

Telephone access using B4RN router

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Introduction

There are some excellent documents on the B4RN website (<https://b4rn.org.uk/resources>) describing how to set up a VOIP (Voice Over Internet Protocol) telephone service to replace that associated with the now redundant landline. The documents describe using “Vonage” and “Sipgate” as VOIP service providers and discuss the merits of each.

Since those documents were written, B4RN are, at November 2020, fitting a router with built-in VOIP capabilities, the Zyxel VMG8825_B50B, or the similar Zyxel DX5301-B. This guide applies to both. The purpose of this guide is to describe the process and router configuration required to connect an ordinary telephone, plugged in to the router, to a Sipgate VOIP account.

Audience

This guide is primarily intended for:

- B4RN customers who want to use their existing telephone instrument(s) and possibly their existing landline number (but not the landline itself), to receive incoming calls. Outgoing calls are also possible – see “Scope” below.

- Those intending (and are confident) to configure the B4RN router - the customer or perhaps a volunteer.

Scope

Initially at least this guide concentrates on configuring the B4RN router and setting up a Sipgate account. Sipgate has been chosen because:

- The service is free to set up and outgoing call charges are “pay as you go” – there are no other ongoing charges. There is, however, a one-off charge of £30 for “porting” an existing landline number to Sipgate.
- It is particularly suitable for those who, in general, want to keep their existing (landline) number for incoming calls. Sipgate can also be used for outgoing calls, either on a “pay-as-you-go” basis or with a call package. See “More Options” below.
- An Analogue Telephone Adapter (ATA) is neither supplied nor required (because the router has one built in).

Much of this guide could also be used as a basis for other SIP services, but there may be some specific parameter changes for some services. This guide could be updated to include other services in future. Note that Vonage in particular provides an pre-configured adapter (ATA) as part of their (paid-for) package, so this guide does not apply to their service.

The process step by step

- Register for a Sipgate account.
- Configure the router.
- Arrange transfer (“port”) of your existing telephone number. *
- Connect telephone to router
- Check the status of your landline

*** Note carefully that, if you wish to continue to receive calls on your existing landline number, you should not prematurely cancel your landline contract. See the detailed steps below.**

Register for a Sipgate account

This can be carried out in advance of B4RN installation. Create a “Sipgate Basic” account at sipgate.co.uk You will be offered a choice of geographic telephone number (which will be used temporarily if you “port” your existing landline number – see below). There will be a UK address verification procedure for access to emergency services – this will involve some posted documents.

Configure the router

After B4RN is installed, your router can be configured to connect to your Sipgate VOIP service. See the appendix for configuration details.

The service and configuration can be tested by temporarily plugging in a telephone to the router “PHONE1” port. See Testing on page 4. Note at this stage the telephone number will be the one you chose when you set up the account.

Arrange to “port” your existing telephone number (optional)

There are certain forms to complete (and a fee to pay) for Sipgate to request to take over (“port”) your landline number from your existing service provider. **It is important not to cancel your landline contract until the porting of your number is complete. If you cancel before this you are likely to lose the number for good.** Your landline number will be associated with your Sipgate account and can be used instead of (or in addition to) the number you earlier chose from Sipgate. Start the porting process by sending an email to porting@sipgate.co.uk, stating the name of your current (landline) telephone service provider, the telephone number you are porting, and your Sipgate account number.

Connect telephone to router

An RJ11 plug to BT socket adapter will be required in most cases to enable a telephone to be plugged in to one of the two telephone sockets on the router. Using an adapter with a built-in “ring capacitor” will ensure any telephone instrument with a BT plug will work, and costs about £3.30 inc VAT and postage. I will keep a small stock available at cost. Cheaper adapters may work with some more modern telephone instruments, but it is difficult to predict. Note that the telephone instrument could be a wireless (DECT) base station controlling handsets throughout the house.

The router configuration below assumes a telephone will be plugged into the first phone socket (PHONE1).

Check the status of your landline

When the porting of your landline telephone number is complete, your contract with your landline provider should be automatically terminated. You may wish to verify this with them.

Final Sipgate “tweaks”

There are a number of options that can be added or changed from your Sipgate on-line account.

- Automatic Area Code (“Phones” section) – can be set to local area code (eg 01524). Any number dialled without a leading 0 will have the code sent first.
- Outgoing caller-id (“Feature store”) – select the free caller-id feature and follow the instructions. You will probably want to select your ported number (if applicable).
- Voicemail (“Feature store”) – you can get an email notification for each message. Free.
- Call forwarding (“Feature store”) – forward incoming calls to another number if you don’t answer, or eventually to voicemail. You pay for forwarded calls.

Testing

With a telephone plugged into the first telephone port:

- Dial **10000** to check successful service registration
- Dial **10005** to check call quality
- Dial **10020** to check dialling tones are set up correctly
- Call another telephone number and check conversation is possible.
- Ring your VOIP telephone number (or your old landline number if you have already ported it) from another device (e.g. mobile phone) and check the phone rings. If you receive ring tone but the telephone doesn't ring, it may be because an unsuitable adapter has been plugged in the telephone port; see "Connect telephone to router" on page 3. Answer the call and check conversation is possible

More options

VOIP (and SIP) is very flexible and it is possible to configure other telephone schemes. Examples:

- Because SIP supports concurrent calls on one VOIP account, two telephones (one in each router socket) can have simultaneous conversations.
- Two (or more) SIP accounts from different providers can be configured and each used for different types of call. For example, one account for incoming calls and another for outgoing. Many providers have competitive rates for international calls to specific countries. Have a look at VOIP comparison sites such as www.voip-comparison.com
- Internal calls can be made from one telephone to another, and calls transferred between them.
- It is possible to connect the router to existing internal telephone extension wiring, but this requires some additional kit and is beyond the scope of this guide. A simple alternative is to use wireless telephones.
- If you don't necessarily want to use your existing telephone instruments, you can install a "softphone" app on your smartphone to connect to a SIP service, so your calls are made from and received by it. Call quality can vary so you may have to try a few apps. No router configuration is required.

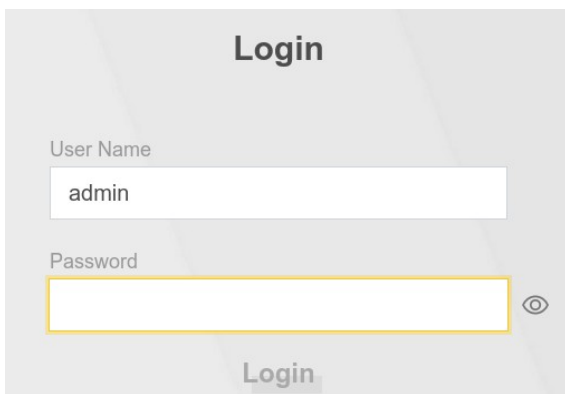
Appendix

Configuring the Zyxel router

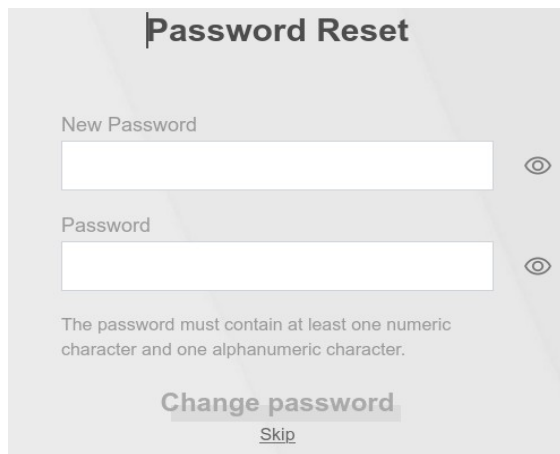
Note: Some parameters relate to the Sipgate account you set up earlier. Set up an account now before continuing with the configuration.

Note: The following diagrams illustrate the minimum configuration required to get a working VoIP service. See the Summary of parameters on page 14 for other, optional, configuration parameters.

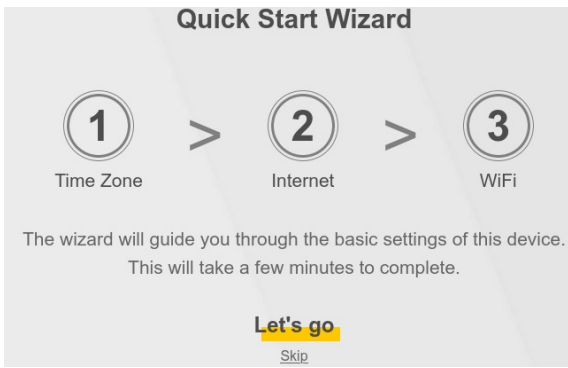
In your browser (Firefox, Chrome etc) enter “192.168.1.1” in the address bar. Follow the steps in the screenshots below.



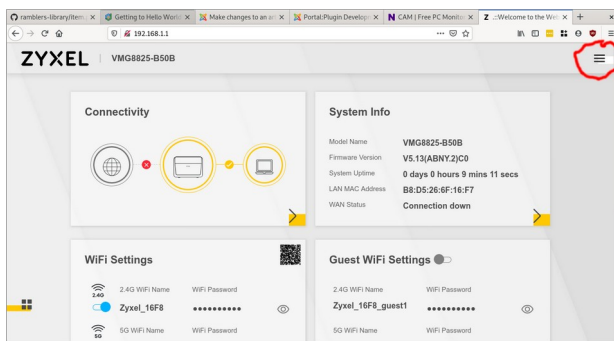
Log in using the Username and Login Password on the card attached to the router (unless previously changed).



The first time the router is accessed it offers a password change. You can skip this or change the password, but make sure it is noted somewhere because it cannot be recovered (and a factory reset will be necessary).

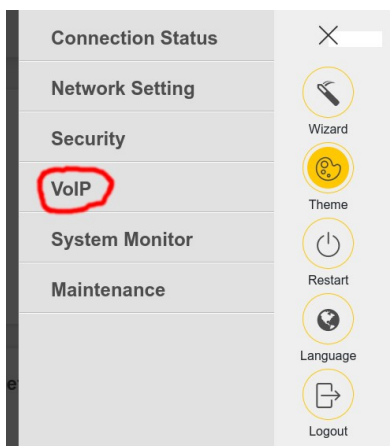


Click “Skip” to skip the Quick Start Wizard.

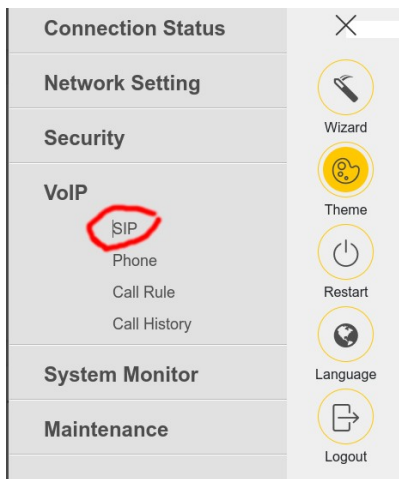


It is advisable to make a backup of the router configuration before proceeding. Click the “settings” icon top right (3 bars). Select Maintenance then Backup/Restore. Follow the instructions for backup, which will download the configuration to the download folder on your computer. You can restore from this if things go horribly wrong!

Parameters listed should be changed or set as shown.



Click the “settings” icon again (top right (3 bars)). Select VOIP.



Select SIP

SIP

SIP Account SIP Service Provider

In order to make Internet phone calls, a valid SIP account is essential. You may need to consult your SIP service provider for the following settings. This configuration should be used in conjunction with SIP Service Provider.

Add New Account

#	Enable	SIP Account	Service Provider	Account Number	Modify
1	Disabled	SIP1	ChangeMe	ChangeMe	
2	Disabled	SIP2	ChangeMe	ChangeMe	

Click “Modify” to change the first SIP account

SIP Account Entry Edit

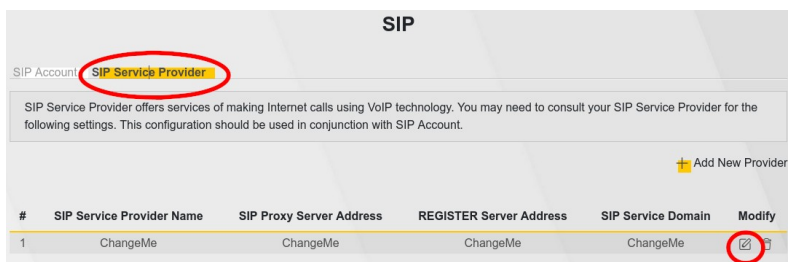
SIP Account Selection
SIP Account Selection SIP1

SIP Service Provider Association
SIP Account Associated with ChangeMe

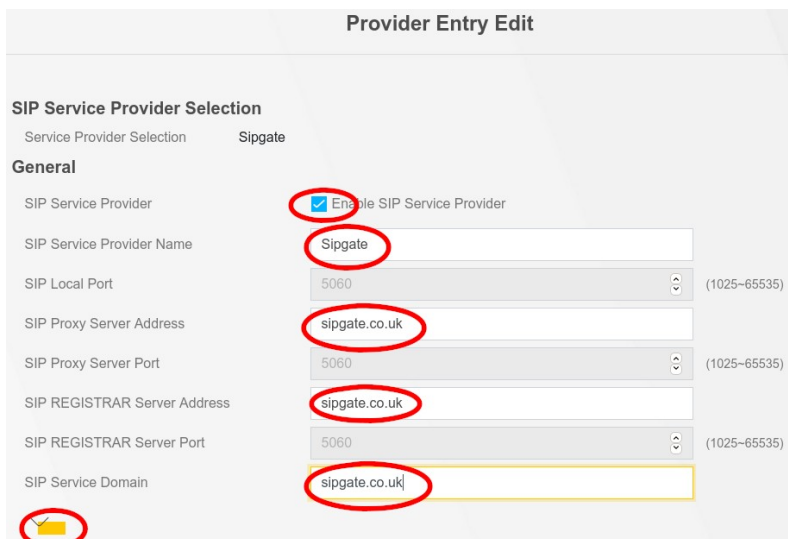
General
 Enable SIP Account
 SIP Account Number

Authentication
 Username
 Password

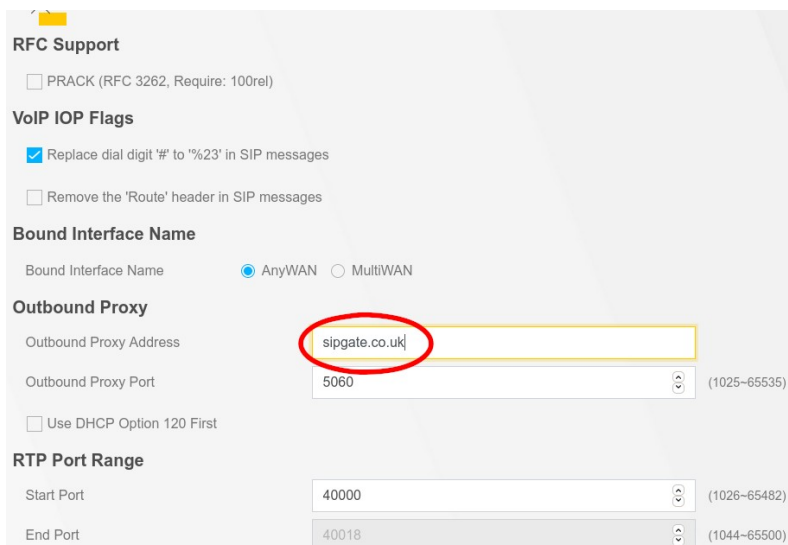
Tick “Enable SIP Account” and enter your SIP ID in two places and your SIP password. Note these are NOT your Sipgate account user-id and password. (You can find your SIP ID and SIP password by logging in to your account at Sipgate.com and selecting “Phones” from the panel on the left. The correct values are shown under “SIP Details”). Click OK.



Select the “SIP Service Provider” tab, then click “Modify” on the existing Provider.



Enable this provider and complete the fields as shown: “Sipgate” for the Provider Name and “sipgate.co.uk” for the other fields. Do not click “OK” yet; instead click the yellow rectangle to show more settings.



Enter “sipgate.co.uk” for the Outbound Proxy as shown. Scroll down for more options.

SRTP Support

SRTP Support

Crypto Suite: AES_CM_128_HMAC_SHA1_80 (Encrypt/Decrypt)

DTMF Mode

DTMF Mode: RFC 2833

Transport Type

Transport Type: UDP

Ignore Direct IP

Enable Disable

FAX Option

G.711 Fax Passthrough T.38 Fax Relay

QoS Tag

SIP DSCP Mark Setting: 46 (0-63)

RTP DSCP Mark Setting: 46 (0-63)

Select "RFC2833" for DTMF mode. Scroll for more options.

G.711 Fax Passthrough T.38 Fax Relay

QoS Tag

SIP DSCP Mark Setting: 46 (0-63)

RTP DSCP Mark Setting: 46 (0-63)

Timer Setting

SIP Register Expiration Duration: 600 (20-65535) second

SIP Register Fail Re-try Timer: 1800 (30-65535) second

Session Expires (SE): 900 (100-3600) second

Min-SE: 600 (90-1800) second

Dialing Interval Selection

Dialing Interval Selection: 3 second

DNS SRV

Enable DNS SRV

Cancel OK

Change the Expiration Duration to 600 seconds as shown. Then press "OK" to save changes.

ZYXEL | VMG8825-B50B

SIP

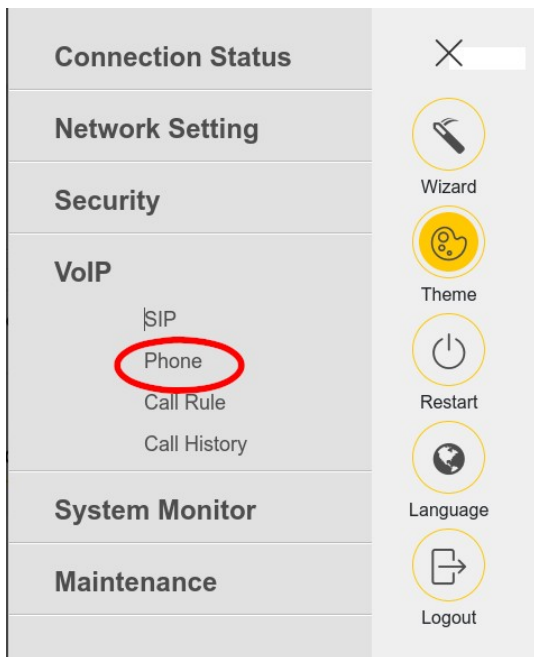
SIP Account: SIP Service Provider

SIP Service Provider offers services of making Internet calls using VoIP technology. You may need to consult your SIP Service Provider for the following settings. This configuration should be used in conjunction with SIP Account.

[Add New Provider](#)

#	SIP Service Provider Name	SIP Proxy Server Address	REGISTER Server Address	SIP Service Domain	Modify
1	Sipgate	sipgate.co.uk	sipgate.co.uk	sipgate.co.uk	

Now click the 3 bars again...



... and select "Phone"

Phone

Phone Device | Relation

Phone Device configuration defines the relations between your SIP account(s) and phone(s). That is, which phone(s) will ring when a specific SIP account number receive an incoming call; and which SIP account number will be used when a specific phone is used to make an outgoing call.

Analog Phone

#	Phone ID	Internal Number	Incoming SIP Number	Outgoing SIP Number	Modify
1	PHONE1	**11	your_sip_id	your_sip_id	<input checked="" type="checkbox"/>
2	PHONE2	**12	ChangeMe	ChangeMe	<input type="checkbox"/>

Check that your SIP ID is set for both incoming and outgoing calls on the first Phone entry (#1). If not, click "Modify" on the first phone...

Phone Device Edit

SIP Account to Make Outgoing Call

SIP Account	SIP Number
<input checked="" type="radio"/> SIP1	your_sip_id
<input type="radio"/> SIP2	ChangeMe

SIP Account(s) to Receive Incoming Call

SIP Account	directoryNumber
<input checked="" type="checkbox"/> SIP1	your_sip_id
<input type="checkbox"/> SIP2	ChangeMe

... and set SIP1 for both incoming and outgoing calls. Click OK.

Phone

Phone Device **Region**

Selecting current region where this device physically is located provides better quality of phone calls.

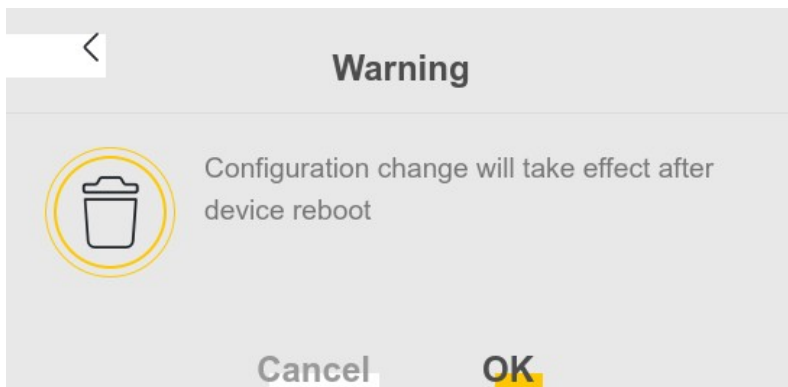
Region Setting **GBR - UK**

Call Service Mode **Europe Type**

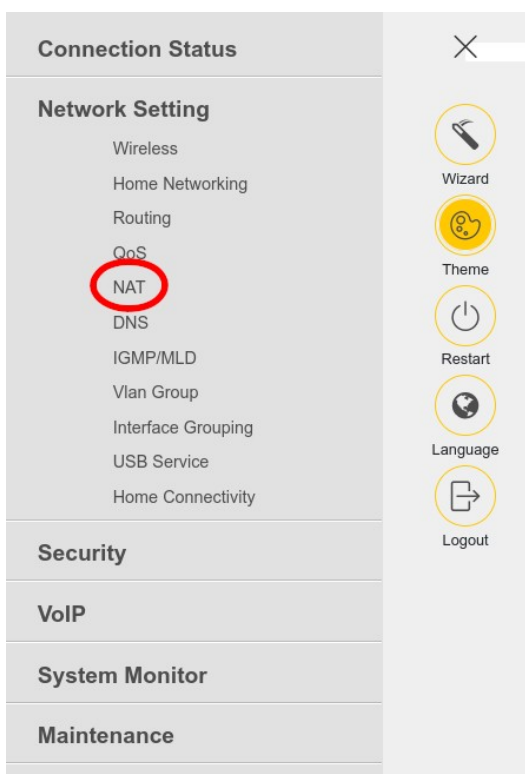
Note
Caution : When Region Setting is changed, you need to reboot device to take settings effect.

Cancel **Apply**

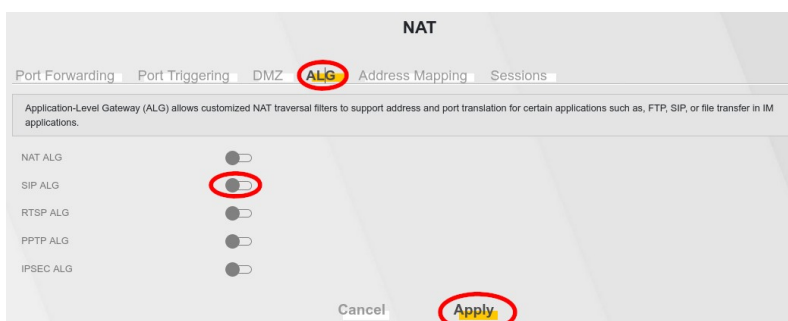
Now click the “Region” tab.
Choose “GBR-UK” for the
Regional Setting and “Europe
Type” for Call Service Mode.
click “Apply”



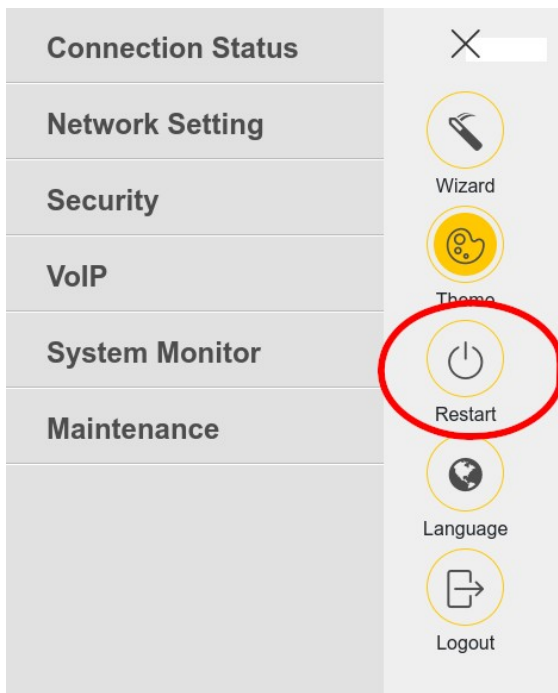
This warning will be displayed. Click OK and you will return to the previous screen.



Click the "3 bars" again and select "Network Setting", then "NAT".



Select the "ALG" tab. Ensure that "SIP ALG" is disabled i.e. switch to the left of the slider (it may already be disabled). Click "Apply"



Finally, click the “3 bars” again and select “Restart”. This will reboot the router. Wait for the router to complete start-up. If the Sipgate account is active the router should register with the service, and the green “Phone” indicator on the router will come on. If it doesn’t, check your parameters carefully.

Summary of parameters

Table 1: Sip Account

Parameter	Value
SIP account selection	eg SIP1
Associated service provider profile	e.g. Sipgate
Enable SIP account	tick
SIP account number	SIP-ID (from Sipgate)
User name	SIP-ID (from Sipgate)
Password	SIP password (from Sipgate)
(optional) Enable Call Waiting	This is enabled by default but disable it if you want callers to get immediate engaged tone if you are already on a call.

Table 2: Sip Service Provider

Parameter	Value
Service provider name	Sipgate (for example)
Enable SIP service provider	tick
SIP proxy server	sipgate.co.uk
Registrar (or Register) server	sipgate.co.uk
SIP service domain	sipgate.co.uk
Outbound proxy	sipgate.co.uk
DTMF mode	RFC2833
SIP Register Expiration Duration	600 seconds

Table 3: Phone device (usually PHONE1 for the first telephone port)

Parameter	Value
SIP Account to Make Outgoing Call	eg SIP1 (the SIP account as above)
SIP Account(s) to Receive Incoming Call	eg SIP1 (the SIP account as above)

Table 4: Phone region

Parameter	Value
Region setting	GBR-UK
Call service Mode	Europe Type

Table 5: NAT

Parameter	Value
SIP ALG	Disabled

Document History

November 2020	Initial release
July 2021	Reference to new router Added Siptate optional facilities More detail on porting process Minor clarifications and amendments

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July 2021
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