500:  AMO LDAT  STARTED
+--------------------------------------------------------------------------------+
| LROUTE = 15     LDPLN        NAME = XCAPI                      SERVICE =  ALL |
| TYPE = LCR                                 DNNO OF ROUTE  = 1 -1  -124        |
| SERVICE INFO =                                                                |
+------+-----+-----+----+-----+----------+-----------+----------+------+-------+
|      |     |     |    |     | SCHEDULE | CARRIER   |          |      |       |
|LRTEL | LVAL|TGRP |  ODR|LAUTH| ABCDEFGH |       ZONE|    LATTR | LDSRT|COTIDX |
+------+-----+-----+----+-----+----------+-----------+----------+------+-------+
|     1|    1|    6|  15| 1   | ******** | 1    EMPTY|     NONE |      | 0     |
+--------------------------------------------------------------------------------+
```

### 3.8 Digit Analysis (WABE)

The digit analysis (WABE), which assignments depends on the call progress states and the digit analysis group or dial plan, refers to the digit analysis results of a dialed digit sequence or dialed code.

```
DISPLAY-WABE:TYPE=GEN,CD=64;
H500:  AMO WABE  STARTED
  ------------------------------------------------------------------------------
  | DIGIT INTERPRETATION                  VALID FOR ALL DIAL PLANS             |
  ------------------------------------------------------------------------------
  |                 |     CALL PROGRESS STATE     |NODE/DIGIT| RESERVED/CONVERT |
  |      CODE       |             1 11111 11112 22| ANALYSIS | DNI/ADD-INFO/UFIP|
  |                 |0 12345 67890 12345 67890 12|  RESULT  | *=OWN NODE       |
  ------------------------------------------------------------------------------
  | 64              |. .**** ***** **... ..... .*| TIE      |                  |
  ------------------------------------------------------------------------------
```

## 3.9 LCR Dialplan (LDPLN)

The AMO LCR dialing plan (LDPLN) specifies the LCR digit patterns (LDP). Each pattern is assigned to an LCR route pattern number (LROUTE) and an LCR authorization number (LAUTH) and group-wise related to the WABE digit analysis. This example use LDP **64-xxxx**. Adjust the dialplan to the local requirements (for example **9-W-1-XXX-XXX-XXXX** for a North American dialplan).

```
DISPLAY-LDPLN:TYPE=LDP,LDP="64"-"XXXX";
H500:  AMO LDPLN STARTED
    +--------------+-----------------------------------------------------+
    |              |                                                     |
    | DIPLNUM:    0|                                                     |
    | LDPNO   :15  | LDP : 64-XXXX                                       |
    |              | SPC : 22                                            |
    |              | FDSFIELD : 0   SDSFIELD : 0   PINDP : N             |
    +------+-------+-----------------------------------------------------+
    | DPLN | LROUTE| LAUTH                                               |
    |------+-------+-----------------------------------------------------+
    |   0  |    15 | 1                                                   |
    |   1  |    15 | 1                                                   |
    |   2  |    15 | 1                                                   |
    |   3  |    15 | 1                                                   |
    |   4  |    15 | 1                                                   |
    |   5  |    15 | 1                                                   |
    |   6  |    15 | 1                                                   |
    |   7  |    15 | 1                                                   |
    |   8  |    15 | 1                                                   |
    |   9  |    15 | 1                                                   |
    |  10  |    15 | 1                                                   |
    |  11  |    15 | 1                                                   |
    |  12  |    15 | 1                                                   |
    |  13  |    15 | 1                                                   |
    |  14  |    15 | 1                                                   |
    |  15  |    15 | 1                                                   |
    +------+-------+-----------------------------------------------------+
```

## 3.10 Class of Services

The class of services, in meaning of the AMOs COT (Class of Trunks), COP (Class of Parameters) and COSSU (Class of Services), has to be configured in accordance with the TDCSU, **Digital Trunks (TDCSU)** and **Trunk Routing (RICHT)** as shown in the same named chapters starting on page 12. For this example those classes of services (COP, COT, COSSU) are used as described next.

## 3.11 Class of Services (COSSU)

The AMO COSSU (Classes of Services) specifies the authorizations and features assigned to stations (AMO-ACSU, AMO-SBCSU, AMO-SCSU and AMO-SSCSU) and trunks (AMO-TACSU, AMO-TDCSU and AMO-TSCSU). For this example the class of services are used as follows:

```
DISPLAY-COSSU:TYPE=COS,COS=4;
H500:  AMO COSSU STARTED
   +------+-----------------+---------------+-----------------+
   | COS  |      VOICE      |      FAX      |       DTE       |
   +------+-----------------+---------------+-----------------+
   |    4 |>NATIVE SIP - XCAPI                                |
   |      |          TA     |      NOCO     |         TA      |
   |      |      TNOTCR     |     NOTIE     |     TNOTCR      |
   |      |         TTT     |               |      BASIC      |
   |      |                 |               |     MULTRA      |
   +------+-----------------+---------------+-----------------+

DISP-COSSU:LAUTH,1;
H500:  AMO COSSU STARTED
   +--------+---------------------------------------------------+
   |LAUTH  1|                                                   |
   +--------+---------------------------------------------------+
   |LCOSV   |   1    2    5    7                                |
   +--------+---------------------------------------------------+
   |LCOSD   |   1                                               |
   +--------+---------------------------------------------------+

DISPLAY-COSSU:TYPE=LCOSV,LCOSV=1;
H500:  AMO COSSU STARTED
   +----+----------------------------------------------------------------+-----+
   |LCOS|                             LAUTH                              |COPIN|
   |  V |         1         2         3         4         5         6    |     |
   |    |1234567890123456789012345678901234567890123456789012345678901234|     |
   |    |>SERVICE INFORMATION                                            |     |
   +----+----+----|----+----|----+----|----+----|----+----|----+----|----+-----+
   |   1|XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX|  0  |
   |    |>LCR ATTENDANT FOR VOICE                                        |     |
   +----+----------------------------------------------------------------+-----+

DISPLAY-COSSU:TYPE=LCOSD,LCOSD=1;
H500:  AMO COSSU STARTED
   +----+----------------------------------------------------------------+-----+
   |LCOS|                             LAUTH                              |COPIN|
   |  D |         1         2         3         4         5         6    |     |
   |    |1234567890123456789012345678901234567890123456789012345678901234|     |
   |    |>SERVICE INFORMATION                                            |     |
   +----+----+----|----+----|----+----|----+----|----+----|----+----|----+-----+
   |   1|XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX|  .  |
   |    |>LCR ATTENDANT FOR DATA                                         |     |
   +----+----------------------------------------------------------------+-----+
```

## 3.12 Class of Trunks (COT)

The class of trunk for call processing **(COT)** is used to specify the switching technology parameters. Each trunk has an assigned COT which is here used as shown below.

```
DISPLAY-COT:COTNO=3;
H500:  AMO COT   STARTED
   COT:   3  INFO: XCAPI
   DEVICE: INDEP        SOURCE: DB
   PARAMETER:
        RECALL IF USER HANGS UP IN CONSULTATION CALL                  RCL
        TRUNK CALL TRANSFER                                           XFER
        TRUNK SIGNALING ANSWER                                        ANS
        CALL EXTEND FOR BUSY, RING OR CALL STATE                      CEBC
        NETWORKWIDE AUTOMATIC CALLBACK ON BUSY                        CBBN
        NETWORKWIDE AUTOMATIC CALLBACK ON FREE                        CBFN
        NETWORKWIDE CALL FORWARDING PERMITTED                         FWDN
        NETWORKWIDE FORWARDING NO-ANSWER                              FNAN
        DON'T RELEASE CALL TO BUSY HUNT GROUP                         BSHT
        END-OF-DIAL FOR BLOCK IS SET                                  BLOC
        SEND NO NODE NUMBER TO PARTNER                                LWNC
        CONNECTION TO ROUTE OPTIMIZATION NODE                         ROPT
        INCOMING CIRCUIT FROM SYSTEM WITHOUT LCR                      NLCR
        TSC-SIGNALING FOR NETWORKWIDE FEATURES (MANDATORY)            TSCS
        USE DEFAULT NODE NUMBER OF LINE                               DFNN
        INCOMING CIRCUIT FROM SYSTEM WITHOUT LCR (DATA)               NLRD
        PIN NETWORKWIDE POSSIBLE                                      PINR
        SEND NO BILLINGELEMENTS                                       SNBE
        SUPPRESS SIGNALING OF CDR-E SPECIFIC MESSAGES                 NCDR
        LAST REDIRECTING NUMBER IS SEND TO PHONEMAIL                  LRPM
        NO FLAG TRACE                                                 NOFT
        NPI ISDN, OUTGOING CALL                                       NPIS
        INTERNAL DIAL TONE                                            DTNI
```

## 3.13 Class of Parameters (COP)

The class of parameters (COP) is used to specify the line parameters for signaling control of the device handler. Each trunk has also an assigned COP. For this example the CO TRUNK ACCESS and TOLL ACCESS parameter for the COP number **99** is used with the **TRUNK ACCESS (TA)** option.

```
DISPLAY-COP:COPNO=3;
H500:  AMO COP   STARTED

   COP:   3  INFO: NATIVE SIP - XCAPI
   DEVICE: INDEP        SOURCE: DB
   PARAMETER:

   CO TRUNK ACCESS:
        TRUNK ACCESS                                                  TA

   TOLL ACCESS:
        TRUNK ACCESS                                                  TA
```

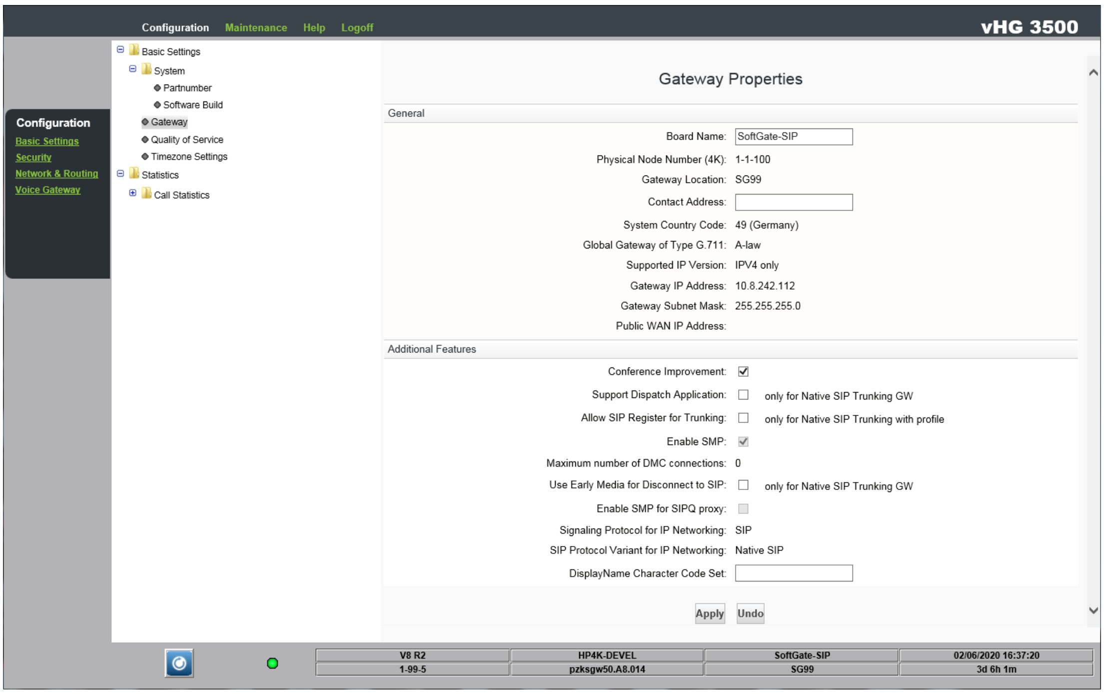
## 3.14 Reference Clock Table (REFTA)

Please ensure that the Reference Clock Table (AMO REFTA) is handled in the right way. It is necessary that all systems are synchronized. Wrong settings/priorities may lead to facsimile abruption.

```
DISP-REFTA:;
H500:  AMO REFTA STARTED
    +-----------------------------------------------------------------------------+
    |           R E F E R E N C E   C L O C K   C I R C U I T S                   |
    +--------------+---------+----------+---+------+------+------+-----+------+
    | PEN          | MODULE  | DEVICE   |PRI|ERROR |BLOCK |SUPP. |READY|SRCGRP|
    |              |         |          |   |      |      |      |BUT  |      |
    |              |         |          |   |      |      |      |ASYN.|      |
    +--------------+---------+----------+---+------+------+------+-----+------+
    |  1-17-   7- 0 | DIU-N2  | S2COD    | 90| 64000|     N |      |  N  |     1|
    +--------------+---------+----------+---+------+------+------+-----+------+
```

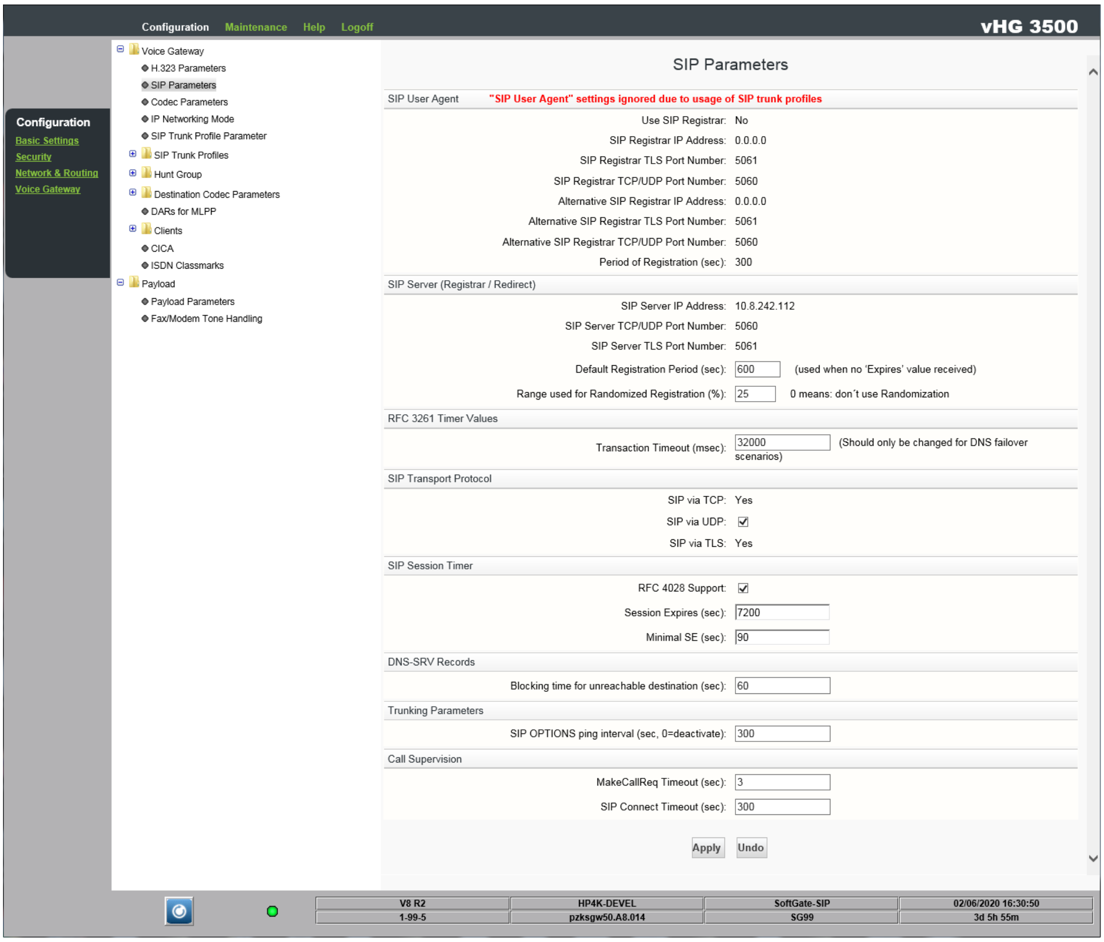
## 3.15 Gateway Properties

Please note: The **SIP Protocol Variant** and **Signaling Protocol for IP Networking** must be used with **SIP** and **Native SIP**. `SIP-Q` is **not** supported!



## 3.16 SIP Parameters

The **SIP Parameters** are used as shown next.

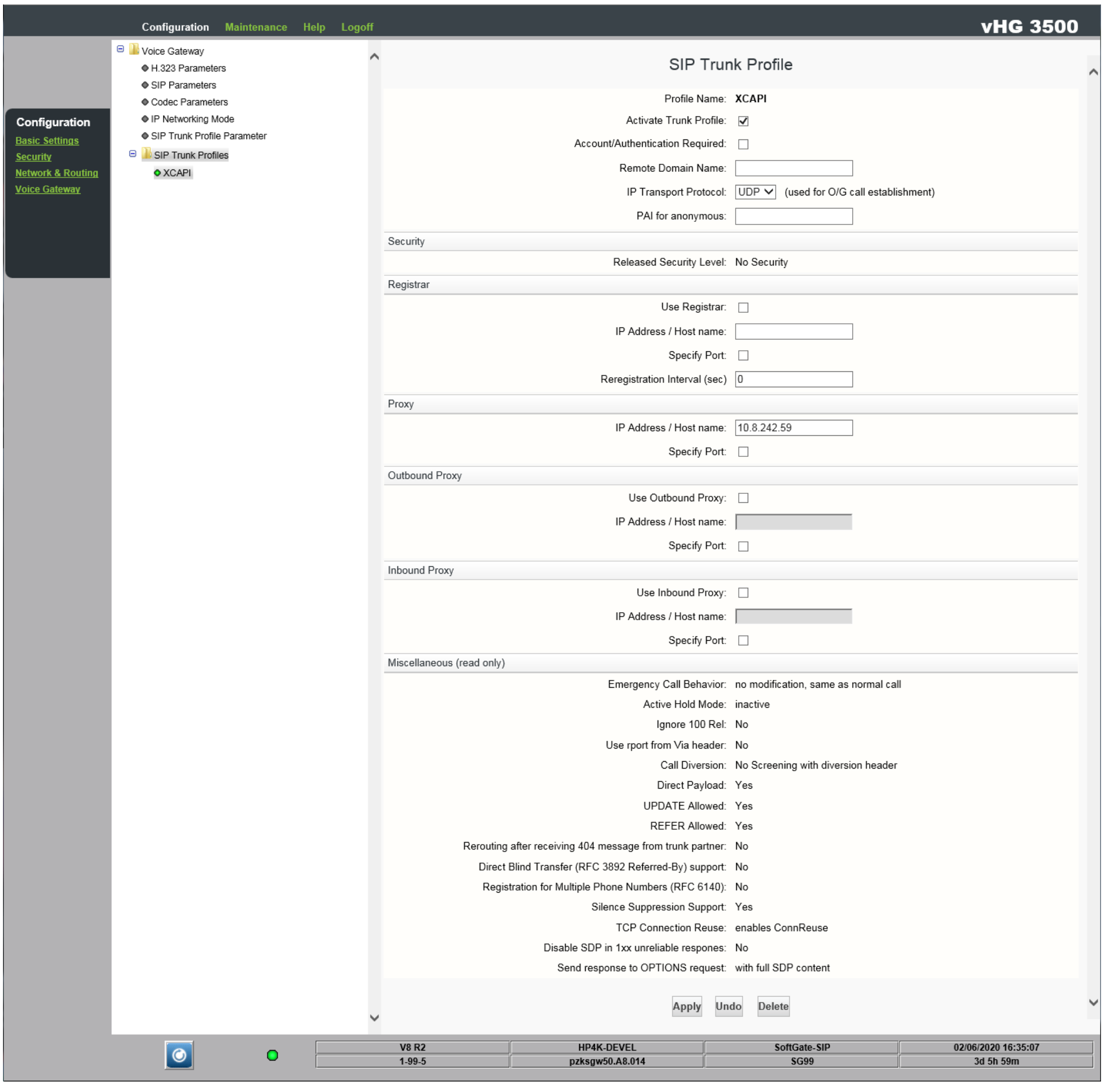


## 3.17 SIP Trunk Profiles

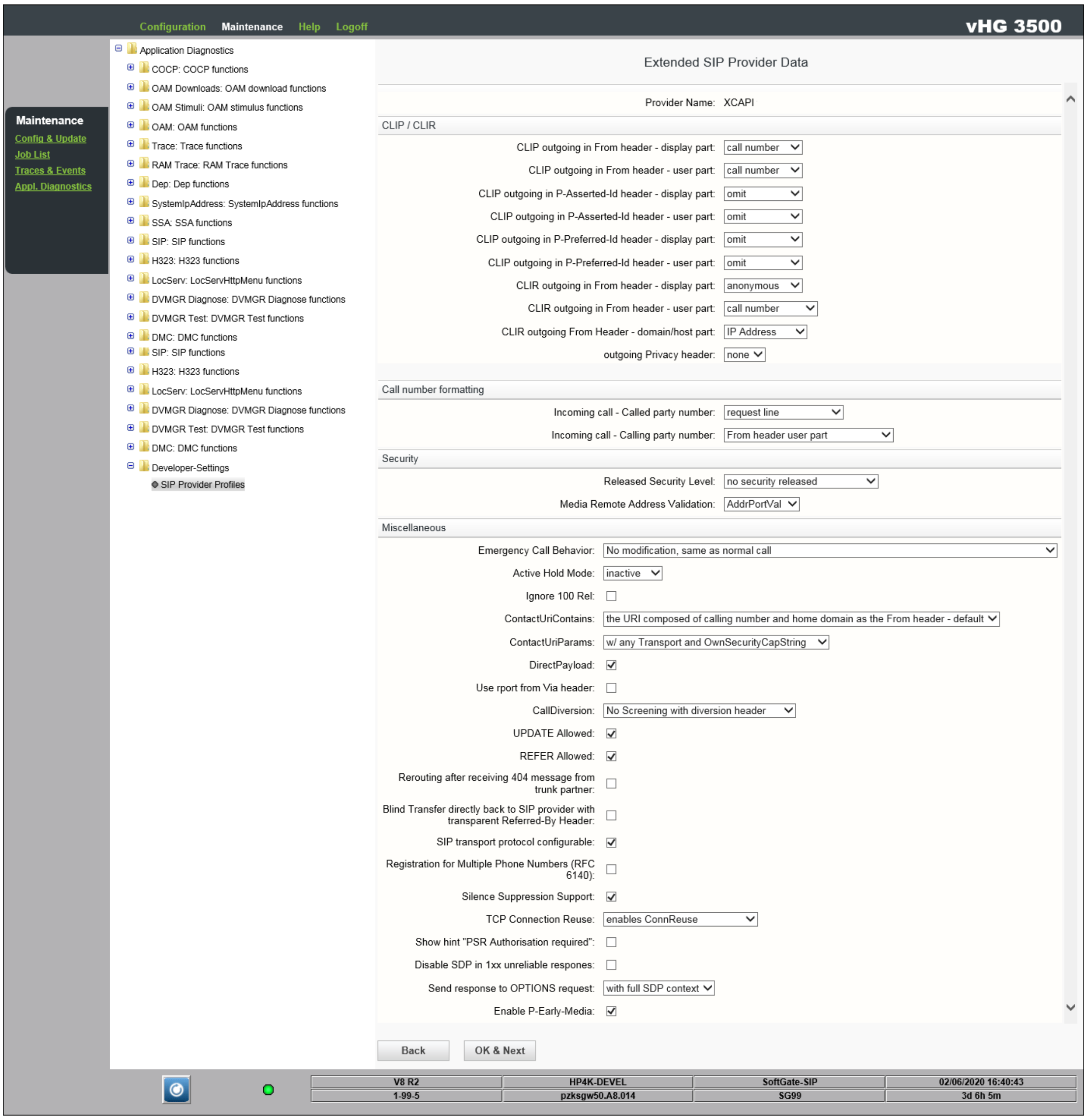
From Unify OpenScape 4000 V8 & V10 the **NatTrkEnterprise** profile can be used for appropriate interworking and call transfer support via SIP refer method. Nevertheless, an own SIP trunk profile should be created for using/enabling required services/settings such as call transfer and numbering behavior.

The SIP trunk for this example uses the proxy address 10.8.242.59. This is the IP address used by the XCAPI controllers' related Ethernet interface, as shown in the chapter **Network Interface** starting on page 6. The **SIP Transport Protocol** is used by default (also from XCAPI) with **UDP** and no **Registrar** is set at all.

The SIP profile has to be enabled. If it's not in operation, just try disabling and enabling the profile once again. If required, the HG board must be rebooted as well.

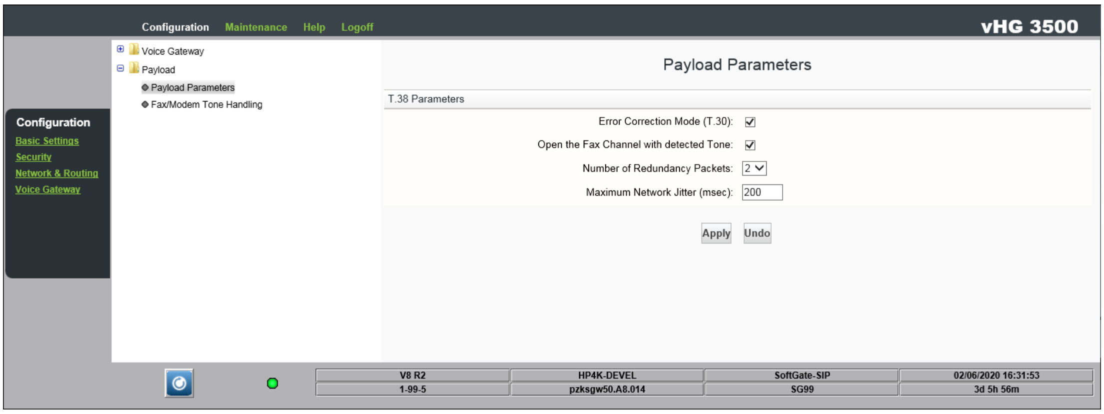


This example uses an own profile which can be added via **Maintenance**, **Appl Diagnostics** and **Developer-Settings** requires the appropriate user administration rights for the WBM.

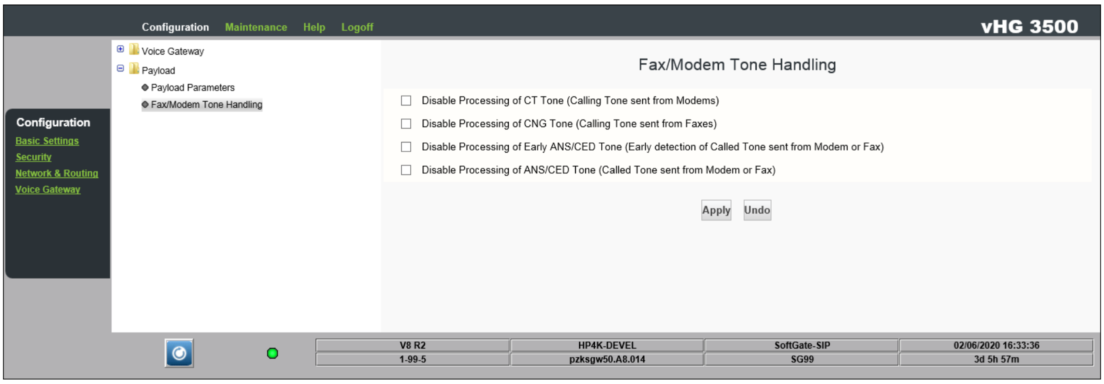


## 3.18 Payload

The payload parameters are used as shown next. Ensure that **Error Correction Mode** is enabled for T.38 usage.

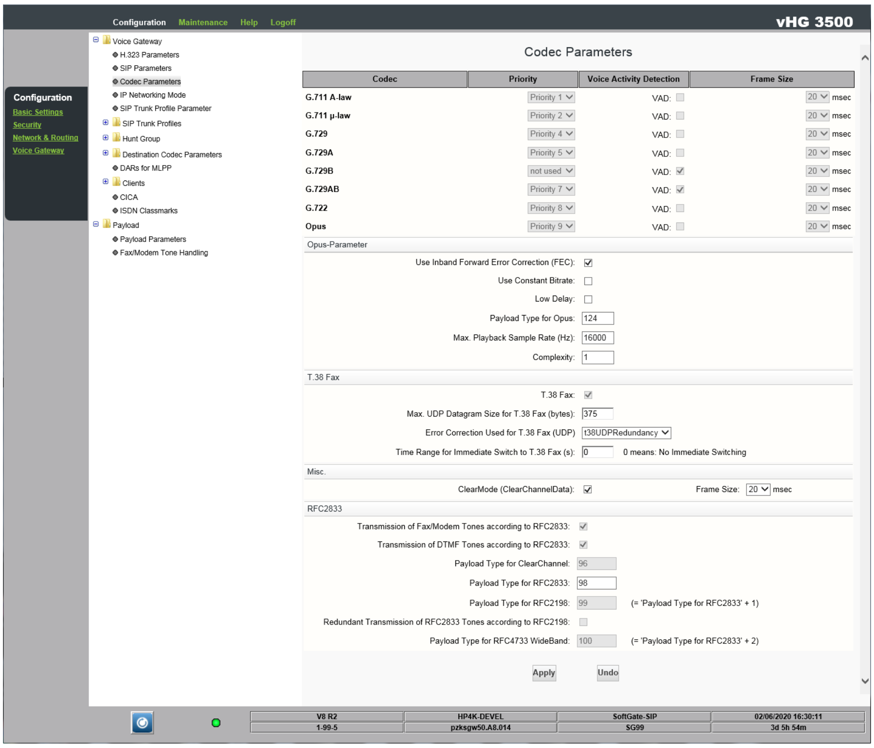



The **Fax/Modem Tone Handling** parameters are used with their defaults.



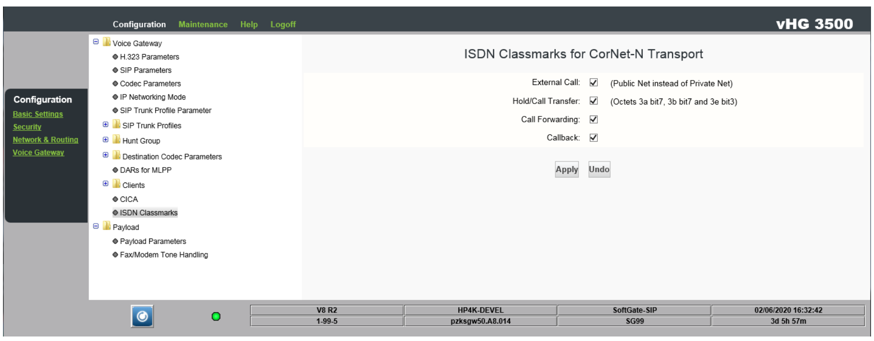
## 3.19 Codec Parameters

The **Codec Parameters** are used as shown next. Most of the parameters must be configured through the CGWB-AMO as shown in the chapter **Configuration of Global- and Feature-Board Data for HG3500 (CGWB)** starting on page 10.
The defaults usually work fine, but it is recommended to use the G.711 codecs with a frame size of 20 msec. This is a common default for VoIP, also for XCAPI, and prevents possible transcoding issues of the gateway and other participating instances. You can review the facsimile related chapters (**Fax Support** starting on page 23) for additional configuration hints. The XCAPI controller codec defaults can be reviewed in the chapter **Codecs** on page 28.




## 3.20 ISDN Classmarks

The **ISDN Classmarks** are used as follows.



# Appendix

The appendix gives several information and configuration hints as well as other considerations. If using the XCAPI controller wizard with its Unify OpenScape 4000 template, most of the shown configurations are set by default. The shown configurations must be reviewed, checked and tested, especially with the participating stations and public trunk bindings of the Unify OpenScape 4000 environment. Some of the features, codecs and fax methods might not being supported in conjunction with specific Unify OpenScape 4000 trunk bindings.

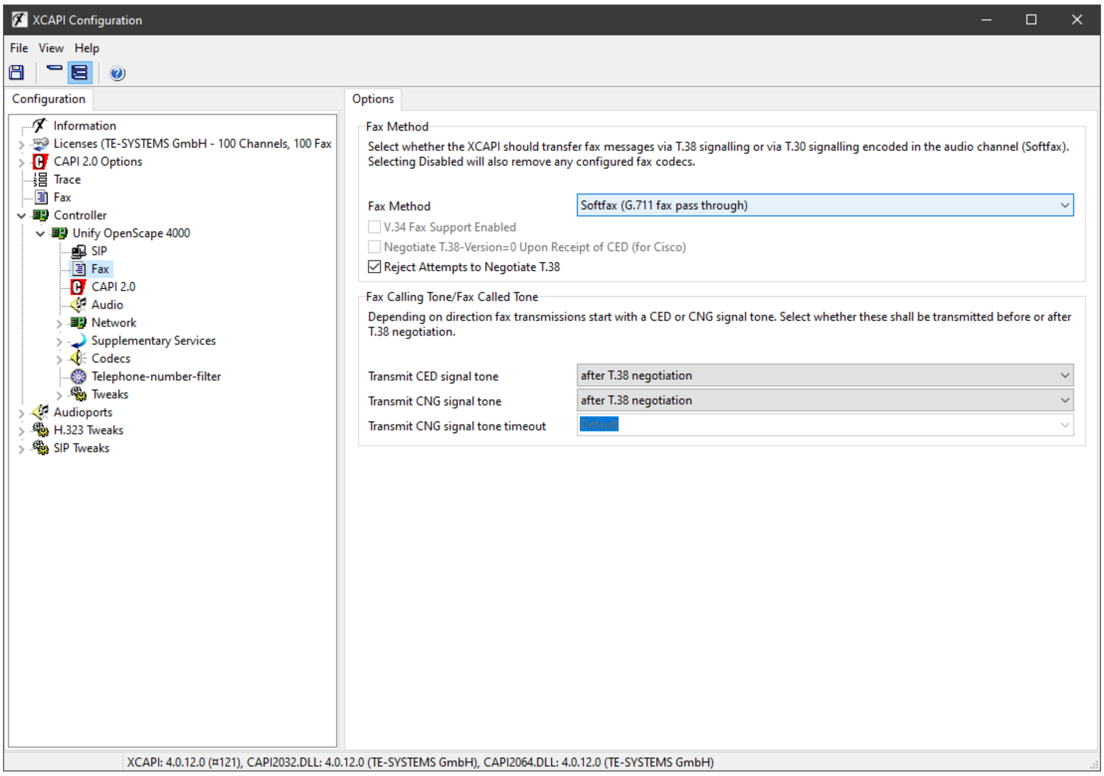
## 4.1 Fax Support

This chapter refers to Fax related topics about leveraging T.38, Softfax (G.711 Fax Pass Through) and T.38 to Softfax (G.711 Fax Pass Through) fallback.
It must be ensured that the fax method, codecs, framing, bandwidth and DTMF settings are properly set, and conform to the ones of the XCAPI SIP controller and other participating VoIP instances (SBC's, ITSP's etc.) connected to the Unify OpenScape 4000. We always recommend using the latest XCAPI version and manufacturer releases.

Always use the recommended and supported Fax method between the Unify OpenScape Business and the SIP carrier for the XCAPI controller. For most known VoIP scenarios G.711 Fax Passthrough should be the first choice!

### 4.1.1 G.711 Fax Pass Through (Softfax)

With the Softfax mode, the XCAPI simulates an analogue Fax device by transmitting modulated Fax-signals modem-like through the established G.711 audio channels. For enabling **Softfax (G.711 fax pass through)** must be set as **Fax Method** within the labeled **Fax** tab.



### 4.1.2 G.711 Fax Pass Through (Softfax) in Virtual Environments

Apart of the given suggestions for virtual environments in our **XCAPI TechNote (en) - VMware Virtual Machines** and **XCAPI TechNote (en) - Microsoft Hyper-V** documentation, facsimile transmission (which is real-time based) might be improved by adjusting the jitter buffer. A gateway jitter buffer operating with more tolerance might improve the stability for facsimile transmissions. Thus the timing difference between single RTP packets, caused by a virtual environment, could be absorbed by the XCAPI and the gateway. Set the **Jitter Buffer Type** to **Static**, the **Average Delay for Voice (msec)** to **200** and **Maximum Delay for Voice (msec)** to **300**.

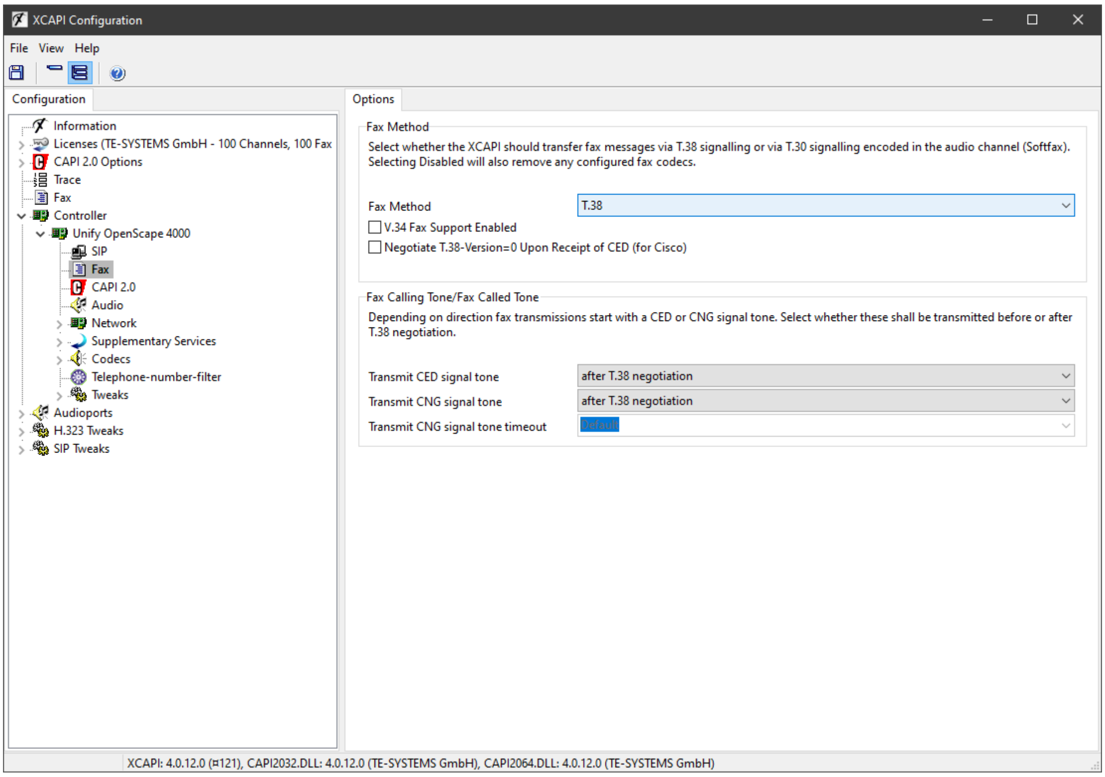
```
DISP-CGWB:99,5,JB;
H500:  AMO CGWB  STARTED
------------------------------------------------------------------------------
|  CGW BOARD DATA                                                             |
------------------------------------------------------------------------------
|   SIP        HG3550                                                         |
------------------------------------------------------------------------------
|  LTU = 99      SLOT = 5      SMODE = NORMAL           POOLNO: 0             |
------------------------------------------------------------------------------

  JB DATA - CONFIGURABLE VALUES:
  ------------------------------
  JBMODE    = 1
  AVGDLYV   = 200 (40)
  MAXDLYV   = 300 (120) MINDLYV = 20  (20)
  PACKLOSS  = 4   (4)
  AVGDLYD   = 60  (60)  MAXDLYD = 200 (200)
```

Please note, that this kind of adjustment should only be done for environments that are using the gateway for plain facsimile transmission and only done by experienced engineers. This chapter was originally intended for physical HG3500 gateways and the settings should only be adjusted after consultation with the Atos Unify support. All adjustments of the DSP subsequently require performance, stability and quality tests.

### 4.1.3 T.38

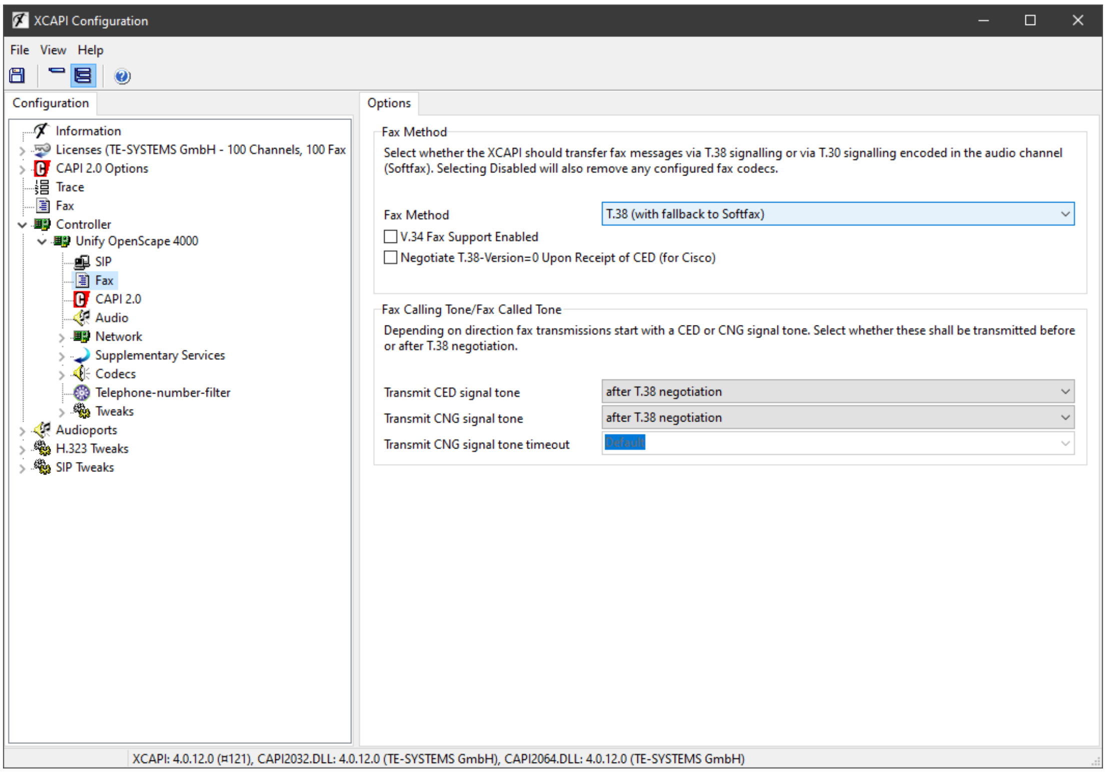
When using the T.38 Fax-over-IP protocol ensure that the **T38FAX** parameter in the AMO CGWB has to be enabled and those RFC2833 parameters are set as shown in the chapter **Configuration of Global- and Feature-Board Data for HG3500 (CGWB)** starting on page 10. In the case of T.38 usage, this protocol must also be the recommended and supported fax method between the Unify OpenScape 4000 and its carrier trunk binding. It is recommended to avoid unnecessary transcoding (G.711 to T.38 or vice versa) and use conforming fax methods for all participating instances. Please note that it is mandatory that the **T.38 - UDP** and at least one voice codec (for the initial call establishment) is enabled for the XCAPI controller, what it is by default.
An example of the default codec setup can be reviewed in the referring chapter from page 28.
For XCAPI, T.38 has to be enabled as shown on the next screenshot. For the Unify OpenScape 4000, **T.38 (Fax)** must be enabled in the gateways **Codec Parameters**.

For XCAPI, please ensure that **T.38** is selected as **Fax Method** within the XCAPI controllers **Fax** dialog.



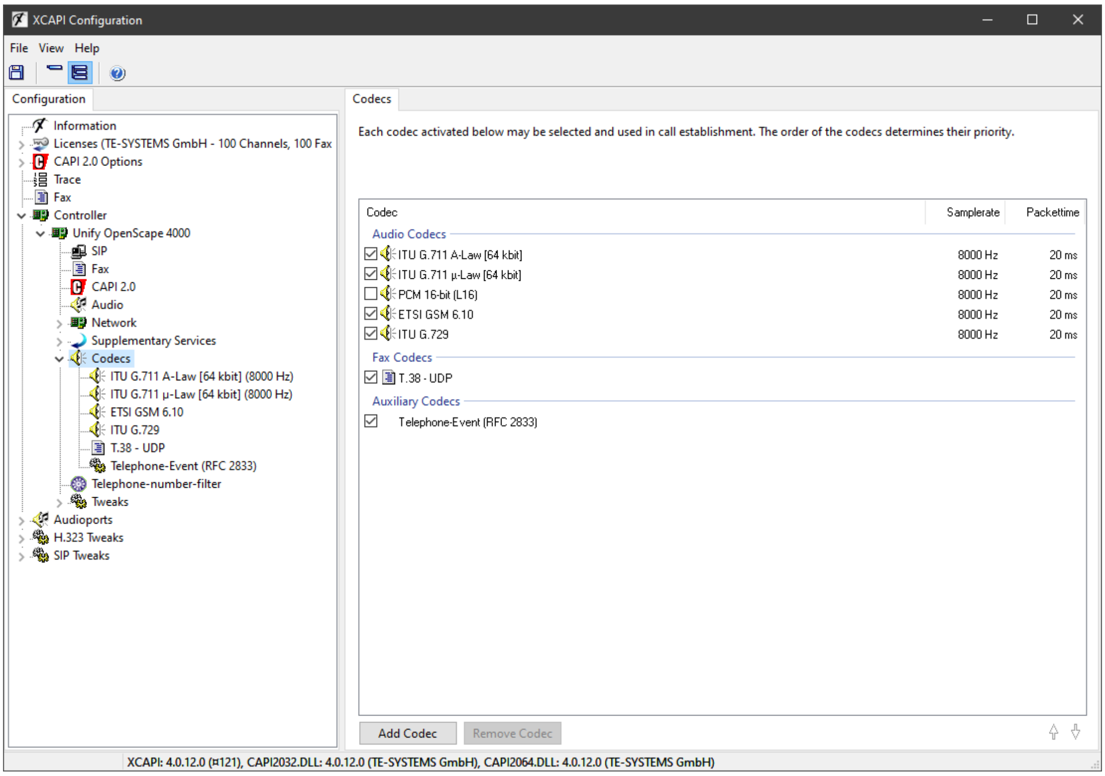
### 4.1.4 T.38 to G.711 Fax Pass Through Fallback

The fax fallback can be enabled as shown on the screenshot below. Even though this seems to be one of the most reliable options for fax transmissions, it can cause more issues in some of the VoIP infrastructures. So it is **important** to check if this fax mode is supported by all participating VoIP instances, especially in case of cross-compatibility due to participating SBC's or connected ITSP's, within the Unify OpenScape 4000 environment. Depending on the VoIP environment with its participating instances, additional configurations and adjustments might be required. However, in practice and for most instances plain G.711 Fax Pass Through (Softfax) should be the first choice for faxing.



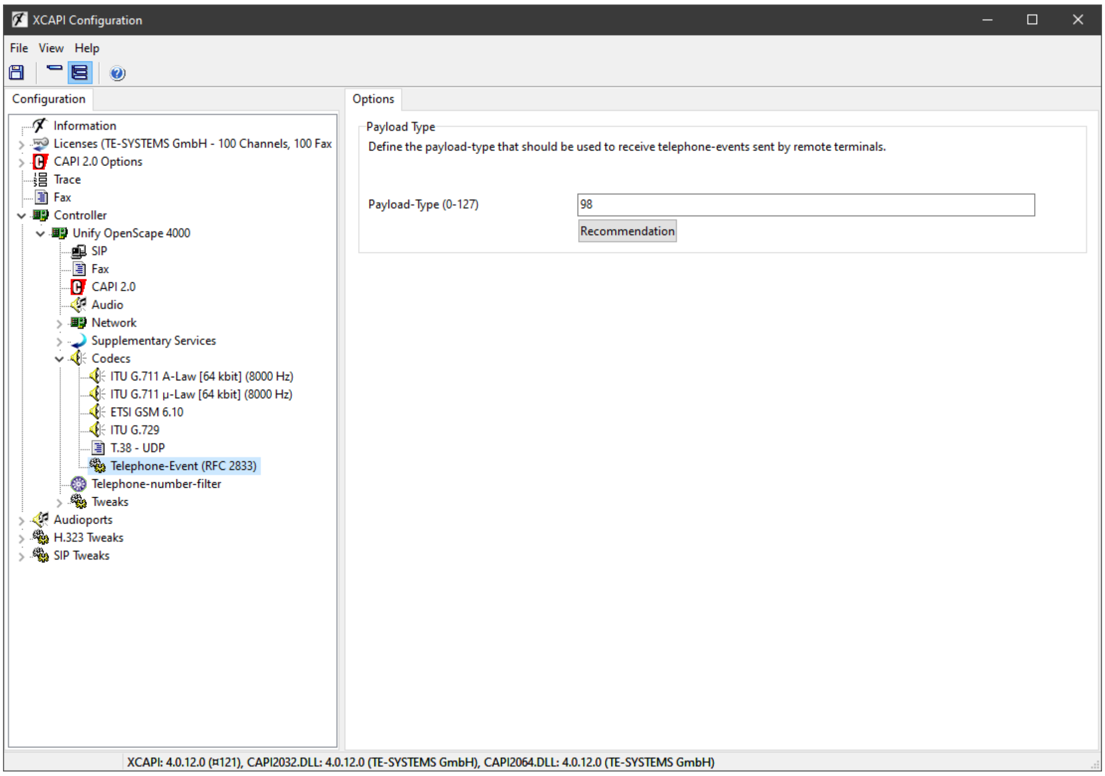
## 4.2 Codecs

The screenshot below shows the default codec settings of the XCAPI SIP controller. As a general rule, there is no need to change anything here.



## 4.3 DTMF via RFC2833

Please ensure that the **RFC2833** parameters **RFCFMOIP** and **RFCDTMF** are set. Further, the parameter **Redundant Transmission of RFC2833 Tones according to RFC2198** (CGWB-Parameter **REDRFCTN**) must be disabled for appropriate interworking. For interworking, the value for the **Payload Type for RFC2833** (shown in the chapter **Codec Parameters** starting on page 22) must match the XCAPI controller settings. Please review the appropriate configurations.



## 4.4 Message Waiting Indication

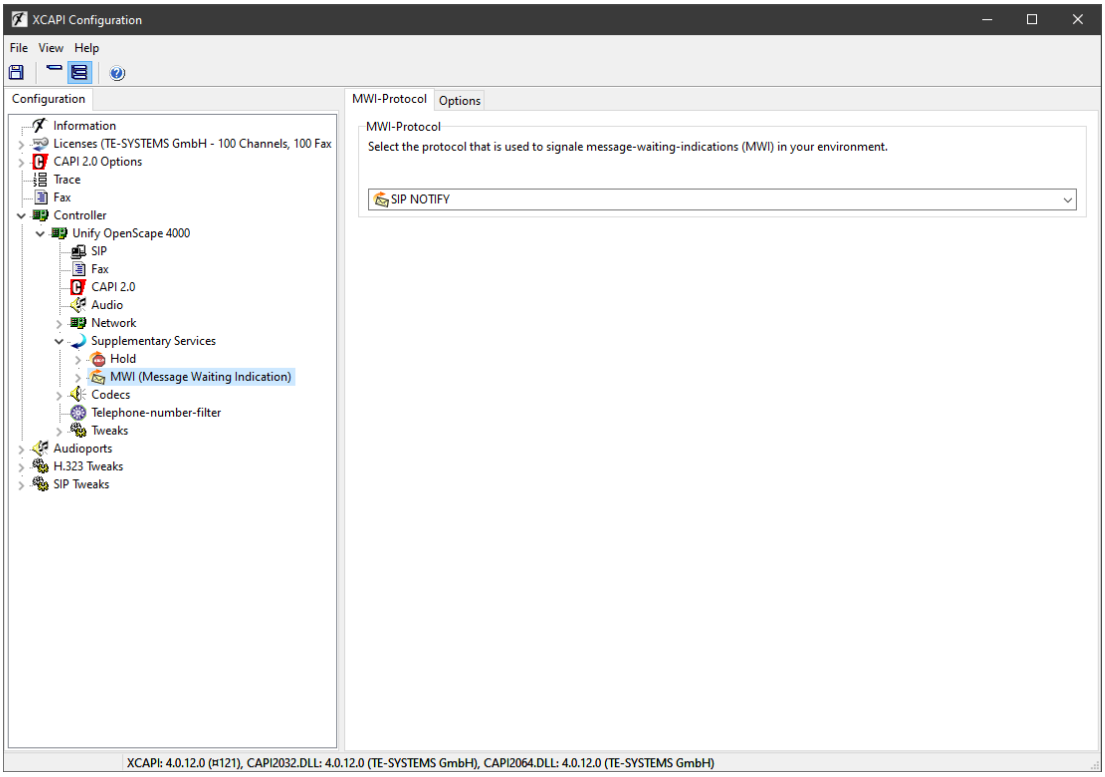
Signaling message waiting indications must be specified through the **PM** mode parameter of the AMO **RICHT**.

```
H500:  AMO RICHT STARTED
+-------+----------------------+------------------------------+--------+
| IDX  |          SAN         |                NAME          |  TYPE  |
+-------+----------------------+------------------------------+--------+
|     1|492119598559          |MWI                           |OTHER   |
+-------+----------------------+------------------------------+--------+
H23:  SVC FAX IS NOT USED FOR RICHT BRANCH CD.  VOICE IS USED
      FOR G3 FAX AND DATA FOR G4 FAX.
```

The **PMIDX** (Phone Mail Index) must be enabled for the according subscribers.

```
DISP-SBCSU:4001;
H500:  AMO SBCSU STARTED

----------------------------- USER DATA ----------------------------------------
 STNO     =4001          OPT     =OPTI       COS1     =1          DPLN    =0
 MAINO    =4001          CONN    =IP2        COS2     =1          ITR     =0
 PEN      =1-17-  2- 41                      LCOSV1   =1          COSX    =0
 INS      =Y             ASYNCT  =500        LCOSV2   =1
 SSTNO    =N             PERMACT =           LCOSD1   =1          CBKBMAX =5
 TRACE    =N             EXTBUS  =           LCOSD2   =1          RCBKB   =N
 ALARMNO  =0             DFSVCANA=           SPDI     =0          RCBKNA  =N
 HMUSIC   =0             FLASH   =           SPDC1    =           CBKNAMB =N
 PMIDX    =1                                 SPDC2    =
 SECR     =N             DIGNODIS=N          DSSTNA   =N          COMGRP  =0
 STD      =110           CALLOG  =NONE       DSSTNB   =Y          TEXTSEL =ENGLISH

 REP      =0             OPTICOM =N          OPTIUSB  :           VPI     =
 IDCR     =N             OPTICA  =           OPTISOA  :0          VCI     =
 APPM     =              OPTIDA  =           OPTISPA  :0          PATTERN =
 BLF      =N             OPTIUPOE:0          OPTIABA  :0

 DCFWBUSY=N              HEADSET =N          APMOBUSR=N           APICLASS=
 DNIDSP   =N             HSKEY   =NORMAL     IPCODEC  =G711P      SECAPPL =0
 DTMFBLK  =N                                 IPPASSW  =
 DTMFCTRD=N              BASICSVC=
 DVCFIG   =OPTIIP   *    TSI     =1          SPROT    =           SOPTIDX =
                                             DPROT    =           DOPTIDX =
                                             FPROT    =           FOPTIDX =
```

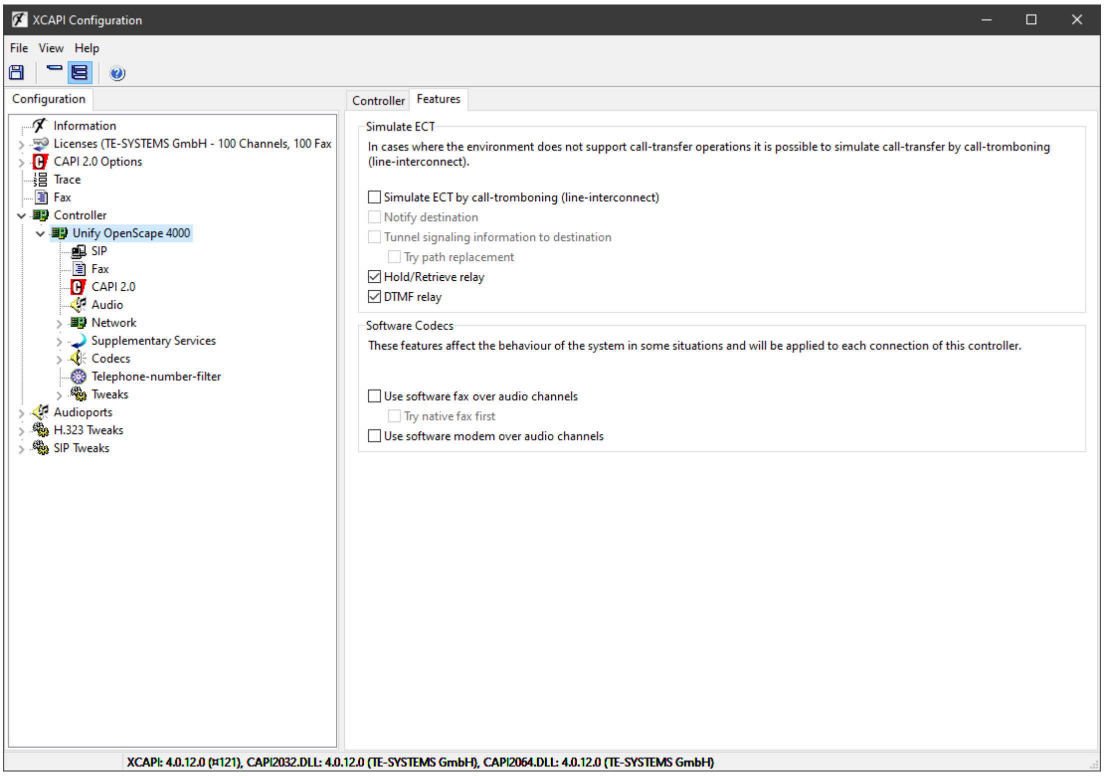
Ensure that the default MWI method for the XCAPI controller is set to **SIP Notify**.



### 4.5 Call Transfer

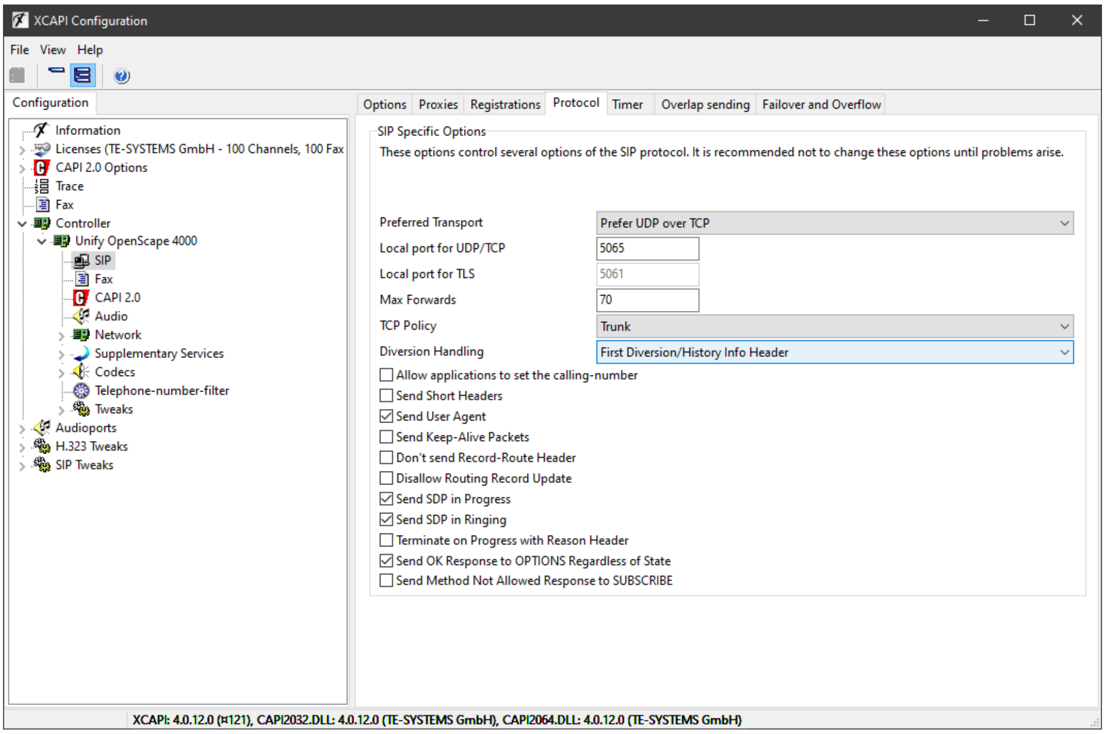
Ensure that **REFER Allowed** is enabled for the XCAPI related **SIP Trunk Profile**. as shown in the same named chapter for the **Extended SIP Provider Data** configurations starting on page 19.

Within the XCAPI controller **Features** tab, the **Simulated ECT by call-tromboning (line-interconnect)** parameter must be disabled for supporting call transfer via **SIP REFER**.



## 4.6 Diversion Handling

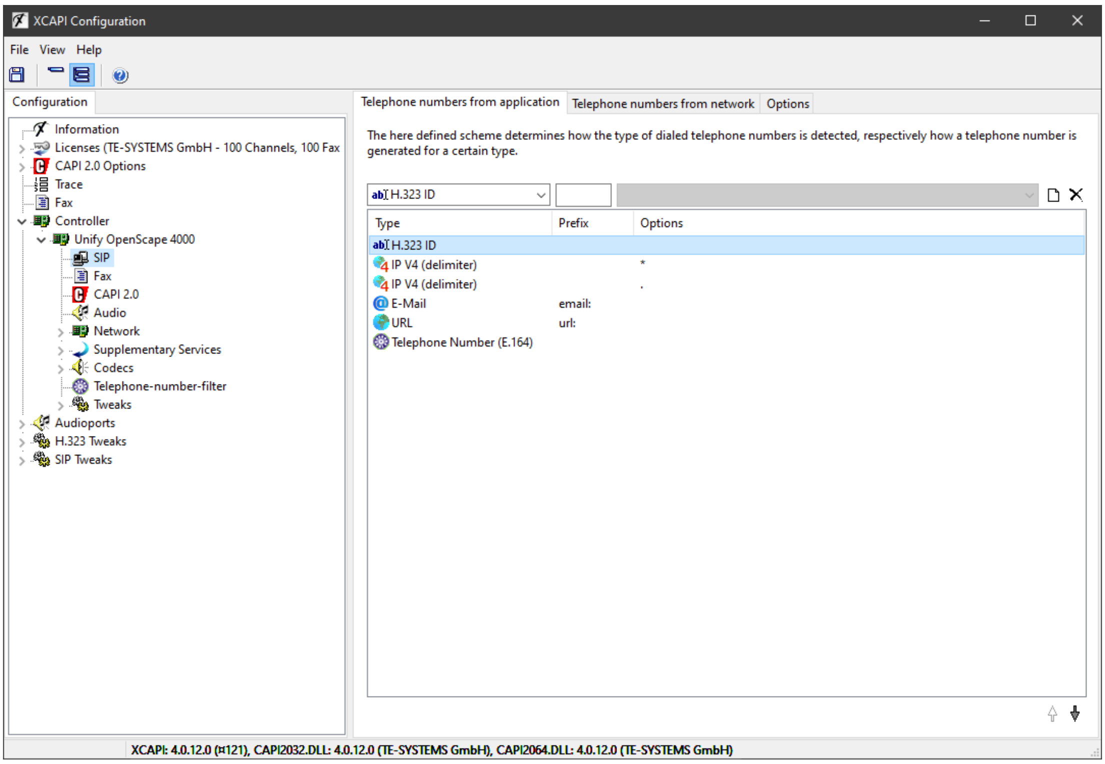
For some call scenarios, the CAPI 2.0 application might be aware about the first or last provided redirection number of the PBX. If needed, this behavior can be changed via the **Diversion Handling** option in XCAPI's SIP controller protocol tab as shown on the screenshot below. The Unify OpenScape 4000 gateway delivers this information via the SIP **Diversion** header towards XCAPI.
For this, the **Call Diversion** header must be enabled for the associated SIP trunk of XCAPI. This header has to be specified in the **Miscellaneous** section of the **Extended SIP Provider Data** are as shown in the screenshot of the **SIP Trunk Profiles** chapter from page 19.



## 4.7 Numbering

Please note, with very few exceptions, XCAPI can't do any numbering manipulations.
The numbering or digits from 0 to 9, of the VoIP binding or the CAPI applications will passed through by XCAPI. It must be ensured that the PBX or VoIP instance and the CAPI 2.0 application is based on a uniform dial plan. That means, that the CAPI application and the Unify OpenScape 4000 must provide proper calling and called numbers. If required, additional numbering manipulations have to be done within the PBX. AS the CAPI 2.0 ISDN layer is basically only aware about dialed digits and some numbering attributes, other dial strings formats (for e.g. +49536381950) are not passed through XCAPI by default. Apart of that, there are also some CAPI 2.0 applications which are not even able to generate such dial strings.

If it's required that XCAPI pass dial strings like +49536381950, the SIP controller has to be adjusted. Go to the **Telephone-number-filter** dialog of the XCAPI controller. In the **Telephone numbers from application** tab, select the **H.323 ID** type and delete its **h323id:** related **Prefix** and move this entry to the top of the list as shown on the next screenshot.




Important: In this configuration, XCAPI would even pass non-valid dial strings which may lead to numbering malfunction.

## Unify Ready Technology Connectivity Certification

The official certificate and test report is available on the Unify Technology Partners Extranet.

Unify

# Atos Unify Ready Technology connectivity certification

The connectivity of

**XCAPI V3.6**

developed by TE-Systems GmbH has been certified at the SIP-Interface of Atos Unify OpenScape 4000 V10 in accordance with the respective test report, dated April 24th, 2020. Atos Unify declares the test result for OpenScape 4000 V8 R2 even valid for OpenScape 4000 V10 in respect of the interworking with TE-Systems XCAPI V3.6.

The test was conducted conforming to DIN EN ISO 9001. This certificate is only valid in conjunction with the full test report and the notes contained therein. **Please consider that the test report only covers the functionality of the interface. The certificate and test report are not good for a statement of end-to-end functionality.**

Munich, April 19th, 2021

Andre Bergmann

Director Technology Partner Program

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