



# APPLICATION NOTE

## APNUS016 Connect before break *Client setup procedure*

March 2020 - Rev. A1

## Introduction

The purpose of this document is to help you configure your ACKSYS product in client mode, with the **CONNECT BEFORE BREAK** functionality. Please note that this functionality is described in the *WaveOS User's guide DTUS070*, section V.2.6.7

## Wi-Fi Client configuration

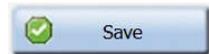
For this example, we will use the following parameters:

- Bridge client mode (no routing)
- 802.11ac using channels 36, 40 & 44
- SSID **AcksysRBB**
- No security
- Roaming delay between scans = 2 seconds
- Roaming leave threshold = -75 dB
- Interface Wi-Fi 1 used for data



Please note that when the Wi-Fi client is in bridge mode, the **Connect Before Break** can be used only with Acksys WaveOS products as Access points. To use Access Points from other brands, your client must be configured as a NAT router.

In SETUP/PHYSICAL INTERFACES, set the RADIO CLUSTER to *Group for connect before break* and



SETUP
TOOLS
STATUS

PHYSICAL INTERFACES

WIFI 1  
WIFI 2  
LAN 1  
LAN 2

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			
Client / bridge	single, auto, multiple, roaming*	yes		1		
SRCC	single	yes	auto	auto		
Other / Ad-hoc	single	no			unsupported	unsupported

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.

\* The roaming feature is not yet available for IEEE802.11ac cards.

#### WI-FI INTERFACE

📶
🔴

**WiFi 1: Wi-Fi 5 (Dual band)**

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
36 40 44	802.11ac+n	acksys	Client (infrastructure)	none	🔧 🗑️

📶
🔴

**WiFi 2: Wi-Fi 5 (Dual band)**

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
Automatic	802.11ac+n	acksys	Access Point (infrastructure)	none	🔴 Interface disabled

#### GLOBAL PARAMETERS

**RADIO REGULATION AREA**

Country: United States

**RADIO CLUSTER**

Cluster mode: Do not group

Do not group

Group for scanning

Group for connect before break

Do not group

🔴 Save & Apply

🟢 Save

The choice of the initial primary interface has, in most cases, no effect on the operation since it's a temporary state. The WiFi 1 interface is selected by default as the primary card. **This is the configuration we will use for this example.**

**RADIO CLUSTER**

Cluster mode: Group for connect before break

Primary data card:  WiFi 1  WiFi 2

Secondary data card:  WiFi 1  WiFi 2

For your information, please note that you can also choose to use only one radio card for both functions. In the following example, the Connect before break client is defined only on WiFi1, and WiFi2 can be used for another purpose. **Beware: this implies that you can use only one radio channel!**

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**RADIO CLUSTER**

Cluster mode: Group for connect before break

Primary data card:  WiFi 1  WiFi 2

Secondary data card:  WiFi 1  WiFi 2

If your product only has one radio card, of course you have no choice: both functions, scanning and data exchange, are handled by the same radio interface, **and you can scan only one channel**

**RADIO CLUSTER**

Cluster mode: Group for connect before break

Primary data card:  WiFi

Secondary data card:  WiFi

After saving this page, edit the Wi-Fi interface

**WI-FI INTERFACE**

WiFi 1: Wi-Fi 5 (Dual band) 🟢

	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
	36 40 44	802.11ac+n	Acksys	Client (infrastructure)	none	

Edit this network

Give a name to the *bond interface* (here we choose *Roaming*), and change the Wi-Fi settings according to your needs.

SETUP
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### WIRELESS SETTINGS : WIFI 1

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
Advanced Settings

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

**HT mode** 20MHz for 802.11ac ▼  
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**

BEWARE : Multi-channel selection is possible only with double-radio products

- 36 (5.180 GHz) - Max Tx power 23 dBm
- 40 (5.200 GHz) - Max Tx power 23 dBm
- 44 (5.220 GHz) - Max Tx power 23 dBm
- 48 (5.240 GHz) - Max Tx power 23 dBm
- 52 (5.260 GHz) - Max Tx power 23 dBm (DFS)
- 56 (5.280 GHz) - Max Tx power 23 dBm (DFS)

The Max Tx Power mentioned is the legal limit for the selected country, it may be higher than the effective maximum power that can be provided by the radio card  
This field is ignored in client proactive roaming mode; see 'Roaming' tab instead

#### INTERFACE CONFIGURATION

General Setup
Wireless Security
Advanced Settings
Roaming
Advanced Roaming
Frame filters

**Role** Client (infrastructure) ▼

**Multiple ESSIDs**

**ESSID**  
AcksysRBB

**bond interface**  
 create bond interface: Roaming

The cluster mode "roaming before break" require a bonding to work

Back to Overview
Reset
Save
Save & Apply

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In the advanced settings, select *4 addresses format (WDS)*. **Caution: this implies the exclusive use of WaveOS Acksys access points.**

#### INTERFACE CONFIGURATION

General Setup
Wireless Security
Advanced Settings
Roaming
Frame filters

**Bridging mode** ARPNAT (pseudo L2 NAT) ▼

**Deauthenticate before roaming to next AP**

**Do not cache old scan results**

- ARPNAT (pseudo L2 NAT)
- ARPNAT (pseudo L2 NAT)
- 4 addresses format (WDS)
- Wired device cloning (only one)
- Profinet device cloning (only one)

Back to Overview
Reset
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Save & Apply

In the Roaming tab, select *Enable proactive roaming*

**INTERFACE CONFIGURATION**

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

When Proactive Roaming is disabled, the device will scan the general channels selection configured above.

When Proactive Roaming is enabled, its suboption 'list of channels scanned' will supersede the general channels selection above.  
DFS channels are subject to passive scans.

**Enable proactive roaming**  If unchecked, the device will not roam until it loses its current AP

Back to Overview | Reset | Save | Save & Apply

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Set your roaming parameters, then



**INTERFACE CONFIGURATION**

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

When Proactive Roaming is disabled, the device will scan the general channels selection configured above.

When Proactive Roaming is enabled, its suboption 'list of channels scanned' will supersede the general channels selection above.  
DFS channels are subject to passive scans.

**Enable proactive roaming**  If unchecked, the device will not roam until it loses its current AP

**List of channels scanned for the next AP discovery**

**BEWARE : Multi-channel selection is possible only with double-radio products**

- 36 (5.180 GHz)
- 40 (5.200 GHz)
- 44 (5.220 GHz)
- 48 (5.240 GHz)
- 52 (5.260 GHz) (DFS)
- 56 (5.280 GHz) (DFS)

If no channel is selected, the scan list is the complete list of available channels.  
In 802.11n HT mode 40MHz, if the primary channel of the AP is not fixed, you will have to select both the primary and secondary channels

**Delay between two successive scan cycles**

Value in milliseconds, e.g. "10000". Must be greater than 0

**Current AP leave threshold**

Value in dBm, e.g. "-60". Below (worse than) this value, the device will try to use another AP

**Required level boost**

Roaming occurs only if the candidate signal level is above the current AP's plus this value

**Current AP scan threshold**

Value in dBm, e.g. "-40". Above (better than) this value, the device will stop scanning. Set to 0 to scan unconditionally. Incompatible with the Maximum signal level option

**Minimum signal level**

In dBm, e.g. "-75". 0 to disable. Roaming won't occur if the candidate signal is below this level. Association is still possible if no other AP is available

Back to Overview | Reset | Save | Save & Apply

Edit your main Network (default name is LAN)

**NETWORK OVERVIEW**

NAME	ENABLED	IP ADDRESS	NETMASK	GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	<input checked="" type="checkbox"/>	192.168.15.116	255.255.255.0		Default	

[Add network](#)

[Edit this network](#)

Include the *Roaming* bond interface into the bridge, then



**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

**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 - AcksysRBB (bond: Roaming)
- WiFi adapter: WiFi 1 - AcksysRBB (bond: Roaming)
- Bond virtual interface: Roaming
- Ethernet adapter: LAN 1 (network: lan)
- Ethernet adapter: LAN 2 (network: lan)

**MTU**

**IP ALIASES**

**NATed VRRP networks warning**  
 The following applies to NATed networks which use the VRRP protocol:

- Public-side NAT MUST NOT define IP aliases; else the NAT might use the alias IP as public address instead of the VRRP IP
- Conversely, Private-side NAT SHOULD define a private IP alias to allow connection tracking replication

*This section contains no values yet*

[Add](#)

[Reset](#) [Save](#) [Save & Apply](#)

Your product is now ready for a fast and efficient roaming, without loss of packets during the handover

**ASSOCIATED STATIONS**

ASSOCIATED STATIONS RESULTS : 1

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi 1	AcksysRBB	Infrastructure	C4:93:00:0C:50:20	40	-36 dBm	-103 dBm	67 dB

[Reset](#)

## Troubleshooting

In the event of malfunction, first check on the [STATUS/Network](#) page that the interfaces are correctly mounted

The screenshot shows the 'STATUS' tab with 'NETWORK' selected. It displays two main sections: 'BOND1' and 'LAN'.

**BOND1: BOND VIRTUAL DEVICE**

IP CONFIGURATION: not configured

GRAPH	PHYSICAL INTERFACE	MAC ADDRESS	TX COUNT (IN BYTES)	RX COUNT (IN BYTES)	INTERFACE MODE	MTU
	WiFi 2	04:f0:21:28:ad:dc	0	0	Role: Transparent client (infrastructure) SSID: AcksysRBB Channel: Automatic	1500
	WiFi 1	04:f0:21:28:ad:db	556023	588491	Role: Transparent client (infrastructure) SSID: AcksysRBB Channel: 40	1500

**LAN: IP CONFIGURATION**

IPv4: 192.168.15.16 Netmask: 24 MTU: 1500

GRAPH	PHYSICAL INTERFACE	MAC ADDRESS	TX COUNT (IN BYTES)	RX COUNT (IN BYTES)	INTERFACE MODE	MTU
	bond1	0a:8b:7a:32:07:01	556023	588491	N/A	1500
	LAN 1	00:09:90:00:71:32	5776630	3197548	Negotiated 1000 baseTX FD, link ok	1500
	LAN 2	00:09:90:00:71:33	0	0	no link	1500

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The [STATUS/WIRELESS/ASSOCIATED STATIONS](#) and the [STATUS/WIRELESS/SERVICES STATUS](#) page will also give you invaluable information, in particular an instantaneous view of the state of the cards, to know which is active and which is passive.

Here we can see that the client hasn't found any access point: no station associated, and the two radio interfaces are in the scanning state. You can run a site survey to check for the presence of Access Points with our settings (SSID, Radio channel, Security mode...)

The screenshot shows the 'STATUS' tab with 'WIRELESS' selected. The 'ASSOCIATED STATIONS' section displays 'ASSOCIATED STATIONS RESULTS : 0'. Below this is a table with columns for GRAPH, RADIO, NAME / SSID, MODE, MAC, CHANNEL, SIGNAL, NOISE, and SIGNAL/NOISE. A 'Reset' button is visible below the table.

The screenshot shows the 'STATUS' tab with 'WIRELESS' selected. The 'SERVICES STATUS' section shows details for 'WIFI 1' and 'WIFI 2'.

**WIFI 1**

SERVICE	SSID	MAC	STATUS	CHANNEL	FREQUENCY	CHANNEL WIDTH	HT MODE
Client	N.A	04:f0:21:28:ad:db	SCANNING	N.A	N.A	N.A	N.A

**WIFI 2**

SERVICE	SSID	MAC	STATUS	CHANNEL	FREQUENCY	CHANNEL WIDTH	HT MODE
Client	N.A	04:f0:21:28:ad:dc	SCANNING	N.A	N.A	N.A	N.A

Here we can see that WiFi1 is connected to an Access Point, but WiFi2 is still scanning, looking for a second Access Point.

SETUP TOOLS **STATUS**

DEVICE INFO  
NETWORK  
WIRELESS

ASSOC STATIONS CHANNEL STATUS MESH SURVEY SERVICES STATUS SITE SURVEY SRCC STATUS

SERVICES  
LOGS

**ASSOCIATED STATIONS**

ASSOCIATED STATIONS RESULTS : 1

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi 1	AcksysRBB	Infrastructure	C4:93:00:0C:50:20	40	-36 dBm	-103 dBm	67 dB

Reset

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SETUP TOOLS **STATUS**

DEVICE INFO  
NETWORK  
WIRELESS

ASSOC STATIONS CHANNEL STATUS MESH SURVEY SERVICES STATUS SITE SURVEY SRCC STATUS

SERVICES  
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**SERVICES STATUS**

WiFi 1

SERVICE	SSID	MAC	STATUS	CHANNEL	FREQUENCY	CHANNEL WIDTH	HT MODE
Client	AcksysRBB	04:f0:21:28:ad:db	COMPLETED	40	5200 MHz	20 MHz	HT20

WiFi 2

SERVICE	SSID	MAC	STATUS	CHANNEL	FREQUENCY	CHANNEL WIDTH	HT MODE
Client	N.A	04:f0:21:28:ad:dc	SCANNING	N.A	N.A	N.A	N.A

Here, WiFi2 has found a candidate AP and is connected.

SETUP TOOLS **STATUS**

DEVICE INFO  
NETWORK  
WIRELESS

ASSOC STATIONS CHANNEL STATUS MESH SURVEY SERVICES STATUS SITE SURVEY SRCC STATUS

SERVICES  
LOGS

**SERVICES STATUS**

WiFi 1

SERVICE	SSID	MAC	STATUS	CHANNEL	FREQUENCY	CHANNEL WIDTH	HT MODE
Client	AcksysRBB	04:f0:21:28:ad:db	COMPLETED	40	5200 MHz	20 MHz	HT20

WiFi 2

SERVICE	SSID	MAC	STATUS	CHANNEL	FREQUENCY	CHANNEL WIDTH	HT MODE
Client	AcksysRBB	04:f0:21:28:ad:dc	COMPLETED	44	5220 MHz	20 MHz	HT20

SETUP TOOLS **STATUS**

DEVICE INFO  
NETWORK  
WIRELESS

ASSOC STATIONS CHANNEL STATUS MESH SURVEY SERVICES STATUS SITE SURVEY SRCC STATUS

SERVICES  
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**ASSOCIATED STATIONS**

ASSOCIATED STATIONS RESULTS : 2

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi 1	AcksysRBB	Infrastructure	C4:93:00:0C:50:20	40	-39 dBm	-103 dBm	64 dB
	WiFi 2	AcksysRBB	Infrastructure	C4:93:00:08:A0:76	44	-64 dBm	-105 dBm	41 dB

In the event that the product does not find an access point, you can launch a site survey in order to visualize which APs are detected by the product. If no AP is detected, there may be a problem with the antennas or with the radio card. If APs are detected, check that the SSID, the frequency and the security mode match the configuration of your Client

SETUP
TOOLS
STATUS

DEVICE INFO

---

NETWORK

---

WIRELESS

---

ASSOC STATIONS

CHANNEL STATUS

MESH SURVEY

SERVICES STATUS

SITE SURVEY

SRCC STATUS

---

SERVICES

---

LOGS

### SITE SURVEY

**Wireless Environment Survey**

Radio under test: WiFi 1 Scan Radio

- When the radio card is in *client mode*, and a list of channels is selected, the survey includes **these channels only**.
- When the radio card is in *access point mode*, the scan will **disconnect** associated clients. On DFS channels, CAC will be re-performed if required.
- When the radio card is in *802.11s mesh mode*, peers seldom appear because their beacon interval is large per the protocol definition.

**WiFi 1 : SCAN RESULTS PER BAND**

2.4 GHz | 5 GHz

**WiFi 1 : SCAN RESULTS DETAILS**

2.4 GHz - 5 GHz						
NAME	CHANNEL	BANDWIDTH	ROLE	BSSID	ENCRYPTION	SIGNAL
hidden	36	40 MHz	Access Point	04:F0:21:42:02:29	WPA2 PSK	-87 dBm
AcksysRBB	44	20 MHz	Access Point	C4:93:00:08:A0:76	None	-38 dBm <a href="#">Join</a>