



Cloud managed & monitored
VoIP Gateways and Appliances

How to:

Configuration of beronet Gateways with 3CX



Index

Overview:.....	3
1) Pre configuration environment:	3
2) Setting up the beroNet Gateway	4
3) FXS Extensions in 3CX Phone System	5
4) Creating the PSTN Device in the 3CX Phone System	5
5) 3CX – beroNet Wizard	7
6) 3CX – Inbound routing	9
7) beroNet – Troubleshooting	11
8) Gateway options:	12
FXO Gateway:.....	12
GSM Gateway:.....	13

Overview:

This application note explains how to connect a modular beroNet gateway to 3CX Phone System. Although beroNet non-modular (“Small Business Line”) gateways are available, the modular versions are recommended as modules can be added or upgraded if required.

1) Pre configuration environment:

- 3CX v14 SPI installed and configured according to the instructions provided by 3CX.
<http://www.3cx.com/docs/manual/>
- In this example, 3CX is referred to by a dotted-decimal IP.
- For a live installation please use a FQDN with split DNS – 3CX best practice.
<http://www.3cx.com/docs/creating-fqdn-split-dns/>

Two extensions (e.g. 500, 501) created in 3CX – use any IP phone.

Status	Extension	User Status	DND	Queues	Name
Registered (idle)	500	Available	OFF	OUT	Test 1
Registered (idle)	501	Available	OFF	OUT	Test 2

Create two additional extensions in 3CX (e.g. 502, 503).

The FXS ports on the beroNet gateway will be configured to register against these.

beroNet modular Gateway - in this example, populated with BRI+FXS.
Connect the BRI ports to the Telco wall socket.

	+	
BF400Box beroNet boxed Baseboard supports 4-16 concurrent channels		BF2S02FXS 2 Port BRI/FXS Hybrid Module

beroFix v3.0.03 or later



2) Setting up the beroNet Gateway

1. Connect the beroNet Gateway to your network and power up the device.
2. On firmware 3.0 and more, DHCP is activated on beroNet gateways. If not, the default IP address of the beroNet Gateway is 10.0.0.2 / 255.0.0.0. In order to find the gateway on the network, use the bfdetect tool:

```
Scanning network for beroNet devices...
1> serial: 2-16-0000014269   appfs: 3.0.03
:29:5F ip: 10.5.1.13
2> serial: 3-04-0000013557   appfs: 3.0.02
:29:B5 ip: 10.5.10.49
Select a device: 2
General Information:
serial   : 3-04-0000013557
appfs    : 3.0.02
mac      : D8:DF:0D:00:29:B5
Network-Configuration:
ip       : 10.5.10.49
netmask  : 255.255.0.0
gateway  : 10.5.254.254
dhcp     : yes
mtu      : 1500
nameserver: 10.5.1.15
Actions:
d> switch dhcp off
t> change mtu
m> change nameserver
r> reset network settings
s> save and quit
q> quit
What would you like to do? _
```

3. If the gateway has a 10.0.0.2 IP address, you can either change the IP address or assign your PC network card to for instance the IP 10.0.0.1 255.0.0.0 or any free IP from this network segment.
4. Open the web interface of the beroNet Gateway by pointing a browser the IP address of the gateway

5. The default credentials for the beroNet web interface are

Username: admin

Password: admin

3) FXS Extensions in 3CX Phone System

1. Two empty extensions need to preliminarily setup in 3CX Phone System – as you can see below.

	Not Registered	502	Available	OFF	OUT	FXS 1
	Not Registered	503	Available	OFF	OUT	FXS 2

They will remain in an un-registered state until the credentials in the beroNet Wizard have been completed.

4) Creating the PSTN Device in the 3CX Phone System

Creating the PSTN Device in the 3CX Phone System

1. Open the 3CX Phone System management console and navigate to the menu 'PSTN Gateways'. Click 'Add Gateway'
2. Configure the name for your gateway, example 'beroNet', and click on the dropdown then select 'beroNet' and choose the 'beroNet BRI / PRI or FXO' depending on your beroNet module configuration.



3. Enter the IP address of the beroNet Gateway (you have assigned in step 1) in the field "Gateway Host/IP"

VOIP Gateway

Gateway Hostname or IP	10.5.10.49	i
Gateway Port (default is 5060)	5060	i
Number of ports	1	i
Type	BRI	i
Number of channels per port	2	i

4. Authentication and Channel Information

Create ports

The following ports will be created in the "Create Ports" screen. You can edit the Port identification and authentication settings before they are created. Note that the Port identification is used for identification purposes, and the internal line number is used by 3CX Phone System to address the line connected to the port on the VOIP Gateway. Therefore the Internal Line Number range should be different from the extension number range. You can configure to which extension incoming calls should be routed based on whether they are inside or outside office hours (inbound route).

Remove selected	Virtual extension	Authentication ID	Authentication Password	Channels	Port Identification	Inbound Route Day	Inbound Route Night
☐	90001	90001	vnlcm	2	90001	500	500

< Back Next >

Take the Authentication ID and the Authentication Password for this device. In the channels field, enter the amount of calls that you can make on this port. In this example, we have 1 BRI port and therefore 2 channels. If you have 2 BRI ports, set the number of channels to 4.

Note: If you have 2 BRI Lines which have telephone numbers that are not in the same number block example BRI1=222210-222212 and BRI2=223577-223580, then you have to create 2 gateways with 2 Channels for each gateway not 1 gateway with 4 Channels.

Possible values for the channels:

1 BRI = 2 channels, 2 BRI = 4 channels...

1 PRI = 30 channels, 2 PRI = 60 channels...

5. Create an outbound rule for the gateway

↑ Create an Outbound Call Rule to configure on which PSTN port, VOIP provider or bridge an outbound calls should be placed on

General

Rule Name ⓘ

Apply this rule to these calls

Define to which outbound calls the rule must apply

Calls to numbers starting with prefix ⓘ

Calls from extension(s) ⓘ

Calls to Numbers with a length of ⓘ

Calls from extension group ... ⓘ

Make outbound calls on

Configure up to 3 routes for calls. The second and third route will be used as backup. For each route, digits can be stripped or added.

Route		Strip Digits	Prepend	
Route 1	beroFix	0		ⓘ
Route 2		1		ⓘ
Route 3		1		ⓘ

In our Example all calls starting with a '0' should be routed to the beroNet gateway. Enter the prefix '0' to the field 'Calls starting with the prefix' as you can see in the next figure.

Press 'Finish' to complete the 'PSTN Device' setup

From here you will be asked to configure the beroNet card from 3CX – it will automatically log you straight into the beroNet Interface:

[Configure Beronet Card](#)

5) 3CX – beroNet Wizard

You have to login with the default credentials: Username: admin/Password: admin (In the below example I am setting up the Gateway and PBX for my BRI lines and 2 FXS Ports).

Configure your VoIP PBX settings as the address of 3CX Phone System (ex.: 10.5.1.12)

Assign your ISDN Username and Password to the same credentials matching the settings in the virtual extension under the “Authentication and Channel Information” section of this setup guide.

Under the FXS interface you need to enable which ports you want added and assign the Extension number and Password from the extensions previously pre-created in 3CX Phone system.

Load the configuration.

VoIP PBX Settings			
Server Address	10.5.1.12		
Port	5060		

ISDN Extern BRI	
Select your external ISDN BRI lines.	Available Ports Lif0 (BRI): ☒ 1 ☒ 2 ☒ 3 ☒ 4
Are lines Point to Point (PTP) or Point to Multi Point (PTMP) ?	PTP ▼
User:	90001
Password:	
For which country should the tonset be configured ?	[uk] ▼

ISDN Intern: Select your internal ISDN lines			
FXS Intern: Select your internal FXS lines			
CSV File: Choose File No file chosen Upload			
Port	User	Password	Tones
Port 1: ☒	502		[uk] ▼
Port 2: ☒	503		[uk] ▼

1. You will be asked whether you want to  the configuration – hit activate (no configuration will be saved unless you do).
2. Let the configuration take (this can take a couple of minutes) and then you should see that all your extensions are configured.

	Registered (idle)	500	Available	OFF	OUT	Test 1
	Registered (idle)	501	Available	OFF	OUT	Test 2
	Registered (idle)	502	Available	OFF	OUT	FXS 1
	Registered (idle)	503	Available	OFF	OUT	FXS 2
	Registered (idle)	90001	Gateway		beroFix	

Both FXS ports and my ISDN will now show green.

Your dial-plan will also be updated by the auto-configuration.

DIALPLAN

Direction: all Search: Entries per page: 15									
☐ Check all	Direction	From ID	To ID	Destination	New destination	Source	New source	Position	
☐	isdn-sip	ISDN-Extern-BRI	ISDN-Extern-BRI	(.*)	\1	(.*)	\1	1 ▲ ▼	   
☐	sip-isdn	ISDN-Extern-BRI	ISDN-Extern-BRI	(.*)	\1	(.*)	\1	2 ▲ ▼	   
☐	analog-sip	FXS-Intern-1	FXS-Intern-1	(.*)	\1	(.*)	\1	3 ▲ ▼	   
☐	sip-analog	FXS-Intern-1	FXS-Intern-1	(502)	\1	(.*)	\1	4 ▲ ▼	   
☐	analog-sip	FXS-Intern-2	FXS-Intern-2	(.*)	\1	(.*)	\1	5 ▲ ▼	   
☐	sip-analog	FXS-Intern-2	FXS-Intern-2	(503)	\1	(.*)	\1	6 ▲ ▼	   

6) 3CX – Inbound routing

1. Go to the menu PSTN-Gateways and click on our beroNet device. On the right you will a tab called 'DID'
2. We want to add DID's from 500 to 503. This can be done by typing *500-*503 in the blank field and then pressing the 'Add' button.

Port Identification

90001 ⓘ

*500
*501
*502
*503

3. The next step is to assign extensions to the newly created DID's. This can be done by going to the menu 'Inbound Rules' where you can see the 3 DID's *500,*501,*502,*503.

	VoIP Gateway/Provider	Port Identification	DID Name	DID Number	During Office Hours	Out of Office Hours
DID	beroFix	90001		*500	500	500
DID	beroFix	90001		*501	501	501
DID	beroFix	90001		*502	502	502
DID	beroFix	90001		*503	503	503

4. By selecting the DID *500, you can choose where the calls should be routed. In our example we want to route it to extension 500. You will then need to add for the remaining 5XX extension range you have also.

Office Hours

Configure where calls to this DID/DDI should be routed during office hours.

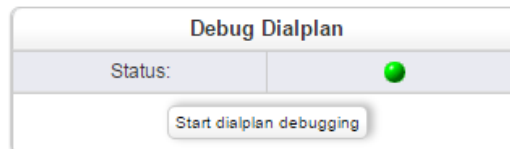
☐ End Call	
☒ Connect to Extension	500 Test 1 ▼
☐ Connect to Queue / Ring Group	800 ▼
☐ Connect to Digital Receptionist	
☐ Voicemail box for Extension	500 Test 1 ▼
☐ Forward to Outside Number	
☐ Send fax to	email of extension 888 ▼

Now you can check your settings and both inbound and outbound calls should now be possible.

7) beroNet – Troubleshooting

This section of the guide is only relevant if you are experiencing issues with you units during or after setup and need to do some troubleshooting done – the following options are available to you.

Dialplan Debug:

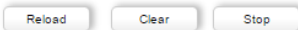


This page is to give the user the opportunity to debug the dial plan if something is not working as expected. It is a useful tool for simply finding out whether the dial plan has been configured correctly. Normally used if calls are not reaching their expected destination.

The output from the dialplan debug will look something like the below.

DIALPLAN DEBUG

State: ON



```
CDR,4,SIP:10.5.1.12,ANALOG:2:1,"Test 2","",501,503,15/10/30-11:10:07,15/10/30-11:10:08,-,-,SIP,NUA_I_CANCEL:200,-,-
A RINGOFFREQUEST: port=2
S CANCELINDICATION: from="Test 2" 501@10.5.1.12, to="" 503@10.5.1.12
A RINGINGREQUEST: port=2
D INCOMING src:501 dest:503 -- OUTGOING src:501 dest:503
S INVITEINDICATION: from="Test 2" 501@10.5.1.12, to=503@10.5.1.12
CDR,3,SIP:10.5.1.12,ANALOG:1:1,"Test 2","",501,502,15/10/30-11:09:39,15/10/30-11:09:59,-,-,SIP,NUA_I_CANCEL:200,-,-
A RINGOFFREQUEST: port=1
S CANCELINDICATION: from="Test 2" 501@10.5.1.12, to="" 502@10.5.1.12
A RINGINGREQUEST: port=1
D INCOMING src:501 dest:502 -- OUTGOING src:501 dest:502
S INVITEINDICATION: from="Test 2" 501@10.5.1.12, to=502@10.5.1.12
CDR,2,SIP:10.5.1.12,ANALOG:2:1,"Test 2","",501,503,15/10/30-11:09:19,15/10/30-11:09:23,-,-,SIP,NUA_I_CANCEL:200,-,-
A RINGOFFREQUEST: port=2
S CANCELINDICATION: from="Test 2" 501@10.5.1.12, to="" 503@10.5.1.12
A RINGINGREQUEST: port=2
D INCOMING src:501 dest:503 -- OUTGOING src:501 dest:503
S INVITEINDICATION: from="Test 2" 501@10.5.1.12, to=503@10.5.1.12
CDR,1,SIP:10.5.1.12,ANALOG:1:1,"Test 2","",501,502,15/10/30-11:09:14,15/10/30-11:09:16,-,-,SIP,NUA_I_CANCEL:200,-,-
```

Full Trace & System log:

If you need something more than what the dial plan debug has to offer you then you will need to look at the full trace and system log.

Full Trace		
ISDN Ports	SIP	ANALOG
☒ enable Check all ☐ ☒ 1 ☒ 2	☒ Sip Sign ☐ Sip Audio	☒ enable
 Start		

Downloads	
Debug files Download Delete file	30 Oct 2015 12:20
System log Download	30 Oct 2015 11:27

The full trace starts an ISDN and SIP trace which can be analyzed with Wireshark. Here you can select the ISDN ports and SIP services you want to trace and activate the trace by clicking the start button. After the test press stop and deactivate the trace, you can then download it from the download link seen here.

These sorts of debugging files will also be requested from your distributor or beroNet support when troubleshooting issues for you.

8) Gateway options:

FXO Gateway:

For you FXO Gateway (lines) you need to follow a similar process to what has been covered already but when selecting your gateway in 3CX you need to select FXO.

 Add Gateway Wizard

Add PSTN Gateway

Name	beroNet_FXO 
Brand	BeroNet 
Model	bero*fix FXO (400/1600/6400) 
Description	beroNet bero*fix FXO (400/1600/6400) 4 Ports
URL	 http://www.beronet.com
More vendor supported gateways can be found here: http://www.3cx.com/voip-gateways/index.html	

Follow the Wizard as before. Input the network credentials. You will then be asked to put in your lines.

Virtual extension	Authentication ID	Authentication Password	Channels	Port Identification	Inbound Route Day	Inbound Route Night
90002	90002	7o2hx55	1	90002	500 ▼	500
90003	90003	dvprfkik	1	90003	500 ▼	500
90004	90004	01o7pig	1	90004	500 ▼	500
90005	90005	qd9marc	1	90005	500 ▼	500

Something unique to beroNet with 3CX is the ability to put in multiple FXO lines and be able to route accordingly (see above). With most other gateways you will only get the one line configured for ALL lines.

VoIP PBX Settings	
Server Address	10.5.1.12
Port	5060

FXO Extern	
Select your external FXO lines.	☒ 1 ☐ 2 ☐ 3 ☐ 4
User:	90002
Password:	*****
For which country should the tonset be configured ?	[uk] ▼

You can input your PBX details in 3CX and also add your FXO lines according to whatever you have configured.

	Registered (idle)	90002	Gateway	beroNet_FXO
FXO-Extern	10.5.1.12	90002		

Your lines will now be configured – registered in both the PBX and Gateway and the ability to make outbound calls via your FXO lines should now be available to you.

GSM Gateway:

As with all the above options also you can run the wizard for the gateway.

The only additional points you need to be aware of with the GSM option is the following.

GSM Extern	
Select your external GSM lines.	☒ 1 ☒ 2
User:	90001
Password:	*****

When running the Wizard you will need to select your GSM lines – these are in relation to the SIM cards you are going to use. As with the other configuration you will also need a username and password for registration.

Group	Ports	
GSM-Extern	1,2	 

The auto-configuration will create your PSTN interface with your ports as well as a SIP interface and dial plan rules (see below).

Sip interface:

GSM-Extern	10.5.1.12:5060	90001	0	manual	 
------------	----------------	-------	---	--------	---

Dial plan rules:

gsm-sip	GSM-Extern	GSM-Extern	(.*)	\1	(.*)	\1
sip-gsm	GSM-Extern	GSM-Extern	(.*)	\1	(.*)	\1

Within 3CX you will also see that it is registered.

	Registered (idle)	90001	Gateway	GSM_Gateway
---	-------------------	-------	---------	-------------

The GSM status screen in the beroNet Gateway should also now show you the Provider details, Registration status details and what signal quality you are getting. When you are in this state and everything looks good you should be able to make calls out through the Gateway.

GSM Status			
Port	Provider	Reg. status	Signal Quality
1	vodafone UK		OK
2	vodafone UK		OK
Restart LI 1			