innovaphone GW Routing

Gateway routing to manipulate incoming and outgoing numbers

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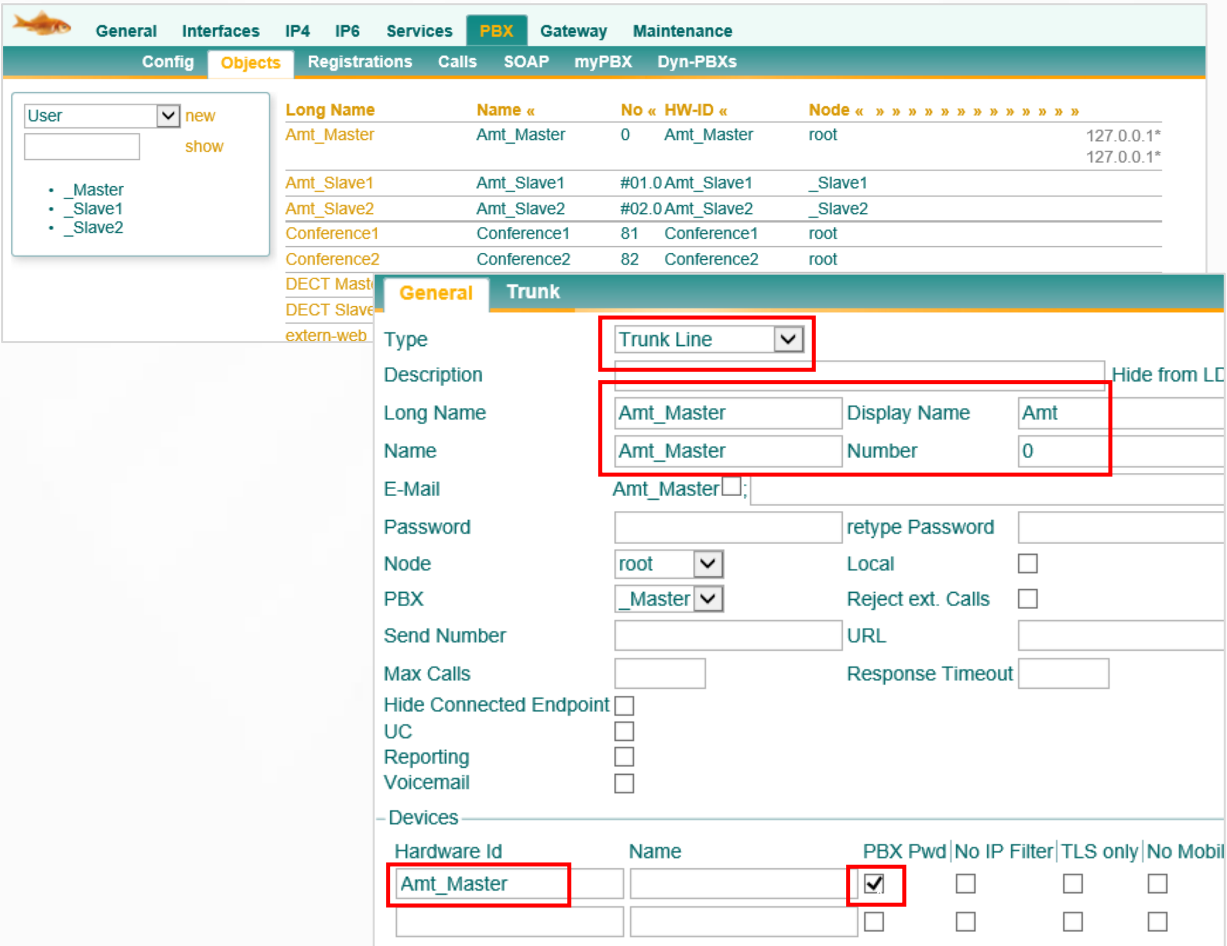
Content

1 Introduction – Setting up a trunk

1.1 Setting Up a Trunk Object

First, a trunk object needs to be set up in the PBX.

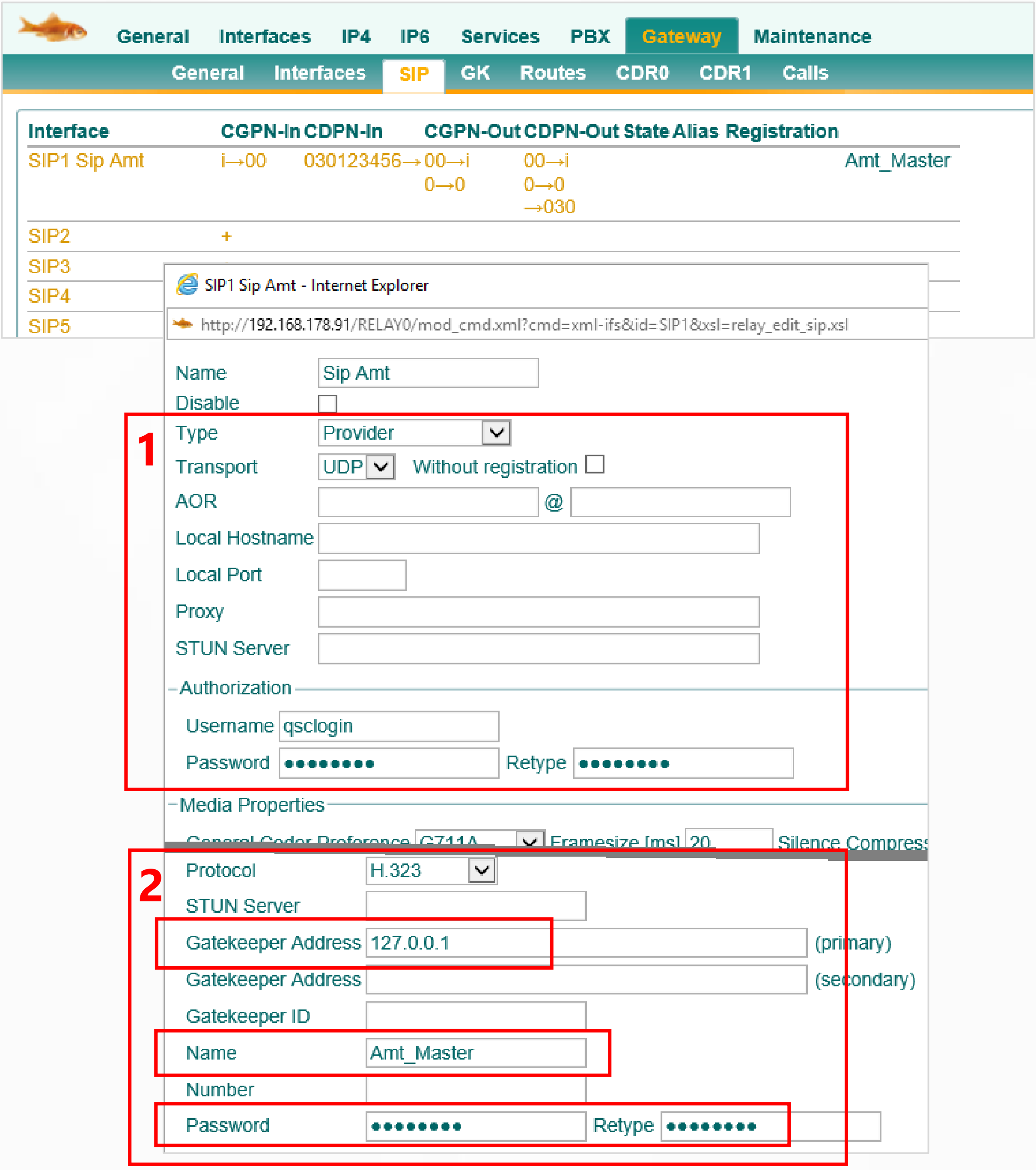
- A name (e.g. Extern)
- A phone number (e.g. 0)
- A HW ID for registration
- It is recommended to use the PBX password



1.2 Setting up the Gateway Interface

The GW interface connects in two directions:

1. EXTERNAL > To the public network (e.g. SIP or ISDN)
2. INTERNAL > To the trunk object in the PBX
   - The IP address of the PBX must be entered (e.g. "localhost").
   - The HW ID and password (e.g. PBX password) of the trunk must be specified.



1.3 The routes are created automatically

The connection between the EXTERNAL and INTERNAL sides of the GW interface is exclusively via routes. These routes are usually created automatically.

With the setup of the gateway interface, two routes were automatically generated.

1. From public network to PBX (EXTERNAL > INTERNAL)
2. From PBX to the public network (INTERNAL > EXTERNAL)

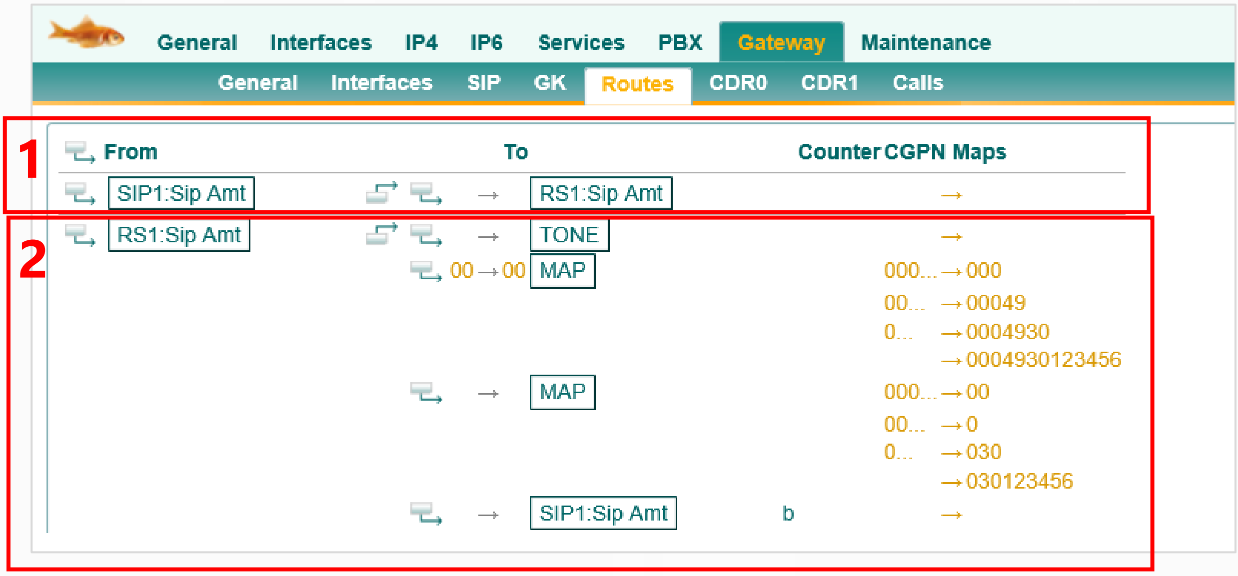
Hint:

- "SIP1" stands for the first SIP interface
- "RS1" stands for the internal registration of the first SIP interface

Examples:

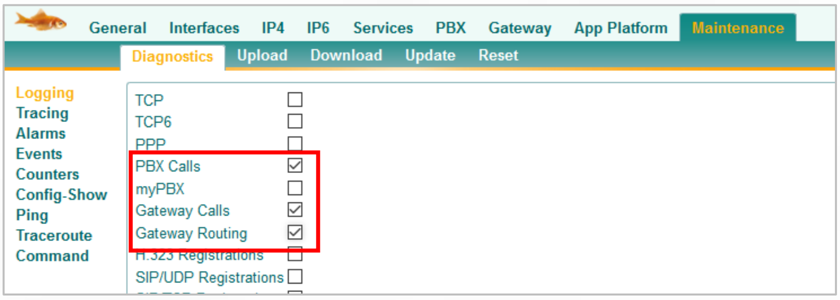
- "BRI2" would stand for the second BRI interface
- "RB2" would stand for the internal registration of the second BRI interface

- "PRI3" would stand for the third PRI interface
- "RP3" would stand for the internal registration of the third PRI interface



2 Call Tracking in Logging

Logging is very well suited for easy call tracking and detection of phone number manipulation, for this the options "PBX Calls", "Gateway Calls" and "Gateway Routing" should be activated.



In the logging itself, it is recommended to look for the entries with "INTERFACE MAP". Here you can see how the phone numbers are manipulated at the interfaces, and which interfaces are used at all. The routes can usually be derived from this.

```
Syslog
20191115-140645 CALL 8 Alloc
20191115-140645 CALL 8 A:Call     ->                      / RS1::->*::
20191115-140645 ROUTE 8 INTERFACE MAP if=RS1:'Deutsche_Telek' CGPN-In 1421->1421, CDPN-In 00491603333333->00491603333333, DGPN-In ->
20191115-140645 ROUTE 8 EVAL ROUTE route=RT7
20191115-140645 ROUTE 8 EVAL MAP route=RT7 map=1 dest='TONE' in=''->out=''
20191115-140645 ROUTE 8 MAP(CDPN-MATCH OK) route=RT7 map=1 dest='TONE' in=''->out=''
20191115-140645 ROUTE 8 APPLY CDPN-MAP in='00491603333333'->out='00491603333333'
20191115-140645 ROUTE 8 SUCCESS route=RT7 map=1 dest='TONE' in=''->out=''
20191115-140645 ROUTE 8 INTERFACE MAP if=TONE CGPN-Out 1421->1421, CDPN-Out 00491603333333->00491603333333, DGPN-Out ->
20191115-140645 CALL 8 B:Call     1421:test@test.de->00491603333333 / RS1:1421:_trunk->TONE:00491603333333:
20191115-140645 CALL 8 B:Rel      1421:test@test.de->00491603333333 / RS1:1421:_trunk->TONE:00491603333333: Cause: Resources unavailable, unspec:
20191115-140645 ROUTE 8 EVAL ROUTE route=RT7
20191115-140645 ROUTE 8 EVAL MAP route=RT7 map=1 dest='TONE' in=''->out=''
20191115-140645 ROUTE 8 MAP(CDPN-MATCH OK) route=RT7 map=1 dest='TONE' in=''->out=''
20191115-140645 ROUTE 8 CONTINUE TO NEXT MAP route=RT7 map=1 dest='TONE' in=''->out='' reason='retry>0' found=false
20191115-140645 ROUTE 8 EVAL MAP route=RT7 map=2:'Routing Abgehende CLIP' dest='MAP' in=''->out=''
20191115-140645 ROUTE 8 MAP(CDPN-MATCH OK) route=RT7 map=2:'Routing Abgehende CLIP' dest='MAP' in=''->out=''
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1406'->out='0030555511111'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1405'->out='0030555511111'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1404'->out='0030555511111'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1403'->out='0030555511111'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1402'->out='0030555511111'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1401'->out='0030555511111'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='1408'->out='0030555511111'
20191115-140645 ROUTE 8 CONTINUE TO NEXT MAP route=RT7 map=2:'Routing Abgehende CLIP' dest='MAP' in=''->out='' reason='processed MAP interface'
20191115-140645 ROUTE 8 EVAL MAP route=RT7 map=3 dest='MAP' in='00'->out='00'
20191115-140645 ROUTE 8 MAP(CDPN-MATCH OK) route=RT7 map=3 dest='MAP' in='00'->out='00'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='000...'->out='000'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='00...'->out='00049'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in='0...'->out='000492871'
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=1421 verify=false in=''->out='00049305555'
20191115-140645 ROUTE 8 EVAL CGPN-MAP SUCCESS in=''->out='00049305555'
20191115-140645 ROUTE 8 APPLY CGPN-MAP in='1421'->out='000493055551421'
20191115-140645 ROUTE 8 CONTINUE TO NEXT MAP route=RT7 map=3 dest='MAP' in='00'->out='00' reason='processed MAP interface'
20191115-140645 ROUTE 8 EVAL MAP route=RT7 map=4 dest='MAP' in=''->out=''
20191115-140645 ROUTE 8 MAP(CDPN-MATCH OK) route=RT7 map=4 dest='MAP' in=''->out=''
20191115-140645 ROUTE 8 EVAL CGPN-MAP cgpn=000493055551421 verify=false in='000...'->out='00'
20191115-140645 ROUTE 8 EVAL CGPN-MAP SUCCESS in='000...'->out='00'
20191115-140645 ROUTE 8 APPLY CGPN-MAP in='000493055551421'->out='00493055551421'
20191115-140645 ROUTE 8 CONTINUE TO NEXT MAP route=RT7 map=4 dest='MAP' in=''->out='' reason='processed MAP interface'
20191115-140645 ROUTE 8 EVAL MAP route=RT7 map=5 dest='SIP1' in=''->out=''
20191115-140645 ROUTE 8 MAP(CDPN-MATCH OK) route=RT7 map=5 dest='SIP1' in=''->out=''
20191115-140645 ROUTE 8 APPLY CDPN-MAP in='00491603333333'->out='00491603333333'
20191115-140645 ROUTE 8 SUCCESS route=RT7 map=5 dest='SIP1' in=''->out=''
20191115-140645 ROUTE 8 INTERFACE MAP if=SIP1:'Deutsche_Telek' CGPN-Out 00493055551421->I493055551421, CDPN-Out 00491603333333->00491603333333,
20191115-140645 CALL 8 B:Call     00493055551421:test@test.de->00491603333333 / RS1:1421:_trunk->SIP1:00491603333333:
20191115-140645 CALL 8 B:Rel      00493055551421:test@test.de->00491603333333 / RS1:1421:_trunk->SIP1:00491603333333:
20191115-140645 CALL 8 A:Rel      00493055551421:test@test.de->00491603333333 / RS1:1421:_trunk->SIP1:00491603333333:
20191115-140645 CALL 8 Free
20191115-140807 CALL 13 Alloc
20191115-140807 CALL 13 A:Call     ->                      / RS1::->*::
```

3 Easy routing and number manipulation

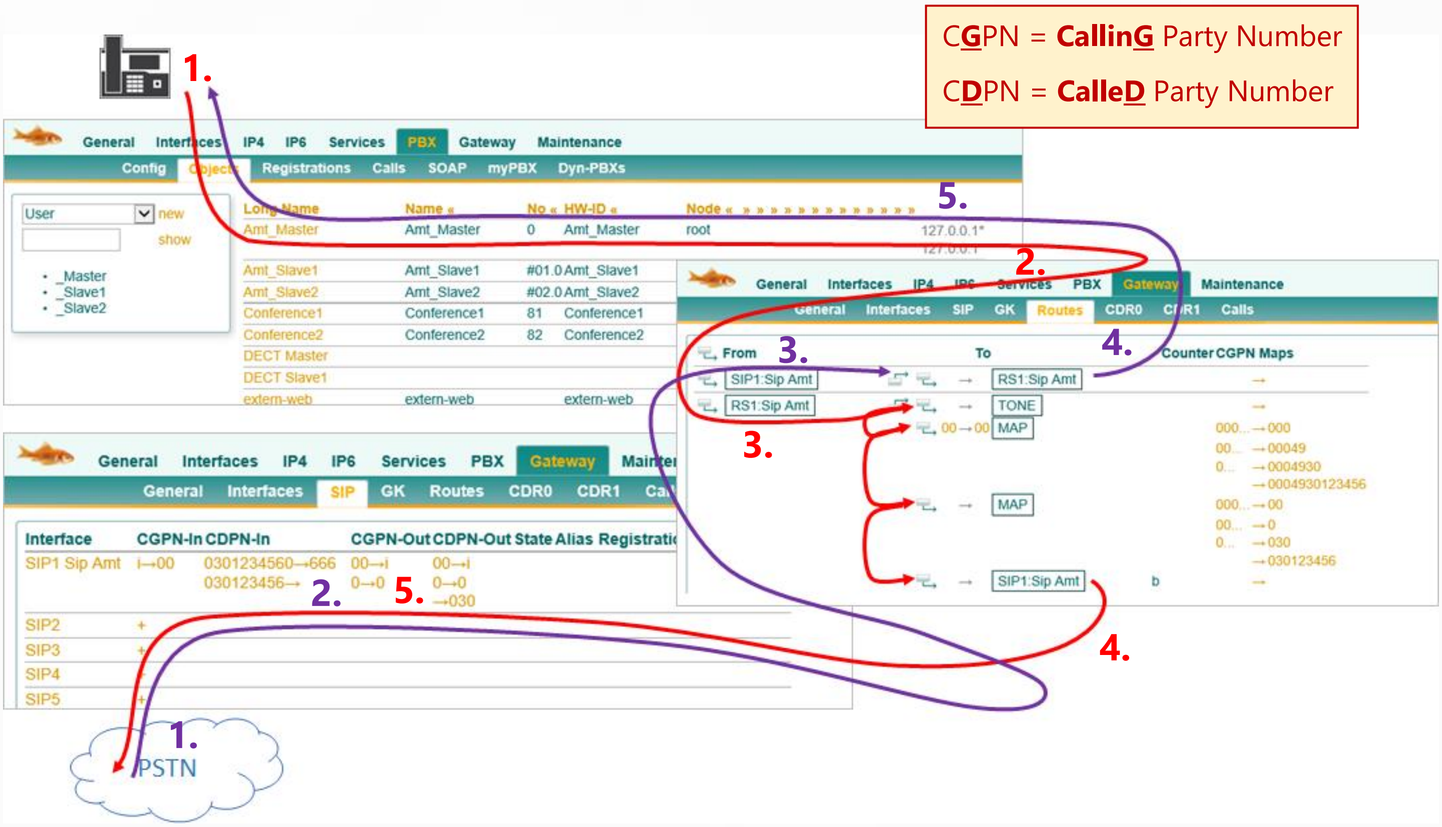
3.1 Routing Ways

Outgoing call (red):

- The call goes from the end device **(1.)** via the trunk object to the gateway **(2.).**
- That's where it comes down to the INTERNAL registration **(3.)**
- After routing, the call goes via the EXTERNAL registration (4th) to the **GW interface** (5th) **and from there to the office.**

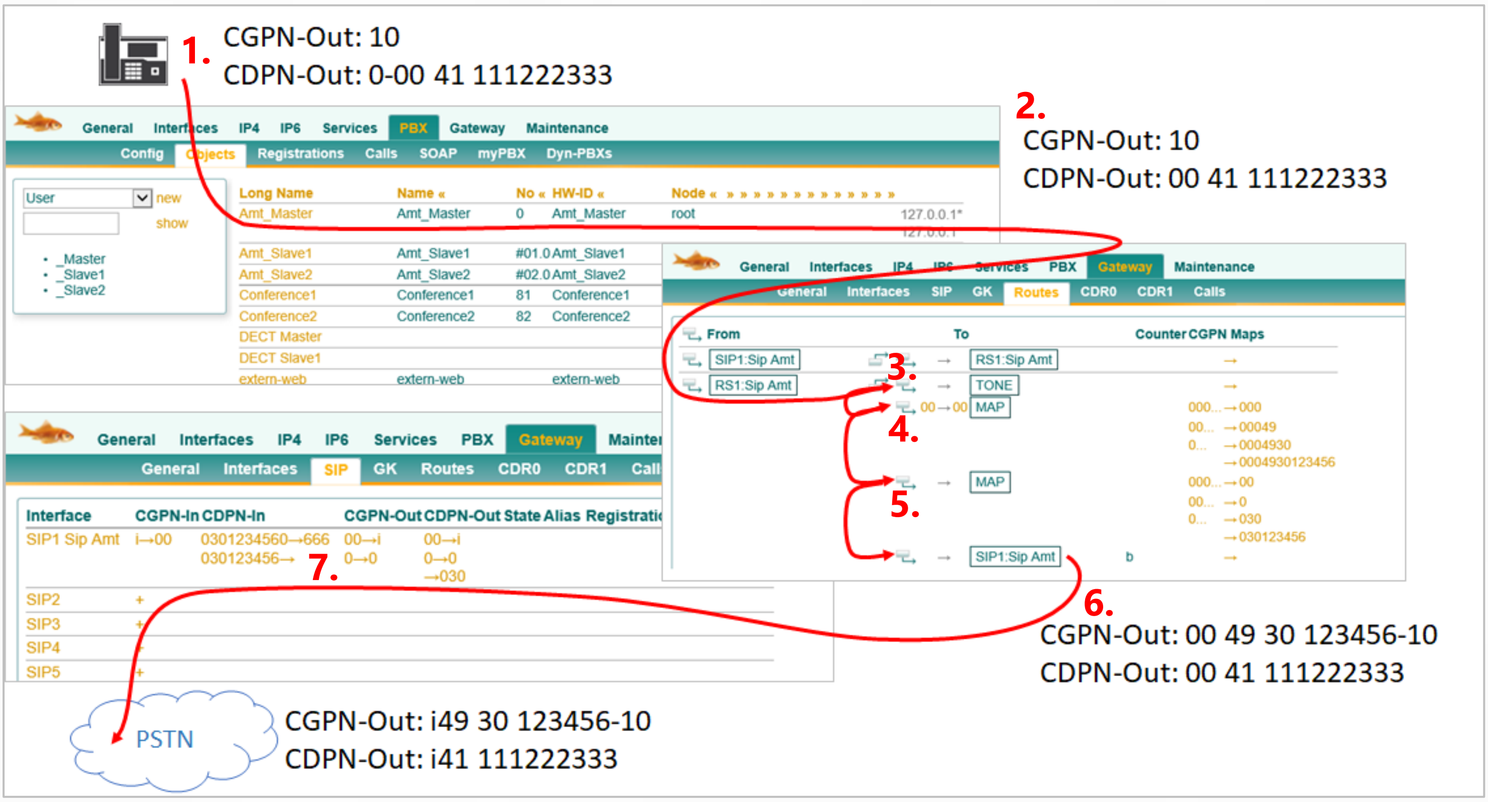
Incoming call (purple):

- The call comes from the office **(1.) via the GW interface** (2.) **into the gateway**.
- There it depends on the EXTERNAL registration **(3.)**
- After routing, the call goes via the INTERNAL registration **(4.) to the** trunk object **(5.)** and from there to the end device.



3.2 Outbound Manipulation Example 1

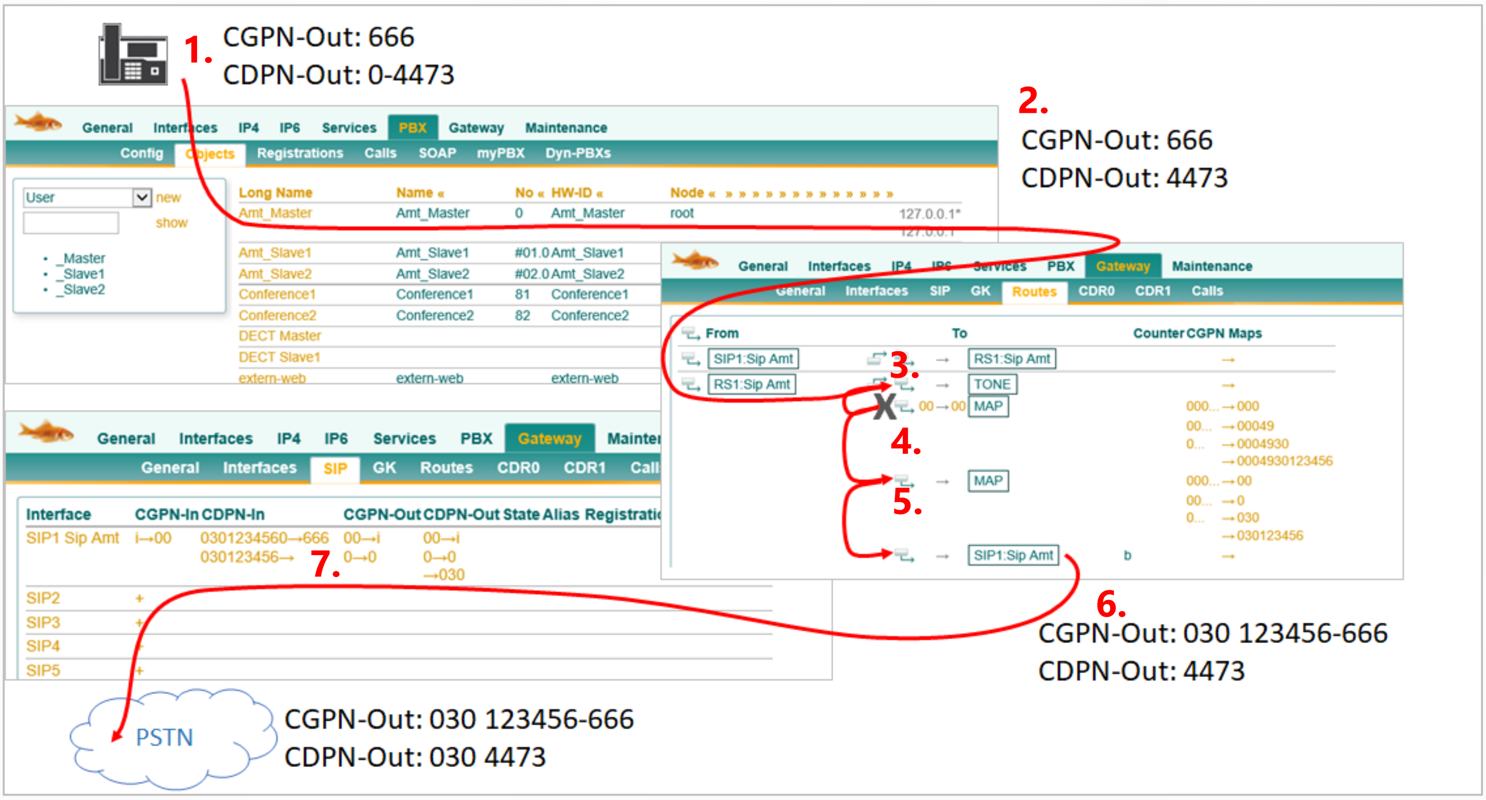
The extension "10" dials the official number "0041 111222333"



1. The extension sends its single extension and must also dial the dial "0".
   CGPN-Out: 10 | CDPN-Out: 0-0041 111222333
2. Once the call leaves the PBX and reaches the route, the "0" dial is automatically removed. You can't prevent that.
   CGPN-Out: 10 | CDPN-Out: 0-0041 111222333 > 0041 111222333
3. The first routing entry only generates the official tone and has no other effect
   CGPN-Out: 10 | CDPN-Out: 0041 111222333
4. The second routing entry checks if the CDPN starts with "00" and replaces it with "00" (left of the arrow truncates, right adds). So no change to the CDPN here.
   BUT: Since the CDPN starts with the "00", this route and thus the CGPN mapping applies.
   CGPN-Out: 10 > 00049 30 123456-10 | CDPN-Out: 0041 111222333
5. The third routing entry always applies, so does this CGPN mapping.
   CGPN-Out: 00049 30 123456-10 > 0049 30 123456-10 | CDPN-Out: 0041 111222333
6. The last entry routes to the SIP interface without manipulation
   CGPN-Out: 0049 30 123456-10 | CDPN-Out: 0041 111222333
7. In the SIP interface, the interface mappings are still effective.
   CGPN-Out: i49 30 123456-10 | CDPN-Out: i41 111222333

3.3 Outgoing Manipulation Example 2

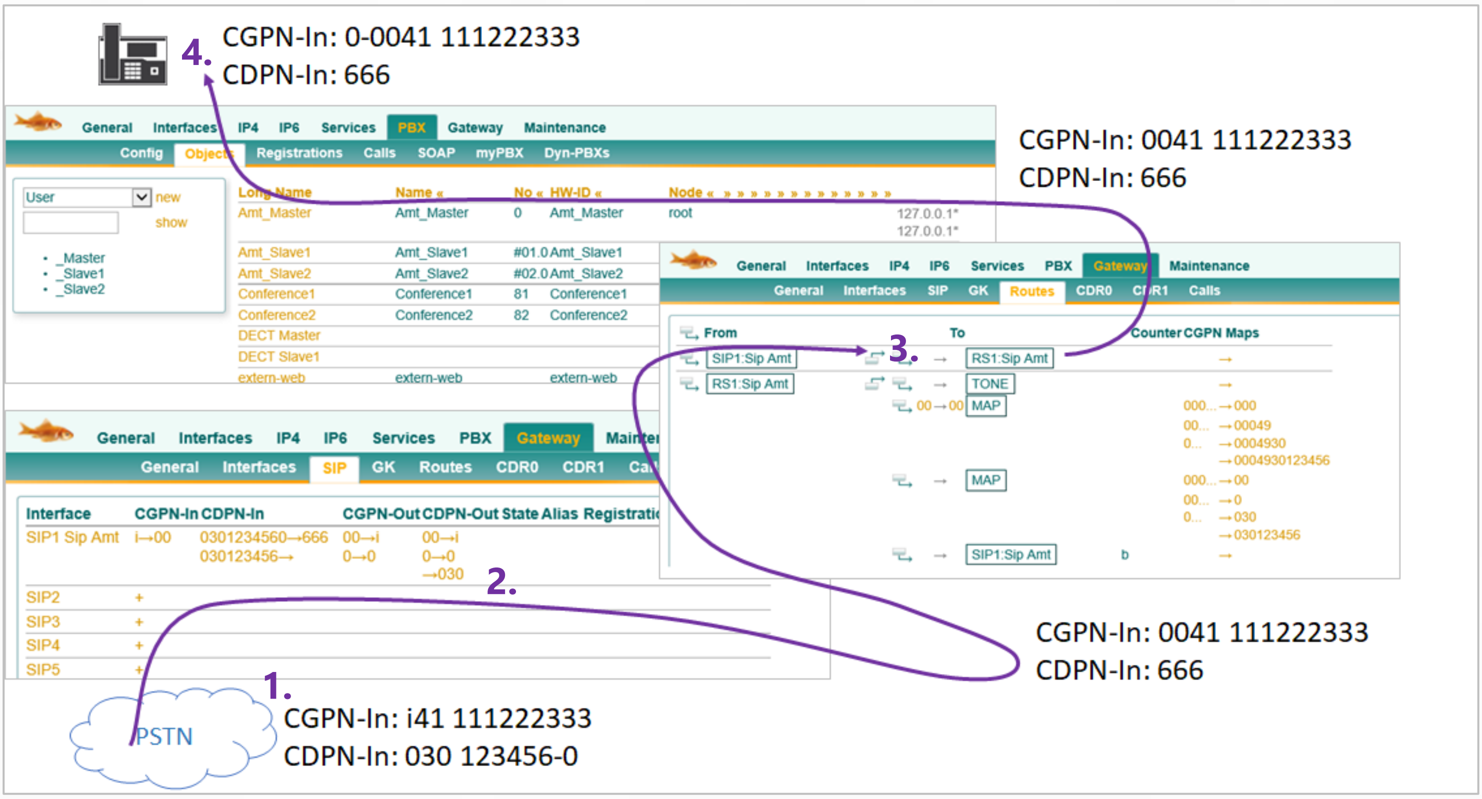
The extension "666" dials the official number "4473" (in the same city)



1. The extension sends its single extension and must also dial the dial "0".
   CGPN-Out: 666 | CDPN-Out: 0-4473
2. Once the call leaves the PBX and reaches the route, the "0" dial is automatically removed. You can't prevent that.
   CGPN-Out: 666 | CDPN-Out: 0-4473 > 4473
3. The first routing entry only generates the official tone and has no other effect
   CGPN-Out: 666 | CDPN-Out: 4473
4. The second routing entry checks if the CDPN starts with "00" and replaces it with "00" (left of the arrow truncates, right adds). Because the CDPN does not start with the "00" in this example, this route does not apply
   CGPN-Out: 666 | CDPN-Out: 4473
5. The third routing entry always applies, so does this CGPN mapping.
   CGPN-Out: 666 > 030 123456-666 | CDPN-Out: 4473
6. The last entry routes to the SIP interface without manipulation
   CGPN-Out: 030 123456-666 | CDPN-Out: 4473
7. In the SIP interface, the interface mappings are still effective.
   CGPN-Out: 030 123456-666 | CDPN-Out: 4473 > 030 4473

3.4 Example of incoming manipulation 1

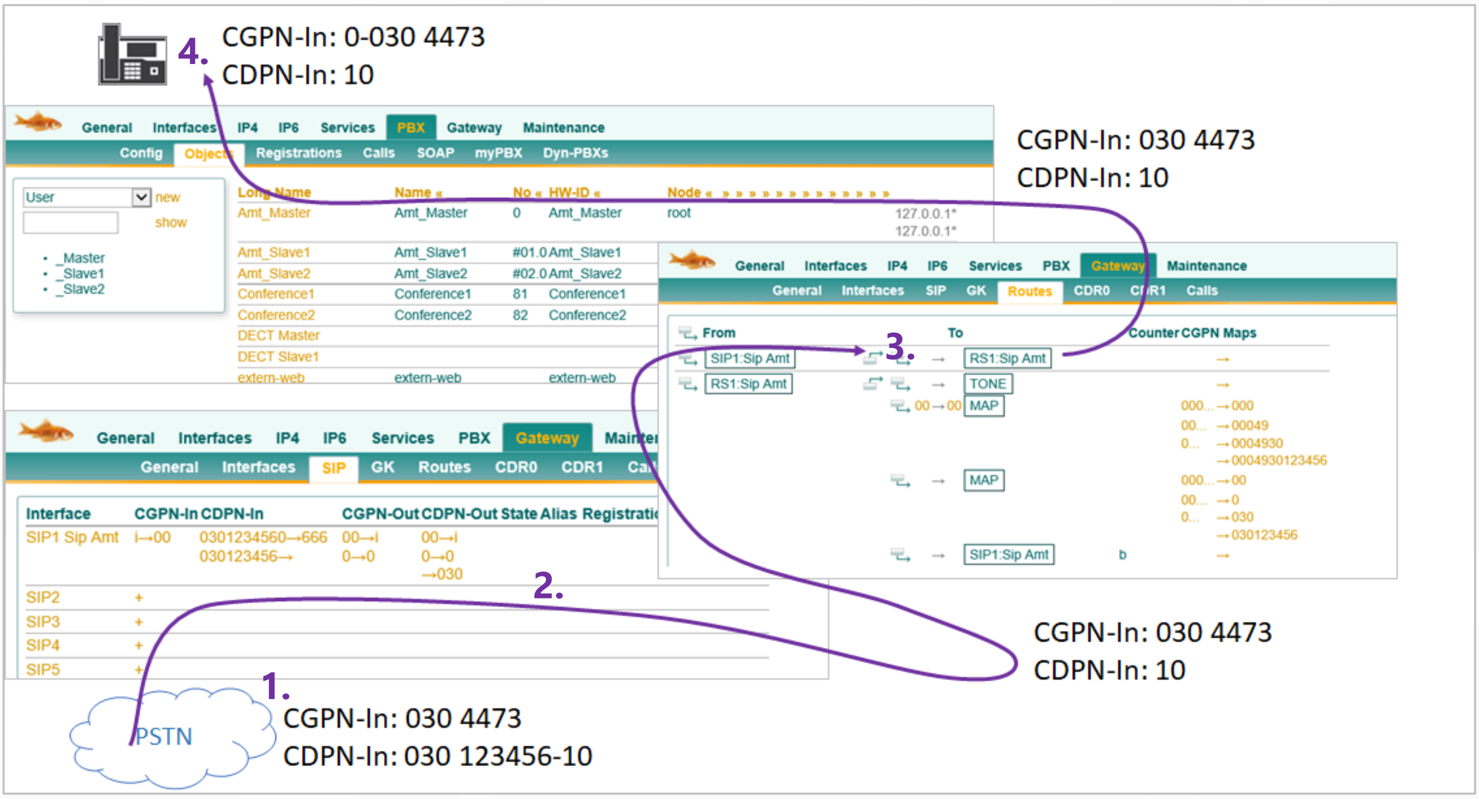
An incoming call with the number 0041 111222333 to extension "0"



1. The call arrives with the "i" instead of 00.
   CGPN-In: i41 111222333 | CDPN-In 030 123456-0
2. In the SIP interface, the interface mappings come into play first.
   CGPN-In: i41 111222333 > 0041 111222333 | CDPN-In 030 123456-0 > 666
3. There is no manipulation in the incoming routing.
   CGPN-In: 0041 111222333 | CDPN-In 666
4. The trunk object automatically adds its own prefix. You can't prevent that.
   CGPN-In: 0-0041 111222333 | CDPN-In 666

3.5 Example of incoming manipulation 2

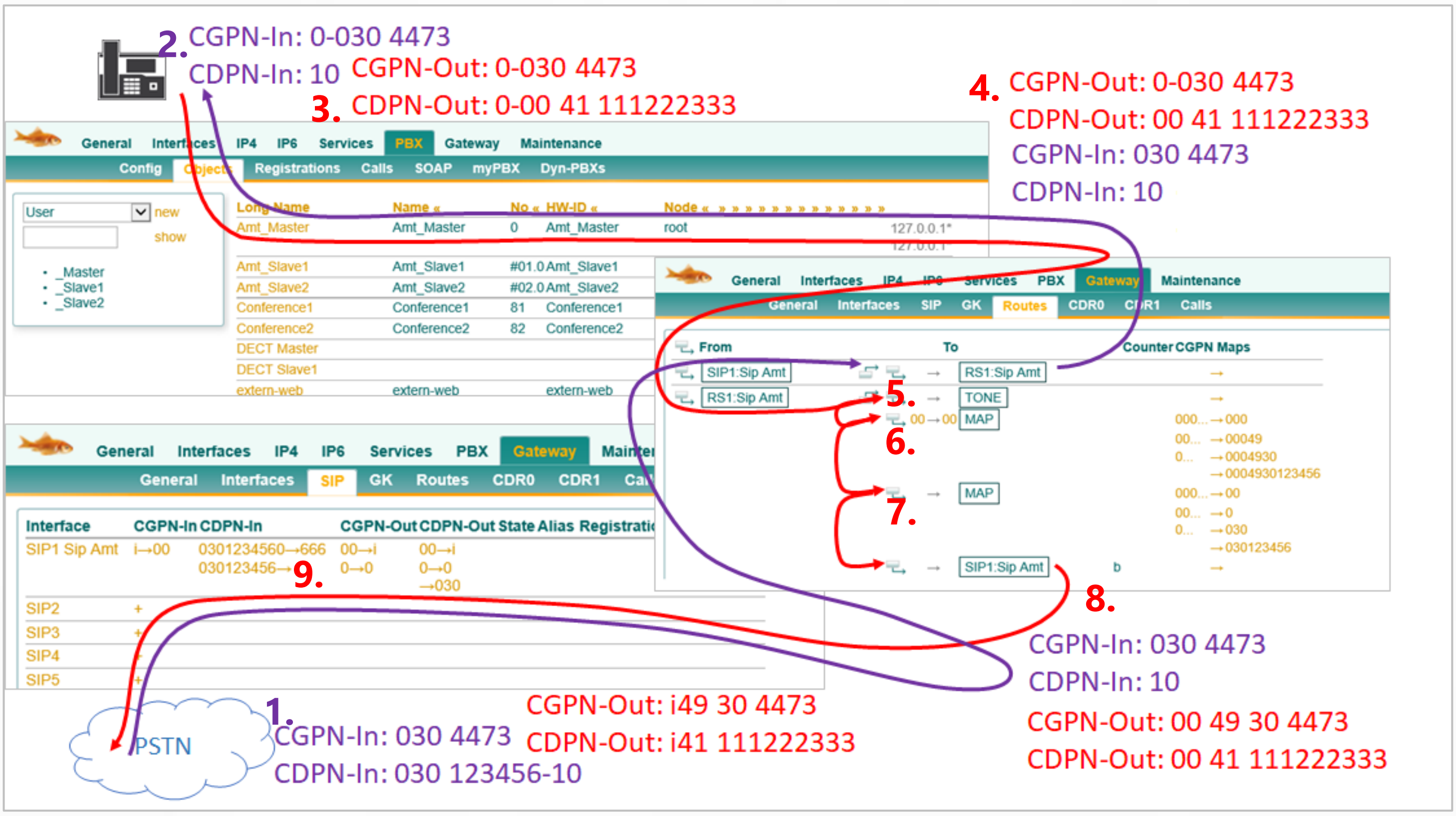
An incoming call to 030 4473 to extension "10"



1. The call arrives in the normal national format.
   CGPN-In: 030 4473 | CDPN-In 030 123456-10
2. In the SIP interface, the interface mappings come into play first.
   CGPN-In: 030 4473 | CDPN-In 030 123456-10 > 10
3. There is no manipulation in the incoming routing.
   CGPN-In: 030 4473 | CDPN-In 10
4. The trunk object automatically adds its own prefix. You can't prevent that.
   CGPN-In: 0-030 4473 | CDPN-In 10

3.6 Summary Example Call Forwarding

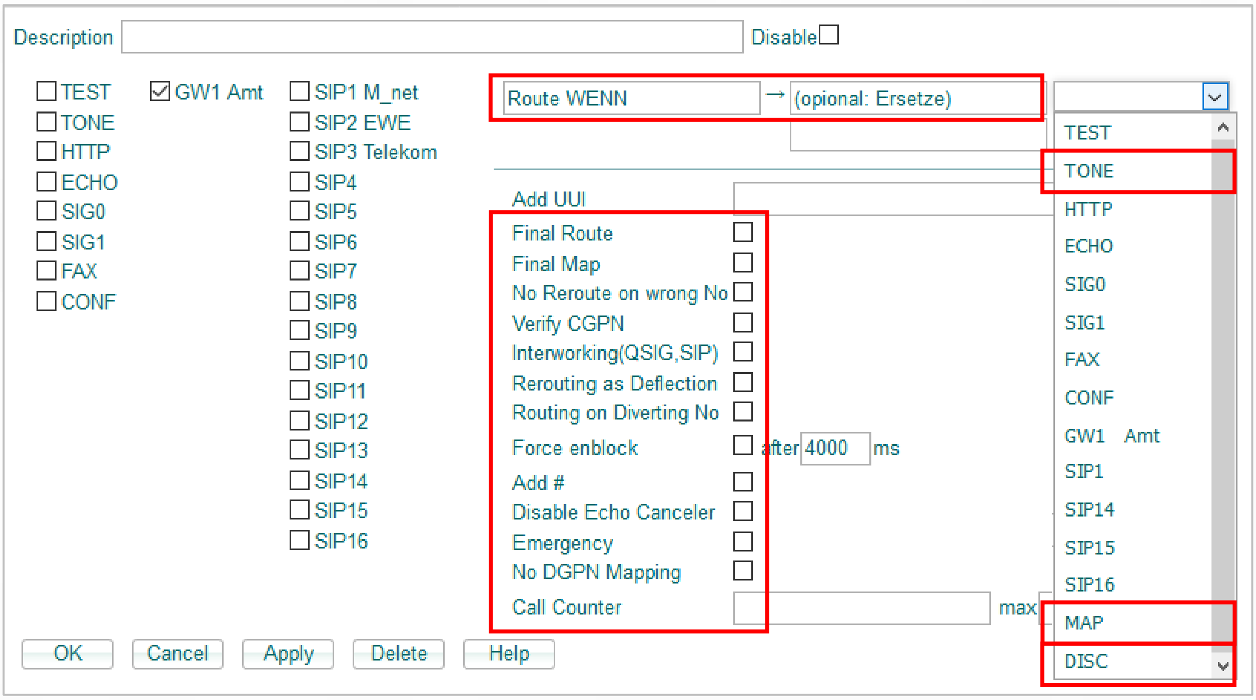
The extension "666" has a diversion to the 0041111222333



1. The call arrives in national format and is customized in the interface mapping.
   CGPN-In: 030 4473 | CDPN-In 030 123456-10
2. In the PBX, the sender phone number arrives with the official prefix.
   CGPN-In: 0-030 4473 | CDPN-In 10
3. The outgoing phone number during the redirection is the same as the original number including the "prefix"
   CGPN-Out: 0-0304473 | CDPN-Out: 0-0041 111222333
4. Once the call leaves the PBX, only the CDPN prefix "0" is removed. (NOT the CGPN).
   CGPN-Out: 0-0304473 | CDPN-Out: 0041 111222333
5. The first routing entry only generates the official tone and has no other effect
6. The second routing entry checks if the CDPN starts with "00" and replaces it with "00". Since the CDPN matches, the CGPN mapping is done.
   CGPN-Out: 00049 304473 | CDPN-Out: 0041 111222333
7. The third routing entry always applies, so does this CGPN mapping.
   CGPN-Out: 0049 304473 | CDPN-Out: 0041 111222333
8. The last entry routes to the SIP interface without manipulation
   CGPN-Out: 0049 304473 | CDPN-Out: 0041 111222333
9. In the SIP interface, the interface mappings are still effective.
   CGPN-Out: i49 304473 | CDPN-Out: i41 111222333

4 Special Route Options

In the routes themselves, various special settings can be made or routing destinations can be set.



A description of all options can be found in [Help]. The main options for routing manipulations are as follows:

Route “WENN”:
This route only applies if the initial digits of the CDPN match this entry. Otherwise, this route will be skipped. If these initial digits are to be retained, they must be entered 1 to 1 in the "Replace field".

Verify CGPN:
This route only works if the initial digits of the CGPN match an entry from the "CGPN Mapping"

Route target MAP:
A "MAP" is actually a real goal. There is only a number mapping, after which the route continues normally. This entry is used when you want to manipulate the phone number in the route.

Route target TONE:
Only one of the TONES is played, after which the route continues normally.

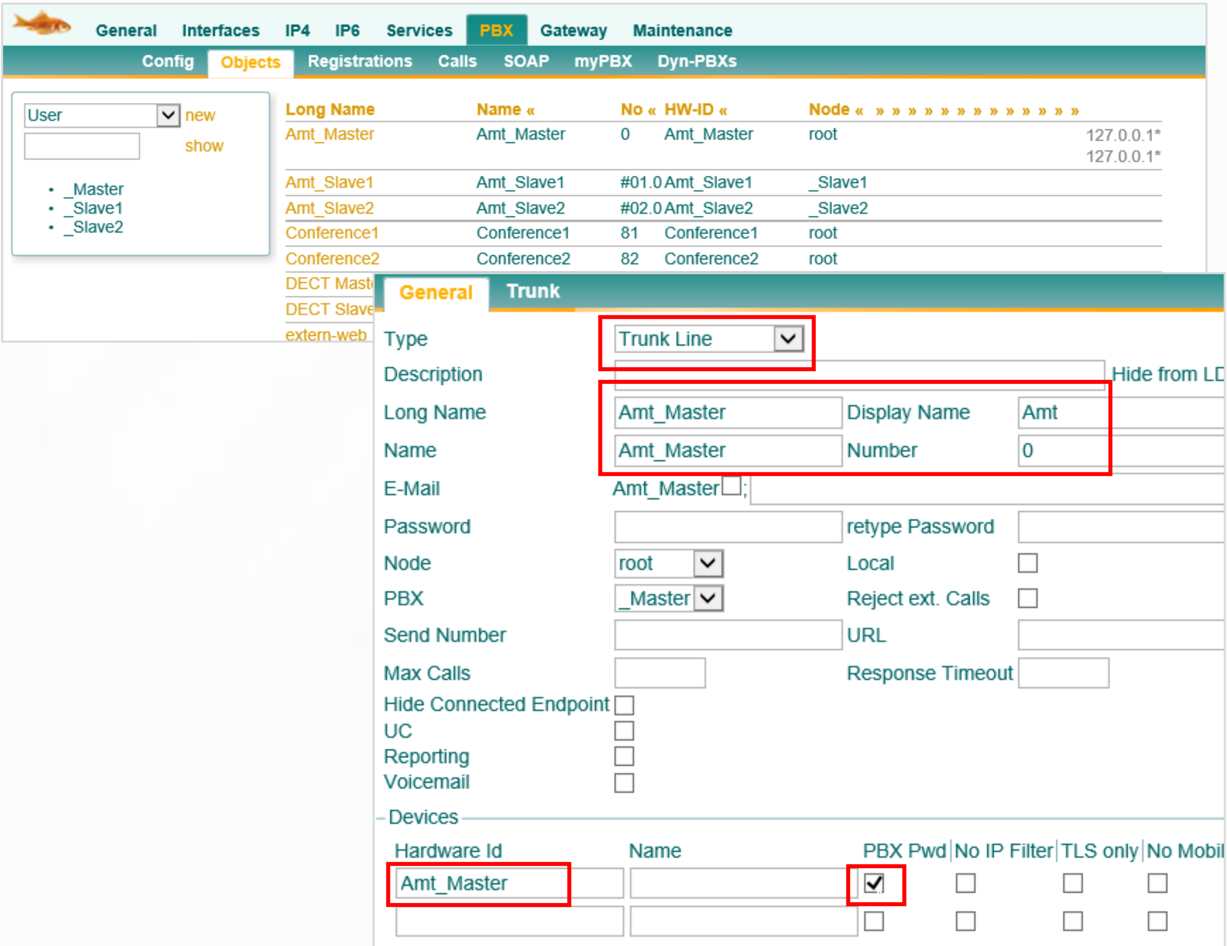
Route target DISC:
Only a DISCONNECT is sent, after which the route aborts.

5 Advanced Routing - Separate GW Registrations

5.1 Setting Up a Trunk Object

Also for the separate gateway registration, a normal trunk object is set up in the PBX.

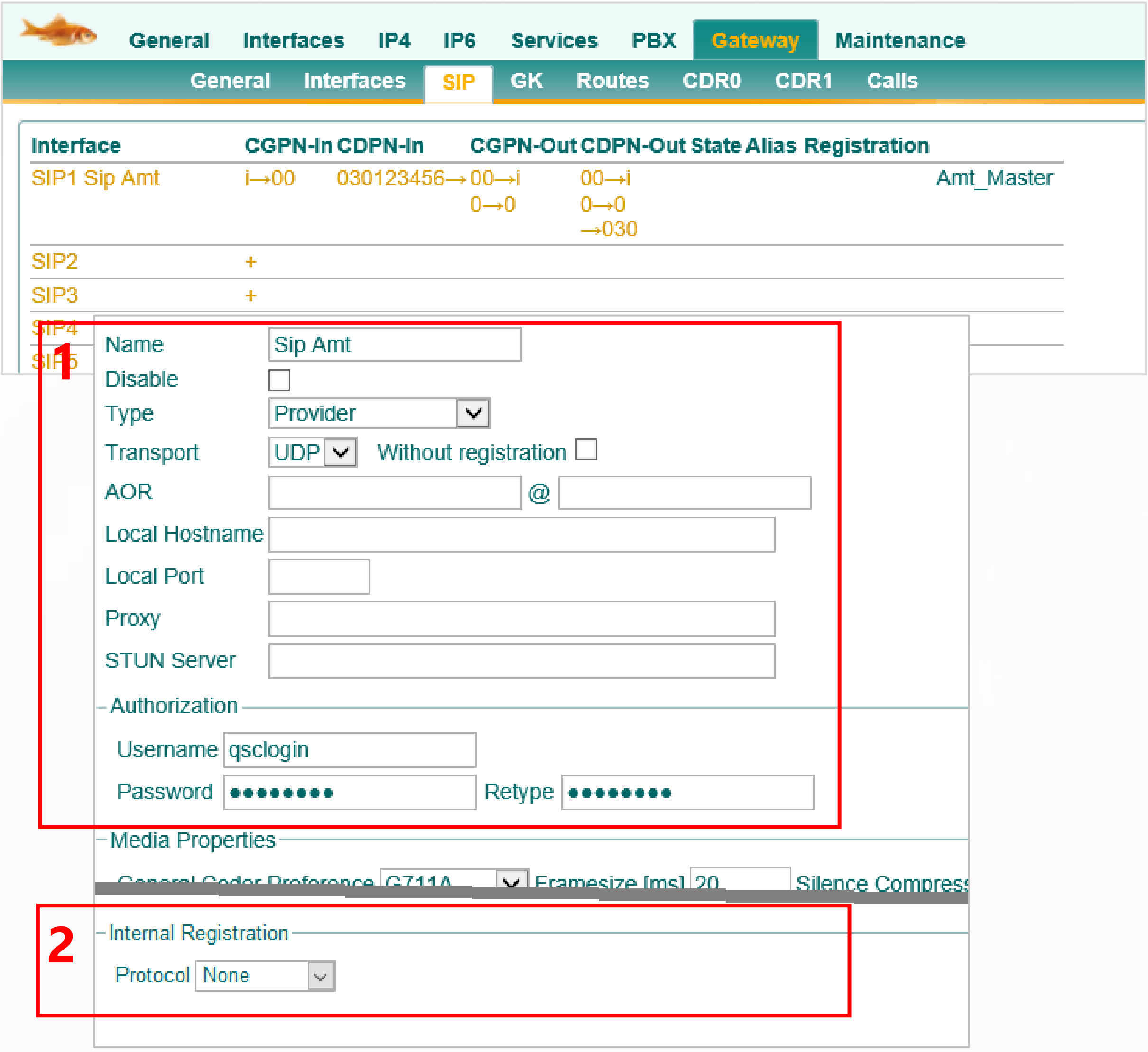
- A name (e.g. Extern)
- A phone number (e.g. 0)
- A HW ID for registration
- It is recommended to use the PBX password



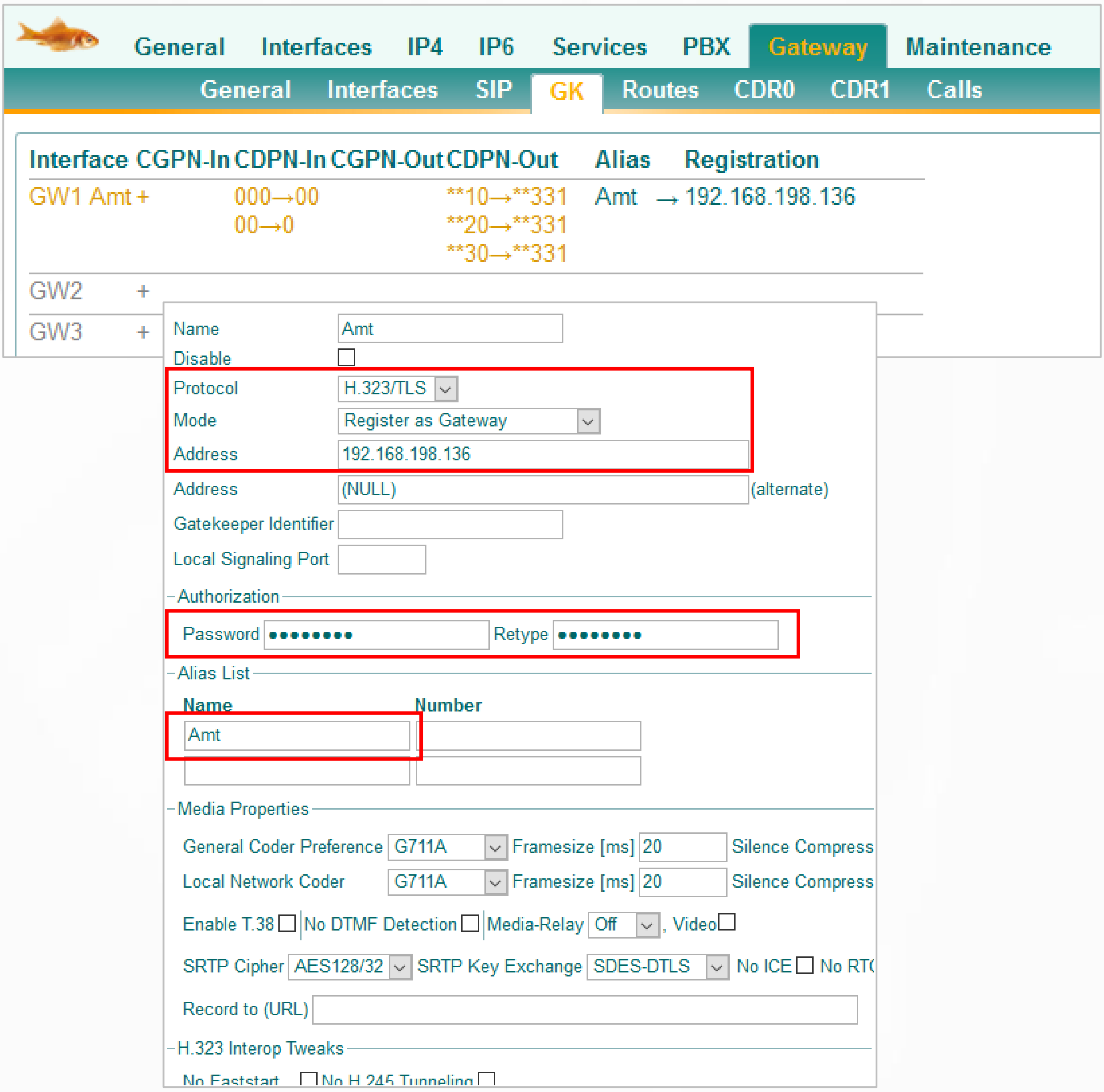
5.2 Gateway interface with dedicated internal registration

You can also set up a gateway interface without an internal registration. This then only connects to the SIP provider EXTERNALLY:

1. EXTERNAL > To the public network (e.g. SIP or ISDN)
2. INTERNAL > Off



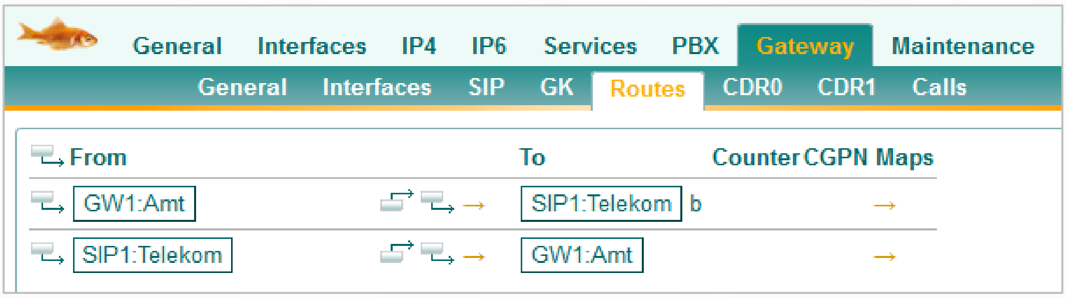
The internal registration of the trunk object in the PBX is then done via its own GW interface. This is then set up at the "GK-Interfaces".



- Now there are two independent registries that are not yet connected to each other. The connection is then made in the routes.

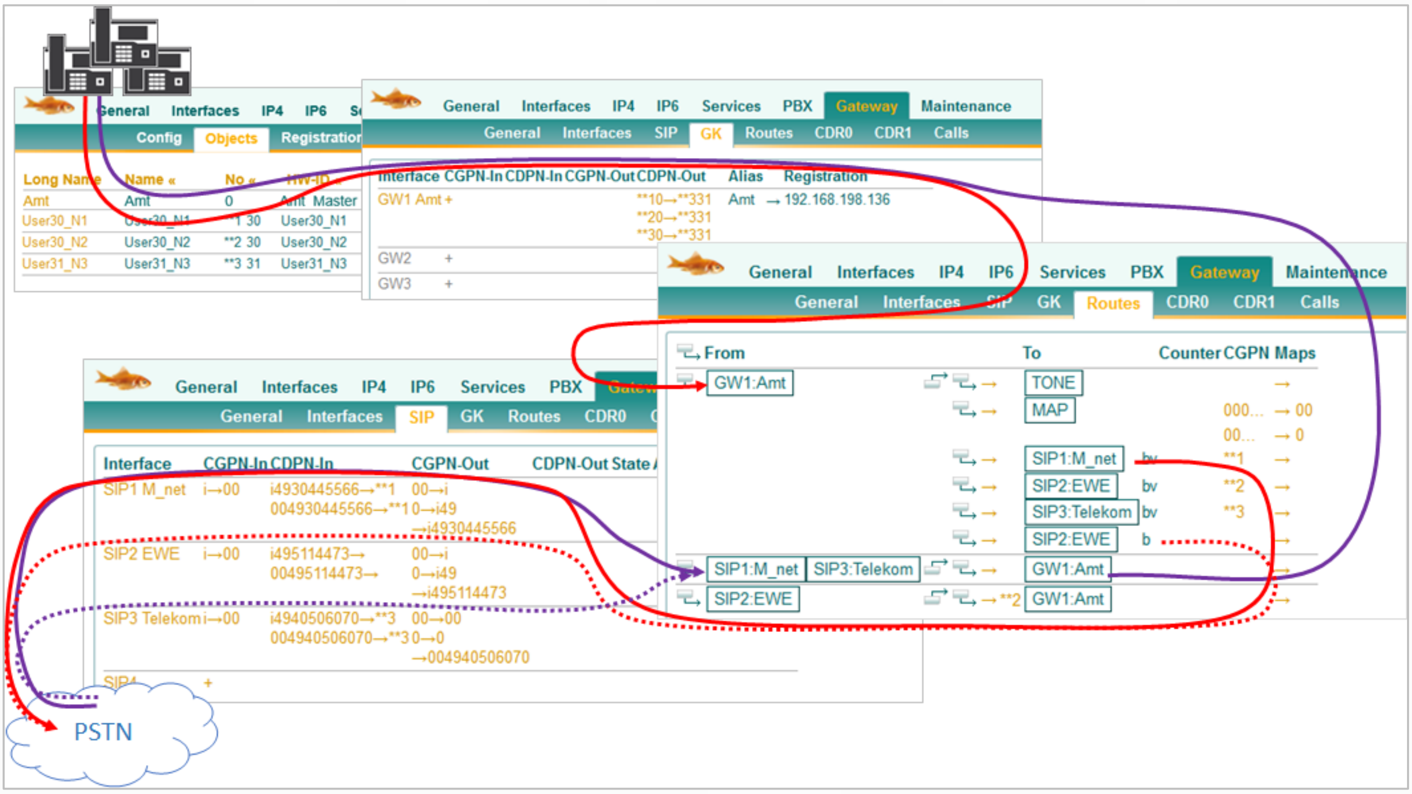
5.3 Setting Up Manual Routes

The routes now have to be set up manually in both directions.



5.4 Use Case/Benefits

A use case for such routing arises if, for example, there are three different external trunk ports, but they are all to be routed via the same trunk object in the PBX. The decision on how the calls should go can now be made in the routes.

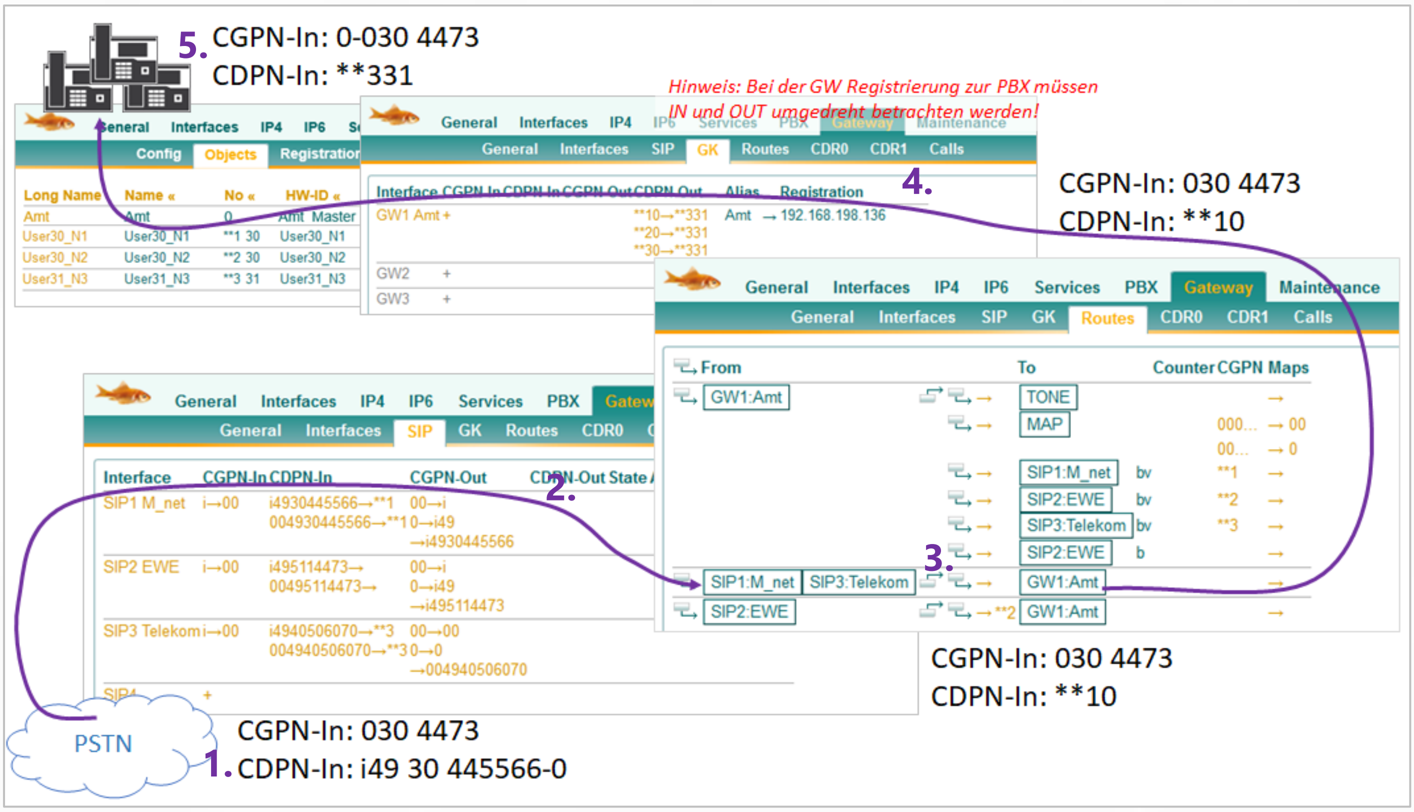


➢ Another advantage is that the number manipulation can now also be carried out on the "internal interface". Here in the example, the GK>GW1:Amt.

6 Advanced Routing Examples

6.1 Advanced Inbound Routing 1

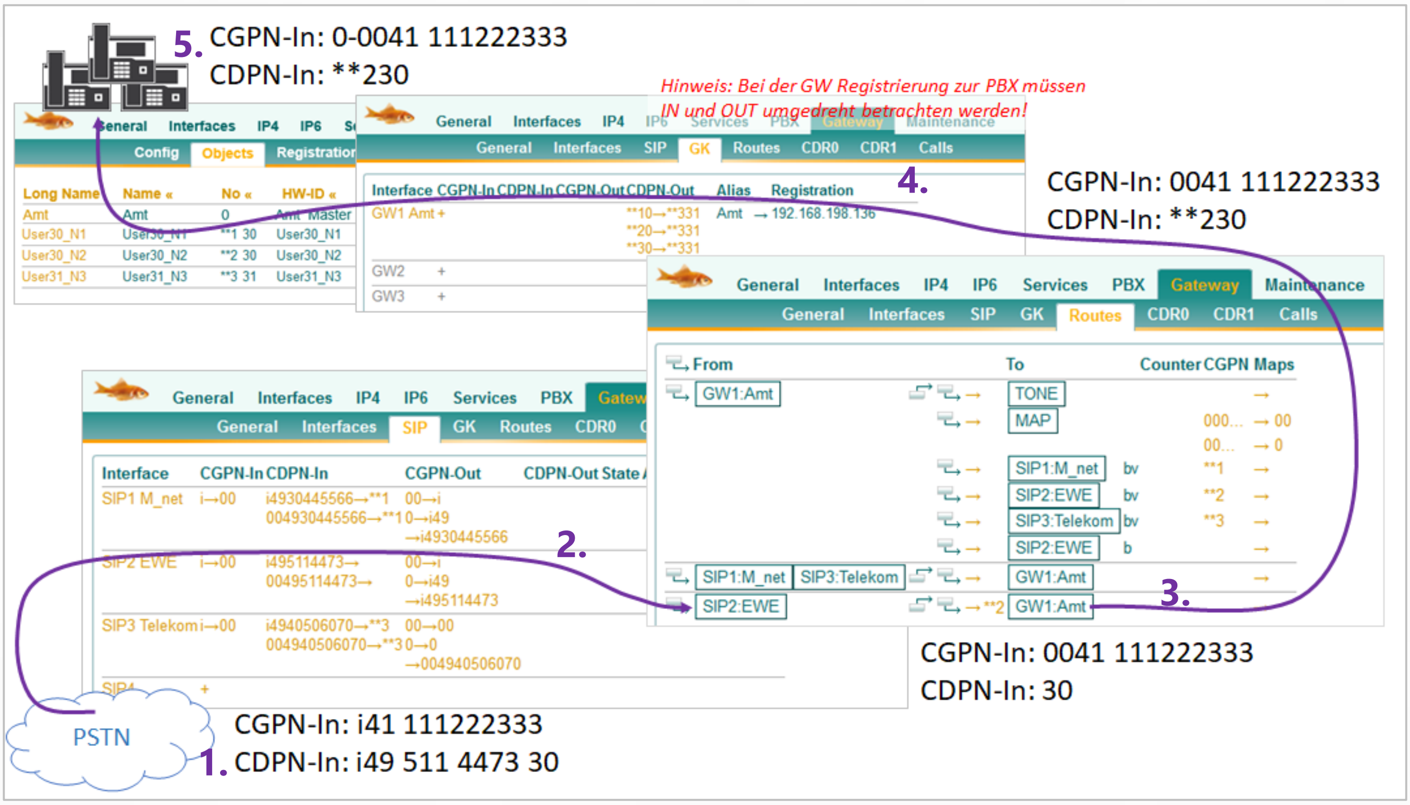
Incoming call to the central "0" of SIP number 1



1. The call comes in via the 1st SIP trunk.
   CGPN-In: 030 4473 | CDPN-In i49 30 445566-0
2. In the mapping, the root number is truncated and replaced by **1.
   CGPN-In: remains 030 4473 | CDPN-In i49 30 445566-0 > **1-0
3. There is no manipulation in the routing for SIP1 and the call is routed to GW 1.
   CGPN-In: 030 4473 | CDPN-In **1-0
4. In interface mapping, the **1-0 is routed to the common control center **3-31.
   CGPN-In: 030 4473 | CDPN-In **3-31
5. The trunk object automatically adds its own prefix to the CGPN.
   CGPN-In: 0-030 4473 | CDPN-In **3-31

6.2 Advanced Inbound Routing 2

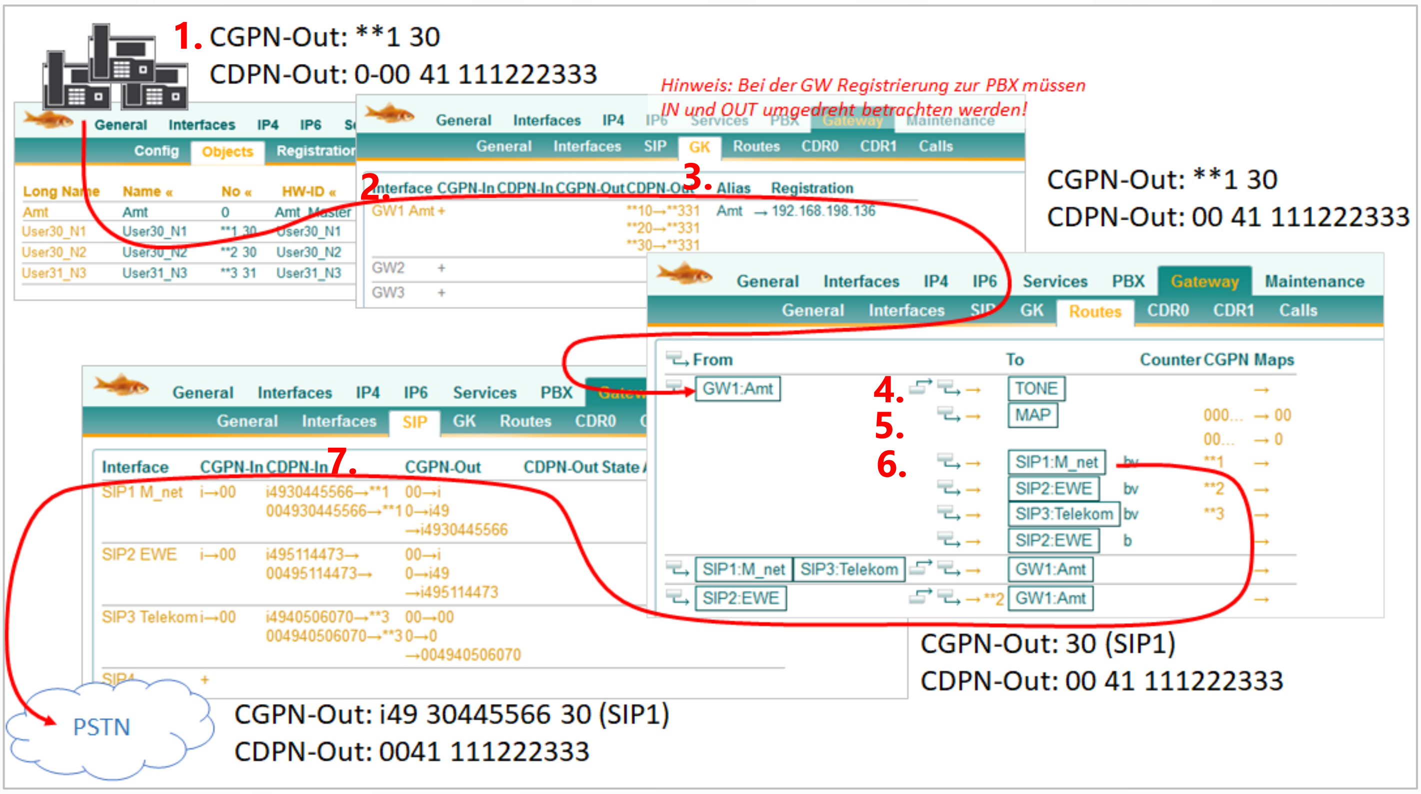
Incoming call to an extension from SIP number 2



1. The call comes in via the 2nd SIP trunk.
   CGPN-In: i41 111222333 | CDPN-In i49 511 4473 30
2. In the mapping, the CDPN root number is truncated and the CGPN "i" is replaced.
   CGPN-In: i41 111222333 > 0041 111222333 | CDPN-In i49 511 4473 30 > 30
3. In the routing for SIP2, **2 is added and the call is routed to GW 1.
   CGPN-In: 0041 111222333 | CDPN-In 30 > **230
4. There is no match in the interface mapping.
   CGPN-In: 0041 111222333 | CDPN-In **230
5. The trunk object automatically adds its own prefix to the CGPN.
   CGPN-In: 0-0041 111222333 | CDPN-In **230

6.3 Advanced Outbound Routing 1

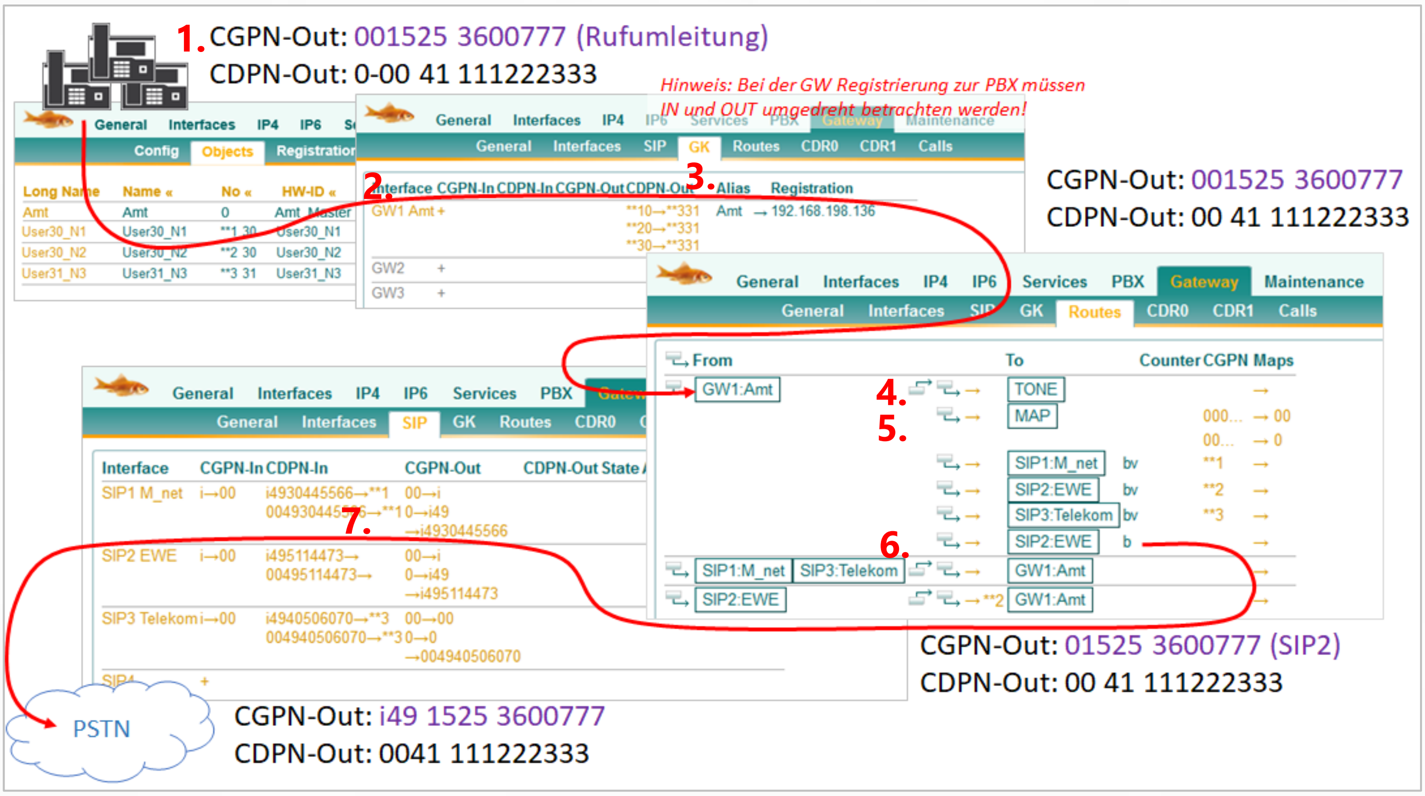
The extension "30" of node "**1" dials the official number "0041 111222333"



1. The extension transmits the complete phone number as CGPN and has to dial the dial "0".
   CGPN-Out: **1 30 | CDPN-Out: 0-0041 111222333
2. As soon as the call leaves the PBX, the "0" dial is automatically removed.
   CGPN-Out: **1 30 | CDPN-Out: 0-0041 111222333 > 0041 111222333
3. There is no match in the interface map of GW1.
   CGPN-Out: **1 30 | CDPN-Out: 0041 111222333
4. The first routing entry only generates the official tone.
5. In the second routing entry, there is a CGPN mapping, but there is no match because the sender number does not start with "00" or "000".
6. The third routing entry takes effect because "Verify CGPN" is set. In addition, the **1 will be removed from the CGPN.
   CGPN-Out: **1 30 > 30 | CDPN-Out: 0041 111222333
7. In the SIP interface, the interface mappings are still effective.
   CGPN-Out: 30 > i4930 445566 30 | CDPN-Out: 0041 111222333

6.4 Advanced Outbound Routing 2a

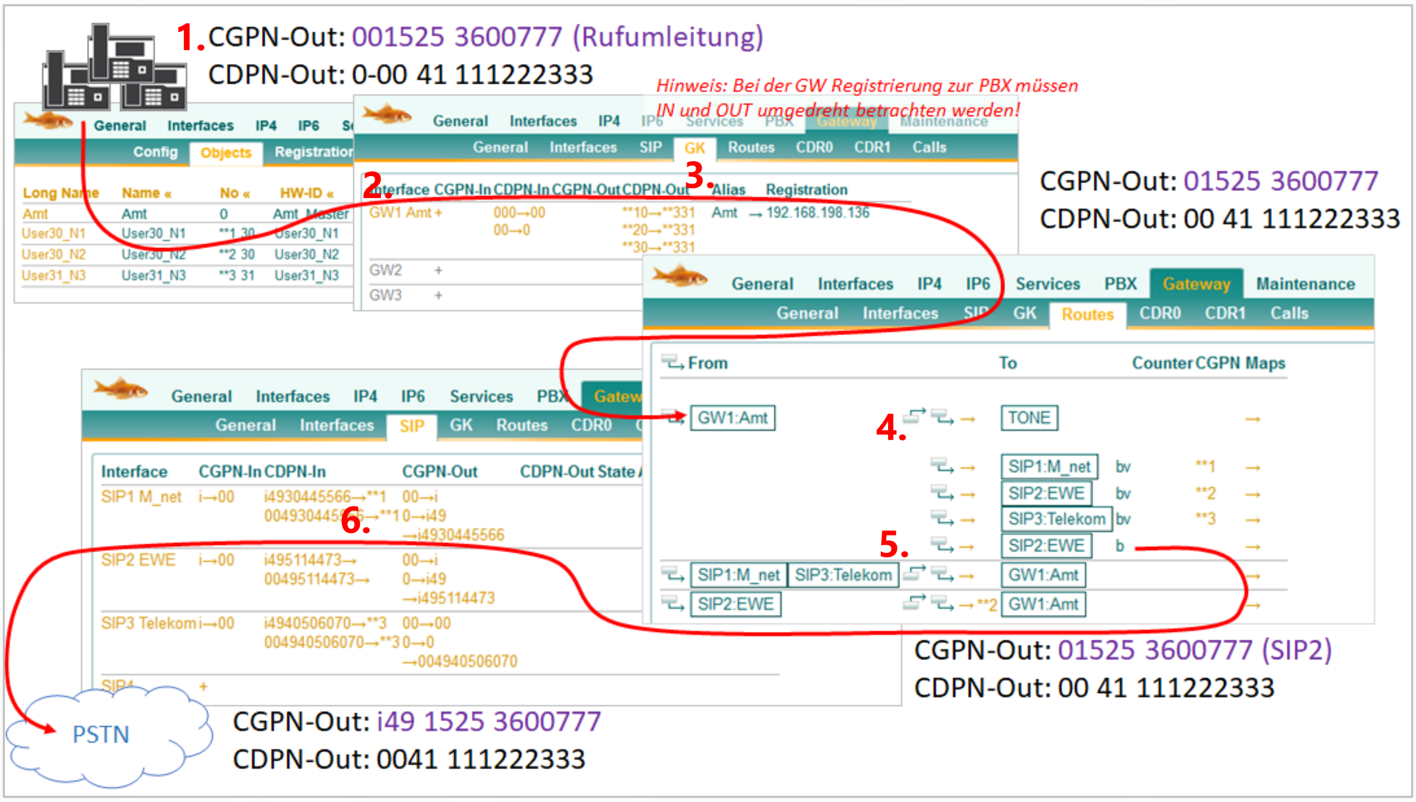
The extension "**2 30" is redirected to "0-0041 111222333"



1. The mobile phone number is transmitted with the leading "Amt-0" as CGPN, just as it was signalled when it arrived.
   CGPN-Out: 001525 3600777 | CDPN-Out: 0-0041 111222333
2. As soon as the call leaves the PBX, the "0" dial is automatically removed.
   CGPN-Out: 001525 3600777 | CDPN-Out: 0-0041 111222333 > 0041 111222333
3. There is no match in the interface map of GW1.
   CGPN-Out: 001525 3600777 | CDPN-Out: 0041 111222333
4. The first routing entry only generates the official tone.
5. In the second routing entry, the CGPN mapping now applies because the sender phone number starts with "0".
   CGPN-Out: 001525 3600777 > 01525 3600777 | CDPN-Out: 0041 111222333
6. Only the last routing entry takes effect again, because no "Verify CGPN" fits before. There is no more manipulation here.
   CGPN-Out: 01525 3600777 | CDPN-Out: 0041 111222333
7. In the SIP interface, the interface mappings are still effective.
   CGPN-Out: i49 1525 3600777 | CDPN-Out: 0041 111222333

6.5 Advanced Outbound Routing 2b

The extension "**2 30" is redirected to "0-0041 111222333"



➢ *Note: The difference from the previous example is that the removal of the leading "0" on the mobile number is now done in the mapping of the GW interface. This example is only intended to illustrate once again that there are often several good solutions.*

1. The mobile phone number is transmitted with the leading "Amt-0" as CGPN, just as it was signalled when it arrived.
   CGPN-Out: 001525 3600777 | CDPN-Out: 0-0041 111222333
2. As soon as the call leaves the PBX, the "0" dial is automatically removed.
   CGPN-Out: 001525 3600777 | CDPN-Out: 0-0041 111222333 > 0041 111222333
3. In the interface map of GW1, the CDPN mapping applies.
   CGPN-Out: 01525 3600777 | CDPN-Out: 0041 111222333
4. The first routing entry only generates the official tone.
5. Only the last routing entry takes effect again, because no "Verify CGPN" fits before. There is no more manipulation here.
   CGPN-Out: 01525 3600777 | CDPN-Out: 0041 111222333
6. In the SIP interface, the interface mappings are still effective.
   CGPN-Out: i49 1525 3600777 | CDPN-Out: 0041 111222333

7 PBX: "Trunk Line" Object vs. "Gateway" Object

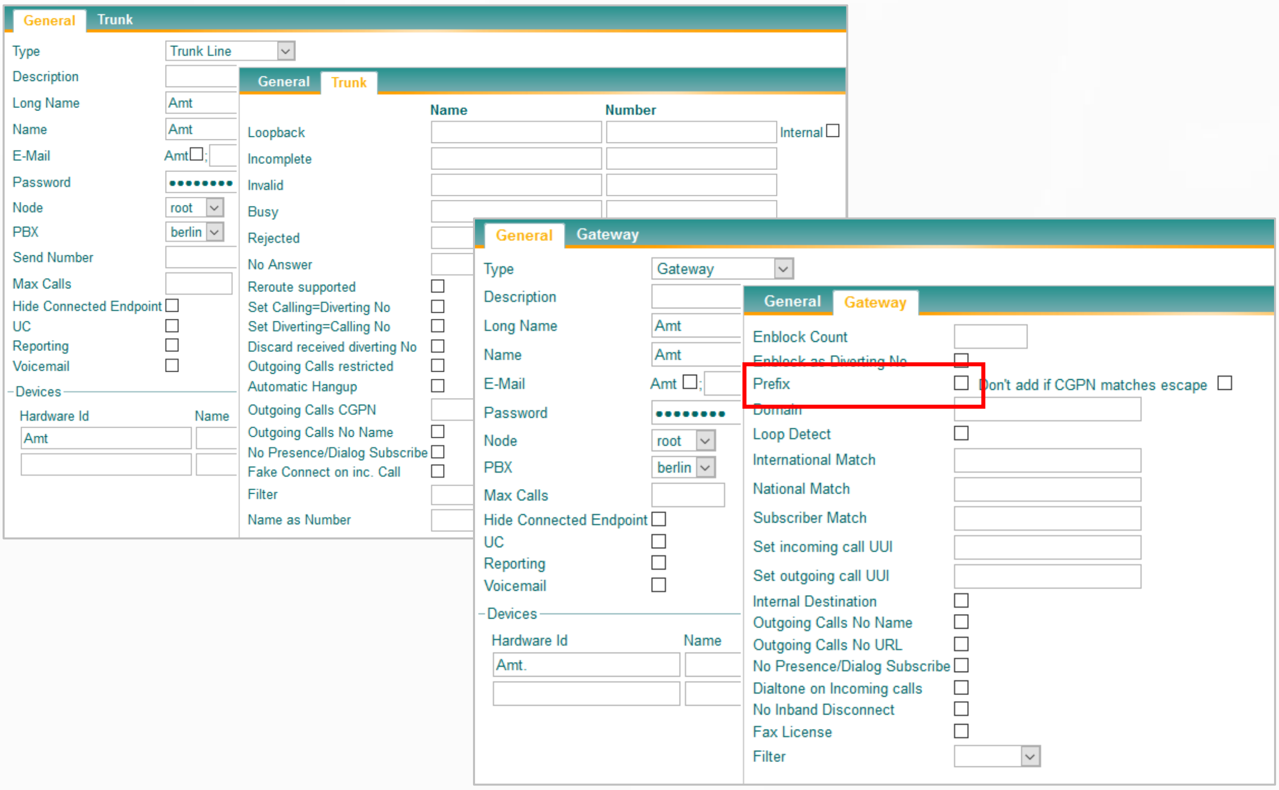
For most connections from external connections, a "Trunk Line" object is better suited, because here the drop targets can be easily declared, and special trunk settings are stored.

Most "gateway" objects are better suited for networking to other PBXs, because they allow you to make phone number plan settings.

However, there are crucial differences when it comes to routing and number manipulation:

- Outgoing: The "Gateway" object submits its own prefix to the routing.
- Incoming: The "Gateway" object does NOT add its own prefix to the call.

➢ As a reminder, the trunk object always has the office prefix added when it arrives and is automatically removed when the outgoing dial is made. In other words, exactly the opposite of the gateway. However, if you check the "Prefix" box for the gateway, it behaves like a trunk object again.



Contact

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I look forward to your message.

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