BRIDGE SETUP GUIDE

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Introduction

When setting up Green-GO bridges a loads of scenarios are possible. Each situation is different and choices need to be made depending on the situation.

> *To setup a bridge connection at least basic IP and IT knowledge is needed. This document will not try to explain all the technical language used*

The word **Port** is used a lot when describing bridging. a brief overview/reference.

- **Network or Physical Port** the four connectors on the back of the device. 2 on the *Internal Network* and 2 on the *External network*.

- **UDP Port** the UDP port used for the connection and forwarding.

- **Connection Port** one of the connections between a bridge and another bridge or device.

General Concept

A Green-GO bridge connects 2 or more sites using a UDP audio stream between the sites. A bridgeX has 4 **connection ports** each connection port uses its own *UDP port* Each Port is a Point to point connection between 2 devices and carries ONE audio stream.

Each port connection can be in one of 2 modes, Group or User. In Group mode one Bridge-port connects to one other Bridge-port. The group mode will share the audio of the assigned group between the two sites. In User mode one Bridge-port connects to one Green-GO device in remote mode.

Typically a connection in **Group mode** will be used to connect *few* partylines between 2 or more sites with *lots* of devices.

A Connection in **User mode** will be used to connect *few* remote devices (on multiple sites) with each *lots* of channels

Port forwarding

The UDP traffic from one bridge to another is *routed* as soon as the two bridges are not in the same LAN. for the bridges to be able to setup a connection they must be able to find each-other. This can be done by setting UDP port forwarding on the router that is visible to the WAN side.

Bridge A can not directly talk to the IP address of a bridge B that is behind a Router. The the LAN ip of bridge B is not visible to the outside world.

This can be solved by telling the router on site B to forward a specific UDP port to the ip address of Bridge B.

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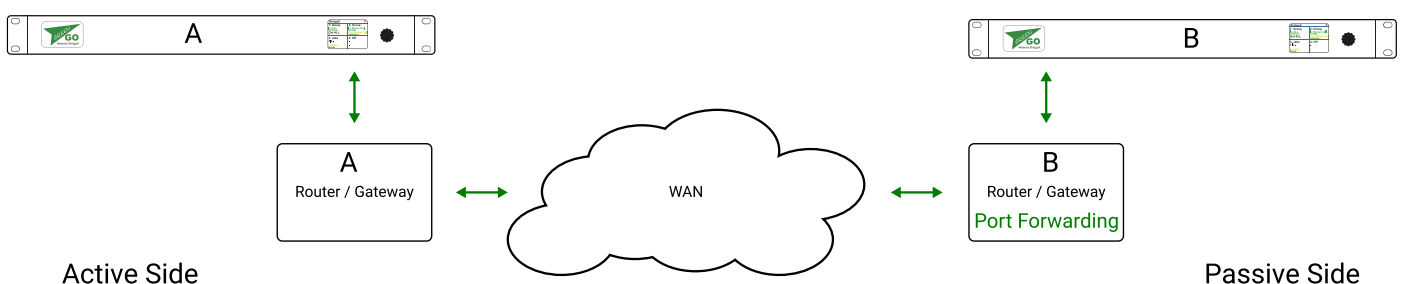
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The flow will be:

Sender	Receiver	message
Bridge A	Gateway A	Connection request for *IP address of Gateway B* on port XXXX
Gateway A	Gateway B	Connection request for port XXXX
Gateway B		My port forwarding table says to forward port xxxx to *IP address of Bridge B*
Gateway B	Bridge B	Connection request on *IP address of Bridge B* port xxxx

Once this is done the 2 bridges can find each other to setup a connection.

Passive side

The side that *waits* for an incoming connection is called the **Passive side**. For each Bridge *connection port* on the passive side a Port forwarding rule needs to be set in the Gateway/Router on that site.

Active side

In a Green-GO Bridging setup the side that initiates the connection to the other bridge via the gateway's IP is called the **Active side**. Port forwarding is **NOT** necessary on the Active side. a Wired connection with *internet access* is required.

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Local Topology

A bridge has 4 physical **network ports**. 2 are labeled Internal, 2 External. Each set of 2 Physical ports can have its own Network configuration (IP settings)

The Green-GO data is always only present on the 2 Internal network ports. Other **local** Green-GO devices need to connect to the same LAN as the Internal lan. Normally the **bridged data** is present on the External ports. but this can be changed to the Internal Ports as wel.

A separate LAN for internal and external

Green-GO devices in the local network connect to one of the Internal network ports. The Green-GO default is dynamic, which will assign a Link local 169.254.x.x address automatically if no DHCP server is present.

The External network is connects to a LAN with internet access. IP setup needs to be done Static as Dynamic is not available on this interface.

| Example IP config	Int Network	Ext Network
IP address	169.254.21.124	192.168.1.201
Netmask	255.255.0.0	255.255.255.0
Gateway	0.0.0.0	192.168.1.1

Where the External Gateway is the IP address of the on site router. Special care needs to be taken that the Internal and External subnets do **NOT** overlap. eg Internal **10.1.2.23/255.0.0.0** and **10.100.1.3/255.255.255.0** will not work as External subnet is within the subnet of the Internal network

Downsides for this method:

- A fixed IP needs to be used for the External Network. Care needs to be taken that no double IP address is used on the network. It is advised use a fixed address IN the routers subnet but OUTSIDE the DHCP server range **or** reserve the address in the router.

Upsides for this method:

- There is strict separation between the Local Green-GO network and other services that might disturb or be disturbed by Green-GO.
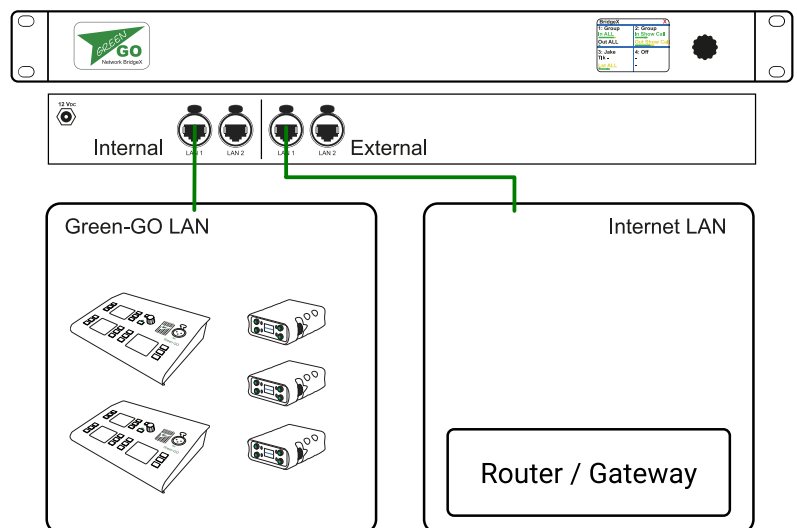
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One LAN for all

The other option is to route the "bridged" traffic also to the Internal Network ports and create one Lan where both the Green-GO devices and the Router are in. In this case we "disable" the External interface by setting the properties to 0. A Physical connection is only made to the Internal Network. No cable is plugged in the External network.

The internal Network can either be configured Static or Dynamic. Most of the time the router will also act as DHCP server and hand out IP address

| Example IP config	Int Network	Ext Network
IP address	192.168.10.201	0.0.0.0
Netmask	255.255.0.0	0.0.0.0
Gateway	192.168.1.101	0.0.0.0

Where the Internal Gateway is the IP address of the on site router.

Downsides of this method:

- There is no separation between the Green-GO Network and other services. Especially on larger sites with a big IT infrastructure issues might arise

Upsides of this method:

- Dynamic Ip addressing can be used for all equipment. Make sure that the DHCP server pool is big enough to accommodate for all devices. For A passive bridge Make sure to use a Static IP or reserve a address in the router so the port forwarding will keep working.
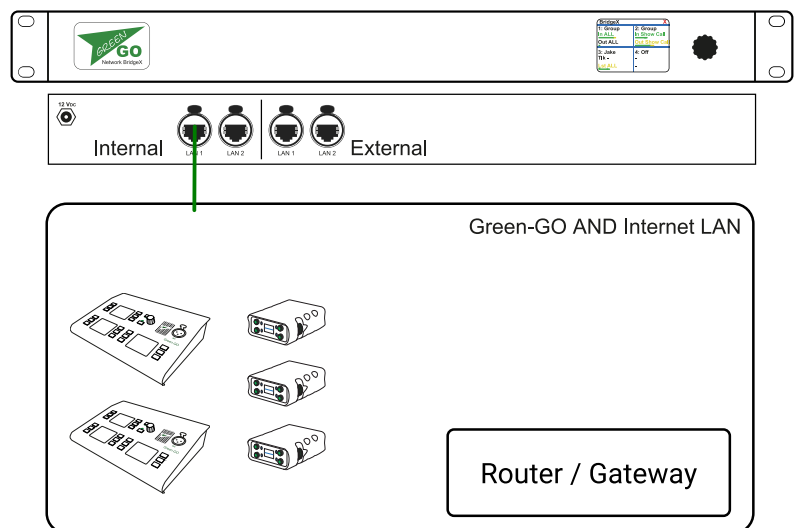
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Using a NAT

On One of the Two sites Port forwarding is always necessary. On the Other side only a fixed IP is necessary. On temporary sites it can be hard to gain access to the Router to reserve a fixed IP for a Bridge. And it can be unwanted to share the Green-GO network with the local infrastructure.

In this case it can be Use-full to setup a small router as Nat to obtain an DHCP address from the local Router/Gateway. and a Fixed Ip is used to connect to the bridges external network.

For example a *Ubiquti EdgerouterX* can be utilized for this function.
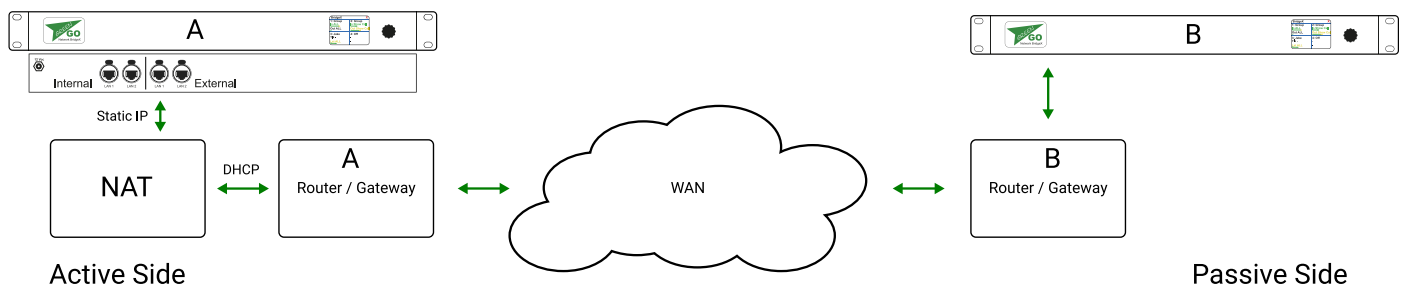
Why not use a VPN as bridging method

It is possible to create a Site to Site tunnel with a VPN connection between the two sites. The devices then can *see* each-other. even the Green-GO data will be send from one site to the other.

It might even work. The issue is that these connections are **routed**. The very nature of these routed IP connections is that there is absolutely no guarantee that the packets arrive to the other site with the same latency or even in the right order. As the System latency of Green-GO is very low there are no buffers large enough to cover this **Jitter** in latency.

A routed connection might work one day but can stop working or give distorted audio the other day. Therefore it is **NOT** advised to utilize only a VPN connection to bridge between sites.

A VPN can of course be used for other reasons. One being an extra security layer. And port forwarding might not be necessary if both bridges are in the same subnet. Care needs to be taken that the 2 Green-GO networks can *NOT* see each-other via the VPN. This can be done by settin up both local Green-GO networks in their own net. Or by blocking the local Green-GO traffic over the vpn (Multi-cast on UDP port 5908)

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Connection port setup

When the bridge is setup right in the IT infrastructure and port forwarding the port connection needs to be setup

Group mode

- Mode: Group bridge

- Group: Select any group from the local config. note that the group on the remote site can be named different on a different config

- Call, determine if sending and or receiving calls over the bridge connection is needed

- Routing enabled/Don't Route. when routing is enabled the the bridge can act as *proxy* between other sites. When set to Don't Route audio coming from the bridge will not be send over another bridge connection again.

- Connection

- Active/Passive (port-forwarding needed or not)

- Password: 8 characters needs to be identical on both sides

- Port: the forwarded UDP port on the passive side. Identical on both sides

- Remote IP: (only on active side) the IP address of the gateway/router on the passive side (https://www.whatismyip.com/)

- Backup: OFF

- SndBuf: Default, 99% of the time good. in case of connection issues this can be set smaller or larger

- RecvBuf: Auto, if bad audio is experienced due to long latency set to bigger, note that more latency between sites will be experienced

User mode

- Mode: User

- User: If set to Any, the user can be selected on the remote device. if a user is selected a connected device is forced to the selected user. for the IPhone app a user needs to be selected.

- Connection - always passive

- Password: 8 characters needs to be identical on both sides

- Port: the forwarded UDP port on the passive side. Identical on both sides

- SndBuf: Default, 99% of the time good. in case of connection issues this can be set smaller or larger

- RecvBuf: Auto, if bad audio is experienced due to long latency set to bigger, note that §more latency between sites will be experienced

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Complete Group bridge example

This is an example of a Group bridge between 2 sites. On both sides the Green-GO network and the Local "internet LAN" are kept separate. On Site A the port forwarding is setup in the router. on site B it was possible to reserve an IP address for the bridge so using a NAT was not necessary.
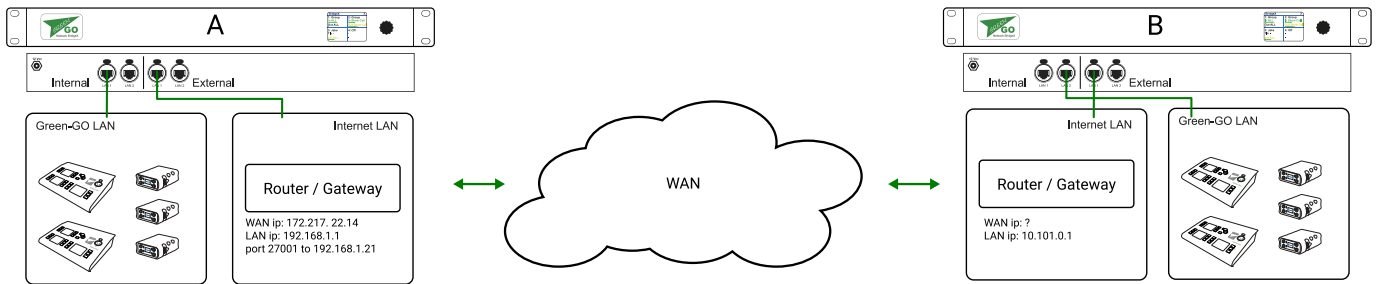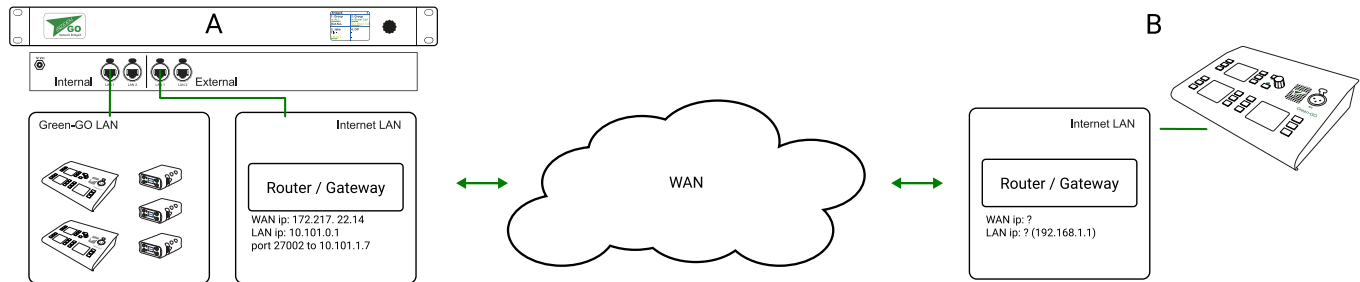

Property	Bridge Site A (passive)	Bridge Site B (active)
internal network	(dynamic)	(dynamic)
Ip Address	169.254.21.5	169.254.1.7
Netmask	255.255.0.0	255.255.0.0
Gateway	0.0.0.0	0.0.0.0
external network		
Ip Address	192.168.1.121	10.101.1.7
Netmask	255.255.255.0	255.255.0.0
Gateway	192.168.1.1	10.101.0.1
port		
Mode	Group bridge	Group bridge
Group	Toronto	Berlin
Call	enabled	enabled
Route	Don't route	Don't route
connection		
Mode	Passive Connection	Active connection
Password	PASW1234	PASW1234
Remote/local Port	27001	27001
Remote IP	–	172.217. 22.14
SndBuff	Default	Default
RecvBuff	Auto	Auto

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Complete User bridge example

This is an example of a User bridge between 2 sites. On both sides A the Green-GO network and the Local *internet LAN* are kept separate. On Site B the Device plugs directly into the *internet LAN* as Dhcp is available on the device the IP config for the device is set to dynamic. On Site A the port forwarding is setup in the router. As the person on side B can have different roles the user can be selected on the remote device by setting the user to *Any* in the bridge

Property	Remote Device (active)	Bridge Site B (passive)
internal network	(dynamic)	(dynamic)
Ip Address	169.254.1.7	192.186.1.21
Netmask	255.255.0.0	255.255.255.0
Gateway	0.0.0.0	192.168.1.1
external network		
Ip Address	10.101.1.7	–
Netmask	255.255.0.0	–
Gateway	10.101.0.1	–
port		
Mode	User Access	Remote connection
User	Any	Reporter 1
Password	PASW1235	PASW1235
Remote/local Port	27002	27002
Remote IP	–	172.217.22.14
SndBuff	Default	Default
RecvBuff	Auto	Auto