

### MikroTik AP1 / AP2 Quick Setup Guide

To access your MikroTik AP, download the following applications:

Winbox : <u>http://www.mikrotik.com/download/winbox.exe</u> Neighbour Viewer : <u>http://www.mikrotik.com/download/neighbour.zip</u> Dude : <u>http://www.mikrotik.com/dude/</u> PuTTy : http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe

### \*\* READ THIS FIRST \*\*

The full version of this document can be downloaded from the MikroTik section of <u>www.wi-pipe.com</u>. It contains important information, setup guides and support for this AP. If contacting Wi-Pipe for support please indicate which of the provided setups you are using and confirm you have completed the appropriate Troubleshooting actions.

### \*NOTE\* : Wi-Pipe strongly recommend users configure and test their setup before installing this equipment.

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## 1. Accessing the MikroTik AP

- 1) Power up your MikroTik AP
- 2) Connect the AP directly to a PC using a cross over cable, or directly to a hub / switch
- 3) Run Winbox
- 4) Click on the '...' button to view connected MikroTik devices

🔲 WinBox Lo	ader v2.2.9			
<u>C</u> onnect To:	00:0B:6B:4F:89:25	Co	onnect	
L	MAC Address	IP Address	Identity	Version
Login:	00:0C:42:0E:78:2A	0.0.0.0	MikroTik	2.9.38
Password:				
-				
<u>N</u> ote:				
Address 🛆				
<u> </u>				

5) Select the device and click on connect

Connection Info					
Logging in 00:0C:42:0E:78:2A (port 20561)					
	Cancel				

6) You are now connected to your MikroTik AP



Once you have assigned the AP an ip address it can also be accessed using PuTTY.

# 1. MikroTik Bridged AP setup



In this, the simplest setup we will create a dual access point (i.e. two radios, both set as an AP) and bridge all the interfaces. The internet is accessed through a server connected to the wired interface.

1) Select Bridge



2) Click on the red '+' to add a new bridge

Bridge										
Bridges	Ports	Filters	Broute	NAT	Hosts					
+ -	1	× [	e ==							
Add ar	me	1	MAC A	ddress		STP				

3) Accept all defaults and click on ok

New Interface	×
General STP Status Traffic	OK
Name: bridge1	Cancel
Type: Bridge	Apply
MTU: 1500	Disable
ARP: enabled	Comment
	Сору
	Remove
disabledrunning	

4) Click on the Ports tab

🗖 Bridge									
Bridges	Ports	Filters	Broute	NAT	Hosts				
Name 🔼 MAC Address						STP			
R 🖆	tabridge1		00:00:0	0:00:0	0:00	no			

5) Click on the red '+' to add a new port



6) Select Interface -> ether1, Bridge -> bridge1

Bridge Port <unknown></unknown>	×
General Status	OK
Interface: ether1	Cancel
Bridge: bridge1	Apply
Priority: 128	Disable
Path Cost: 10	Comment
	Сору
	Remove
disabled disabled	

- 7) Click on the red '+' again. This time select Interface -> wlan1, Bridge -> bridge1
  8) Click on the red '+' again. This time select Interface -> wlan2, Bridge -> bridge1

🔤 Bridge					×
Bridges Ports Filters	Broute NAT Hos	ts			
+ - 🖉 💥					
Interface	Bridge	Priority	Path Cost	Status	
ttatether1	bridge1	128	10	forwarding	
l 🗠 🗠 🗠	bridge1	128	10	disabled	
I 🖽 wlan2	bridge1	128	10	disabled	

- 9) Close the Brige window10) Click on IP > Addresses

🖿 admin@00:0C:42:0E:78:2A (MikroTik) - WinBox								
6								
Interfaces								
Wireless								
Bridge								
PPP								
IP D	Addresses							
Routing D	Routes							
Ports	Pool							
Ouroupa	400							

- 11) Click on the red'+' to add an address
- 12) Enter the ip adderss 192.168.1.10/24 in the address field
- 13) In the interface drop down list box select bridge 1, the click on ok

\*NOTE\* All address formats in MikroTik are in address/subnet format, i.e. 192.168..1.1/24. For a more detailed explanation of this notation please see the appendix at the end of this document.

New Address	X
Address: 192.168.1.10/24	OK
Network:	Cancel
Broadcast: 🗖	Apply
Interface: bridge1	Disable
	Comment
	Сору
	Remove
disabled	

- 14) Close the Address List dialog box
- 15) Select Interfaces

	🖿 admin@00:0C:42:0E:78:2A (MikroTik) - WinBox v2.9.					
ø	<b>(</b>					
	Interfaces					
	Wireless					
	Bridge					
	PPP					
	IP	$\triangleright$				
	Routing	$\triangleright$				

16) Double click on wlan1 to configure

	Thterface List									
+-	· - 🖌 🗶									
	Name 🛛 🛆	Туре	MTU	Tx Rate	Rx Rate	Tx Pac	Rx Pac			
R	<b>4</b> ⊈bridge1	Bridge	1500	7.1 kbps	2.5 kbps	3	3			
R	ether1	Ethernet	1500	7.1 kbps	2.9 kbps	3	3			
R	ether2	Ethernet	1500	0 bps	0 bps	0	0			
R	<b>∢¦&gt;</b> ether3	Ethernet	1500	0 bps	0 bps	0	0			
X	≪•≽wlan1	Wireless (Atheros AR5413)	1500	0 bps	0 bps	0	0			
X	<b>«-</b> ≱wlan2	Wireless (Atheros AR5213)	1500	0 bps	0 bps	0	0			

17) Click on the wireless tab

	admin@00:0C:42:	E:78:2A	(MikroTik)	) - WinBo	k v2.9.38		
Ø	Q4						
	Interfaces			📑 Interi	face <wla< th=""><th>n1&gt;</th><th></th></wla<>	n1>	
	Wireless			General	Wireless	Data Rates	Adva
	Bridge				Radio Nan	ne: 000C420	CBE 71
	PPP						
	IP D				Mod	de: station	
	Routing		nterface l		SSI	D: 🗹 Mikrol	Tik
	Ports	+			Bar	nd: 5GHz	
	Queues		Name		Frequen	cy: 5180	
	Drivers	R	sonage		Scant	ist 🗆	

- 18) In the Mode drop down select ap bridge
- 19) Enter the desired SSID in the SSID field
- 20) In the Band drop down select either 5GHz or 2.4GHz-B

\*NOTE\* Wi-Pipe recommends using 802.11b only at 2.4 GHz as this standard has more robust signals

\*NOTE\* Wi-Pipe recommends not using the same SSID on multiple AP's as this can cause circular networks. These will cause error's in your network and may prevent you from accessing your AP remotely.

- 21) In the Frequency field enter the desired frequency
- 22) Click on ok to save changes

Interface <wlan1< th=""><th>&gt;</th><th>×</th></wlan1<>	>	×
General Wireless D	ata Rates Advanced WDS	OK
Radio Name:	000C420CBE71	Cancel
Mode:	ap bridge	Apply
SSID:	WIPIPE_S1	Enable
Band:	5GHz	Comment
Frequency:	5765	Scan
Scan List:		Freq. Usage
3 Security Profile:	default	Align
Frequency Mode:	manual txpower	Sniff
Country:	no_country_set	Snooper
Antenna Gain:	0 dBi	
DFS Mode:	none	
Proprietary Extensions:	post-2.9.25	
Default AP Tx Rate:	bps	
Default Client Tx Rate:	bps	
	Default Authenticate     Default Forward     Hide SSID	
disabled running	disabled	

- 23) Repeat for wlan2 (remember not to use the same SSID on both radio's)24) Select wlan1 and click on the blue ✓ to enable the interface

<b>-</b>	Interface List						2
	Name Enable	Туре	MTU	Tx Rate	Rx Rate	Tx Pac	Rx Pac
R	<b>4</b> ⊐tbridge1	Bridge	1500	7.6 kbps	2.5 kbps	4	3
R	ether1	Ethernet	1500	7.6 kbps	2.9 kbps	4	3
R	ether2	Ethernet	1500	0 bps	0 bps	0	0
R	<b>∢</b> ≱ether3	Ethernet	1500	0 bps	0 bps	0	0
X	≪-≽wlan1	Wireless (Atheros AR5413)	1500	0 bps	0 bps	0	0
X	<b>«</b> ∙¥wlan2	Wireless (Atheros AR5213)	1500	0 bps	0 bps	0	0

- 25) Select wlan2 and click on the blue  $\checkmark$  to enable the interface
- 26) Close the Interface List window

### 27) Select IP -> Routes

	🖿 admin@00:0C:42:0E:78:2A (MikroTik) - WinBox v2.9.3						
Ø	Q4						
	Interfaces						
	Wireless						
	Bridge						
	PPP						
	IP D	Addresses					
	Routing D	Routes					
	Ports	Pool					
	Queues	ARP					
	Drivers	VRRP					

- 28) Click on the red '+' to add the default route29) In the destination field enter the address 0.0.0.0/0 (this is the notation for the default route)
- 30) In the gateway field in the ip address 192.168.1.1

New Route			×
Destination:	0.0.0.0/0		OK
Gateway:	192.168.1.1	\$	Cancel
Check Gateway:		-	Apply
Distance:		-	Disable
Mark:		•	Comment
Pref. Source:		•	Сору
			Remove
disabled			

31) Click on ok to save changes

Ro	oute List							
Rout	es Rules							
	Destination 🛛 🔺	Gateway	Pref. Source	Distance	Interface	Routing Mark		
AS	▶ 0.0.0.0/0	192.168.1.1			bridge1			
DAC	▶ 192,168,1.0/24		192.168.1.10		bridge1			



This guide highlights the differences between a bridged and a routed setup. Note this assumes you have not created the bridge and have not yet assigned an ip address to any interface.

- 1) Click on IP -> Address
- 2) Click on the red '+' to add an address
- 3) Enter the ip address 192.168.1.10/24, Interface -> ether1
- 4) Click on the red '+' to add another address
- 5) Enter the ip address 10.0.10.1/24, Interface -> wlan1
- 6) Click on the red '+' to add another address
- 7) Enter the ip address 10.0.20.1/24, Interface -> wlan2

Address List				×
+ - 🗸 🗠 🗅				
Address 🛆	Network	Broadcast	Interface	
🕆 10.0.10.1/24	10.0.10.0	10.0.10.255	wlan1	
🕆 🕆 10.0.20.1/24	10.0.20.0	10.0.20.255	wlan2	
🕆 🕆 192.168.1.10/24	192.168.1.64	192.168.1.95	ether1	

 Click on IP -> Routes and add 192.168.1.1 as the default route as per steps 27 to 31 above.

### 2. MikroTik Routed Setup

### 9) Click on IP -> Firewall



- 10) Click on the NAT tab
- 11) Click on the red '+' to add a new NAT rule
- 12) Select Chain -> srcnat, Out Interface -> ether1

New NAT Rule					×
General Advanced	Extra	Action	Statistic	s	ОК
Chain: 💿	renat		ľ	- I	Cancel
Src. Address:				•	Apply
Dist. Address:				•	Disable
Protocol:				-	Comment
Src. Port:				-	Сору
Dst. Port:				-	Remove
In. Interface:	ether1		•	•	
Packet Mark:				-	
Connection Mark:				-	
Routing Mark:				•	
Connection Type:				•	
disabled					

- 13) Click on the action tab14) Select masquerade from the Action list box



15) Click on ok to save

#### 3. Adding WPA / WPA2 Security to your AP

1) Click on the wireless button

	🖿 admin@10.0.10.1 (MikroTik) - WinBox v2.9.38					
<b>10</b> (4						
	Interfaces					
	Wireless					
	Bridge					
	PPP					

2) Click on the Security Profiles tab

	Wireles	s Tables										×
Int	terfaces	Access List	Registration	Conr	iect List	Security Profile	s					
÷	-	<pre></pre>	<b>E</b>									
	Name	Δ	Туре		MTU	MAC Address		Mode	Band	Frequency	SSID	
R	<s>⊗wla</s>	an1	Wireless (Ath	ero	1500	00:0C:42:0C:BE	:71	ap bri	5GHz	5765MHz	WIPIPE_	
	<s>⊗wla</s>	an2	Wireless (Ath	ero	1500	00:0B:6B:80:B1	:35	ap bri	5GHz	5825MHz	WIPIPE_	

- 3) Click on the red '+' to add a new profile4) Enter a name for the profile in the name field
- 5) Enter the WPA pass phrase in the WPA pre-shared key field
- 6) Enter the WPA2 pass phrase in the WPA2 pre-shared key field

New S	ecurt	y Profile	×	۲
General	EAP	Static Keys	OK	
		Name: WPA	Cancel	
		Mode: dynamic keys	<ul> <li>Apply</li> </ul>	]
– Authen	ticatior PSK	Types	Сору	
T WPA	EAP	WPA2 EAP	Remove	
– Unicas 💌 tkip	t Ciphe	rs — — — — — — — — — — — — — — — — — — —	_	
– Group ( 💌 tkip	Ciphers	aes com		
WPA P	re-Shar	ed Key: thismustbelong	-	
WPA2 P	re-Shar	ed Key: thismustbelong		
Grou	p Key l	Jpdate: 00:05:00		
		RADIUS MAC Authentication		

- 7) Click on ok to save
  8) Click on the Interfaces tab
  9) Double click on wlan1 to configure
  10) Click on the wireless tab
  11) In the security drop down select the new security profile
  12) Click on ok to save

Interface <wlan1></wlan1>	×
General Wireless Data Rates Advanced WDS	ОК
Radio Name: 000C420CBE71	Cancel
Mode: ap bridge	Apply
SSID: 🗹 WIPIPE_S1	Disable
Band: 5GHz	Comment
Frequency: 5765	Scan
Scan List: 🔲	Freq. Usage
Security Profile: default	Align
Frequency Mode: WPA	Sniff
Country: no_country_set	Snooper
Antenna Gain: 0	dBi

## 4. Setting up a WDS Bridge

- 1) Click on Bridge
- 2) Click on the red '+' to add a new bridge
- 3) Enter details and click on ok
- 4) Click on Wireless
- 5) Double click on the wireless interface to configure
- 6) Select the wireless tab
- 7) In the mode drop down select bridge
- 8) In the band drop down select 5GHz or 2.4GHz-b as appropriate
- 9) In the Frequency enter the desired frequency
- 10) Click on the WDS tab
- 11) In the WDS mode tab select static
- 12) In the WDS default bridge drop down select the bridge created in step 2 above
- 13) Check the WDS Ignore SSID check box

	Interface <wlan2></wlan2>	x
	Advanced WDS Nstreme Tx Power Status	OK
	WDS Mode: dynamic	Cancel
	WDS Default Bridge: bridge1	Apply
	WDS Default Cost: 100	Disable
	WDS Cost Range: 50-150	Comment
	WDS Ignore SSID	Scan
İ		Freq. Usage
		Align
		Sniff
		Snooper

- 14) Click on ok to save changes
- 15) Click on the red '+' and select WDS to add a new WDS interface

Wireless Tables												
Interfaces	Access L	ist Registration		Connect List		Security Profiles						
<b>+</b> -	+											
VirtualAP		Δ	Туре		MTU	MAC A	ddress		Mode	Band	Fre	
WDS			Wireless (Ath	ero	1500	00:0C;4	42:0C:BE:7	'1	ap bri	5GHz	576	
Nstreme I	Dual		Wireless (Ath	ero	1500	00:0B:6	SB:80:B1:3	5	ap bri	5GHz	582	

- 16) Click on the WDS tab
- 17) From the Master Interface tab select the desired wireless interface
- 18) Enter the MAC address of the other side of the link in the WDS address field
- 19) Click on ok to save
- 20) Repeat steps on second AP to create the bridge connection.

### 5. Backing up and Restoring AP configurations

To backup your configuration:



- 3) The system configuration will automatically be saved
- 4) To download the file, ftp to the router and download the file

To restore your configuration:

- 1) Open an ftp connection to the router and upload the configuration file
- 2) Click on files
- 3) Select the backup file and click on restore

#### 6. **Appendix A: Link Distances**

Mbps)

0.3

0.4

0.4

0.7

0.6

0.9

1.1

The graph below details the distances at which you should get a link quality (signal to noise, SNR) of 10dB. The combined gain is the sum of the antenna gain at the access point and CPE. This graph assumes the use of MikroTik R52 radio cards at both ends of the link, and perfect line of sight.



5Ghz 10dB Distances

2.4Ghz 10dB Distances

1.4

1.7

2.2

3.5

4.4

7

8.7

11

5.5



Combined Gain	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38
Distance km (1 Mbps)	1.5	1.9	2.4	3	3.8	4.8	6	7.6	9.5	12	15	19			
Distance km (11 Mbps)	0.85	1.1	1.5	1.7	2.1	2.7	3.4	4.3	5.4	6.7	8.5	11	13.5	17	21.3

# 7. Appendix B: IP Subnets

Class C										
Network Bits	Subnet Mask	Number of Subnets	Number of IP's							
/24	255.255.255.0	0	254							
/25	255.255.255.128	2	126							
/26	255.255.255.192	4	62							
/27	255.255.255.224	8	30							
/28	255.255.255.240	16	14							
/29	255.255.255.248	32	6							
/30	255.255.255.252	64	2							

Class B										
Network Bits	Subnet Mask	Number of Subnets	Number of IP's							
/16	255.255.0.0	0	65534							
/17	255.255.128.0	2	32766							
/18	255.255.192.0	4	16382							
/19	255.255.224.0	8	8190							
/20	255.255.240.0	16	4094							
/21	255.255.248.0	32	2046							
/22	255.255.252.0	64	1022							
/23	255.255.254.0	128	510							
/24	255.255.255.0	256	254							
/25	255.255.255.128	512	126							
/26	255.255.255.192	1024	62							
/27	255.255.255.224	2048	30							
/28	255.255.255.240	4096	14							
/29	255.255.255.248	8192	6							
/30	255.255.255.252	16384	2							

# 8. Appendix C: Trouble Shooting

#### Winbox unable to find router locally connected to PC

#### Remedial steps:

- Ensure router is powered up
- Ensure router has fully booted, this can take more than 60 seconds
- If router has ip address ensure PC has an ip address on same subnet
- Ensure cross over cable is used from PoE injector to PC
- Ensure the cross over cable is not damaged
- Check the PC shows the Ethernet port has a connection. To do this start a command prompt. At the command prompt enter the command 'ipconfig'. If 'Media Disconnected' is displayed, check all cables for damage.
- Ensure no firewalls etc. are running on the PC which would prevent it from accessing the router on all ports
- Attempt the same operation on a separate PC

If after performing all of the above steps you still cannot access the AP, fill out the RMA form <a href="http://www.wi-pipe.com/docs/Returns%20Form.pdf">http://www.wi-pipe.com/docs/Returns%20Form.pdf</a> and return to Wi-Pipe for further investigation. Wi-Pipe will check the unit once received and report on whether the unit is faulty or not.

#### Winbox connects to router, and then immediately disconnects

Remedial steps:

- Try to connect by entering the ip address rather than the MAC address of the router into the Winbox connection screen
- Deselect the secure mode check box before connecting to the router
- Ensure the PC does not have an enabled wireless interface. If it does, disable the wireless interface and attempt to connect again
- Attempt the same operation of a separate PC

If after performing the above steps you still cannot access the AP perform either of the following steps:

- Download and start PuTTy (http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe)
- Enter the AP's ip address and click on open
- Enter login of admin and press enter
- If asked for a password leave blank and hit enter
- Reset the system by entering the command /system reset at the command prompt
- When asked are you sure, select y and hit enter
- When the system has been reset, try and access it using Winbox again

If after performing all of the above steps you still cannot access the AP, fill out the RMA form <a href="http://www.wi-pipe.com/docs/Returns%20Form.pdf">http://www.wi-pipe.com/docs/Returns%20Form.pdf</a> and return to Wi-Pipe for further investigation. Wi-Pipe will check the unit once received and report on whether the unit is faulty or not.

#### AP Reboots erratically

This can be cause by many wireless interfaces having the same SSID causing many circular networks, poor power supply or board malfunction.

Remedial actions:

- Select Wireless
- Select each of the wireless interfaces and click on the red 'x' to disable them
- Wait to see if router reboots. If not, amend the SSID's so they are not all the same

If after performing all of the above steps you still cannot access the AP, fill out the RMA form <a href="http://www.wi-pipe.com/docs/Returns%20Form.pdf">http://www.wi-pipe.com/docs/Returns%20Form.pdf</a> and return to Wi-Pipe for further investigation. Wi-Pipe will check the unit once received and report on whether the unit is faulty or not.

#### Other Issues

If you have any other problems with you AP, please main details of the problem to <u>info@wi-pipe.com</u>. Include in the mail which of the setup's above you were attempting, symptoms and as many screen shots as possible, especially the Status tab from the wireless configuration menu.

### 9. Appendix D: Further Information

If you require further assistance it can be found at:

Manuals http://www.mikrotik.com/testdocs/ros/2.9/

MikroTik FAQ http://wiki.mikrotik.com/wiki/MikroTik RouterOS Frequently Asked Questions - FAQ

MikroTik Forum http://forum.mikrotik.com/

MikroTik Support Support@mikrotik.com

If you would like guidance on more complicated setups please contact Wi-Pipe at + (0) 51 387 753 or <u>info@wi-pipe.com</u>