

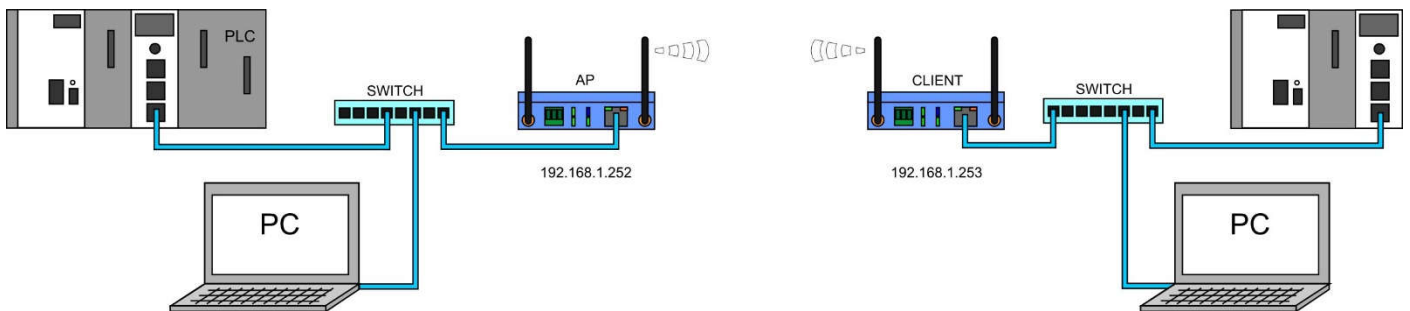
APPLICATION NOTE

APNUS003 – A SIMPLE WIRELESS LINK using WaveOS products

May 2020 – Rev A1

To help you get started with WaveOS products, here is a very simple example, describing the minimum configuration required to create a wireless link between two devices, using an access point and a Wi-Fi client to replace a wired link.

For this example, we want each device to have a fixed IP address, on the 192.168.1.0/24 subnet. We will set the AP (Access Point) to **192.168.1.252** and leave the client on **192.168.1.253**, which is the default address. The products will be installed in Belgium, so we will choose this country to ensure that we use the authorized frequencies and output levels. We want to use channel 36, on the 5 GHz band (802.11a + n), and the name of the wireless network will be **MYSSID**. As we want to protect our network against intrusions, we will use the WPA2 security mode, with the key **MyPresharedKey**



Using your usual browser, open the WEB page of the first product (AP), at 192.168.1.253, then select the SETUP tab. The main page is the Physical Interfaces Overview. The first thing to do is activate the radio card by clicking on the red button:

SETUP

TOOLS

STATUS

PHYSICAL INTERFACES

WIFI

LAN

VIRTUAL INTERFACES

NETWORK

VPN

BRIDGING

ROUTING / FIREWALL

QOS

SERVICES

WIRELESS INTERFACES OVERVIEW

You can set up to 8 simultaneous roles (wifi interface types) per radio card, among the following combinations:

Combination	Channel selection		Max number of interfaces			
	Multiplicity	Can use DFS	Access point	Infrastructure client	Mesh point	Ad-hoc
Multiple access points	single, auto, multiple	yes	8			
Portal	single	no	8		1	
Client / bridge	single, auto, multiple, roaming	yes		1		
Other / repeater	single	no	8	1 (non-roaming)	1	1

When using several roles, they all use the same shared channel; in this case, the client role must not be set to multichannel roaming.

Repeater mode is a combination of two roles: access point + client.

WI-FI INTERFACE

Wi-Fi 4 (802.11n) Wireless interface

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTION
Automatic	802.11g+n	acksys	Access Point (infrastructure)	none	Enable interface Interface Disabled

GLOBAL PARAMETERS

RADIO REGULATION AREA

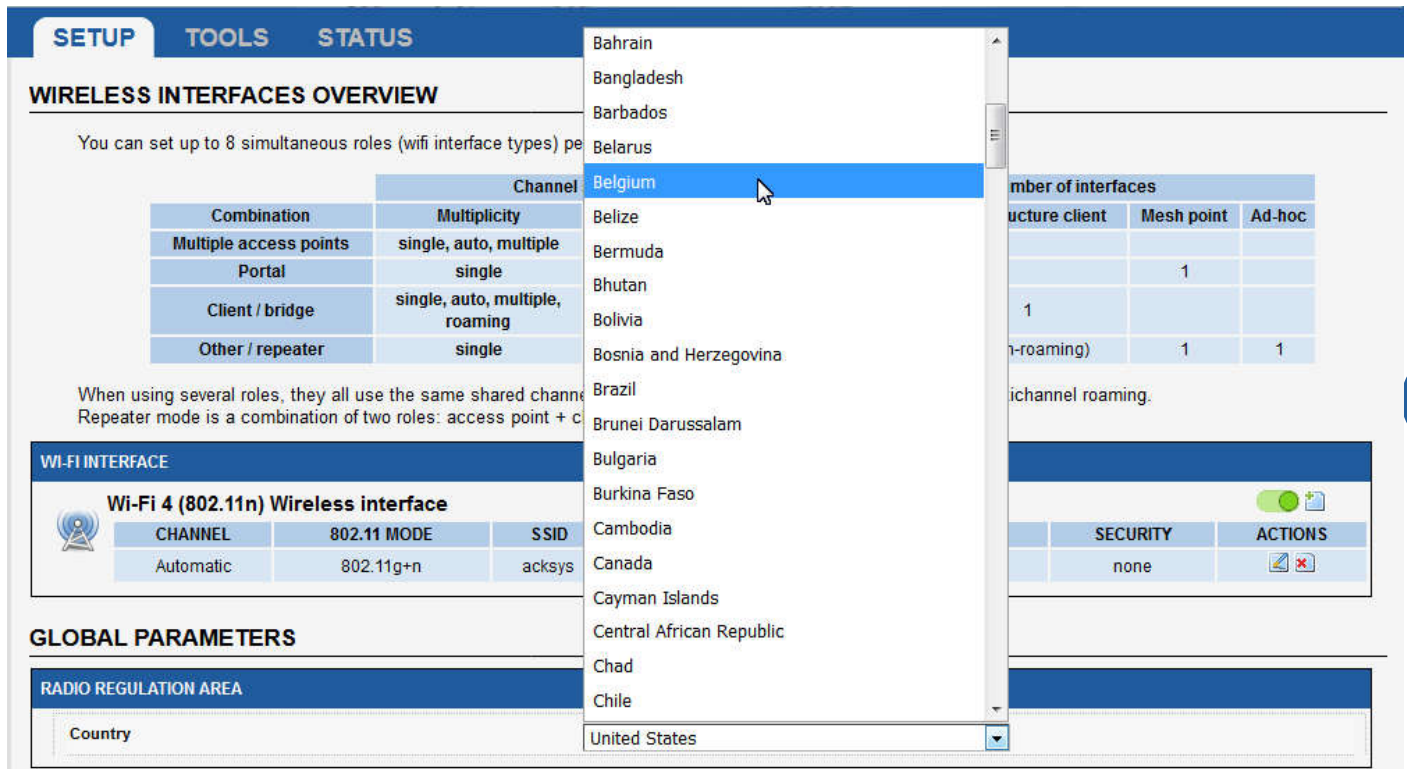
Country

United States

Save

Save & Apply

Then select the country where the product will be installed:



SETUP **TOOLS** **STATUS**

WIRELESS INTERFACES OVERVIEW

You can set up to 8 simultaneous roles (wifi interface types) per interface.

Combination	Multiplicity
Multiple access points	single, auto, multiple
Portal	single
Client / bridge	single, auto, multiple, roaming
Other / repeater	single

When using several roles, they all use the same shared channel.
Repeater mode is a combination of two roles: access point + client.

WI-FI INTERFACE

Wi-Fi 4 (802.11n) Wireless interface

CHANNEL	802.11 MODE	SSID
Automatic	802.11g+n	acksys

GLOBAL PARAMETERS

RADIO REGULATION AREA

Country: United States

Number of interfaces

Structure client	Mesh point	Ad-hoc
1	1	
1	1	1

channel roaming.

SECURITY **ACTIONS**

none  

You can now Save and Apply:

 Save  Save & Apply

You must now click on the button **Edit this network**, on the right:

WI-FI INTERFACE

Wi-Fi 4 (802.11n) Wireless interface

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
Automatic	802.11g+n	acksys	Access Point (infrastructure)	none	 

[Edit this network](#)

On the **WIRELESS SETTINGS** page, select the **802.11a + n** mode and uncheck the **Automatic channel select** box, so that you can choose channel 36. Enter your wireless network name (ESSID), then Save and Apply

WIRELESS SETTINGS : WIFI	
The <i>Device Configuration</i> section covers physical settings of the radio hardware which is shared among all defined wireless networks. Per network settings like encryption or operation mode are in the <i>Interface Configuration</i>. If SRCC role is selected, most of the <i>Device Configuration</i> is irrelevant (please refer to the product user guide).	
DEVICE CONFIGURATION	
General Setup	a/b/g Data Rates 802.11n Mcs Advanced Settings
802.11 mode	802.11a+n (5 GHz)
HT mode	20MHz
Automatic channel select	☐ Automatic channel select is not compatible with Ad-hoc, Mesh and multi-interfaces
Channel	36 (5.180 GHz) - Max Tx power 20 dBm 40 (5.200 GHz) - Max Tx power 20 dBm 44 (5.220 GHz) - Max Tx power 20 dBm 48 (5.240 GHz) - Max Tx power 20 dBm 52 (5.260 GHz) - Max Tx power 20 dBm (DFS) 56 (5.280 GHz) - Max Tx power 20 dBm (DFS)
This field is ignored in client proactive roaming mode; see 'Roaming' tab instead	
INTERFACE CONFIGURATION	
General Setup	Wireless Security Advanced Settings MAC Filter Frame filters
Role	Access Point (infrastructure)
ESSID	MYSSID
Maximum simultaneous associations	Max allowed by radio card (see documentation)
Hide ESSID	☐ In order to comply with the DFS regulation, clients might not associate if you check this option and select a DFS channel. See the user guide for more details.
Network	lan: [icon]
Choose the network you want to attach this wireless interface to	

Back to Overview
Reset
Save
Save & Apply

For the moment, we don't define the security mode, this will be done later.

In the left column, click on **NETWORK**, then click on the button **Edit this network** on the right.

SETUP
TOOLS
STATUS

PHYSICAL INTERFACES
 VIRTUAL INTERFACES
NETWORK
 LAN
 VPN
 BRIDGING
 ROUTING / FIREWALL
 QOS
 SERVICES

NETWORK OVERVIEW

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	☒	192.168.1.253	255.255.255.0		Enabled	

Add network

Edit this network

Here, just change the IP address to 192.168.1.252, then **Save & Apply**

SETUP TOOLS STATUS

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

General Setup Interfaces Settings Advanced Settings

Enable interface ☒

Network description

Protocol static

IPv4-Address 192.168.1.252

IPv4-Netmask 255.255.255.0

Default IPv4 gateway

Default gateway metric 0

DNS server(s)

IP ALIASES

This section contains no values yet

Add

Reset Save Save & Apply

The first step of the Access Point configuration is complete, you can now close the tab of your browser and use the second PC to configure the Wi-Fi client. If you only have one PC, you must connect it to the switch on the client side. Note that each time you move the PC from the AP side to the client side, or vice versa, you must open a command prompt, **in administrator mode**, and type the command **arp -d**



Configure the client in the same way as the access point. Start by selecting the country, then the WIRELESS SETTINGS as follows: select the 802.11a+n mode. You can either set the channel to **36**, as on the AP, or leave the Automatic channel selection box checked (the Client will automatically find the AP channel). Set the role to **Client (infrastructure)**, enter the ESSID "**MYSSID**" then Save & Apply

SETUP

TOOLS

STATUS

WIRELESS SETTINGS : WIFI

The *Device Configuration* section covers physical settings of the radio hardware which is shared among all defined wireless networks. Per network settings like encryption or operation mode are in the *Interface Configuration*.
If *SRCC* role is selected, most of the *Device Configuration* is irrelevant (please refer to the product user guide).

DEVICE CONFIGURATION

General Setup

a/b/g Data Rates

802.11n Mcs

Advanced Settings

802.11 mode

802.11a+n (5 GHz)

Changing the mode may affect the list in the 'a/b/g data rates' tab

HT mode

20MHz

Automatic 40MHz HT mode is not compatible with AP, Ad-hoc, Mesh and multi-interfaces

Automatic channel select

☒

Automatic channel select is not compatible with Ad-hoc, Mesh and multi-interfaces

INTERFACE CONFIGURATION

General Setup

Wireless Security

Advanced Settings

Roaming

Frame filters

Role

Client (infrastructure)

Multiple ESSIDs

☐

ESSID

MYSSID

Network

☒ lan:

Choose the network you want to attach this wireless interface to

Back to Overview

Reset

Save

Save & Apply

You can now go to the STATUS/Wireless page to verify that the client is connected to the Access Point:

SETUP

TOOLS

STATUS

DEVICE INFO

NETWORK

WIRELESS

ASSOC STATIONS

CHANNEL STATUS

MESH SURVEY

SERVICES STATUS

SITE SURVEY

SRCC STATUS

SERVICES

LOG

ASSOCIATED STATIONS

ASSOCIATED STATIONS RESULTS : 1

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi	MYSSID	Infrastructure	00:80:48:64:22:D2	36	-44 dBm	-91 dBm	47 dB

Reset

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From the command prompt, verify that you can ping the Access Point:

```

C:\Users\>arp -d

C:\Users\>ping 192.168.1.252

Envoi d'une requête 'Ping' 192.168.1.252 avec 32 octets de données :
Réponse de 192.168.1.252 : octets=32 temps<1ms TTL=64
Réponse de 192.168.1.252 : octets=32 temps<1ms TTL=64
Réponse de 192.168.1.252 : octets=32 temps<1ms TTL=64
Réponse de 192.168.1.252 : octets=32 temps<1ms TTL=64

Statistiques Ping pour 192.168.1.252:
    Paquets : envoyés = 4, reçus = 4, perdus = 0 (perte 0%),
    Durée approximative des boucles en millisecondes :
        Minimum = 0ms, Maximum = 0ms, Moyenne = 0ms
    
```

Now is the time to set the security mode. You can either use the PC on the Access Point side, or open the Access Point web page from the Client side PC. Edit the Wireless Settings directly, then click on the **Wireless Security** tab and Select security mode **WPA2-PSK (Personal)**

SETUP TOOLS STATUS

PHYSICAL INTERFACES
WIFI
LAN

VIRTUAL INTERFACES
NETWORK
BRIDGING
ROUTING / FIREWALL
QOS
SERVICES

WIRELESS SETTINGS : WIFI

The *Device Configuration* section covers physical settings of the radio hardware which is shared among all defined wireless networks. Per network settings like encryption or operation mode are in the *Interface Configuration*.
If SRCC role is selected, most of the *Device Configuration* is irrelevant (please refer to the product user guide).

DEVICE CONFIGURATION

General Setup | a/b/g Data Rates | 802.11n Mcs | Advanced Settings

Enable device ☒

802.11 mode 802.11a+n (5 GHz)
Changing the mode may affect the list in the 'a/b/g data rates' tab

HT mode 20MHz
Automatic 40MHz HT mode is not compatible with AP, Ad-hoc, Mesh and multi-interfaces

Automatic channel select ☐ Automatic channel select is not compatible with Ad-hoc, Mesh and multi-interfaces

Channel
36 (5.180 GHz) - Max Tx power 20 dBm
40 (5.200 GHz) - Max Tx power 20 dBm
44 (5.220 GHz) - Max Tx power 20 dBm
48 (5.240 GHz) - Max Tx power 20 dBm
52 (5.260 GHz) - Max Tx power 20 dBm (DFS)
56 (5.280 GHz) - Max Tx power 20 dBm (DFS)
This field is ignored in client proactive roaming mode; see 'Roaming' tab instead

INTERFACE CONFIGURATION

General Setup | **Wireless Security** | Advanced Settings | Roaming | Frame filters

Security
No encryption
No encryption
WEP
WPA2-EAP (Enterprise)
WPA2-PSK (Personal)
Mixed WPA/WPA2 PSK (Personal)
WPA-EAP (Enterprise)
WPA-PSK (Personal)

[Back to Overview](#) [Save & Apply](#)

Enter your security key (Pre-Shared Key), here **MyPresharedKey**, then Save & Apply.

INTERFACE CONFIGURATION

General Setup
Wireless Security
Advanced Settings
Roaming
Frame filters

Security
WPA2-PSK (Personal)
Protected management frame (802.11w)
disable
Fast transition support (802.11r)
Pre-Shared Key
MyPresharedKey
This key must have a length from 8 to 63 characters. If the key length is 64 characters it will be used directly as hexadecimal format

Back to Overview
Reset
Save
Save & Apply

8

You can now do exactly the same for the Client. After saving, you can check as before that the units are associated in the STATUS/Wireless pages.