CISCO/Aironet 2.4GHz 11Mbps Wireless Interface

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General Information

Summary

The MikroTik RouterOS supports the following CISCO/Aironet 2.4GHz Wireless ISA/PCI/PC Adapter hardware:

- Aironet ISA/PCI/PC4800 2.4GHz DS 11Mbps Wireless LAN Adapters (100mW)
- Aironet ISA/PCI/PC4500 2.4GHz DS 2Mbps Wireless LAN Adapters (100mW)
- CISCO AIR-PCI340 2.4GHz DS 11Mbps Wireless LAN Adapters (30mW)
- CISCO AIR-PCI/PC350/352 2.4GHz DS 11Mbps Wireless LAN Adapters (100mW)

Specifications

Packages required: ***wireless***
License required: ***level4***
Home menu level: ***/interface pc***
Standards and Technologies: ***IEEE802.11b***
Hardware usage: ***Not significant***

Related Documents

- Package Management

- Device Driver List
- IP Addresses and ARP
- Log Management

Additional Documents

- CISCO Aironet 350 Series

For more information about the CISCO/Aironet PCI/ISA adapter hardware please see the relevant User's Guides and Technical Reference Manuals in PDF format:

- 710-003638a0.pdffor PCI/ISA 4800 and 4500 series adapters
- 710-004239B0.pdffor PC 4800 and 4500 series adapters

Documentation about CISCO/Aironet Wireless Bridges and Access Points can be found in archives:

- AP48MAN.exe for AP4800 Wireless Access Point
- BR50MAN.exe for BR500 Wireless Bridge

Wireless Interface Configuration

Home menu level: ***/interface pc***

Description

CISCO/Aironet 2.4GHz card is an interface for wireless networks operating in IEEE 802.11b standard. If the wireless interface card is not registered to an AP, the green status led is blinking fast. If the wireless interface card is registered to an AP, the green status led is blinking slow. To set the wireless interface for working with an access point (register to the AP), typically you should set the following parameters:

- The **service set identifier**. It should match the ssid of the AP. Can be blank, if you want the wireless interface card to register to an AP with any ssid. The ssid will be received from the AP, if the AP is broadcasting its ssid.
- The data-rate of the card should match one of the supported data rates of the AP. Data rate 'auto' should work in most cases.

Loading the Driver for the Wireless Adapter

PCI and PC (PCMCIA) cards do not require a 'manual' driver loading, since they are recognized automatically by the system and the driver is loaded at the system startup.

The ISA card requires the driver to be loaded by issuing the following command:

There can be several reasons for a failure to load the driver:

- **The driver cannot be loaded because other device uses the requested IRQ.**
  Try to set different IRQ using the DIP switches.
- **The requested I/O base address cannot be used on your motherboard**

Try to change the I/O base address using the DIP switches

Property Description

ap1 (*MAC address*) - forces association to the specified access point

ap2 (*MAC address*) - forces association to the specified access point

ap3 (*MAC address*) - forces association to the specified access point

ap4 (*MAC address*) - forces association to the specified access point

arp (*disabled* | *enabled* | *proxy-arp* | *reply-only*; default: **enabled**) - Address Resolution Protocol

beacon-period (*integer*: 20..976; default: **100**) - Specifies beaconing period (applicable to ad-hoc mode only)

card-type (*read-only: text*) - your CISCO/Aironet adapter model and type

client-name (*text*; default: **""**) - client name

data-rate (*1Mbit/s* | *2Mbit/s* | *5.5Mbit/s* | *11Mbit/s* | *auto*; default: **1Mbit/s**) - data rate in Mbit/s

fragmentation-threshold (*integer*: 256..2312; default: **2312**) - this threshold controls the packet size at which outgoing packets will be split into multiple fragments. If a single fragment transmit error occurs, only that fragment will have to be retransmitted instead of the whole packet. Use a low setting in areas with poor communication or with a great deal of radio interference

frequency - Channel Frequency in MHz (applicable to ad-hoc mode only)

join-net (*time*; default: **10**) - an amount of time,during which the interface operating in ad-hoc mode will try to connect to an existing network rather than create a new one

- **0** - do not create own network

long-retry-limit (*integer*: 0..128; default: **16**) - specifies the number of times an unfragmented packet is retried before it is dropped

mode (*infrastructure* | *ad-hoc*; default: **infrastructure**) - operation mode of the card

modulation (*cck* | *default* | *mbok*; default: **cck**) - modulation mode

- **cck** - Complementary Code Keying
- **mbok** - M-ary Bi-Orthogonal Keying

mtu (*integer*: 256..2048; default: **1500**) - Maximum Transmission Unit

name (*name*) - descriptive interface name

rts-threshold (*integer*: 0..2312; default: **2312**) - determines the packet size at which the interface issues a request to send (RTS) before sending the packet. A low value can be useful in areas where many clients are associating with the access point or bridge, or in areas where the clients are far apart and can detect only the access point or bridge and not each other

rx-antenna (*both* | *default* | *left* | *right*; default: **both**) - receive antennas

short-retry-limit (*integer*: 0..128; default: **16**) - specifies the number of times a fragmented packet is retried before it is dropped

ssid1 (*text*; default: **tsunami**) - establishes the adapter's service set identifier This value must match the SSID of the system in order to operate in infrastructure mode

ssid2 (*text*; default: **""**) - service set identifier 2

ssid3 (*text*; default: **""**) - service set identifier 3

tx-antenna (*both* | *default* | *left* | *right*; default: **both**) - transmit antennas

tx-power (*1* | *5* | *20* | *50* | *100*; default: **100**) - transmit power in mW

world-mode (yes | no; default: **no**) - if set, client adapter automatically inherit channel configuration properties directly from the access point to which they associate. This feature enables a user to use a client adapter around the world while still maintaining regulatory compliance

Example

Interface informational printouts

```
[admin@MikroTik] > interface print
Flags: X - disabled, D - dynamic, R - running
  #    NAME                TYPE            MTU
  0  R ether1               ether           1500
  1  X ether2               ether           1500
  2  X pc1                  pc              1500
[admin@MikroTik] interface> set 2 name aironet
[admin@MikroTik] interface> enable aironet
[admin@MikroTik] > interface print
Flags: X - disabled, D - dynamic, R - running
  #    NAME                TYPE            MTU
  0  R ether1               ether           1500
  1  X ether2               ether           1500
  2  R aironet              pc              1500
[admin@MikroTik] > interface pc
[admin@MikroTik] interface pc> print
Flags: X - disabled, R - running
  0  R name="aironet" mtu=1500 mac-address=00:40:96:29:2F:80 arp=enabled
       client-name="" ssid1="tsunami" ssid2="" ssid3="" mode=infrastructure
       data-rate=1Mbit/s frequency=2437MHz modulation=cck tx-power=100
       ap1=00:00:00:00:00:00 ap2=00:00:00:00:00:00 ap3=00:00:00:00:00:00
       ap4=00:00:00:00:00:00 rx-antenna=right tx-antenna=right beacon-period=100
       long-retry-limit=16 short-retry-limit=16 rts-threshold=2312
       fragmentation-threshold=2312 join-net=10s card-type=PC4800A 3.65

[admin@MikroTik] interface pc>
```

Interface status monitoring

```
[admin@MikroTik] interface pc> monitor 0
         synchronized: no
           associated: no
         error-number: 0

[admin@MikroTik] interface pc>
```

Example

Suppose we want to configure the wireless interface to accomplish registration on the AP with a **ssid** 'mt'.

We need to change the value of ssid property to the corresponding value.

To view the results, we can use **monitor** feature.

```
[admin@MikroTik] interface pc> set 0 ssid1 mt
[admin@MikroTik] interface pc> monitor 0
         synchronized: yes
           associated: yes
            frequency: 2412MHz
            data-rate: 11Mbit/s
                 ssid: "mt"
         access-point: 00:02:6F:01:5D:FE
    access-point-name: ""
       signal-quality: 132
```

```
      signal-strength: -82
        error-number: 0
[admin@MikroTik] interface pc>
```

Troubleshooting

Description

Keep in mind, that not all combinations of I/O base addresses and IRQs may work on particular motherboard. It is recommended that you choose an IRQ not used in your system, and then try to find an acceptable I/O base address setting. As it has been observed, the IRQ 5 and I/O 0x300 or 0x180 will work in most cases.

- **The driver cannot be loaded because other device uses the requested IRQ.**
  Try to set different IRQ using the DIP switches.
- **The requested I/O base address cannot be used on your motherboard.**
  Try to change the I/O base address using the DIP switches.
- **The pc interface does not show up under the interfaces list**
  Obtain the required license for 2.4/5GHz Wireless Client feature.
- **The wireless card does not register to the Access Point**
  Check the cabling and antenna alignment.

Application Examples

Point-to-Multipoint Wireless LAN

Let us consider the following network setup with CISCO/Aironet Wireless Access Point as a base station and MikroTik Wireless Router as a client:

The access point is connected to the wired network's HUB and has IP address from the network 10.1.1.0/24.

The minimum configuration required for the AP is:

1. Setting the Service Set Identifier (up to 32 alphanumeric characters). In our case we use ssid "mt".
2. Setting the allowed data rates at 1-11Mbps, and the basic rate at 1Mbps.
3. Choosing the frequency, in our case we use 2442MHz.
4. (For CISCO/Aironet Bridges only) Set Configuration/Radio/Extended/Bridge/mode=access_point. If you leave it to 'bridge_only', it wont register clients.
5. Setting the identity parameters Configuration/Ident: Inaddr, Inmask, and Gateway. These are required if you want to access the AP remotely using telnet or http.

The IP addresses assigned to the wireless interface should be from the network 10.1.1.0/24:

```
[admin@MikroTik] ip address> add address 10.1.1.12/24 interface aironet
[admin@MikroTik] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
```

```
  #   ADDRESS            NETWORK         BROADCAST       INTERFACE
  0   10.1.1.12/24       10.1.1.0        10.1.1.255      aironet
  1   192.168.0.254/24   192.168.0.0     192.168.0.255   Local
[admin@MikroTik] ip address>
```

The default route should be set to the gateway router 10.1.1.254 (! not the AP 10.1.1.250 !):

```
[admin@MikroTik] ip route> add gateway=10.1.1.254
[admin@MikroTik] ip route> print
Flags: X - disabled, I - invalid, D - dynamic, J - rejected,
C - connect, S - static, R - rip, O - ospf, B - bgp
    #    DST-ADDRESS        G GATEWAY         DISTANCE INTERFACE
    0  S 0.0.0.0/0          r 10.1.1.254      1        aironet
    1 DC 192.168.0.0/24     r 0.0.0.0         0        Local
    2 DC 10.1.1.0/24        r 0.0.0.0         0        aironet

[admin@MikroTik] ip route>
```

Point-to-Point Wireless LAN

Point-to-Point links provide a convenient way to connect a pair of clients on a short distance.

Let us consider the following point-to-point wireless network setup with two MikroTik wireless routers:

To establish a point-to-point link, the configuration of the wireless interface should be as follows:

- A unique Service Set Identifier should be chosen for both ends, say "mt"
- A channel frequency should be selected for the link, say 2412MHz
- The operation mode should be set to ad-hoc
- One of the units (slave) should have wireless interface property join-net set to 0s (never create a network), the other unit (master) should be set to 1s or whatever, say 10s. This will enable the master unit to create a network and register the slave unit to it.

The following command should be issued to change the settings for the pc interface of the master unit:

```
[admin@MikroTik] interface pc> set 0 mode=ad-hoc ssid1=mt frequency=2442MHz \
\... bitrate=auto
[admin@MikroTik] interface pc>
```

For 10 seconds (this is set by the property **join-net**) the wireless card will look for a network to join. The status of the card is not synchronized, and the green status light is blinking fast. If the card cannot find a network, it creates its own network. The status of the card becomes synchronized, and the green status led becomes solid.

The monitor command shows the new status and the MAC address generated:

```
[admin@MikroTik] interface pc> monitor 0
         synchronized: yes
           associated: yes
            frequency: 2442MHz
            data-rate: 11Mbit/s
                 ssid: "mt"
         access-point: 2E:00:B8:01:98:01
    access-point-name: ""
       signal-quality: 35
      signal-strength: -62
         error-number: 0
[admin@MikroTik] interface pc>
```

The other router of the point-to-point link requires the operation mode set to **ad-hoc**, the System Service Identifier set to 'mt', and the channel frequency set to 2412MHz. If the cards are able to establish RF connection, the status of the card should become synchronized, and the green status led should become solid immediately after entering the command:

```
[admin@wnet_gw] interface pc> set 0 mode=ad-hoc ssid1=b_link frequency=2412MHz \
\... bitrate=auto
[admin@wnet_gw] interface pc> monitor 0
         synchronized: yes
           associated: no
            frequency: 2442MHz
            data-rate: 11Mbit/s
                 ssid: "b_link"
         access-point: 2E:00:B8:01:98:01
    access-point-name: ""
       signal-quality: 131
      signal-strength: -83
         error-number: 0

[admin@wnet_gw] interface pc>
```

As we see, the MAC address under the **access-point** property is the same as on the first router.

If desired, IP addresses can be assigned to the wireless interfaces of the pint-to-point linked routers using a smaller subnet, say 30-bit one:

```
[admin@MikroTik] ip address> add address 192.168.11.1/30 interface aironet
[admin@MikroTik] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
  #   ADDRESS            NETWORK         BROADCAST       INTERFACE
  0   192.168.11.1/30    192.168.11.0    192.168.11.3    aironet
  1   192.168.0.254/24   192.168.0.0     192.168.0.255   Local
[admin@MikroTik] ip address>
```

The second router will have address 192.168.11.2. The network connectivity can be tested by using ping or bandwidth test:

```
[admin@wnet_gw] ip address> add address 192.168.11.2/30 interface aironet
[admin@wnet_gw] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
  #   ADDRESS            NETWORK         BROADCAST       INTERFACE
  0   192.168.11.2/30    192.168.11.0    192.168.11.3    aironet
  1   10.1.1.12/24       10.1.1.0        10.1.1.255      Public
[admin@wnet_gw] ip address> /ping 192.168.11.1
192.168.11.1 pong: ttl=255 time=3 ms
192.168.11.1 pong: ttl=255 time=1 ms
192.168.11.1 pong: ttl=255 time=1 ms
192.168.11.1 pong: ttl=255 ping interrupted
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 1/1.5/3 ms
[admin@wnet_gw] interface pc> /tool bandwidth-test 192.168.11.1 protocol tcp
                 status: running
             rx-current: 4.61Mbps
    rx-10-second-average: 4.25Mbps
        rx-total-average: 4.27Mbps

[admin@wnet_gw] interface pc> /tool bandwidth-test 192.168.11.1 protocol udp size 1500
                 status: running
             rx-current: 5.64Mbps
    rx-10-second-average: 5.32Mbps
        rx-total-average: 4.87Mbps

[admin@wnet_gw] interface pc>
```