

# APPLICATION NOTE

## APNUS018 GRE TUNNEL OVER Wi-Fi Configuration example

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#### 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:

SETUP	TOOLS	STATUS				
ETWOR		v				
NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan		192.168.1.252	255.255.255.0		Default	R
t) Add	d network					Кŝ
	ETWORI NAME lan	ETWORK OVERVIEV	ETWORK OVERVIEW	NAME         ENABLED         IP ADDRESS         NETMASK           Ian         192.168.1.252         255.255.255.0	ETWORK OVERVIEW           NAME         ENABLED         IP ADDRESS         NETMASK         GATEWAY (METRIC)           Ian         192.168.1.252         255.255.255.0         1000000000000000000000000000000000000	ETWORK OVERVIEW         NAME       ENABLED       IP ADDRESS       NETMASK       GATEWAY (METRIC)       PERSISTENCE         Ian       Image: 192.168.1.252       255.255.255.0       Default

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

PHYSICAL INTERFACES	NETWORK - LAN				
VIRTUAL INTERFACES	NETWORK - LAN				
NETWORK		interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick t			
LAN GRENET	names of several network interfaces.				
VPN	COMMON CONFIGURATION				
BRIDGING	General Setup Interfaces Settings Adv	anced Settings			
ROUTING / FIREWALL	Bridge interfaces	(a) creates a bridge over specified interface(s)			
QOS	Enable STP/RSTP	Contract of the second se			
SERVICES		WARNING: Some cautions must be taken with wireless interfaces, please see user guide			
	Enable LLDP forwarding	Enables the LLDP frame forwarding.			
	bridge VLAN	Control Con			
	Interface	<ul> <li>WiFi adapter: WiFi 2 (currently disabled) - SUP30 (network: LAN)</li> <li>WiFi adapter: WiFi 1 - MYSSID</li> <li>Ethernet adapter: LAN 1 (network: LAN)</li> <li>Ethernet adapter: LAN 2 (network: LAN)</li> </ul>			
	MTU	1500			

Save 🧕

Save

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

Network:

PHYSICAL INTERFACES	NETWOR		N				
VIRTUAL INTERFACES			A.				
NETWORK	NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
LAN	lan	1	192.168.1.252	255.255.255.0		Default	2
/PN	(+D	1					
BRIDGING	Ad 🗋	d network					
ROUTING / FIREWALL		N					
los							
SERVICES							



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

	SETUP TOOLS STATUS				
PHYSICAL INTERFACES	NETWORK - GRENET				
VIRTUAL INTERFACES	NETWORK - GRENET				
NETWORK	On this page you can configure the network in	nterfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the			
LAN	names of several network interfaces.				
GRENET	COMMON CONFIGURATION				
VPN					
BRIDGING	General Setup Interfaces Settings Advan	ced Settings			
ROUTING / FIREWALL	Enable interface				
QOS	Network description	GRENET			
SERVICES					
		Friendly name for your network			
	Protocol	static       ▼         1.2.3.5       255.255.255.0			
	IPv4-Address				
	IPv4-Netmask				
	Default IPv4 gateway				
	Default gateway metric	0			
		② 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.

General Setup Interfaces Settings	Advanced Settings
ridge interfaces	@ creates a bridge over specified interface(s)
Interface	<ul> <li>WiFi adapter: WiFi 2 (currently disabled) - SUP30 (network: LAN)</li> <li>WiFi adapter: WiFi 1 - MYSSID (network: GRENET)</li> <li>Ethernet adapter: LAN 1 (network: LAN)</li> <li>Ethernet adapter: LAN 2 (network: LAN)</li> </ul>
MTU	1500

Now we save the modifications 🛛 Save

and we can go to the L2 TUNNELS OVERVIEW

	SETUP TOOLS STATUS
PHYSICAL INTERFACES	VIRTUAL INTERFACES OVERVIEW
802.1Q TAGS BOND INTERFACES L2 TUNNELS WIRELESS SADS	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.



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

	SETUP TO	OLS STATUS			
PHYSICAL INTERFACES	L2 TUNNELS OV	ERVIEW			
802.1Q TAGS	GRE TUNNEL				
WIRELESS SSIDS	NAME	LOCAL ENDPOINT NETWORK	LOCAL IP	REMOTE IP	ACTIONS
NETWORK	Add GRE tun				
VPN					
BRIDGING					
ROUTING / FIREWALL					
QOS					
SERVICES					

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

PHYSICAL INTERFACES	GRE INTERFACE: GRE1					
/IRTUAL INTERFACES	ORE INTERFACE. ORET					
802.1Q TAGS	In this page you can configure the GRE tunnel.					
BOND INTERFACES L2 TUNNELS WIRELESS SSIDS	GRE TUNNEL					
ETWORK	General Setup Filtering					
PN	GRE interface description	gre1				
RIDGING						
OUTING / FIREWALL	COT and the state	Priendly name for your GRE				
DS	GRE protocol version	GRE IPV4				
ERVICES	Remote IP V4	1.2.3.4				
		This remote IP is used to find the remote GRE endpoint				
	МТО	1280				
	Network	<ul> <li>LAN: LAN: LAN: LAN: LAN: LAN: LAN: LAN:</li></ul>				
	QOS	Inherits encapsulated traffic priority				
	Local GRE endpoint	Configure with Network				
	Local endpoint Network	C LAN:				
	Static route to remote GRE endpoint	Choose the network you want to bind with the local 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 D Save & Apply The client configuration is complete

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### **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:

	SETUP	TOOLS	STATUS				
PHYSICAL INTERFACES	NETWOR		~				
VIRTUAL INTERFACES	NETWOR	NOVERVIEV					
NETWORK	NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
LAN	lan	<b>S</b>	192.168.1.253	255.255.255.0		Default	<b>A</b>
VPN	Ad	d network					13
BRIDGING		Id network					
ROUTING / FIREWALL							
QOS							
SERVICES							

	SETUP TOOLS STAT	TUS
PHYSICAL INTERFACES	NETWORK - LAN	
VIRTUAL INTERFACES	NE WORK - LAN	
NETWORK		etwork interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the
LAN	names of several network interfaces.	
VPN	COMMON CONFIGURATION	
BRIDGING		
ROUTING / FIREWALL	E	Advanced Settings
QOS	Bridge interfaces	🗹 🔞 creates a bridge over specified interface(s)
SERVICES	Enable <u>STP/RSTP</u>	Enables the Spanning Tree Protocol on this bridge WARNING: Some cautions must be taken with wireless interfaces, please see user guide
	Enable LLDP forwarding	B ables 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	
N I a da co	a sel e c

Save

and click NETWORK in the left column to return to the NETWORK OVERVIEW page, then click Add

Network:

	SETUP	TOOLS	STATUS				
PHYSICAL INTERFACES	NETWOR		~/				
VIRTUAL INTERFACES		N OVERVIEW	*				
NETWORK	NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
LAN	lan	<ul> <li>Image: A start of the start of</li></ul>	192.168.1.253	255.255.255.0		Default	2
PN	+2.44	1					
RIDGING	Ad 🗋	d network					
ROUTING / FIREWALL		N					
os							
SERVICES							



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* 

PHYSICAL INTERFACES					
VIRTUAL INTERFACES	NETWORK - NET1				
NETWORK		twork interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick t			
LAN	names of several network interfaces.				
NET1	COMMON CONFIGURATION				
VPN					
BRIDGING	General Setup Interfaces Settings	Advanced Settings			
ROUTING / FIREWALL	Enable interface				
QOS	Network description	GRENET			
SERVICES		Friendly name for your network			
	Protocol	static			
	IPv4-Address	1.2.3.4			
	<u>IPv4</u> -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.

PHYSICAL INTERFACES		
VIRTUAL INTERFACES	NETWORK - NET1	
NETWORK		twork interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and tick the
LAN	names of several network interfaces.	
NET1	COMMON CONFIGURATION	
VPN		
BRIDGING	General Setup Interfaces Settings	Advanced Settings
ROUTING / FIREWALL	Bridge interfaces	Image:
QOS	Interface	🔍 🎯 WiFi adapter: WiFi 1 - MYSSID
SERVICES		WiFi adapter: WiFi 1 - MYSSID WiFi adapter: WiFi 2 (currently disabled) - acksys (network: Ian)
		Ethernet adapter: LAN 1 (network: lan)
		Ethernet adapter: LAN 2 (network: lan)
	мти	1500
		4 <sup>1</sup> <sup>1</sup> .

Now we save the modifications 🥝 Save

and continue with the L2 TUNNELS OVERVIEW



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Click Add GRE tunnel to create the tunnel:

	SETUP TO	OOLS STATUS			
PHYSICAL INTERFACES	L2 TUNNELS OV	RVIEW			
802.1Q TAGS BOND INTERFACES	GRE TUNNEL				
L2 TUNNELS WIRELESS SSIDS	NAME	LOCAL ENDPOINT NETWORK	LOCAL IP	REMOTE IP	ACTIONS
IETWORK	Add GRE tun	nel			
PN IRIDGING					
OUTING / FIREWALL					
OS					
SERVICES					

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.

	SETUP TOOLS STATUS				
PHYSICAL INTERFACES	GRE INTERFACE: GRE1				
VIRTUAL INTERFACES					
802.1Q TAGS BOND INTERFACES L2 TUNNELS WIRELESS SSIDS	In this page you can configure the GRE tu GRE TUNNEL	nnei.			
NETWORK	General Setup Filtering				
/PN	GRE interface description	gre1			
RIDGING		18.5T			
OUTING / FIREWALL		Priendly name for your GRE			
(OS	GRE protocol version	GRE IPV4			
ERVICES	Remote IP V4	1.2.3.5			
		(2) This remote IP is used to find the remote GRE endpoint			
	МТО	1280  Ian: I III IIII IIIIIIIIIIIIIIIIIIIIIIII			
	Network				
	QOS				
	Local GRE endpoint	Configure with Network			
	Local endpoint Network	<ul> <li>Ian: Iso Iso Iso Iso Iso Iso Iso Iso Iso Iso</li></ul>			
	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

DEVICE INFO	INTERFA	CER						
NETWORK		CES						
BRIDGES MULTICAST ROUTES ROUTES	រវិរីឆៃ LAN		ID	CONFIGURATION				
WIRELESS				1.253 Netmask: 24 MT	U: 1500			
SERVICES LOGS	GRAPH	PHYSICAL INTERFACE	MAC ADDRESS	TX COUNT (IN BYTES)	RX COUNT (IN BYTES)	INTERFACE MODE	MT	
	j dili	gre1	5a:a9:bb:cb:90:d3	30342409	5608036	L2 tunnel: Remote IP: 1.2.3.5 N/A	128	
	ilili	LAN 1	00:09:90:01:59:f4	11398972	35747363	Negotiated 100 baseTX FD, link ok	150	
	âŭi	LAN 2	00:09:90:01:59:f5	0	0	no link	150	
	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	мт	
	âŭ	WiFi 1	00:09:90:01:59:12	33363607	7016704	Role: Access Point (infrastructure) SSID: MYSSID Channel: 48	150	

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.

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