Connecting two Asterisk PBX servers using an IAX2 trunk

IAX is the Inter-Asterisk eXchange protocol for Asterisk PBX. IAX2 is version 2 of the protocol. Version 1 (one) is no longer used. IAX2 has some advantages over SIP in that only one network port is opened for communications. SIP uses two ports: SIP and RTP. If you want to find out more about IAX2 visit Wikipedia's IAX2 page.

The first step in setting up an IAX2 trunk is to draw a picture of what you need to do. Here's an example of a simple PBX to PBX connection. Just to keep it simple the two PBXs are name 101 and 106 after their IP host address. They could very well be named Montreal and New York. PBX 101 has all their extensions starting with 1xxx while PBX 106 has all of their extensions starting with 3xxx. This will be handy when making outbound routes.

The IAX2 trunks are drawn as simple arrows pointing to their PBX peer and named based on their destination which seems like a good practise. 106-peer is going from PBX 1

![Diagram of PBX connection](image)

Note: It is good practise to indicate the protocol used in the naming of trunks, users and peers (ex. 106-IAXpeer). This is very important if you are using multiple protocols for trunking (IAX, SIP and T1). Adding the protocol to the trunk names will create a unique entry and prevent unintentional confusion in the dialplans between trunking protocols!

I've left an area on both sides for configuration information. It shows on the PBX 101 side, I will need to configure an outbound trunk called 106-peer and I will need to configure a user called 106-user so that PBX 106's 101-peer can register/qualify to (we'll see a little later why I've used the term register/qualify).
Similarly, on the PBX 106 side, the configuration information indicates that I will need to configure an outbound trunk called 101-peer and I will need to configure a user called 101-user so that PBX 101's 106-peer can register/qualify to.

We will configure the trunks one side at a time starting with PBX 101. Once both PBXs have their IAX2 trunks up, we will configure the outbound routes.

**Create IAX2 Trunk Configuration Tool**

Here is a Microsoft Excel spreadsheet: [CreateIAXtrunk.xls](#) that will aid in creating the trunks for each PBX based on your input. I suggest using this webpage's example as a test case. If you get a read-only error when you try to use it, save it to your PC and then open it up with your spreadsheet of choice. Only fill in the green sections.

Note: In the latest version of IAX2 protocol, there is a new parameter called "token". It is partially implemented. If your IAX2 trunk is not connecting, add the following line to each trunk:

```
requirecalltoken=no
```

1. Configuring the IAX2 Trunks
   1. Configuring PBX 101 IAX2 Trunk
   2. Configuring PBX 106 IAX2 Trunk
   3. Testing the IAX2 trunks

2. Configuring the Outbound Routes

We have the option of configuring the outbound route for dialing directly to the extension or by dialing the digit 7 first. Both outbound routes will be shown:

- Creating PBX 101's Outbound Route(s)
- Creating PBX 106's Outbound Route(s)

3. Now you should be able to dial through each PBX to its peer from any SIP, IAX2 or POTS extension. You can check the status of the phones online and trunks online through FreePBX Statistics window

<table>
<thead>
<tr>
<th>FreePBX Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total active calls</td>
</tr>
<tr>
<td>Internal calls</td>
</tr>
<tr>
<td>External calls</td>
</tr>
<tr>
<td>Total active channels</td>
</tr>
<tr>
<td>FreePBX Connections:</td>
</tr>
<tr>
<td>IP phones Online</td>
</tr>
<tr>
<td>IP trunks Online</td>
</tr>
</tbody>
</table>

In creating the trunks, there was no limit put on the maximum number of channels that can use the trunk. For the above FreePBX Statistics window, I had 6 phones (channels) connected in 3 connections (external calls) across the one IAX2 trunk. Three were IP phones, two were IAX2 S100i POTS to
IAX2 adapters and one FXS pots phone. All worked beautifully! You don't have to configure any protocol translations - the PBX does it all for you.
Configuring PBX 101 IAX2 Trunk

1. Select Add Trunk from the FreePBX main setup menu

2. Select Add IAX2 Trunk
3. Nothing to do here, move on to Outgoing Settings

Outgoing Settings

Trunk Name: 106-peer
PEER Details:

```
host=192.168.1.106
username=101-user
secret=1234
type=peer
qualify=yes
trunk=yes
```

4. The Outgoing Settings are configured with information based on the destination's IAX user. Configure the Outgoing Settings as follows:
5. Move to the Incoming Settings

**Incoming Settings**

**USER Context:**

106-user

**USER Details:**

secret=1234  
*type=user*  
*context=from-trunk*

6. The Incoming Settings are configured so that an incoming IAX2 trunk has an account to qualify to. Configure the Incoming Settings as follows:

   - User Context: 106-user - *The name can be anything you want. This is the user account that the incoming IAX2 trunk will qualify to*
   - secret=1234 - *The password that will be used to qualify the trunk connection at the destination PBX*
   - type=user - *The type of IAX2 connection. This is a user account that a peer will qualify to*

7. Press submit, update and reload. Then check using Webmin - Others - File Manager option to see if /etc/asterisk/iax-additional.conf was updated properly with no typos.
Go to the next step and configure PBX 106 IAX2 Trunk
Configuring PBX 106 IAX2 Trunk

1. Select Add Trunk from the FreePBX main setup menu

2. Select Add IAX2 Trunk
Add IAX2 Trunk

General Settings

Outbound Caller ID:
Never Override CallerID: □
Maximum Channels: 
Disable Trunk: □ Disable
Monitor Trunk Failures: [ ] □ Enable

Outgoing Dial Rules

Dial Rules:

Dial Rules Wizards: (pick one)
Outbound Dial Prefix: 

3. Nothing to do here, move on to Outgoing Settings

Outgoing Settings

Trunk Name: 101-peer

PEER Details:

```plaintext
host=192.168.1.101
username=106-user
secret=1234
type=peer
qualify=yes
trunk=yes
```
4. The Outgoing Settings are configured with information based on the destination's IAX user. Configure the Outgoing Settings as follows:
   - **Trunk Name**: 101-peer - *The name can be anything you want*
   - **host=192.168.1.101** - *This is the domain name or IP address of the trunk destination*
   - **username=106-user** - *This is the IAX2 user that is created on the destination PBX*
   - **secret=1234** - *The password that will be used to qualify the trunk connection at the destination PBX*
   - **type=peer** - *The type of IAX2 connection. This is a connection from PBX to PBX*
   - **qualify=yes** - *Register the connection with the destination*
   - **trunk=yes** - *Send channel data in one trunk packet instead of multiple channel packets, saves on bandwidth - optional*

5. Move to the Incoming Settings

   **Incoming Settings**

   **USER Context**: 101-user

   **secret=1234**
   **type=user**
   **context=from-trunk**

6. The Incoming Settings are configured so that an incoming IAX2 trunk has an account to qualify to. Configure the Incoming Settings as follows:
   - **User Context**: 101-user - *The name can be anything you want. This is the user account that the incoming IAX2 trunk will qualify to*
   - **secret=1234** - *The password that will be used to qualify the trunk connection at the destination PBX*
   - **type=user** - *The type of IAX2 connection. This is a user account that a peer will qualify to*

7. Press submit, update and reload. Then check using Webmin-Others-File Manager option to see if `/etc/asterisk/iax-additional.conf` was updated properly with no typos.
8. Go to the next step [Testing the IAX2 Trunks]
Testing IAX2 Trunks

To test the trunks, we have to go to the Asterisk Command Line Interface (CLI). You can get there many different ways:

- From the PBX console port
- From SSH'ing in using Putty SSH client
- From FreePBX/Webmin SSH client

In all cases, you will be typing the following at the Linux prompt:

```
root@pbx~$ asterisk -rvv (r and two v's)
```

At the Asterisk command line, you will type `iax2 show peers` to see if the IAX2 trunk has connected properly:

```
Name/Username        Host            Mask       Port   Status
106-peer/101-user    192.168.1.106   (S)        255.255.255.255 4569  OK 1 ms
1002                 192.168.1.108   (D)        255.255.255.255 4569  OK 1 ms
```

The preceding image is showing PBX 101 IAX2 peer connections. Here's the important parts:

- It shows that 106-peer is connecting via user 101-user
- The status is ok - if it shows anything else - recheck your configuration cause it's not working
- There is an IAX2 client 1002 connected (nothing to do with the IAX2 trunks that we are configuring)
- There are two peers online.
The preceding image is showing PBX 106 IAX2 peer connections. Here's the important parts:

- It shows that 101-peer is connecting via user 106-user
- The status is ok - if it shows anything else - recheck your configuration cause it's not working
- There is an IAX2 client 3002 connected (nothing to do with the IAX2 trunks that we are configuring)
- There are two peers online.

Next is to create the [Outbound Routes for PBX 101](#) and then for PBX 106.
Creating PBX 101's Outbound Route(s)

There are two examples of outbound routes presented here, you can select one or the other. You start by selecting Outbound Routes

- **Direct Dial PBX 106's Extensions**

  This outbound rule allows PBX 101 to directly dial PBX 106's extensions. For example, to dial PBX 106's extension 3001. You dial 3001.
Three things to configure:

- **Route Name: 106-dial3xxx** - Can be anything, be descriptive so you remember what it is 6 months from now when it stops working!
- **Dial Patterns: 3xxx** - This says any 4 digit extension starting with 3 will be forwarded to the designated trunk.
- **Trunk Sequence: IAX2/106-peer** - This is the trunk that we configured that goes to PBX 106

- **Dial 7 first to go to PBX**

For this outbound rule, you must dial 7 to connect to PBX 106, then the extension. It adds the flexibility that you can also dial local numbers at PBX 106 through the IAX2 trunk.
### Add Route

<table>
<thead>
<tr>
<th>Route Name</th>
<th>106-dial7ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Password</td>
<td></td>
</tr>
<tr>
<td>Emergency Dialing</td>
<td></td>
</tr>
<tr>
<td>Intra Company Route</td>
<td></td>
</tr>
<tr>
<td>Music On Hold?</td>
<td>default</td>
</tr>
<tr>
<td>Dial Patterns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Dial patterns wizards:</td>
<td>(pick one)</td>
</tr>
<tr>
<td>Trunk Sequence</td>
<td>IAX2/106-peer</td>
</tr>
</tbody>
</table>

Three things to configure:

- **Route Name**: 106-dial7ext - *Can be anything, be descriptive so you remember what it is 6 months from now when it stops working!*

- **Dial Patterns**: 7|* - *This says whenever a dialed number starts with 7, the following numbers regardless of length will be forwarded to the designated trunk.*

  Note: If you have problems with this dial pattern, try 7|x|xxxx where each x indicates a digit of the extension.

- **Trunk Sequence**: IAX2/106-peer - *This is the trunk that we configured that goes to PBX 106*

Now, we complete the IAX2 trunk by creating PBX 106's outbound routes.
Creating PBX 106's Outbound Route(s)

There are two examples of outbound routes presented here, you can select one or the other. You start by selecting Outbound Routes

- **Direct Dial PBX 101's Extensions**

  This outbound rule allows PBX 106 to directly dial PBX 101’s extensions. For example, to dial PBX 101’s extension 1001. You dial 1001.
Three things to configure:

- **Route Name**: 101-dial1xxx - *Can be anything, be descriptive so you remember what it is 6 months from now when it stops working!*
- **Dial Patterns**: 1xxx - *This says any 4 digit extension starting with 3 will be forwarded to the designated trunk.*
- **Trunk Sequence**: IAX2/101-peer - *This is the trunk that we configured that goes to PBX 101*

### Dial 7 first to go to PBX

For this outbound rule, you must dial 7 to connect to PBX 101, then the extension. It adds the flexibility that you can also dial local numbers at PBX 101 through the IAX2 trunk.
Three things to configure:

- **Route Name**: 101-dial7ext - *Can be anything, be descriptive so you remember what it is 6 months from now when it stops working!*

- **Dial Patterns**: 7|* - *This says whenever a dialed number starts with 7, the following numbers regardless of length will be forwarded to the designated trunk.*

  Note: If you have problems with this dial pattern, try 7|xxxx where each x indicates a digit of the extension.

- **Trunk Sequence**: IAX2/101-peer - *This is the trunk that we configured that goes to PBX 101*

Now you can return to the [Connecting two Asterisk PBX servers using an IAX2 trunk](#) starting page and read about the FreePBX Statistics window.