

“ANAHEIM WiFi”
Network Enabling Devices Series

Serial-to-WiFi

User's Manual

ver. 0.9.0

“ANAHEIM WiFi” User's Manual

Printed in Italy

Trademarks

DAVE™ is a trademark of DAVE S.r.L.

Ethernet® is a registered trademark of XEROX Corporation

Windows® is a registered trademark of Microsoft Corporation

Copyright

All rights reserved. Specifications may change any time without notification.

Notice

“Anaheim WiFi” modules are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Redundancy and back-up procedures must be set up by the user when the failure of the device may cause serious problems to the the health or to the property.

Anyway, customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify DAVE for any damages resulting from such improper use or sale.

Company Address

DAVE S.r.L.

Via Forniz 2

33080 Porcia (PN) – Italy

Phone: +39 0434 921215

e-mail: info@dave-tech.it

URL: www.dave-tech.it

Technical Support

e-mail: support-anaheim@dave-tech.it

<i>History</i>	
0.9.0	first release (preliminary)

Overview

ANAHEIM Network Enabling Devices Series is a family of products devoted to protocol conversion of data to TCP/IP. ANAHEIM WiFi is the representative that aims to bridge serial links with wireless LAN in the easiest way.

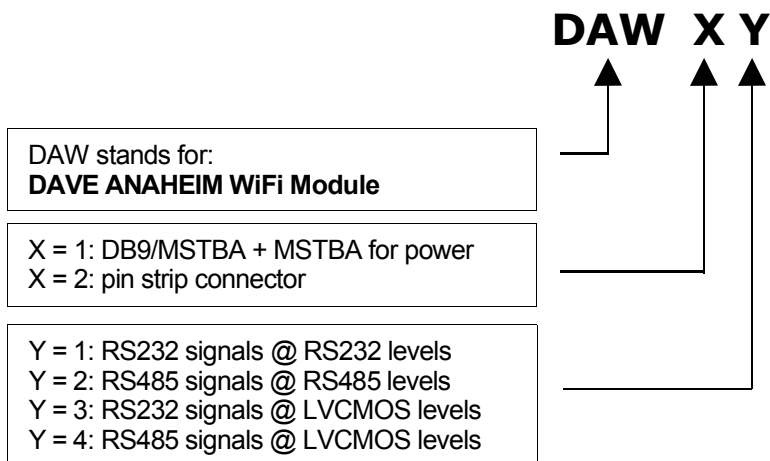
The aim is to allow easy and complete connection to the Intranet and Extranet networks for equipments that are not natively suited for this purpose.

The purpose of the Anaheim series is twofold: either to provide pluggable, ready-to-use modules without major changes in the hosting electronics or to provide a *retrofit* solution to existing equipments.

Two types of serial link have been implemented: RS232 and RS485.

On top, these two serial links – as well as power supply - can be carried over the module either via standard connectors (male DB9 for RS232, and MSTBA for RS485 and power supply), or via standard pin-strip connector. Furthermore, on pin-strip connector, both EIA levels and LVCMOS are available.

All these considerations lead to provide the models that can be summarized as follows:



As an example you may choose among these following models, that are also considered as « standard ».

- DAW 11 : module with DB9 connector for RS232 signals and MSTBA for power
- DAW 12 : module with MSTBA connector for RS485 signals and MSTBA for power
- DAW 23 : module with RS232 at LVCMOS level and pin-strip connector to be plugged
- DAW 24 : module with RS485 at LVCMOS level and pin-strip connector to be plugged

From the point of view of TCP/IP world, each module can behave in two ways:

- Server: Anaheim-WiFi is configured to accept a TCP connection on wireless network side; once it is established, incoming data from serial port will be send over the TCP connection, while received data from TCP connection will be transmitted over the serial port.
- Client: Anaheim WiFi tries to establish a connection with a TCP server through the wireless interface. Once it is established, incoming data from serial port will be send over the TCP connection, while received data from TCP connection will be transmitted over the serial port.

From the point of view of network topology, Anaheim WiFi supports two modes called Infrastructure and Ad-Hoc:

- Infrastructure: Anaheim WiFi will be connected to the network through an "access point"
- Ad-Hoc: Anaheim WiFi will talk directly to its network peer.

Please see section "Configuration" on page 17 for more details.

Examples

This section briefly describes some typical applications of Anaheim WiFi modules.

Figure 1 shows how to use two Anaheim WiFi modules to establish a TCP connection over a point-to-point wireless link. This configuration allows to exchange data between two legacy hosts without an access point. The two hosts are not equipped with any network interface.

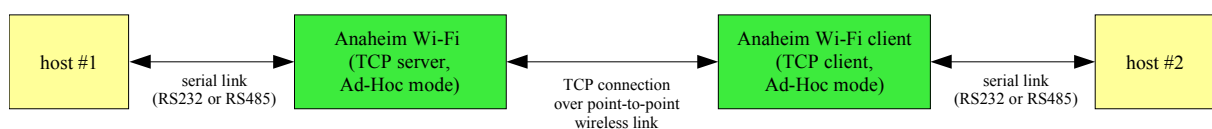


Fig. 1 - TCP connection over point-to-point wireless link

Figure 2 shows how to connect a legacy host (host #1) to the wireless network through Anaheim WiFi. A second host (host #2) is connected to the wireless network through the access point. By establishing a TCP connection with Anaheim WiFi, it can exchange data with host #1.

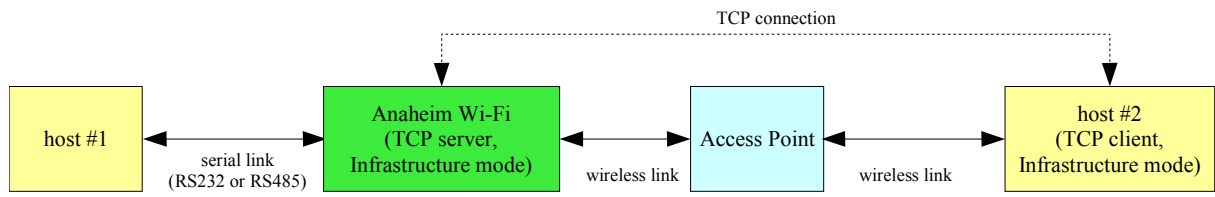


Fig. 2 - TCP connection through wireless network

Product Specifications

	DAW 11	DAW 12	DAW 2x
Power Supply	5.0 Vcc typ (4.7–7.0 Vcc)		
Current	310 mA (ave, inclusive of WiFi module)		
Power Connector	MSTBA 2.5/3-G-5.08	MSTBA 2.5/3-G-5.08	On 20x2 pin strip x 2,54
Suppl.Power Input	pin 1 connector P1	n.a.	n.a.
RS232 connector	DB9	n.a.	n.a.
RS485 connector	n.a.	MSTBA 2.5/3-G-5.08	n.a.
Pin Strip	n.a.	n.a.	20 x 2 x 2,54 mm (h. 11)
CF connector (WiFi)	Molex 671550002		
Temperature (op.)	5-55°C		
Humidity (op.)	0-90% not condensing		
Weight	60 g.	60 g.	50 g.
Dimensions	60,96 x 60,96 x 21 mm.	63,62 x 60,96 x 21 mm.	46,96 x 60,96 x 21 mm.

Mechanical Specifications

Fig.3 and Fig.4 are report mechanical drawings for all Anaheim WiFi model's family.
The following table report connectors that provided for each model.

	JP4 (Power)	JP5(pin strip)	P1(RS232)	JP2(RS485)	JP3(jumper)
DAW11	x	-	x	-	x
DAW12	x	-	-	x	x
DAW2*	-	x	-	-	x

Tab. 1 - Connectors Map for Anaheim WiFi models

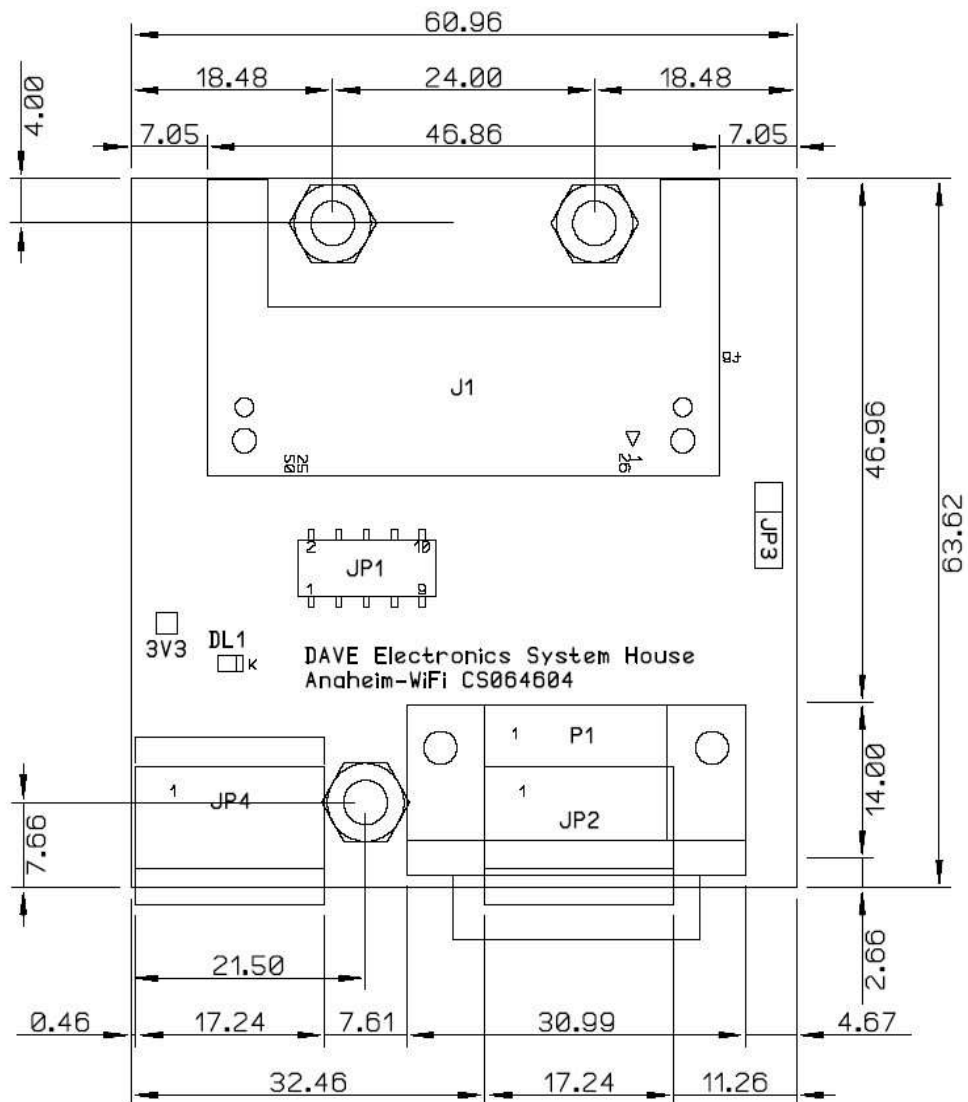


Fig. 3- Mechanical Drawing - TOP Side

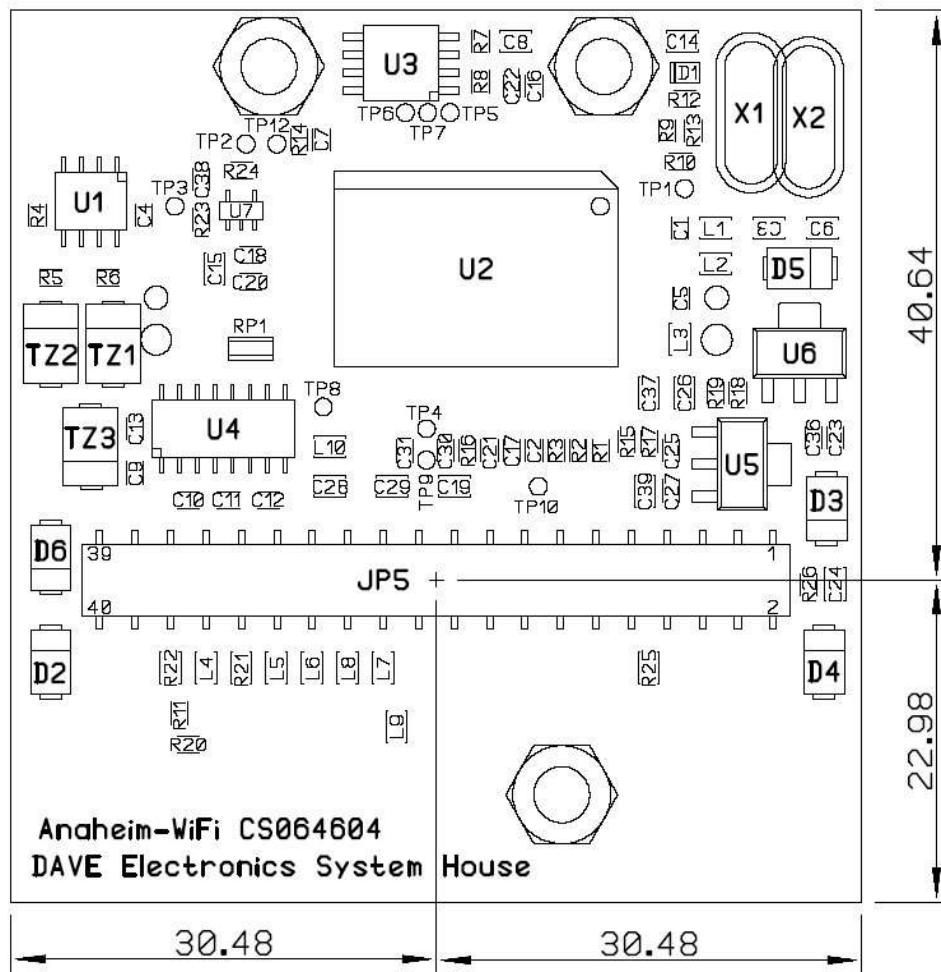


Fig. 4- Mechanical Drawing - BOTTOM Side

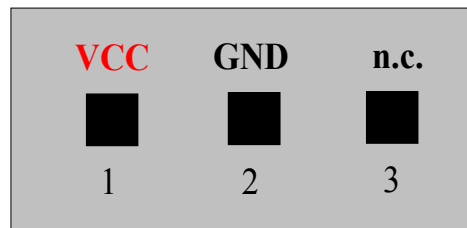
Connectors

In this section pinning of the connectors is reported.

In tab.1, models with proper connectors are listed.

Power Supply (JP4) (DAW1x only)

This is a conventional Phoenix, mod. MSTBA 2.5/3-G-5.08. The range voltage accepted is from +4.7V to +7V DC. Fig.6 and report JP3 pinout.



*Fig. 6 - JP4 - Power Supply connector (DAW1x)
Fig. 5 JP4 connector pinout*

Pin Number	Signal Name	Description
1	VCC	Power Supply ranging from 4.7 to 7 Vcc, 310mA
2	GND	Connected to ground reference
3	OP_MODE	OP_MODE signal. Tie to GND (pin 2 and 3 connected together) to access configuration mode.

RS232/DB9 (P1) (DAW11 only)

Anaheim modules are designed as a Data Terminal Equipment (DTE) with the connections summarized on the following table.

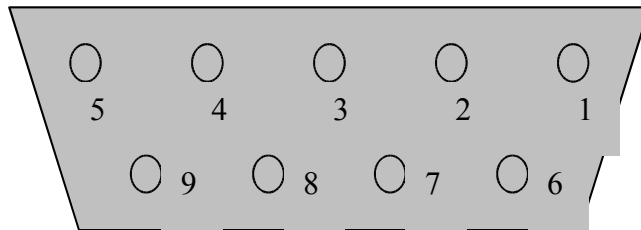


Fig. 1 - RS232 - DB9 MALE CONNECTOR

Pin 1	VCC	Optional Power Supply
Pin 2	RX	Data Receive (input)
Pin 3	TX	Data Transmit (output)
Pin 4	n.c.	
Pin 5	GND	Ground Reference
Pin 6	n.c.	
Pin 7	RTS	Ready To Send
Pin 8	CTS	Clear To Send
Pin 9	n.c.	

Pin 1 is provided as an optional Power Supply Source as alternative to JP4 Power Supply Connector. **WARNING: power supply P1 and JP4 connectors must be used in mutual exclusion mode.**

RS485/MSTBA (JP2) (DAW12 only)

This is a conventional Phoenix, mod. MSTBA 2.5/3-G-5.08. Pinout is reported in Fig.7

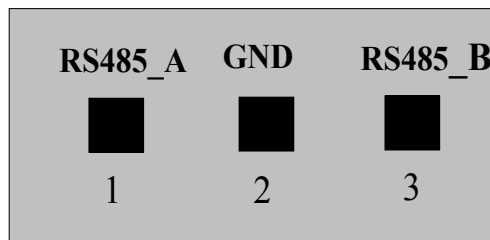


Fig. 7 JP2 connector pinout

<i>PIN Number</i>	<i>Signal Name</i>	<i>Description</i>
1	RS485_B	Inverting receiver input and inverting driver output
2	GND	Connected to ground reference
3	RS485_A	Non-inverting receiver input and non-inverting driver output

Pin-strip connector (JP5) (DAW2x only)

Pinning of the JP5 connector is report in the following table. Signal name with “#” indicate that signal is 'active low'.

PIN Number	SIGNAL Name	Description
1 to 4	GND	Connected to ground reference
5 to 10	n.c.	Reserved for future uses; leave open
11	GND	Connected to ground reference
12	ISPISD_DSDO	Reserved for future use
13	n.c.	Reserved for future uses; leave open
14	ISPISD_DSCK	Reserved for future use
15	UART0_CTS	
16	n.c.	Reserved for future uses; leave open
17	UART0_RTS	
18	n.c.	Reserved for future uses; leave open
19	DIR_485	
20	UART0_TX	
21	GND	Connected to ground reference
22	UART0_RX	
23	UC_CTS	
24	GND	Connected to ground reference
25	UC_RTS	
26	UC_RX	Receiver input signal -RS232
27	OP_MODE	normally pulled up (regular operation). When pulled down, Anaheim WiFi is ready to be configured.
28	UC_TX	
29	RST#	Reset
30	A_485	Non-inverting receiver input and non-inverting driver output
31	MRST#	Master Reset Input
32	B_485	Inverting receiver input and inverting driver output
33 to 36	VCC	Power Supply ranging from 4.7 to 7 Vcc, 310 mA; connected to internal power with a diode
37 to 40	GND	Connected to ground reference

Configuration header (JP3) [when present]

JP3 is used to select 'Configuration Mode Operation' or 'Bridge Mode Operation'. JP3 is a standard 3x1x2.54mm connector. This jumper settings allow to user to enter in configuration mode.

	<i>Signal Name</i>	<i>Description</i>
1	n.c.	Leave open
2	GND	Leave open
3	OP_MODE	OP_MODE signal. Tie to GND (jumper inserted between 2 and 3) to access configuration mode.

Operational modes

Anaheim WiFi can work in two operational modes: Bridge and Configuration.

Bridge mode is the default application mode that provides serial-to-TCP bridging as described in section "Overview" on page 5. Configuration mode allows the user to set communication parameters in order to make the bridge to work properly. User can switch from Bridge to configuration Mode in several ways depending on the specific model. For all models the default operational mode is the "bridge" one.

DAW1x

There are two ways to switch to configuration mode:

- 1) plug-in a jumper in JP3 header between pin 2 and 3 and then turn on the module
or
- 2) connect together pin 2 and 3 of JP2 and then turn on the module

To work in bridge mode Jumper JP3 may be inserted in position 1-2 or it may be left open.

DAW2x

There are two ways to switch to configuration mode:

- 1) plug-in a jumper in JP3 header between pin 2 and 3 and then turn on the module
or
- 2) tie at low level pin 27 of pin strip connector JP5 and then turn on the module.

To work in bridge mode (as default settings) pin 3 should be left open, since pin 27 is internally pulled-up.

Setting up your Anaheim WiFi module

Hardware connections

User is supposed to connect cables prior to setting up power supply.

Insert into the CompactFlash socket the wireless card.

RS232 connector (P1) (DAW11 only)

The RS232 connector (for DAW11 only) behaves as a DTE equipment (like a PC). For more details please see section "RS232/DB9 (P1) (DAW11 only)" on page 12. **WARNING:If serial connection is done with a wrong cable (modem versus null-modem) Anaheim module may be damaged.**

RS485 connector (JP2) (DAW12 only)

RS485 opposite signals A (+) and B(-) is available on a MSTBA 2.5/3-G-5.08 connector (for DAW12 type). User should extract the two A (+) and B(-) signals and GND signal from JP2 connector and connecting to the RS485 bus through a proper cross-wire cable. For further information about JP2 pinout , please refer to RS485/MSTBA (JP2) (DAW12 only) on page 13. Inverting the polarity will not damage the 485 device internally, but it will prevent the module to communicate on the RS485 bus.

Wireless link

After powering up the module, wireless interface will be initialized and it will try to establish the physical link with an access point or with another wireless terminal. The wireless initialization parameters can be changed as described in the following section.

When working in Infrastructure mode, the on-card led will blink during negotiation and will be on when the physical link is established.

Configurable parameters

There are two ways to set up the configurable parameters:

1. using the "Anaheim WiFi Configuration Program" - this requires that Anaheim WiFi module is running in Configuration Mode (see section "Operational modes" on page 16)
2. accessing the embedded web server.

Configuring with the "Anaheim WiFi Configuration Program"

"Anaheim WiFi Configuration Program" (AWCP for short) requires Microsoft Windows 95 or later.

To start the configuration session:

1. connect the serial port of Anaheim WiFi module to a serial port of the PC (the actual cable depends on the model; for example for model DAW11 you must use a null-model cable)
2. enable the configuration mode on Anaheim WiFi (see section "Operational modes" on page 16 for more details)
3. launch the "Anaheim WiFi Configuration Program" and select the COM port the module is connected to (see also figure 8)
4. power up the Anaheim WiFi module.

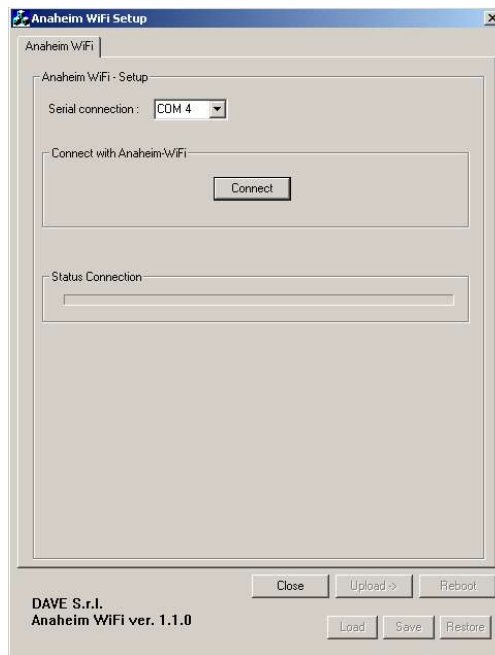


Fig. 8 - Serial connection

AWCP will establish the connection with the module and the configuration panels will be accessible. The fields will be populated with the current values stored in the Anaheim WiFi module. The panels are shown in figures 9, 10 e 11. The figures also show the factory settings.

The Load and Save buttons allow to load from and to save to a file the configuration respectively.

IP configuration

It is possible to change:

1. IP address: this is the static IP address when DHCP client is disabled;
2. Subnet mask: this is the subnet mask when DHCP client is disabled;
3. Default gateway: this is the gateway IP address when DHCP client is disabled;
4. IP address mode : when checked, enables the the DHCP client otherwise use the static IP address;
5. TCP bridge port: when acting as TCP server, this is the port the server will listen on; when acting as TCP client, this is the port the module will try to connect to. The allowable span of values ranges from 1 to 65535. Port 80 and 69 are excluded since they are devoted to *HTTP* and *TFTP* purposes.
6. TCP bridge inactivity timeout: this timeout starts when the TCP connection is established and it is retrigged every time data travel through the TCP-to-serial bridge. When it expires, the TCP connection is closed. *TCP bridge inactivity timeout* can be choosen in the set 10s, 30s, 1', 2', 5', 30', 1h, 6h, 12h. This parameter applies to Infrastructure/TCP server configuration only.
7. Client : when checked, enables the TCP client;
8. Server IP address : when the TCP client is enabled, this is the address of the TCP server Anaheim WiFi will try to connect to.

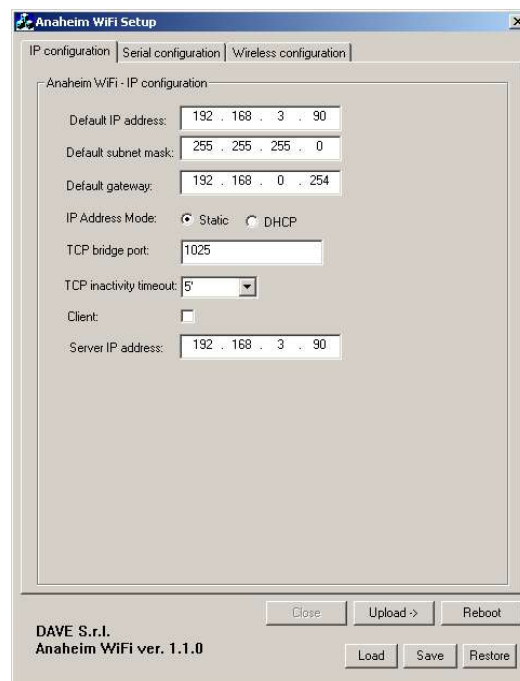


Fig. 9 - IP configuration

RS232/RS485 Serial Port configuration

User can change the following parameters (see also figure 10):

1. **Baud rate:** available options are 9600, 19200, 38400, 57600, 115200, 230400, 460800 and 921600 Bps.
2. **Data bits-Parity-Stop bits:** fixed in the set 8-N-1, 7-E-1 and 7-O-1. This set is congruent with the Ethernet "transparent" transmission mode of 8 bits data.
3. **Hardware handshake**¹: when checked, enables hardware handshake (RTS/CTS).
4. **End-Of-Frame optimization:** it is a common practice – when writing serial protocols based applications – to introduce the so called *End-Of-Frame* character that signifies to the receivers the end of a series of data (e.g. Carriage Return or ASCII 13). If the feature "End-Of-Frame optimization" is enabled, the serial server looks for the "End-Of-Frame character" and sends back immediately to the TCP port all data bytes received from the serial port. If the feature is disabled, data are transferred when buffer is full or – at least - after 100 ms.
5. **End-Of-Frame character:** the ASCII character monitored on the serial RX port for optimized TCP data transfer.

For configurations not available, please contact Technical Support.

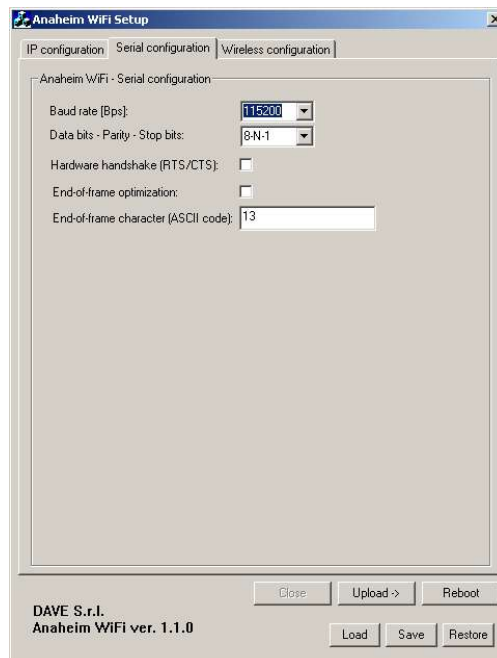


Fig. 10 - Serial configuration

¹ Models DAW11 and DAW23 only.

Wireless configuration

Available wireless parameters are the followings (see also figure 11):

1. Operating mode: fixed to 'Infrastructure' for communication with an Access Point or 'Ad-Hoc' for use Anaheim WiFi in point-to-point mode.
2. SSID: short for **service set identifier**, the SSID differentiates one WLAN from another, so all access points and all devices attempting to connect to a specific WLAN must use the same SSID. Leave field blank to use any SSID.
3. Channel: used only with Ad-Hoc mode, it defines the used channel for transmission. It is fixed in the range 1 to 14. When Ad-Hoc mode is selected, the wireless terminals must use the same channel.
4. Transmission Rate: choose one of the following values: 1, 2, 11 or Automatic [Mbit/s]. When Ad-Hoc mode is selected, the wireless terminals must use the same transmission rate.
5. AP density: used only for Infrastructure mode, it is fixed in the set Low, Medium or High.
6. WEP ON/OFF: it enables or disables the WEP (**Wired Equivalent Privacy**). For proper use of WEP, also select "Deny Unencrypted Data" and set Authentication to "Shared Key" when WEP is enabled.
7. WEP key length: the length of the used WEP key. It is fixed in 64 or 128 bit.
8. WEP key n: defines the WEP key number n.
9. Set the WEP Key: selects the number of the WEP key to use.
10. Set deny unencrypted data: enable it when WEP is used (disabled by default)
11. Set shared key authentication: enable it when WEP is used (disabled by default)

Applying changes

When you are happy with your settings, press the Upload button to store the settings in the Anaheim WiFi module. They will take effect after rebooting the device. To do that press the Reboot button.

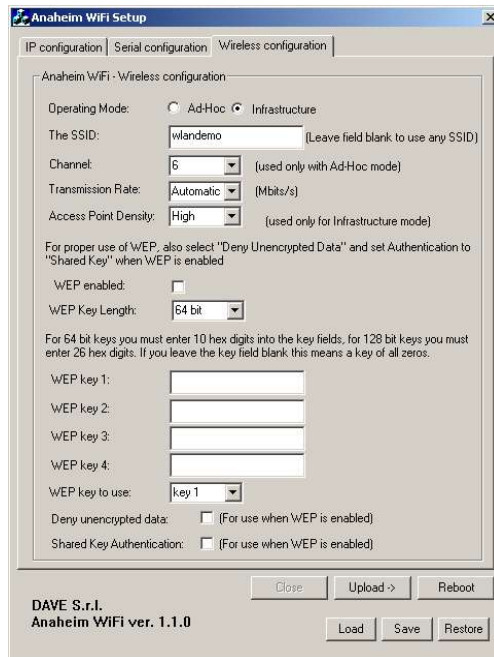


Fig. 11 - Wireless configuration

Restoring original configuration

By pressing the Restore button, the current configuration of the module will be restored.

Configuring through the embedded web server

Anaheim WiFi embeds a web server that can be used to configure it. The embedded web site pages can be viewed with standard web browsers. Access is protected by password. Factory setting password is empty.

The home page looks like following:

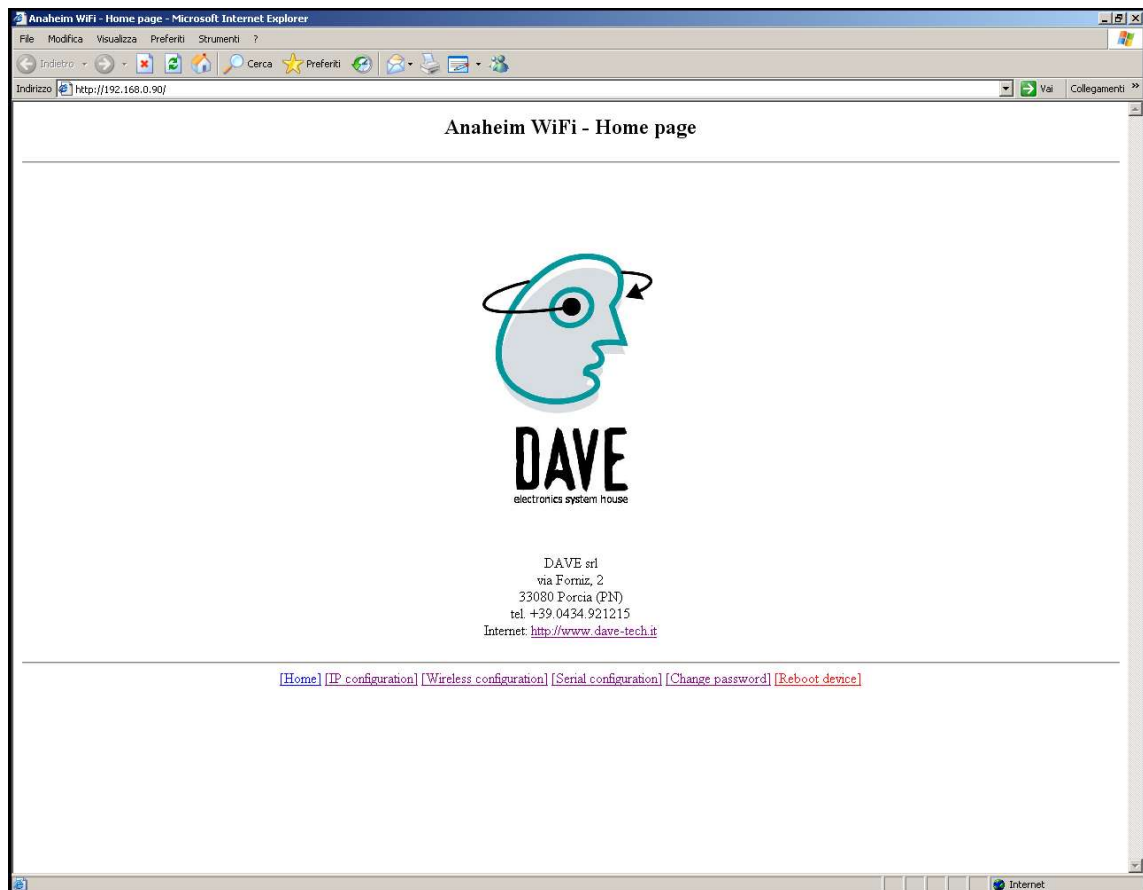


Fig. 12 - Home page of the embedded web site

The home page provides three links to the configuration pages: "IP configuration", "Wireless configuration" and "Serial configuration". These three pages are not shown but they resemble the three panels shown in figures 9, 10 and 11. For this reason please refer to section Configuring with the "Anaheim WiFi Configuration Program" on page 18 for the meaning of the configuration items. For each configuration page, when you are happy with the changes and you want to apply them you must press the OK button. This will redirect the browser to the following page:

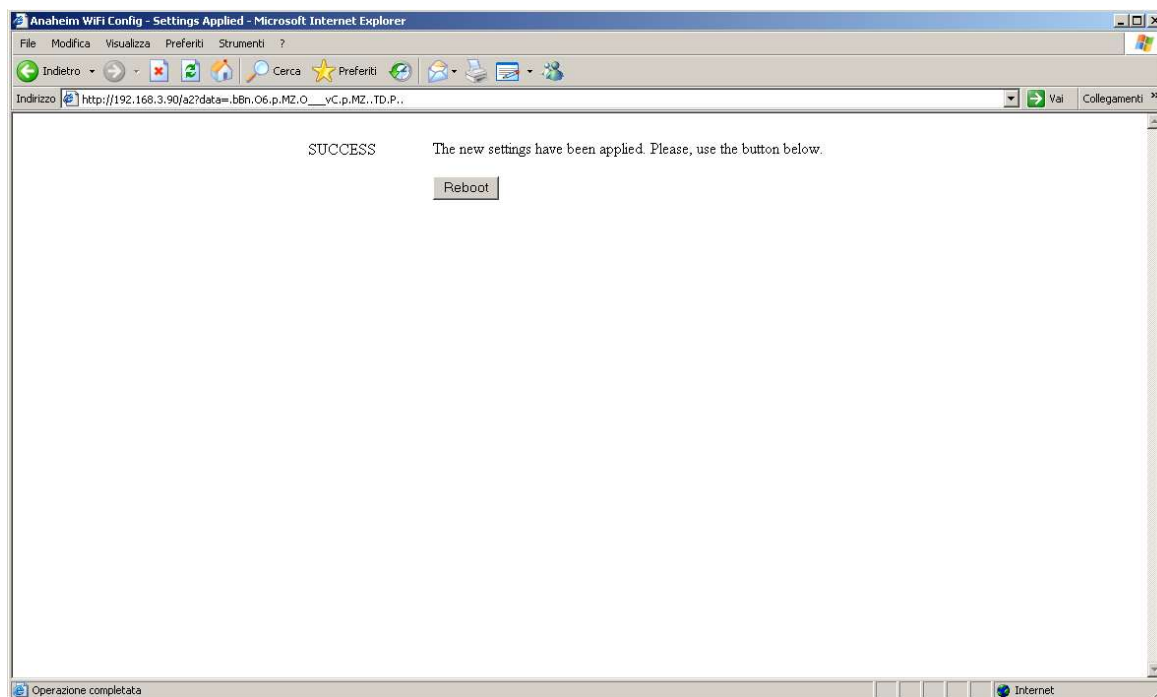


Fig. 13 - Applying changes through the embedded web server

By pressing the Reboot button the Anaheim WiFi module will reboot and the changes will take effect.

Password configuration

If the user wants to change the password, he must access the *Change Password* html page. The device must be rebooted to store the new password.

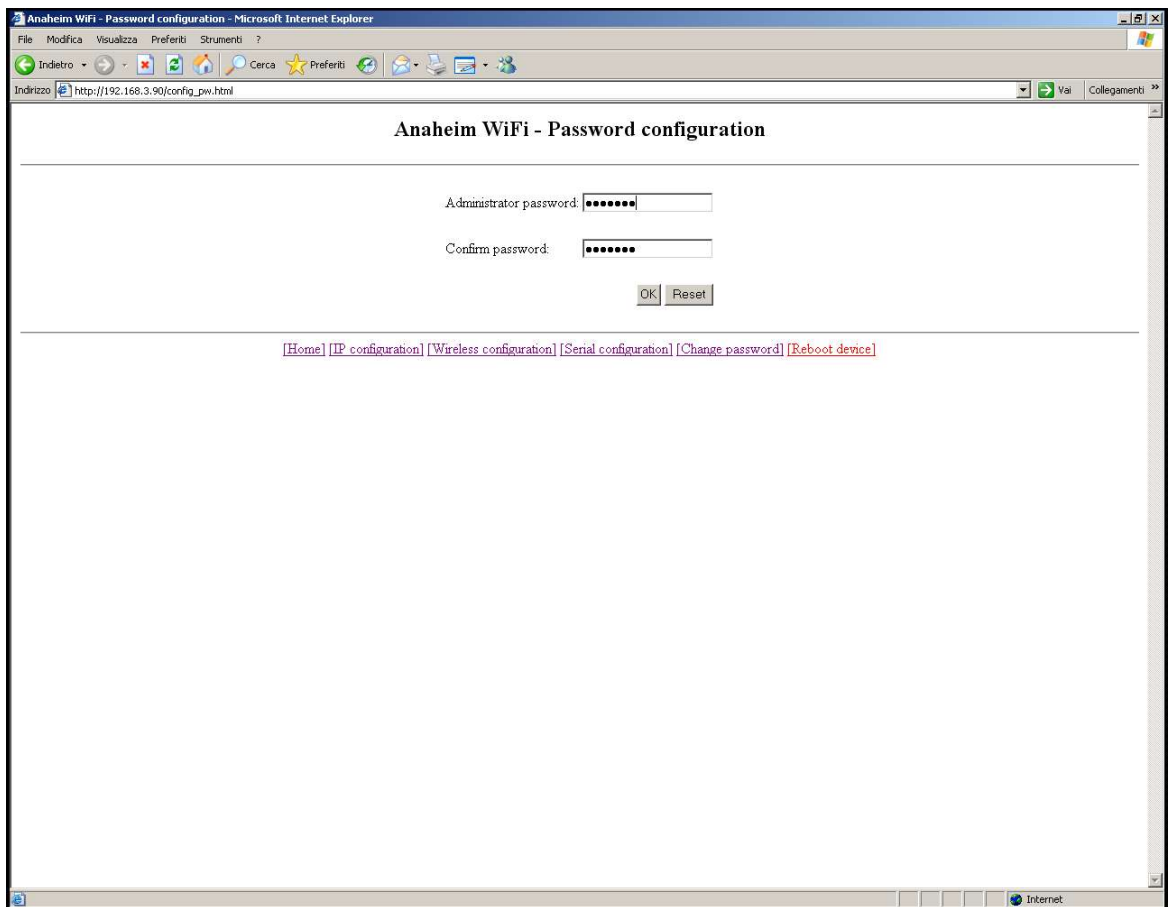


Fig. 14 - Password configuration

Heap

With this term we indicate the free dynamic memory available for the http web server purposes. Since the amount of heap is limited in such devices, the user should pay attention not to saturate the memory stack available. If it happens, the device cannot be reached via http connection until it will release all heap memory from connection closed. Wait for some seconds (1-10 seconds) then retry http request to get access again.

Tips and tricks

Direct TCP/IP port usage for legacy applications

With very low changes in the legacy application software, it is possible to *drive* Anaheim modules directly via TCP/IP port.

The only modification required is to change the low-level driver which sends and gets data to/from the COM port, replacing it with a low-level driver which sends/receives data to/from a TCP socket.

Visual Basic code example

Microsoft Visual Basic programming (VB) environment is an easy way to drive directly Anaheim module. It is possible to extend the event driven metaphor used in the serial COM port in the same way for the TCP/IP port data treatment.

To send data to a COM port in VB it is possible to write (for example):

```
MySerial.Output = dataString
```

where *MySerial* is the name of the MSComm control and *dataString* the data buffer to be sent.

Input data can be collected via *OnComm* event as in the following example:

```
Private Sub MySerial_OnComm()  
    Dim Char As String  
    Select Case MySerial.CommEvent  
        Case comEvReceive  
            Do  
                MySerial.InputLen = 1  
                Char = MySerial.Input  
                '... use data arrived from COM port (parsing byte-by-  
byte)  
                Loop While (MySerial.InBufferCount >= 1)  
            Case comEvSend  
            End Select  
    End Sub
```

In the same way for a TCP/IP Winsock control:

For sending data to a TCP/IP port in VB it is possible to write:

```
MyWinsock. SendData = dataString
```

where *MyWinsock* is the name of the Winsock control and *dataString* the data buffer to be sent.

Input data can be collected via *DataArrival* event as in the following example:

```
Private Sub MyWinsock_DataArrival(ByVal bytesTotal As Long)
    Dim Char As String, InputBuffer As String
    Dim I As Integer
    MyWinsock.GetData InputBuffer, vbString
    I = 1
    Do
        Char = Mid$(InputBuffer, I, 1)
        '... use data arrived from TCP port (parsing byte-by-byte)
        I = I + 1
    Loop While I <= Len(InputBuffer)
End Sub
```

The related error handler allows getting status info on connection and TCP/IP timeouts.

```
Private Sub MyWinsock_Error(ByVal Number As Integer, Description As String, ByVal Scode
As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long,
CancelDisplay As Boolean)
```

```
Select Case Number
    Case sckSuccess
        TCPstatus = TCP_CONNECTED
    Case sckConnectAborted, sckTimedout
        MsgBox "TCP Connection timeout !", vbOKOnly, "TCP link error"
        TCPstatus = TCP_CONNECTION_ERROR
    Case sckSocketShutdown
```

```
        MsgBox "TCP Connection shutdown !", vbOKOnly, "TCP link error"
        TCPstatus = TCP_CONNECTION_ERROR
    Case Else
        MsgBox Description + "!", vbOKOnly, "TCP link error"
        TCPstatus = TCP_CONNECTION_ABORTED
    End Select
    If    TCPstatus = TCP_CONNECTION_ERROR Or _
        TCPstatus = TCP_CONNECTION_ABORTED Then
        ' ... signal to the Application the TCP error
    End If
End Sub
```

Please refer to the VB documentation on opening TCP/IP ports and catching errors.

Hardware COM port redirector

Legacy software applications which can not be modified by the user, need to open a COM port in the PC for proper usage. In this case the COM2TCP software option can be provided from DAVE Srl sales department.

COM2TCP software uses two serial COM port in the PC for allowing connection to Anaheim. The first port is opened by the application software; the second port, linked externally to the first one by a null-modem cable, is opened in the COM2TCP window program and get data bytes which are redirected to the TCP port choosen. Refer to the COM2TCP User Manual for details on its use.

Software COM port redirector (Virtual COM)

Third party software can be bought in order to install a virtual COM port in your PC. Virtual COM is seen by the application as *real* hardware COM port and then opened and used normally.

Some softwares can open COM port limited in the COM1 to COM4 range. Be aware that in this case COM port from COM5 to COM255 cannot be used in the COM redirector installation setup.

References

1. Phoenix, mod. MSTBA 2.5/3-G-5.08
2. Molex 671550002

Contents

“ANAHEIM WiFi” User’s Manual	3
Trademarks.....	3
Copyright.....	3
Notice.....	3
Company Address	3
Overview.....	5
Examples.....	6
Product Specifications.....	8
Mechanical Specifications.....	9
Connectors.....	11
Power Supply (JP4) (DAW1x only).....	11
RS232/DB9 (P1) (DAW11 only).....	12
RS485/MSTBA (JP2) (DAW12 only).....	13
Pin-strip connector (JP5) (DAW2x only).....	14
Configuration header (JP3) [when present].....	15
Operational modes.....	16
DAW1x.....	16
DAW2x.....	16
Hardware connections.....	17
RS232 connector (P1) (DAW11 only).....	17
RS485 connector (JP2) (DAW12 only).....	17
Wireless link.....	17
Configurable parameters.....	17
Configuring with the “Anaheim WiFi Configuration Program”.....	17
Configuring through the embedded web server.....	22
Tips and tricks.....	26
Direct TCP/IP port usage for legacy applications.....	26
Visual Basic code example.....	26
Hardware COM port redirector.....	28
Software COM port redirector (Virtual COM).....	28
References.....	29
Contents.....	30