

APPLICATION NOTE

APNUS043 How To Configure Router in Repeater Mode

February 2025

Content

1. Introduction.....	3
2. Line Topology repeater (single radio card) Architecture	3
3. ACKSYS Router configuration	4
Configuring Routers.....	4
Configuring Router B	5
Configuring SSID in AP role	5
Configuring SSID in Client role	7
Repeater Router Configuration OverView	7
Configuring Router B Network	7
Configuring Router A	9
Configuring SSID in AP role	9
Configuring Router C	10
Configuring SSID in Client role	10
4. TESTING	11
Wireless Status on Router A	11
Wireless Status on Router B	11
Connectivity Test on Router B	12
Wireless Status on Router C	12

1. Introduction

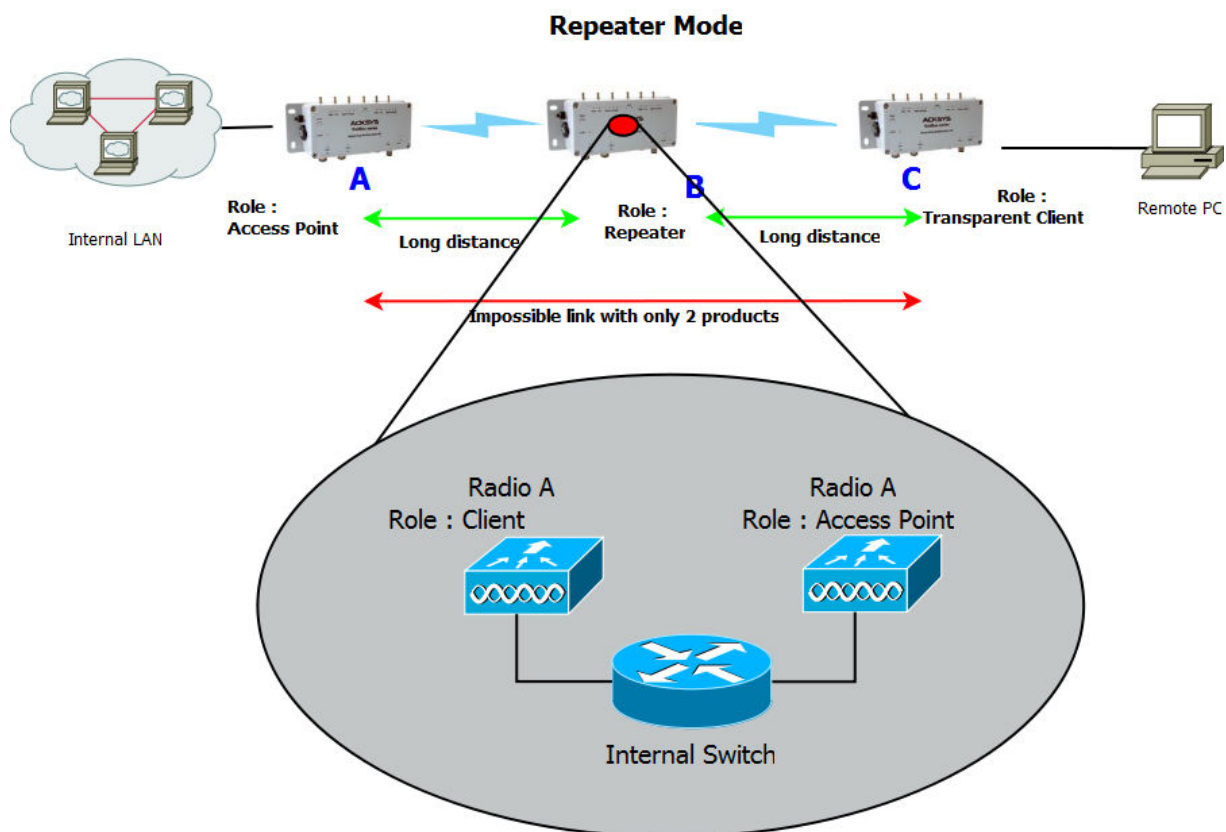
This document provides step-by-step instructions on configuring an ACKSYS router to operate in repeater mode. Repeater mode enables the router to extend the coverage of an existing wireless network by acting as an intermediate node, relaying traffic between a client and an Access Point (AP).

In this application note, we will explain in detail the basic steps required to configure Acksys Router as repeater or relay mode.

2. Line Topology repeater (single radio card) Architecture

it is possible to configure a dual-radio router in repeater mode to take advantage of two separate channels, significantly improving performance compared to single-radio repeaters. This configuration separates the communication channels for the uplink (to the main AP) and the downlink (to the clients), avoiding the performance bottleneck of using a single radio for both tasks.

In this application note, we will use 1 Acksys Router with One radio in Repeater mode as relay.



3. ACKSYS Router configuration

Before we begin, let's overview the configuration that we are attempting to achieve and the prerequisites that make it possible in this application note :

- 1 Any type of Acksys Router in single radio as repeater configured in in both role (Client and AP role) Router B
- 2 Any type of Acksys Router in single radio configured in 2 different role (Router A) , one in Client and the second AP role (router C)
- A Linux PC or Windows PC to configure the 3 routers

WARNING: In repeater mode when using a single radio, if the router is operating in relay mode, network connectivity is only possible if the channel configuration in both client mode and AP mode matches the configuration of the other connected Clients or APs. This ensures seamless communication and avoids connectivity issues due to mismatched frequencies.

Configuring Routers

If you have familiarized yourself with the configuration scheme, we can start configuring the router using instructions provided.

Parameter	Router A	Router B	Router C
IP Address	192.168.1.252/24	192.168.1.252/24	192.168.1.253/24
SSID	<ul style="list-style-type: none"> • SSID_AB 	<ul style="list-style-type: none"> • SSID_AB • SSID_BC 	<ul style="list-style-type: none"> • SSID_BC
Role	<ul style="list-style-type: none"> • AP Role 	<ul style="list-style-type: none"> • AP • Client Role 	<ul style="list-style-type: none"> • Client Role

Product A		Product B	
Device Configuration (Radio A)		Device Configuration (Radio A)	
Value	Parameter	Parameter	Value
Enable device	on	Enable device	on
802.11 mode	802.11a+n	802.11 mode	802.11a+n
HT mode	20MHz	HT mode	20MHz
Channel	36	Channel	36
Country code	FR	Country code	FR
Interface Configuration 1(Radio A)		Interface Configuration 1 (Radio B)	
Value	Parameter	Parameter	Value

Role	Access point	Role	Client
ESSID	SSID_AB	Bridging mode	4 addresses format (WDS)
		ESSID	SSID_AB
Product C		Interface Configuration 1 (Radio B)	
Device Configuration (Radio A)		Parameter	Value
Value	Parameter	Role	Access point
Enable device	on	ESSID	SSID_BC
802.11 mode	802.11a+n		
HT mode	20MHz		
Channel	36		
Country code	FR		
Interface Configuration 1 (Radio A)			
Parameter	Value		
Role	Client		
Bridging mode	4 addresses format (WDS)		
ESSID	SSID_BC		


NOTE: The **4-address format** is a powerful feature for seamless MAC address preservation and transparent Layer 2 communication. However, due to compatibility limitations, it should only be enabled in environments with ACKSYS routers on all nodes of the wireless network. For mixed-vendor setups, alternative configuration like ARP NAT (by default in client mode) is recommended.

Configuring Router B




Configuring SSID in AP role

By default the WiFi Adaptor is disabled therefore in this application note, we will create an SSID to associate to the WIFI adaptor to allow end device connected on its.

In the GUI, go to Setup → Physical Interfaces → Click WiFi Adaptor to On

WI-FI INTERFACE						
Wi-Fi 4 (802.11n) Wireless interface						
	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
	Automatic	802.11b+g+n	acksys	Access Point (infrastructure)	none	Interface disabled

Click the "Edit" button located to the right and your SSID configuration page:

WI-FI INTERFACE						
Wi-Fi 4 (802.11n) Wireless interface						
	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
	Automatic	802.11b+g+n	acksys	Access Point (infrastructure)	none	 

- Role: Client
- ESSID: SSID_AB
- Network: LAN
- Click on Save

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

Primary channel

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 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

The Max Tx Power mentioned above 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

INTERFACE CONFIGURATION

General Setup

Wireless Security

Advanced Settings

Roaming

Frame filters

Role

Client (infrastructure)




Multiple ESSIDs

☐

SSID

SSID_AB

Network

☒ LAN:   

- Security: No encryption (only in this note but we invite partner to set a strong password)

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

Primary channel

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 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

The Max Tx Power mentioned above 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

INTERFACE CONFIGURATION

General Setup

Wireless Security

Advanced Settings

MAC Filter

Frame filters

Security

No encryption

WARNING: The WEP encryption is only supported with 11abg mode.

INTERFACE CONFIGURATION
General Setup
Wireless Security
Advanced Settings
Roaming
Frame filters

Bridging mode
4 addresses format (WDS)
Allows to set the bridging method. Applied only if this interface is added in a bridge.

Deauthenticate before roaming to next AP
☐ Optional. When ON, the previous AP stops transmission immediately, saving up bandwidth. When OFF, let more time for the AP controller to manager handover.

Do not cache old scan results
☒ When scanning for APs, ignore those APs found prior to the last scan pass.

Multiple connection failures watchdog
0
Delay (seconds) before sanitary reboot after repeated failed connection attempts to all legitimate APs around. Leave empty or zero to disable.

Configuring SSID in Client role

In the GUI, go to Setup → Service → Cloud to configure the MQTT client to interact with the MQTT Broker installed on LAN Network with the following information.

INTERFACE CONFIGURATION
General Setup
Wireless Security
Advanced Settings
MAC Filter
Frame filters

Role
Access Point (infrastructure)

ESSID
SSID_BC

Maximum simultaneous associations
128
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:

Repeater Router Configuration OverView

The configuration should after the below screenshot when finishing the Router B playing AP and Client role at the same time with different SSID.

SETUP
TOOLS
STATUS

WIRELESS INTERFACES OVERVIEW

You can set up several 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 4 (802.11n) Wireless interface

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
36	802.11a+n	SSID_AB	Transparent client (infrastructure)	none	
36	802.11a+n	SSID_BC	Access Point (infrastructure)	none	

Configuring Router B Network

In the GUI, go to Setup → Physical Interfaces → Edit LAN Interface

SETUP
TOOLS
STATUS

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

NETWORK OVERVIEW

NAME	ENABLED	IPV6 ADDRESS	IPV6 GATEWAY	IPV4 ADDRESS	NETMASK	IPV4 GATEWAY (METRIC)	PERSISTENCE	ACTIONS
lan	<input checked="" type="checkbox"/>			192.168.1.253	255.255.255.0		Default	

Add network

Click the "Edit" button located to the right and let configure LAN Interface.

- General Setup
 - Network description :PUBLIC (use your custom name)
 - Protocol: Static
 - Select IPv4 Address IP family : 192.168.1.252
 - IPv4-Netmask:255.255.255.0
 - Save

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

<div style="background-color: #f2f2f2; padding: 2px; margin-bottom: 5px;">General Setup</div> <div style="background-color: #f2f2f2; padding: 2px; margin-bottom: 5px;">Interfaces Settings</div> <div style="background-color: #f2f2f2; padding: 2px;">Advanced Settings</div>	<div>Enable interface <input checked="" type="checkbox"/></div> <div>Network description <input type="text" value="LAN"/></div> <div><small>Friendly name for your network</small></div> <div>IP version <div>IPv4</div></div> <div>Protocol <div>static</div></div> <div>IPv4-Address <input type="text" value="192.168.1.252"/></div> <div>IPv4-Netmask <div>255.255.255.0</div></div> <div>Default IPv4 gateway <input type="text"/></div> <div>Default gateway metric <input type="text" value="0"/></div> <div><small>Gateway priority when several default gateways are configured; lowest is chosen. (Used only when a default gateway is defined on this interface)</small></div> <div>DNS server(s) <input type="text"/></div> <div><small>You can specify multiple IPv4 DNS servers here, press enter to add a new entry. Servers entered here will override automatically assigned ones.</small></div>
---	---

- Interface Settings
 - Bridge Interfaces: Click to enable
 - Interface: by default all interface are bridged
 - Click Save

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


<div style="background-color: #f2f2f2; padding: 2px; margin-bottom: 5px;">General Setup</div> <div style="background-color: #f2f2f2; padding: 2px; margin-bottom: 5px;">Interfaces Settings</div> <div style="background-color: #f2f2f2; padding: 2px;">Advanced Settings</div>	<div>Bridge interfaces <input checked="" type="checkbox"/> <small>creates a bridge over specified interface(s)</small></div> <div>Enable STP/RSTP <input type="checkbox"/> <small>Enables the Spanning Tree Protocol on this bridge</small></div> <div><small>WARNING: Some cautions must be taken with wireless interfaces, please see user guide</small></div> <div>Enable LLDP forwarding <input type="checkbox"/> <small>Enables the LLDP frame forwarding.</small></div> <div>bridge VLAN <input type="checkbox"/> <small>Enable VLAN management in bridge. You must configure the bridge VLANs before enabling this option (setup->bridging)</small></div> <div>Interface <div> <input checked="" type="checkbox"/> WiFi adapter: WiFi - SSID_AB (network: LAN) <input checked="" type="checkbox"/> Ethernet adapter: LAN (network: LAN) <input checked="" type="checkbox"/> WiFi adapter: WiFi - SSID_BC (network: LAN) </div> </div> <div>MTU <input type="text" value="1500"/></div>
---	--

Configuring Router A


Configuring SSID in AP role

By default the WiFi Adaptor is disabled therefore in this application note, we will create an SSID to associate to the WIFI adaptor to allow end device connected on its.

In the GUI, go to Setup → Physical Interfaces → Click WiFi Adaptor to On

WI-FI INTERFACE					
Wi-Fi 4 (802.11n) Wireless interface					
	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY
	Automatic	802.11b+g+n	acksys	Access Point (infrastructure)	none
					ACTIONS
					Interface disabled

Click the "Edit" button located to the right and your SSID configuration page:

WI-FI INTERFACE					
Wi-Fi 4 (802.11n) Wireless interface					
	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY
	Automatic	802.11b+g+n	acksys	Access Point (infrastructure)	none
					ACTIONS
					 

- Role: Access Point
- ESSID: SSID_AB
- Network: LAN
- Click on Save

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

Primary channel

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 24 dBm (DFS)
56 (5.280 GHz) - Max Tx power 24 dBm (DFS)

This field is ignored in client proactive roaming mode; see 'Roaming' tab instead

The Max Tx Power mentioned above 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.
N/A means NO-OUTDOOR

INTERFACE CONFIGURATION

General Setup | Wireless Security | Advanced Settings | MAC Filter | Frame filters

Role

Access Point (infrastructure)

ESSID

SSID_AB

Maximum simultaneous associations

128


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: 

Configuring Router C

Configuring SSID in Client role

By default the WiFi Adaptor is disabled therefore in this application note, we will create an SSID to associate to the WIFI adaptor to allow end device connected on its.

In the GUI, go to Setup → Physical Interfaces → Click WiFi Adaptor to On

Wi-Fi INTERFACE					
Wi-Fi 4 (802.11n) Wireless interface					
	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY
	Automatic	802.11b+g+n	acksys	Access Point (infrastructure)	none
					ACTIONS
					Interface disabled

Click the "Edit" button located to the right and your SSID configuration page:

Wi-Fi INTERFACE					
Wi-Fi 4 (802.11n) Wireless interface					
	CHANNEL	802.11 MODE	SSID	ROLE	SECURITY
	Automatic	802.11b+g+n	acksys	Access Point (infrastructure)	none
					ACTIONS
					 

- Role: Client
- ESSID: SSID_BC
- Network: LAN
- Click on Save

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.

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

Primary channel

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 24 dBm (DFS)

56 (5.280 GHz) - Max Tx power 24 dBm (DFS)

This field is ignored in client proactive roaming mode; see 'Roaming' tab instead

The Max Tx Power mentioned above 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.

N/O means NO-OUTDOOR

INTERFACE CONFIGURATION

General Setup

Wireless Security

Advanced Settings

Roaming

Frame filters

Role

Client (infrastructure)


Multiple ESSIDs

☐

ESSID

SSID_BC

Network

☒ LAN: 

4. TESTING

If you've followed all the steps presented above, your configuration should be finished. But as with any other configuration, it is always wise to test the setup in order to make sure that it works properly.

Wireless Status on Router A

192.168.1.251/cgi-bin/guiweb/status/wireless/



ACKSYS COMMUNICATIONS & SYSTEMS

Wireless just became easier
AirLink series

SETUP TOOLS **STATUS**


ASSOCIATED STATIONS

ASSOCIATED STATIONS RESULTS : 1

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi	SSID_AB	Infrastructure	00:09:90:01:1D:CD	36	-45 dBm	-94 dBm	49 dB

Wireless Status on Router B

192.168.1.252/cgi-bin/guiweb/status/wireless/



ACKSYS COMMUNICATIONS & SYSTEMS

Wireless just became easier
AirBox series

SETUP TOOLS **STATUS**

ASSOCIATED STATIONS

ASSOCIATED STATIONS RESULTS : 2

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi	SSID_AB	Infrastructure	00:09:90:02:F9:E2	36	-54 dBm	-95 dBm	41 dB
	WiFi	SSID_BC	Infrastructure	00:09:90:03:14:74	36	-32 dBm	-95 dBm	63 dB

Connectivity Test on Router B

Let testing IP connectivity from Router B configured in Repeater Mode with the Router A in AP mode and Router C in Client mode:

NETWORK UTILITIES

LINK DIAGNOSTIC

192.168.1.251 www.example.com

BANDWIDTH TEST

MODE	PROTOCOL	DELAY (S)	DISPLAY (S)
Server	TCP	1	

DNS TEST

www.example.com A

```

PING 192.168.1.251 (192.168.1.251): 56 data bytes
64 bytes from 192.168.1.251: seq=0 ttl=64 time=0.394 ms
64 bytes from 192.168.1.251: seq=1 ttl=64 time=0.299 ms
64 bytes from 192.168.1.251: seq=2 ttl=64 time=0.296 ms
64 bytes from 192.168.1.251: seq=3 ttl=64 time=0.331 ms
64 bytes from 192.168.1.251: seq=4 ttl=64 time=0.303 ms
64 bytes from 192.168.1.251: seq=5 ttl=64 time=0.24089.585 ms

--- 192.168.1.251 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 1.295/858993.381/4294968.585 ms

```

NETWORK UTILITIES

LINK DIAGNOSTIC

192.168.1.253 www.example.com

BANDWIDTH TEST

MODE	PROTOCOL	DELAY (S)	DISPLAY (S)
Server	TCP	1	

DNS TEST

www.example.com A

```

PING 192.168.1.253 (192.168.1.253): 56 data bytes
64 bytes from 192.168.1.253: seq=0 ttl=64 time=1.586 ms
64 bytes from 192.168.1.253: seq=1 ttl=64 time=1.311 ms
64 bytes from 192.168.1.253: seq=2 ttl=64 time=1.388 ms
64 bytes from 192.168.1.253: seq=3 ttl=64 time=1.399 ms
64 bytes from 192.168.1.253: seq=4 ttl=64 time=1.324 ms

--- 192.168.1.253 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 1.280/1.385/1.596 ms

```

Wireless Status on Router C

192.168.1.253/cgi-bin/guiweb/?stok=8956a45c39d9f76f6ddc1f48cf5a1457/status/wireless/

ACKSYS COMMUNICATIONS & SYSTEMS

Wireless just became easier
AirLink series

SETUP TOOLS **STATUS**

DEVICE INFO
NETWORK
WIRELESS

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

ASSOCIATED STATIONS

ASSOCIATED STATIONS RESULTS : 1

GRAPH	RADIO	NAME / SSID	MODE	MAC	CHANNEL	SIGNAL	NOISE	SIGNAL/NOISE
	WiFi	SSID_BC	Infrastructure	02:09:90:01:1D:CD	36	-23 dBm	-95 dBm	72 dB

For larger networks involving multiple routers (e.g., Router C connecting to Router B), ensure that LOS is maintained between the respective AP-Client pairs. Use tools like Wi-Fi analyzers or site survey tools to validate coverage and avoid interference.

Support : <https://support.acksys.fr>