

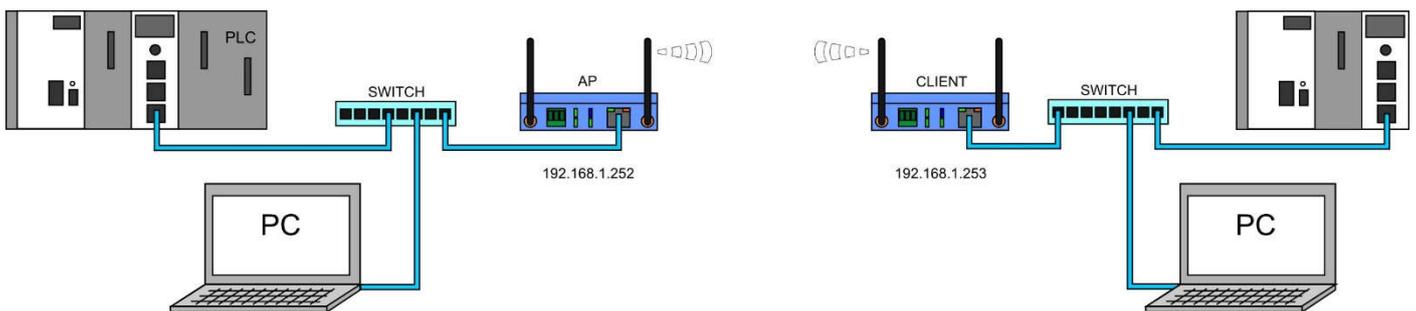
APPLICATION NOTE

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**



2

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	Multiplicity	Can use DFS	Max number of interfaces			
			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	<div style="display: flex; align-items: center; justify-content: center;"> <div style="color: red; font-weight: bold; margin-right: 5px;">ACTION</div> <div style="font-size: x-small; margin: 0;">Enable interface</div> </div>

GLOBAL PARAMETERS

RADIO REGULATION AREA

Country: United States

Then select the country where the product will be installed:

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

3

You can now Save and 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 *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

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)
Specifies the maximum number of clients to connect

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:
Choose the network you want to attach this wireless interface to

Buttons: Back to Overview, Reset, Save, Save & Apply

4

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.

NETWORK OVERVIEW

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	<input checked="" type="checkbox"/>	192.168.1.253	255.255.255.0		Enabled	Edit this network

Buttons: Add network, Edit this network

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

The screenshot shows the 'NETWORK - LAN' configuration page in the ACKSYS web interface. The page has a blue header with 'SETUP', 'TOOLS', and 'STATUS' tabs. On the left, there is a sidebar menu with options: PHYSICAL INTERFACES, VIRTUAL INTERFACES, NETWORK (selected), LAN (selected), VPN, BRIDGING, ROUTING / FIREWALL, QOS, and SERVICES. The main content area is titled 'NETWORK - LAN' and contains a sub-section 'COMMON CONFIGURATION'. This section has three tabs: 'General Setup' (selected), 'Interfaces Settings', and 'Advanced Settings'. The 'General Setup' tab contains several fields: 'Enable interface' (checked), 'Network description' (with a 'Friendly name for your network' link), 'Protocol' (static), 'IPv4-Address' (192.168.1.252, highlighted), 'IPv4-Netmask' (255.255.255.0), 'Default IPv4 gateway', 'Default gateway metric' (0), and 'DNS server(s)'. Below this is an 'IP ALIASES' section with the text 'This section contains no values yet' and an 'Add' button. At the bottom right, there are three buttons: 'Reset', 'Save', and 'Save & Apply'.

5

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

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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

6

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

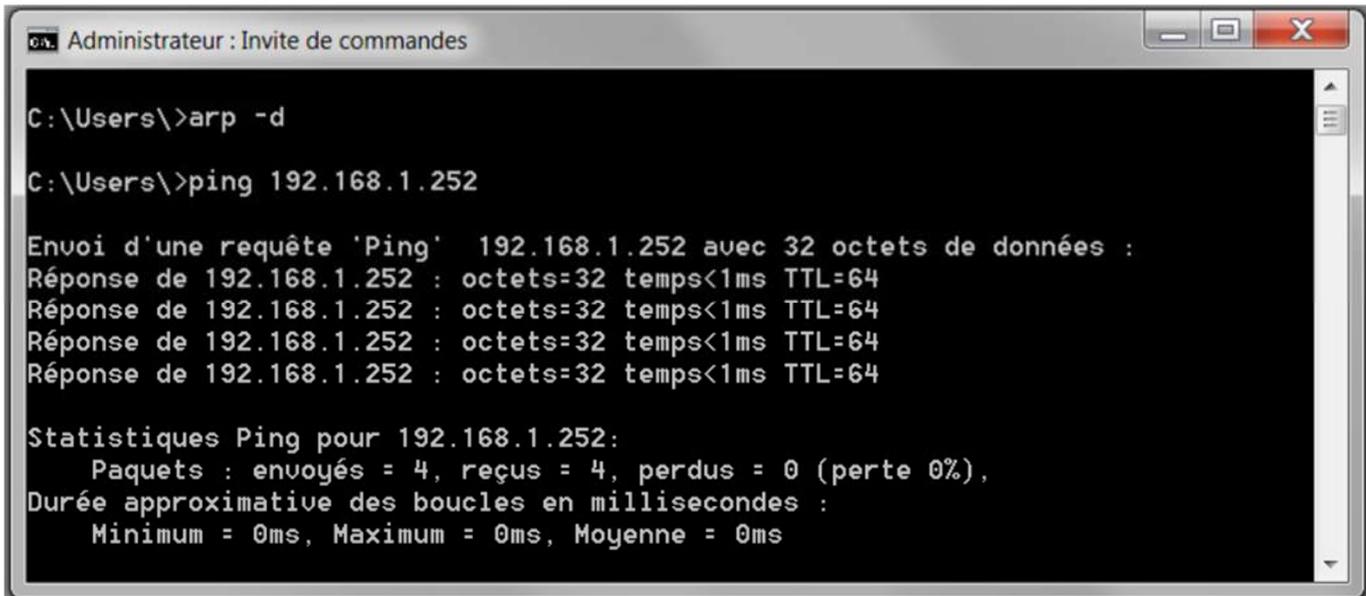
ASSOCIATED STATIONS

ASSOCIATED STATIONS RESULTS : 1

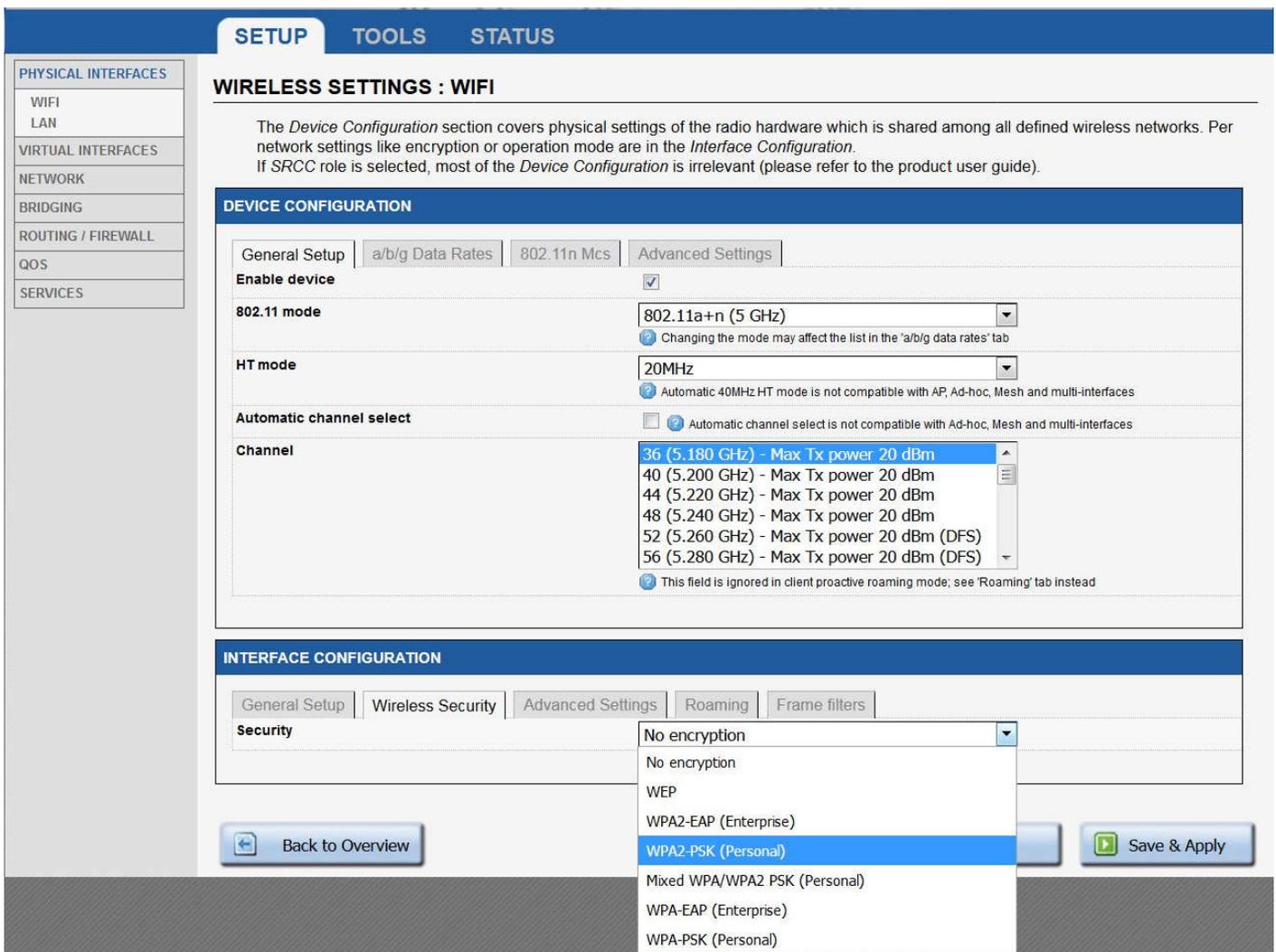
GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi	MYSSID	Infrastructure	00:80:48:64:22:D2	36	-44 dBm	-91 dBm	47 dB

Reset

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



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)**



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

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.