ACKSYS
COMMUNICATIONS & SYSTEMS

APPLICATION NOTE

APNUS018 GRE TUNNEL OVER Wi-Fi
Configuration example

May 2020 – Rev. A1

Introduction

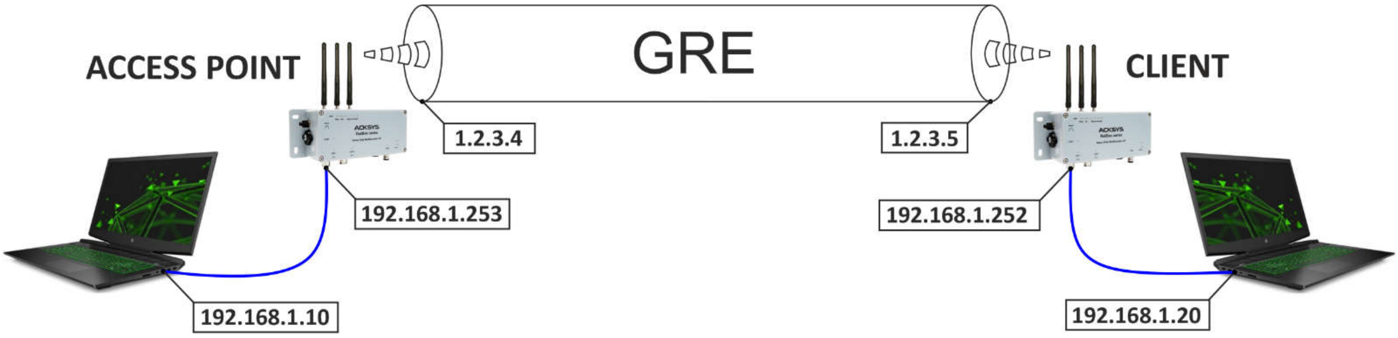
This application note is intended to help you configure your WaveOS Acksys products for the creation of a GRE tunnel between the AP and the Client. We consider that the Wi-Fi interfaces of the products have been previously configured and that the wireless link is working. If you need assistance with this part, please consult the application note *APNUS003 A simple wireless link*

Devices configuration

For this example, we will use the following parameters:

- Access Point Ethernet IP address = 192.168.1.253/24
- Access Point local GRE IP address = 1.2.3.4/24
- Client Ethernet IP address = 192.168.1.252/24
- Client local GRE IP address = 1.2.3.5/24

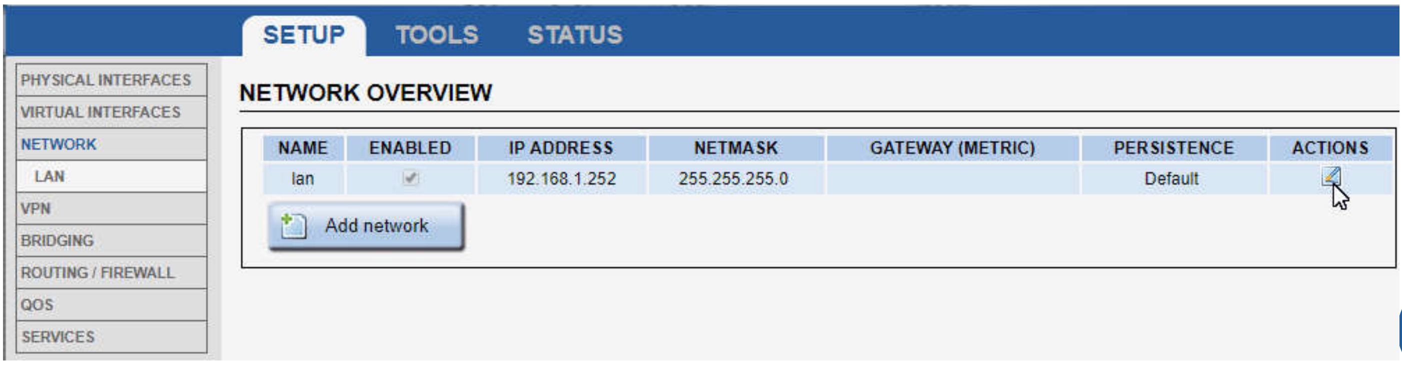
The products used for this example are Railbox/11A0, which have two radio cards. We will only use WiFi 1 radio of each unit, radio WiFi 2 is disabled.



We will configure the two products from a PC connected behind the Access Point, so we must start start by configuring the remote client.

Client configuration

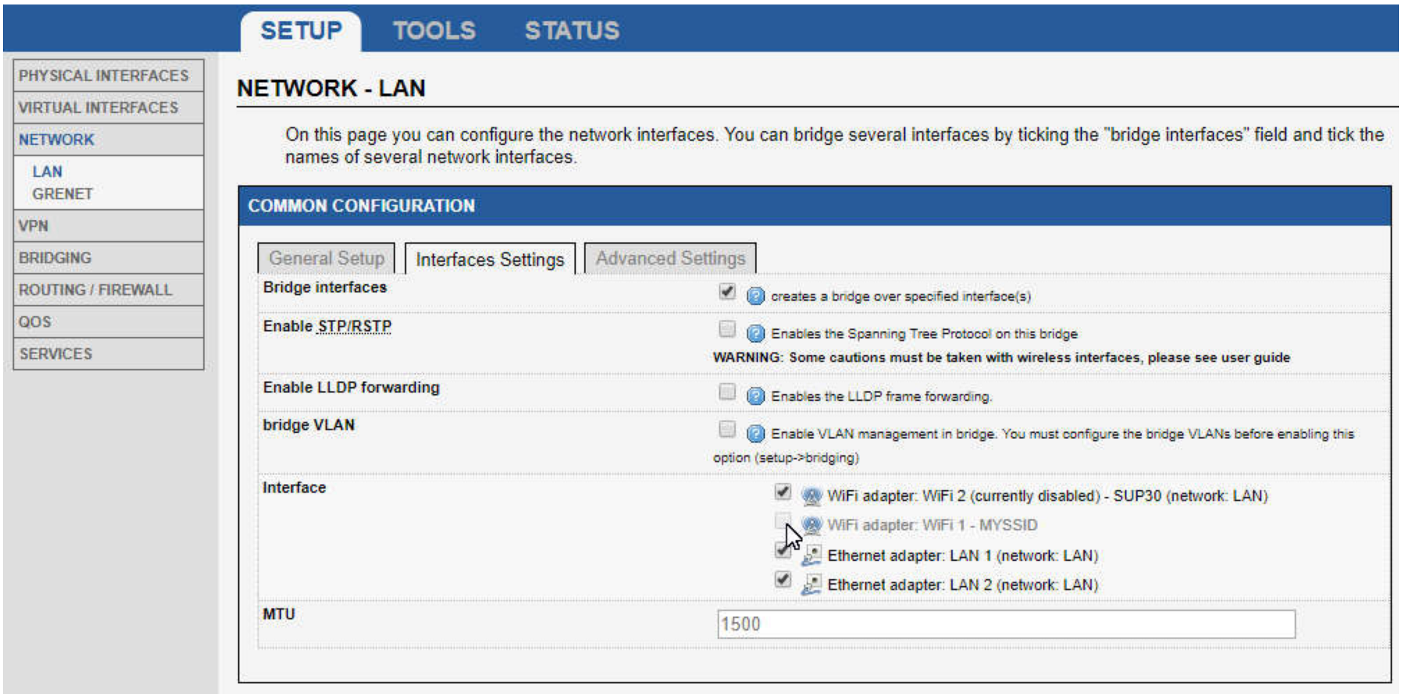
Open the LAN configuration page:



NETWORK OVERVIEW

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	✓	192.168.1.252	255.255.255.0		Default	✎

In the *Interfaces Settings* tab, remove the WiFi 1 interface from the bridge:



NETWORK - LAN

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the names of several network interfaces.

COMMON CONFIGURATION

Bridge interfaces: ☑ creates a bridge over specified interface(s)

Enable STP/RSTP: ☐ Enables the Spanning Tree Protocol on this bridge
WARNING: Some cautions must be taken with wireless interfaces, please see user guide

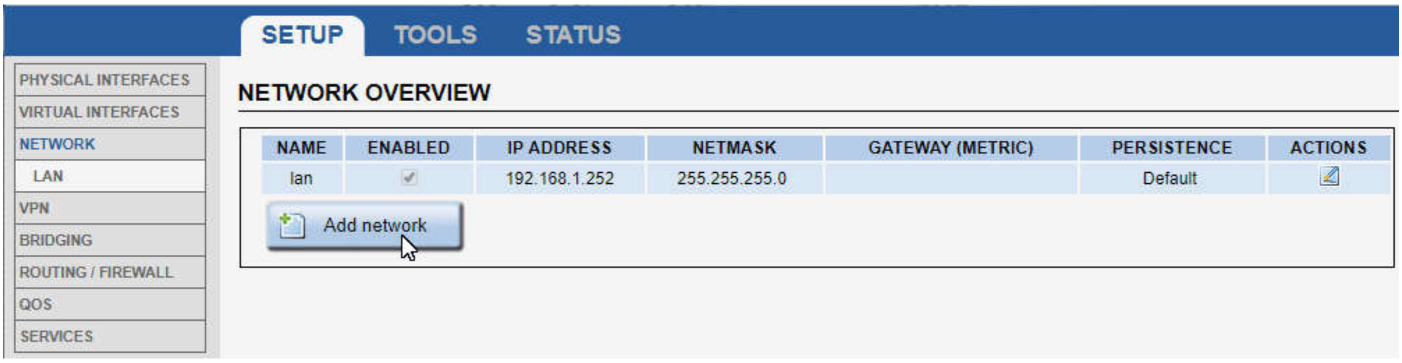
Enable LLDP forwarding: ☐ Enables the LLDP frame forwarding.

bridge VLAN: ☐ Enable VLAN management in bridge. You must configure the bridge VLANs before enabling this option (setup->bridging)

Interface:
☑ WiFi adapter: WiFi 2 (currently disabled) - SUP30 (network: LAN)
☐ WiFi adapter: WiFi 1 - MYSSID
☑ Ethernet adapter: LAN 1 (network: LAN)
☑ Ethernet adapter: LAN 2 (network: LAN)

MTU: 1500

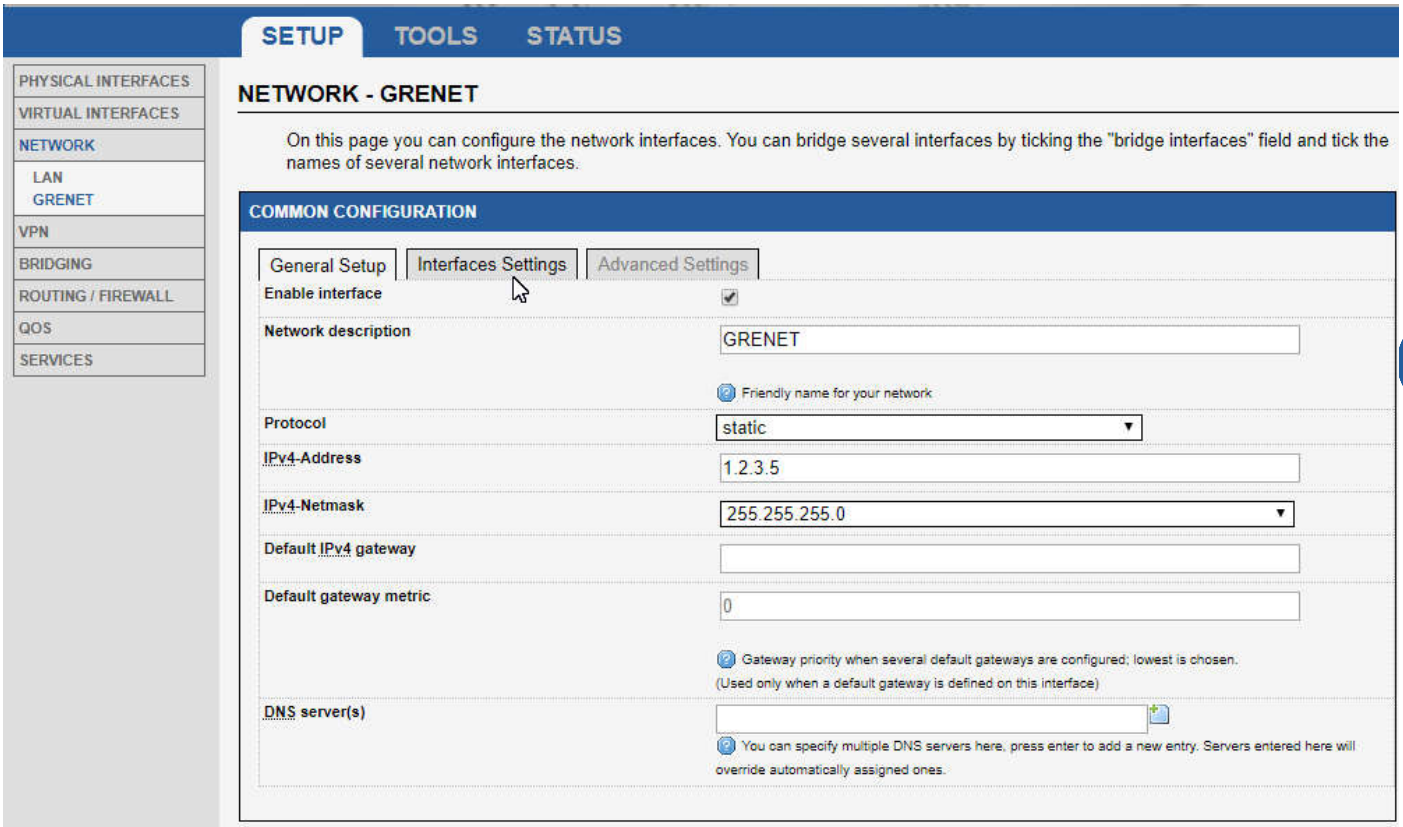
Save **Save** and click **NETWORK** in the left column to return to the **NETWORK OVERVIEW** page, then click **Add Network**:



NETWORK OVERVIEW

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	✓	192.168.1.252	255.255.255.0		Default	✎

This new network will be bound to the local endpoint of our GRE tunnel. In this page, we set the name, GRENET and the local address of our tunnel: 1.2.3.5, and then click on *Interfaces Settings*



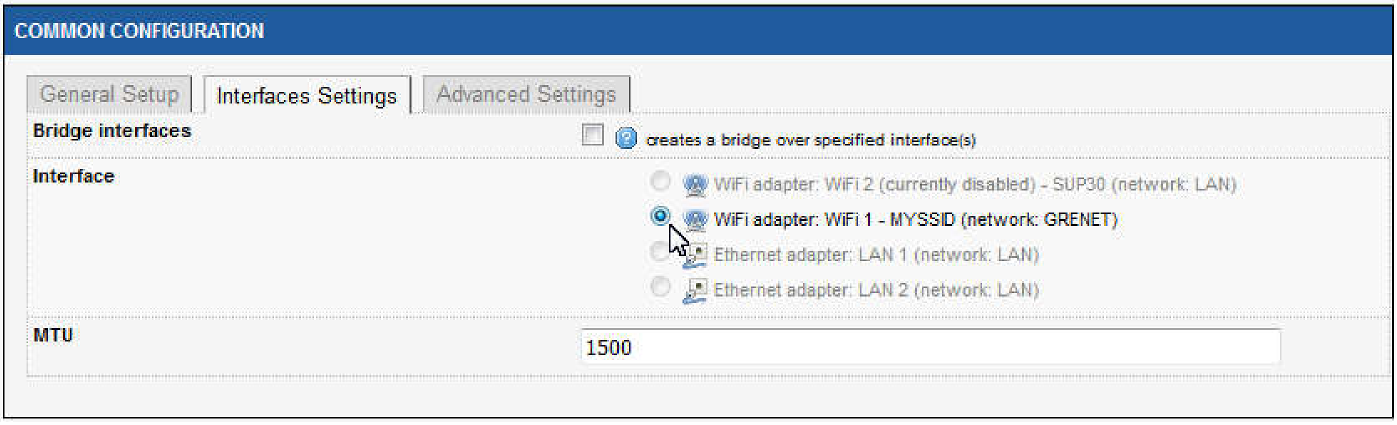
NETWORK - GRENET

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the names of several network interfaces.

COMMON CONFIGURATION

Enable interface	☑
Network description	GRENET Friendly name for your network
Protocol	static ▾
IPv4-Address	1.2.3.5
IPv4-Netmask	255.255.255.0 ▾
Default IPv4 gateway	
Default gateway metric	0 Gateway priority when several default gateways are configured; lowest is chosen. (Used only when a default gateway is defined on this interface)
DNS server(s)	You can specify multiple DNS servers here, press enter to add a new entry. Servers entered here will override automatically assigned ones.

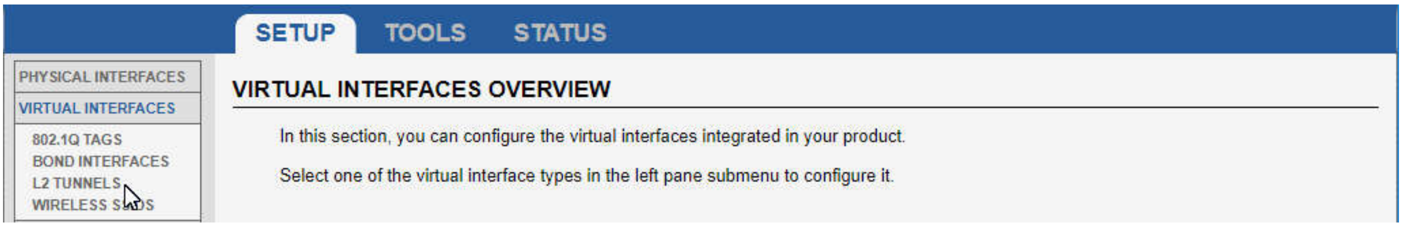
In Interfaces Settings, we attach our network to the WiFi 1 interface.



COMMON CONFIGURATION

Bridge interfaces	□ creates a bridge over specified interface(s)
Interface	○ WiFi adapter: WiFi 2 (currently disabled) - SUP30 (network: LAN) ● WiFi adapter: WiFi 1 - MYSSID (network: GRENET) ○ Ethernet adapter: LAN 1 (network: LAN) ○ Ethernet adapter: LAN 2 (network: LAN)
MTU	1500

Now we save the modifications Save and we can go to the L2 TUNNELS OVERVIEW

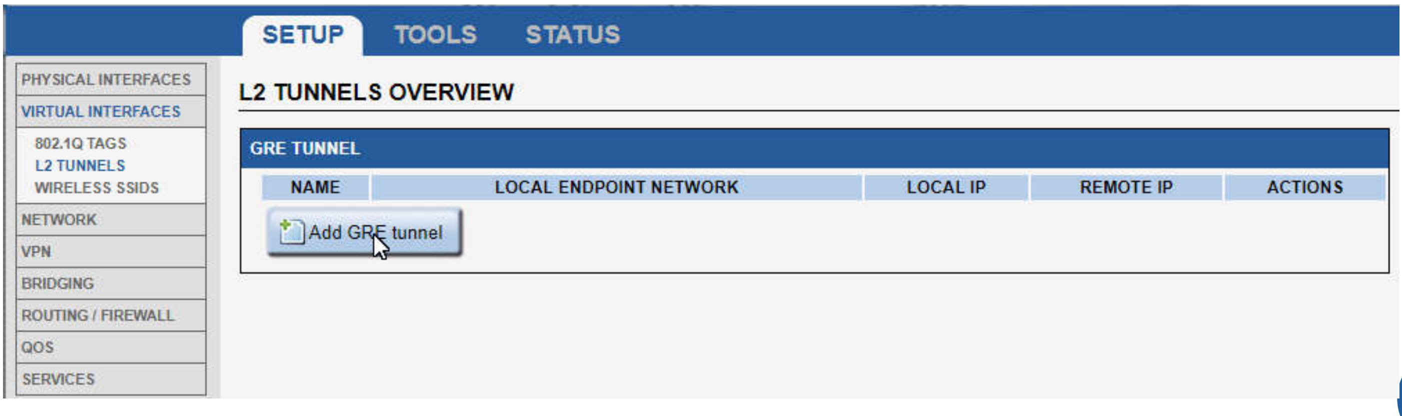


VIRTUAL INTERFACES OVERVIEW

In this section, you can configure the virtual interfaces integrated in your product.

Select one of the virtual interface types in the left pane submenu to configure it.

In the L2 TUNNELS OVERVIEW, click Add GRE tunnel to create the tunnel:

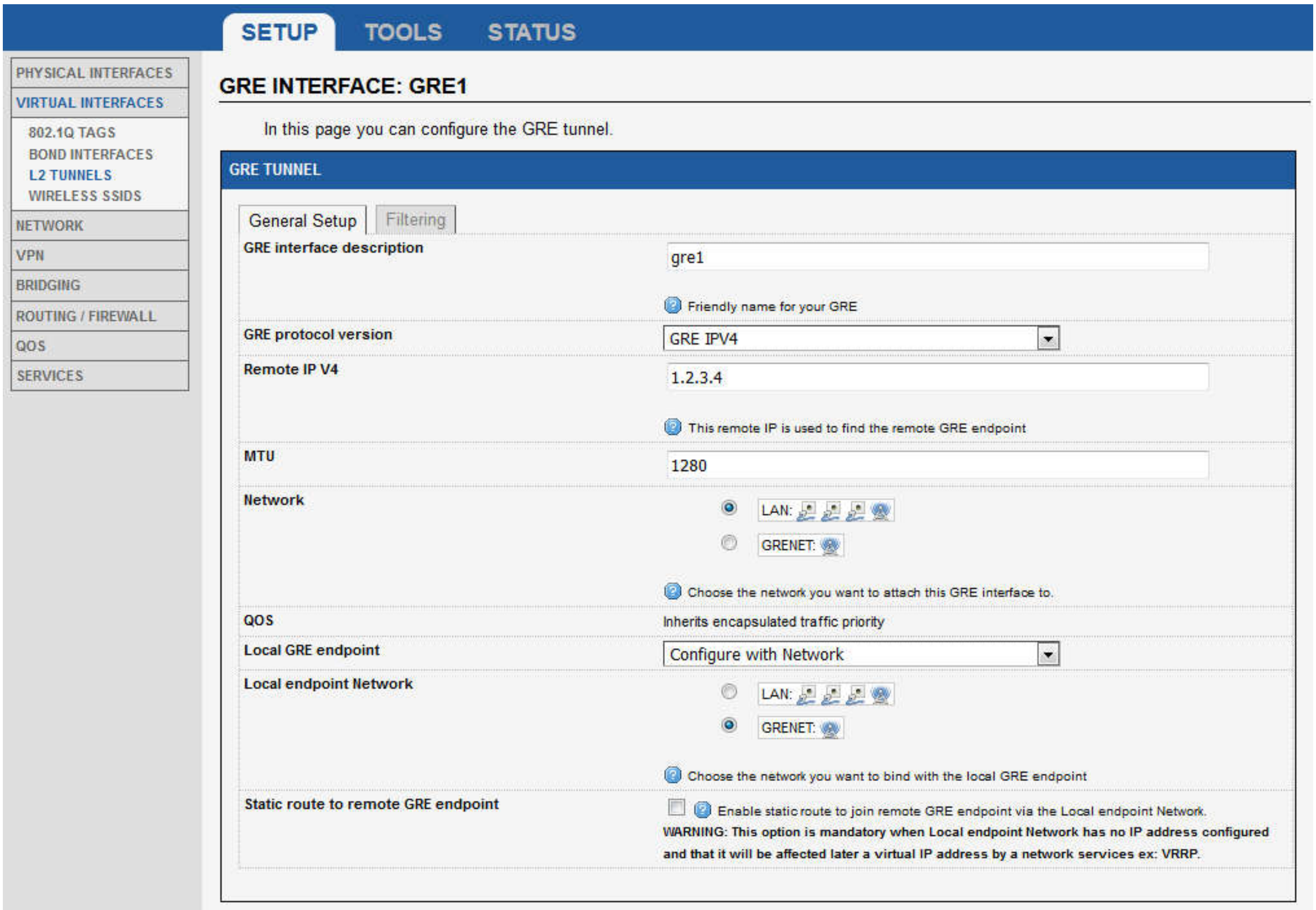


L2 TUNNELS OVERVIEW

GRE TUNNEL

NAME	LOCAL ENDPOINT NETWORK	LOCAL IP	REMOTE IP	ACTIONS

This is where we configure our tunnel. We indicate the address of the remote endpoint, 1.2.3.4. The Network attached to this endpoint is our LAN bridge, and we bind the tunnel to our GRENET network



GRE INTERFACE: GRE1

In this page you can configure the GRE tunnel.

GRE TUNNEL

GRE interface description: gre1
Friendly name for your GRE

GRE protocol version: GRE IPV4

Remote IP V4: 1.2.3.4
This remote IP is used to find the remote GRE endpoint

MTU: 1280

Network: ● LAN: ○ GRENET:
Choose the network you want to attach this GRE interface to.

QOS: Inherits encapsulated traffic priority

Local GRE endpoint: Configure with Network

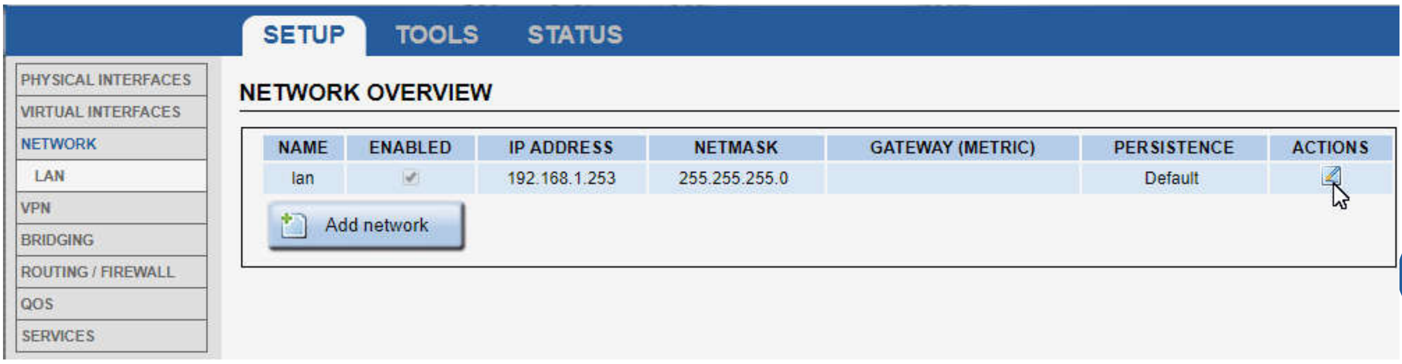
Local endpoint Network: ○ LAN: ● GRENET:
Choose the network you want to bind with the local GRE endpoint

Static route to remote GRE endpoint: □ Enable static route to join remote GRE endpoint via the Local endpoint Network.
WARNING: This option is mandatory when Local endpoint Network has no IP address configured and that it will be affected later a virtual IP address by a network services ex: VRRP.

We can now save and apply the changes [Save & Apply] The client configuration is complete

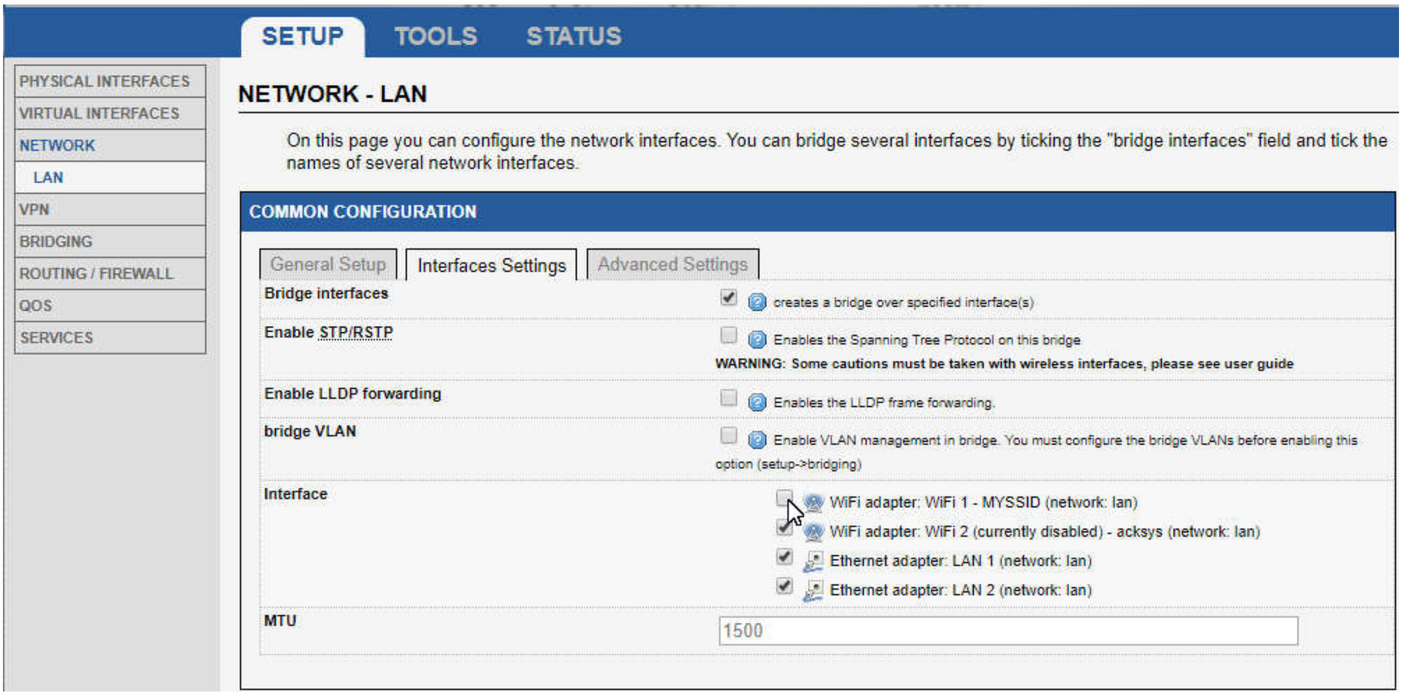
Access Point configuration

While the Client is restarting with its new settings, we can configure the AP in a completely similar way. We start by detaching the WiFi 1 interface from the bridge in the LAN Network:



NETWORK OVERVIEW

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	✓	192.168.1.253	255.255.255.0		Default	✎



NETWORK - LAN

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the names of several network interfaces.

COMMON CONFIGURATION

Bridge interfaces ☑ creates a bridge over specified interface(s)

Enable STP/RSTP □ Enables the Spanning Tree Protocol on this bridge
WARNING: Some cautions must be taken with wireless interfaces, please see user guide

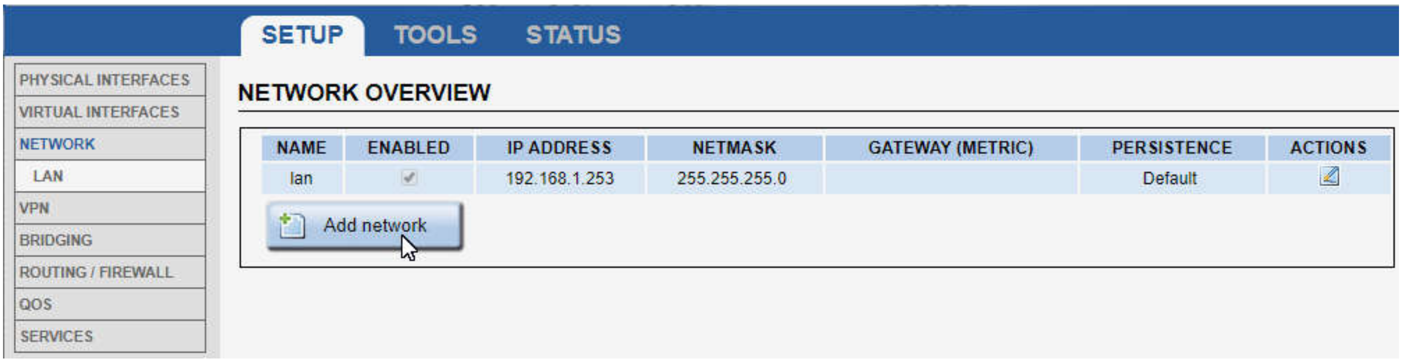
Enable LLDP forwarding □ Enables the LLDP frame forwarding.

bridge VLAN □ Enable VLAN management in bridge. You must configure the bridge VLANs before enabling this option (setup->bridging)

Interface
- □ WiFi adapter: WiFi 1 - MYSSID (network: lan)
- ☑ WiFi adapter: WiFi 2 (currently disabled) - acksys (network: lan)
- ☑ Ethernet adapter: LAN 1 (network: lan)
- ☑ Ethernet adapter: LAN 2 (network: lan)

MTU 1500

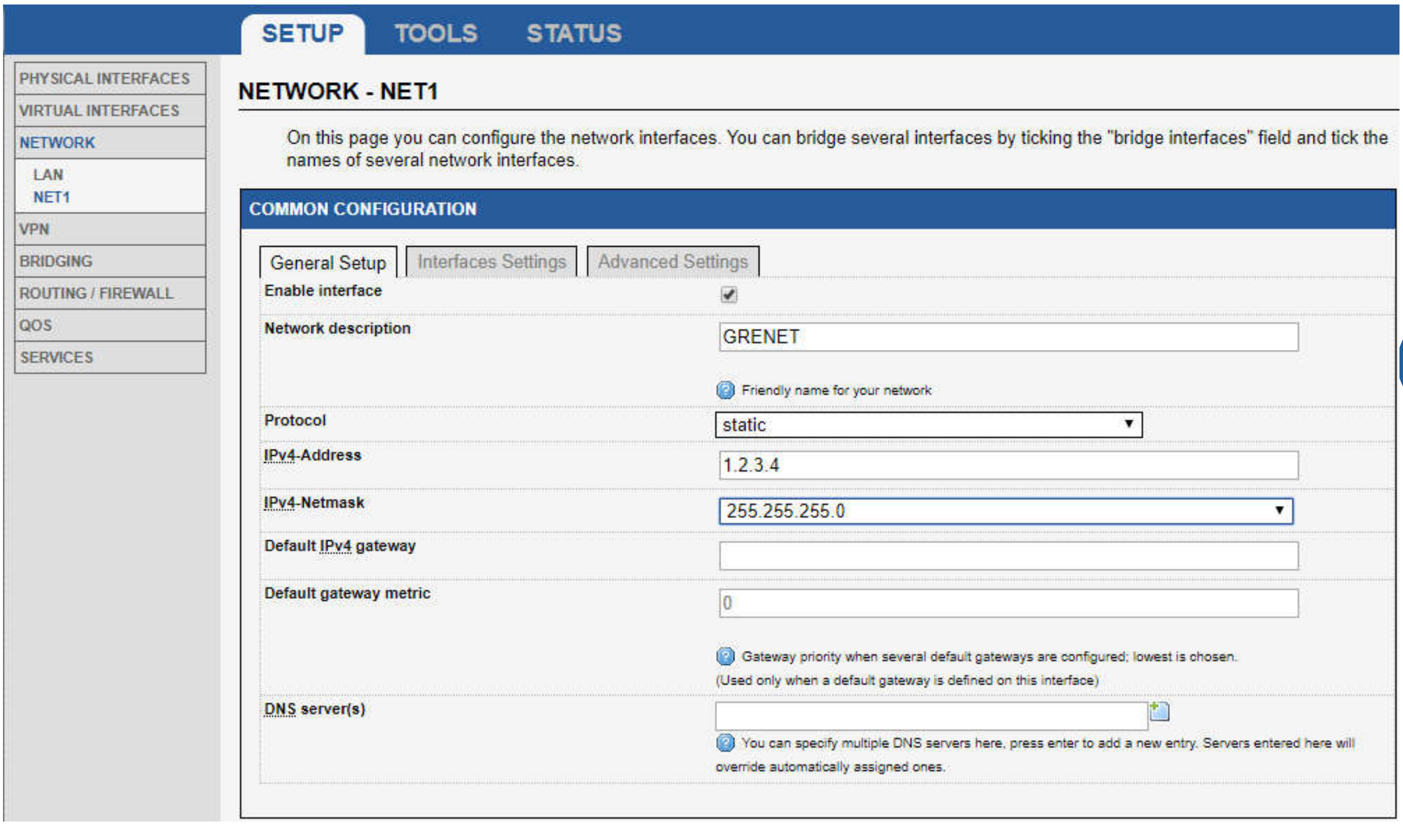
Save ✓ Save and click NETWORK in the left column to return to the NETWORK OVERVIEW page, then click Add Network:



NETWORK OVERVIEW

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	✓	192.168.1.253	255.255.255.0		Default	✎

As for the Client, we create the **GRENET** network and give it the address of the local endpoint of the tunnel, **1.2.3.5**, and then click on *Interfaces Settings*



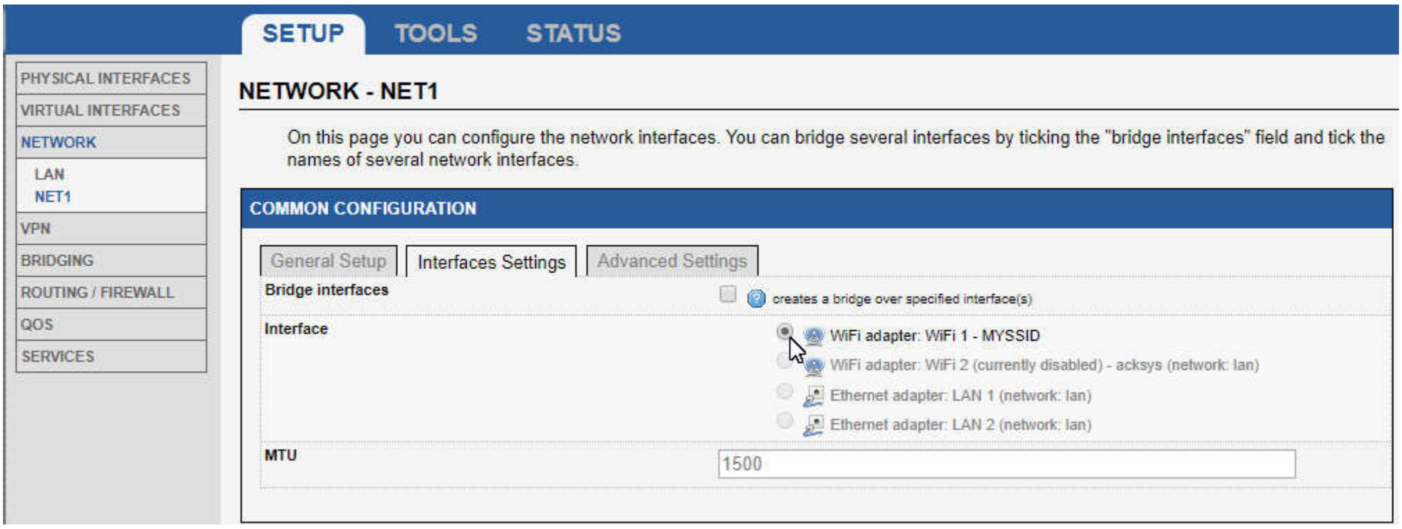
NETWORK - NET1

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the names of several network interfaces.

COMMON CONFIGURATION

Enable interface	☑
Network description	GRENET Friendly name for your network
Protocol	static
IPv4-Address	1.2.3.4
IPv4-Netmask	255.255.255.0
Default IPv4 gateway	
Default gateway metric	0 Gateway priority when several default gateways are configured; lowest is chosen. (Used only when a default gateway is defined on this interface)
DNS server(s)	You can specify multiple DNS servers here, press enter to add a new entry. Servers entered here will override automatically assigned ones.

In Interfaces Settings, we attach this network to the WiFi 1 interface.



NETWORK - NET1

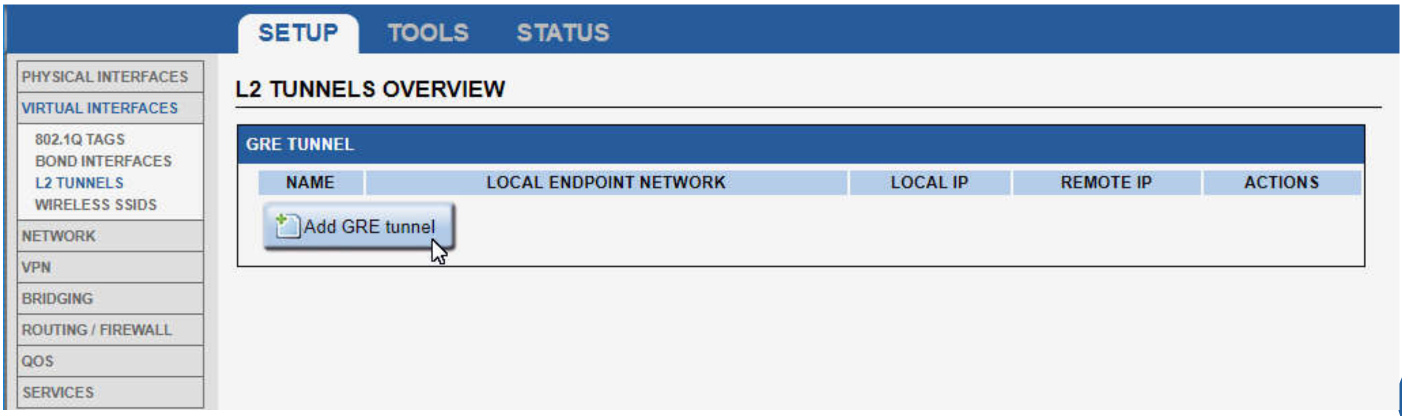
On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the names of several network interfaces.

COMMON CONFIGURATION

Bridge interfaces	□ creates a bridge over specified interface(s)
Interface	● WiFi adapter: WiFi 1 - MYSSID ○ WiFi adapter: WiFi 2 (currently disabled) - acksys (network: lan) ○ Ethernet adapter: LAN 1 (network: lan) ○ Ethernet adapter: LAN 2 (network: lan)
MTU	1500

Now we save the modifications [Save] and continue with the L2 TUNNELS OVERVIEW

Click Add GRE tunnel to create the tunnel:



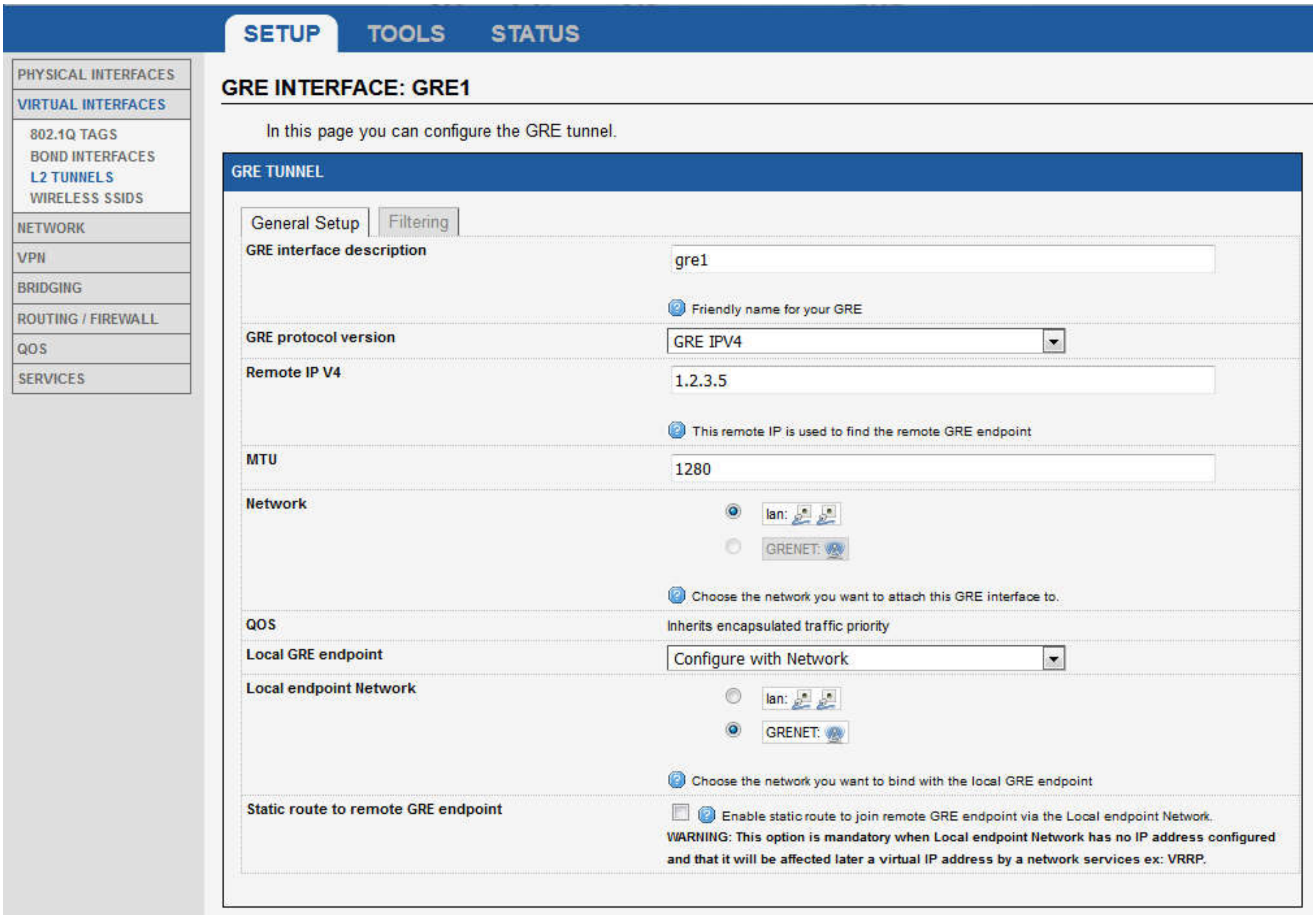
L2 TUNNELS OVERVIEW

GRE TUNNEL

NAME	LOCAL ENDPOINT NETWORK	LOCAL IP	REMOTE IP	ACTIONS

Add GRE tunnel

Here, we give the address of the remote endpoint, 1.2.3. The Network attached to this endpoint is our LAN bridge, and we bind the tunnel to our GRENET network, just like with the Client.



GRE INTERFACE: GRE1

In this page you can configure the GRE tunnel.

GRE TUNNEL

GRE interface description: gre1
Friendly name for your GRE

GRE protocol version: GRE IPV4

Remote IP V4: 1.2.3.5
This remote IP is used to find the remote GRE endpoint

MTU: 1280

Network:
● lan:
○ GRENET:
Choose the network you want to attach this GRE interface to.

QOS: Inherits encapsulated traffic priority

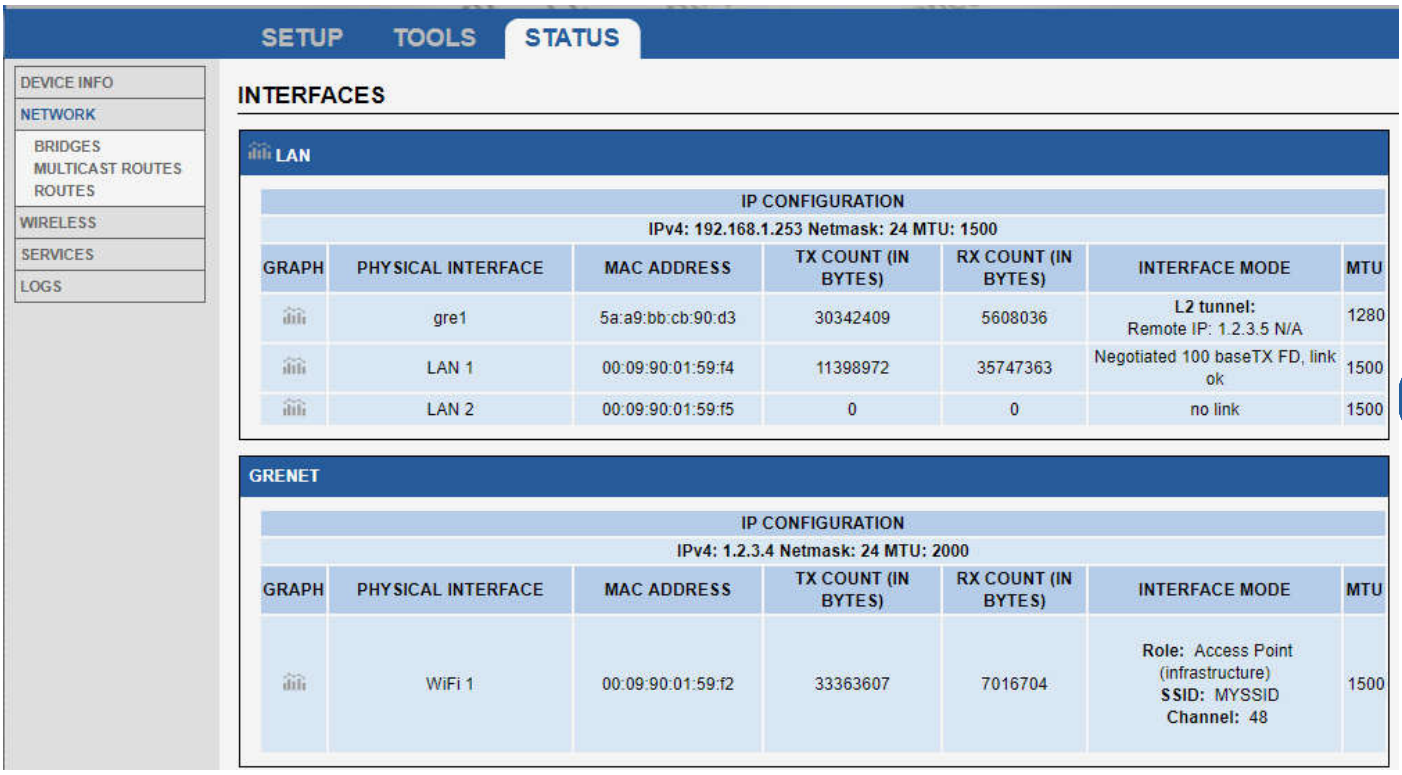
Local GRE endpoint: Configure with Network

Local endpoint Network:
○ lan:
● GRENET:
Choose the network you want to bind with the local GRE endpoint

Static route to remote GRE endpoint: □ Enable static route to join remote GRE endpoint via the Local endpoint Network.
WARNING: This option is mandatory when Local endpoint Network has no IP address configured and that it will be affected later a virtual IP address by a network services ex: VRRP.

The Access Point configuration is complete, we can save and apply Save & Apply

After restarting the Access Point, we can check in the **STATUS/Network** page that the interfaces are correctly mounted



INTERFACES

LAN

IP CONFIGURATION

IPv4: 192.168.1.253 Netmask: 24 MTU: 1500

GRAPH	PHYSICAL INTERFACE	MAC ADDRESS	TX COUNT (IN BYTES)	RX COUNT (IN BYTES)	INTERFACE MODE	MTU
📊	gre1	5a:a9:bb:cb:90:d3	30342409	5608036	**L2 tunnel:** Remote IP: 1.2.3.5 N/A	1280
📊	LAN 1	00:09:90:01:59:f4	11398972	35747363	Negotiated 100 baseTX FD, link ok	1500
📊	LAN 2	00:09:90:01:59:f5	0	0	no link	1500

GRENET

IP CONFIGURATION

IPv4: 1.2.3.4 Netmask: 24 MTU: 2000

GRAPH	PHYSICAL INTERFACE	MAC ADDRESS	TX COUNT (IN BYTES)	RX COUNT (IN BYTES)	INTERFACE MODE	MTU
📊	WiFi 1	00:09:90:01:59:f2	33363607	7016704	**Role:** Access Point (infrastructure) **SSID:** MYSSID **Channel:** 48	1500

We can then verify that the passage of traffic in the tunnel is operational using a PING or an iPERF

NOTE: Due to the overhead introduced by the packet encapsulation in the GRE tunnel, the MTU of the tunnel is limited to 1280 bytes. This means that if the network sends packets with the maximum length allowed on the Ethernet, i.e. 1500 bytes, these packets will be silently dropped at the entrance of the tunnel. It is therefore necessary, in this case, to limit the MTU of your network to 1280.

Note that if the tunnel only goes through the WiFi interface (the two endpoints are the AP and the Client, as in our example), the 802.11 standard allowing packet lengths up to 2304 bytes, it is possible to increase the MTU of the WiFi interface to 2000. The MTU of the tunnel can then be increased to 1500, and you will not need to limit the MTU of your network.