

Operating Manual

iWAP400



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Document Number **319888** (See Last Page for Revision Details)

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1 Introduction

The iWAP400 is an increased safety and encapsulated USB 1.1 or USB 2.0 compatible WiFi certified adaptor with an Intrinsically Safe RF output. It is designed to connect any PC with a USB port to a WLAN without the need for an external power supply (the PC provides the power).

The iWAP400 uses Ralink's RT2571+RT2528 chipset which includes a full set of drivers for all Windows operating systems, Linux and Macintosh 10.3/10.4. It operates in the 2.4GHz range with a bandwidth of up to 54Mbps and complies with 802.11b/g standards. Various wireless security options can be used depending on your current infrastructure and preference, including WEP and WPA encryption systems. It is also Cisco CCX v1.0, v2.0 and V3.0 Compliant.

The iWAP400 can be used within a current wireless network infrastructure, in Ad-hoc (peer to peer) mode, infrastructure mode or soft-AP mode. The iWAP400 is compatible with the iANT200 range of antennas and any other 50 Ohm 2.4Ghz antenna (other antennas must not be used in zone 1 without prior reference to Extronics).

2 Safety Information and Notes

2.1 Storage of this Manual

Keep this user manual safe and in the vicinity of the device. All persons who have to work on or with the device should be advised on where the manual is stored.

2.2 List of Notes

The notes supplied in this chapter provide information on the following.

- **Danger / Warning.**
 - Possible hazard to life or health.
- **Caution**
 - Possible damage to property.
- **Important**
 - Possible damage to enclosure, device or associated equipment.
- **Information**
 - Notes on the optimum use of the device

Warning	Installation to be completed by skilled electricians and instructed personnel in accordance with national legislation, including the relevant standards and, where applicable, in accordance with IEC 79.17 on electrical apparatus for explosive atmospheres.
Important	Before setting the units to work, read the technical documentation carefully.

Important	The latest version of the technical documentation or the corresponding technical supplements is valid in each case.
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Important	The technical data indicated on the iWAP400 rating plate, this manual and the ATEX certificate must be observed.
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Important	For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable regulations and provisions concerned with explosion protection (EN60079-0:2006, EN 60079-14:2003) as well as the Accident Prevention Regulations.
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Important	Changes in the design and modifications are not permitted.
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Important	The iWAP400 shall be operated as intended and only in undamaged and perfect condition.
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Important The iWAP400 must not be operated in ambient temperatures exceeding 60°C or below -20°C.

Important In Zone 1, only antennas which have been approved for use with the iWAP400 by Extronics may be connected.

Important In Zone 2, any antenna may be connected provided that it complies with the following conditions:

1. Any exposed metal parts of the antenna shall not contain, by weight, more than 7.5% by weight Magnesium or Titanium.
2. Any plastic coated antenna shall have a warning label fitted to it stating “WARNING – Potential electrostatic charging hazard. Wipe only with a damp cloth”

Important The installer **MUST** ensure that the USB cable has adequate mechanical protection to avoid damage to the wires. Failure to do so could cause shorts or exposure of non-insulated wires to potentially explosive environments.

Important Only antennas which comply with the conditions of safe use stated in section 2.2 may be used.

Important Do not exceed the Effective Isotropic Radiated Power (EIRP) regulations by your region of intended use. The RF output of the transceiver is limited to 67mW (18dBm)

Important The iWAP400 must not be stored or operated outside of its rated temperature range (-20°C to +60°C)

Important For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable regulations and provisions concerned with explosion protection (EN60079-0:2006, EN 60079-14:2003) as well as the Accident Prevention Regulations.

Caution The iWAP400 weighs approximately 1kg, ensure assembly is mounted using suitable fixtures.

3 Installation and Setting-to-Work

Great care must be taken when installing the iWAP400,

The iWAP400 has two connectors; there is an N-Type bulkhead for connection of an approved antenna, and a set of screw terminals inside the enclosure to allow the connection of a USB cable to the Ex e terminals of the PC.



Figure 1 iWAP400 outer view showing connections

3.1 Connecting the USB Cable

Information The USB standard states that the maximum cable length for USB 2.0 is 5m, and the maximum cable length for USB 1.1 is 3m. It is **HIGHLY** recommended to have the cable length as small as possible to ensure the device works correctly and reliably

Information Although the USB standard does not specifically allow it, tests performed by Extronics have shown that if the iWAP400 is used with high quality Category 6 cable (Cat-6) and the USB port used is USB 1.1, then up to 10m of cable can be used. If using a USB 2.0 port or standard the maximum cable length is that stated by the USB standards

To connect the USB cable to the iWAP400 the cover will need to be removed to gain access to the connectors. To remove the cover all four screws indicated above should be removed and the lid should then lift off.

Due to the iWAP400 being an Ex e/ Ex m device the clearances between the power and data lines must be adequately segregated within the hazardous area. For this reason Ex e approved screw terminals are used within the iWAP400. The USB cable should be fed through the cable gland, stripped to expose the 4 wires of the USB cable and outer sheath and terminated in bootlace ferrules. The ground drain wire should be sleeved. The crimped wires should then be placed into the corresponding screw terminal and securely screwed in place. The standard colour code of a USB cable is (D- = White, D+ = Green, GND = Black, V+ = Red). shows the screw terminals inside the enclosure and which wire each screw terminal corresponds with. The Earth screw terminal should be used to connect the outer

sheath of the USB cable. Once the cable is connected replace the lid and ensure the screws are securely fastened to provide a good seal, avoiding over tightening of the screws.

Important The installer **MUST** ensure that the USB cable has adequate mechanical protection to avoid damage to the wires. Failure to do so could cause shorts or exposure of non-insulated wires to potentially explosive environments.

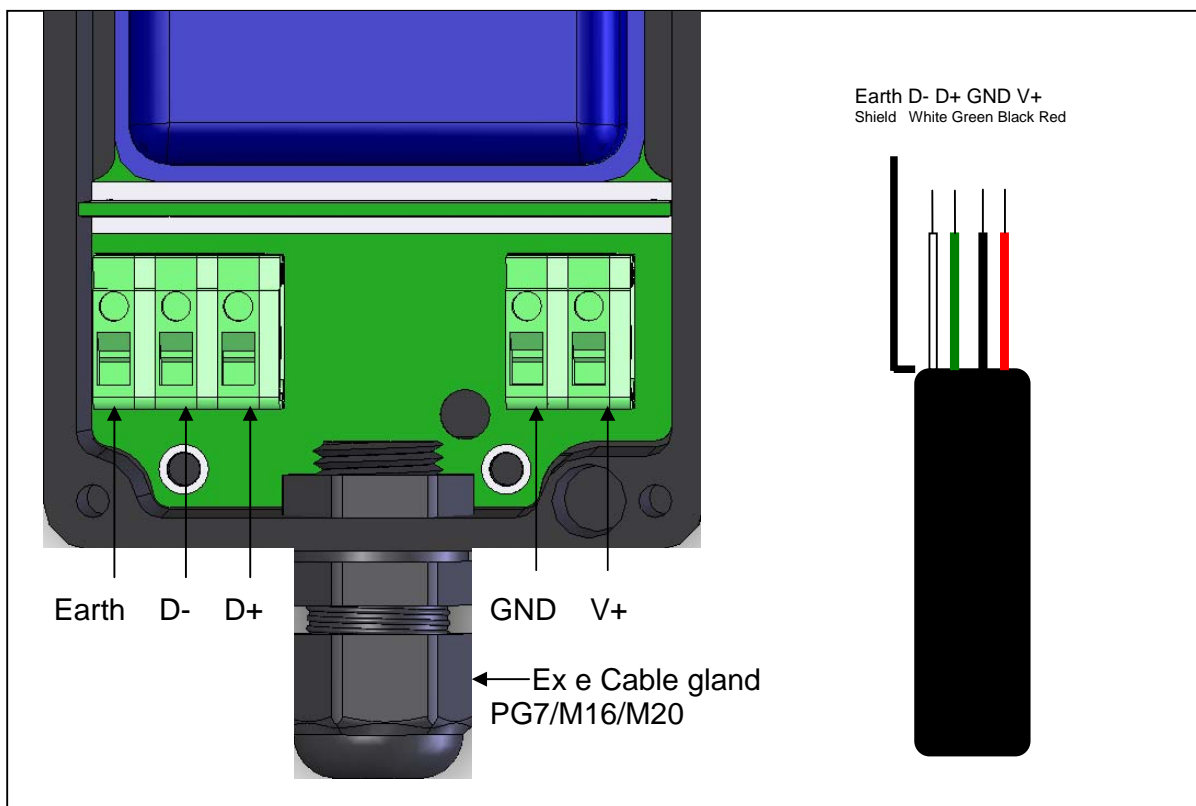


Figure 2 iWAP400 Ex e Terminals

3.2 Connecting the Antenna

A suitable antenna, approved by Extronics, will be required. This should have a cable terminated with a 50 Ohm N-Type male connector. To connect the antenna to the iWAP400 simply screw the N-Type connector of the antenna cable to the iWAP400 RF output connector.

Important Only antennas which comply with the conditions of safe use stated in section 2.2 may be used.

Important Do not exceed the Effective Isotropic Radiated Power (EIRP) regulations by your region of intended use. The RF output of the transceiver is limited to a maximum of 31.5mW (15dBm)

3.3 Connecting to the PC

Important	Ensure you have followed the instructions in 4.1 & 4.2 before proceeding with this section.
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The iWAP400 has an external earth stud which must be connected to an equipotential earth bonding point before being connected to the USB port of a PC. The unit also contains an internal earth terminal which may be connected to the equipotential earth (e.g. using the shield of the USB cable)

To connect the device to the PC terminate each of the 4 wires (V+, D+, D-, GND) to the USB terminal on your PC. See your manufacturer's instructions for the correct connection method.

3.4 Setting to Work

The iWAP400 is compatible with all Windows operating systems, Linux and Macintosh 10.3/10.4. The installation files for these operating systems can be found on the included driver CD. This section will only specify how to install the iWAP400 on a Windows operating system.

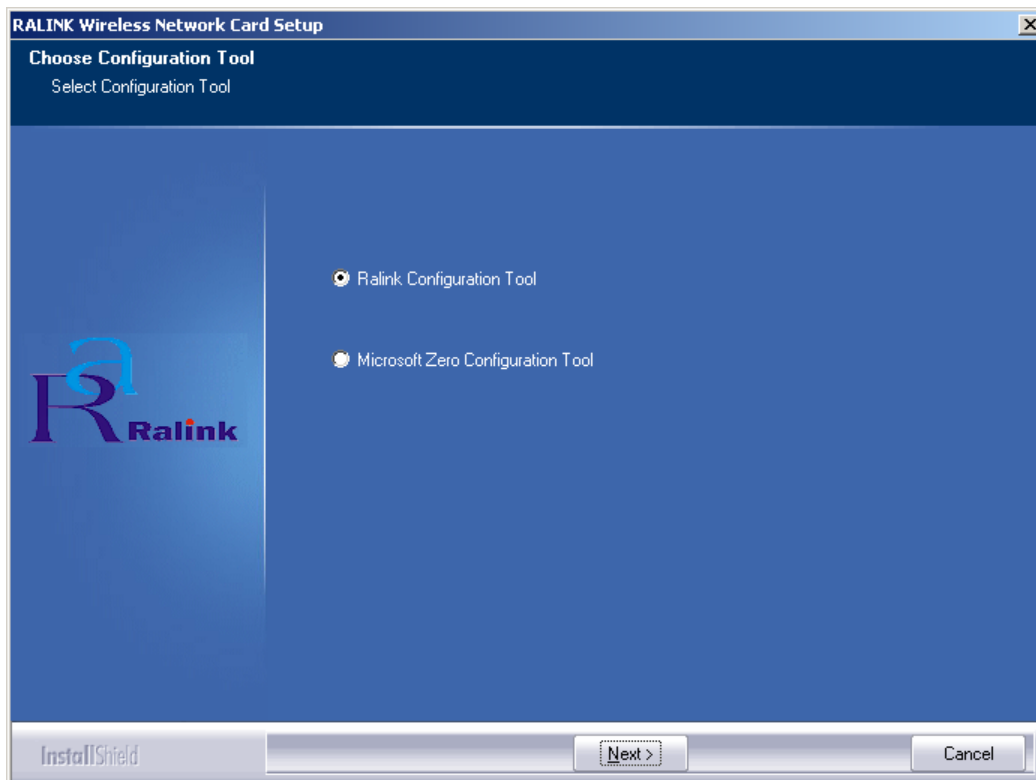
Warning	Never open and/or attach the iWAP400 in a hazardous area. Always perform any operations which require the removing of covers/wires in a safe area. Only the antenna may be disconnected in a hazardous area.
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Firstly ensure the iWAP400 is connected correctly as per instructions above. Once connected switch on the PC, when Windows has loaded you should be advised that new hardware has been detected as shown below. Click cancel on this screen and instead run the installation package, (located on the CD) which corresponds to your operating system.

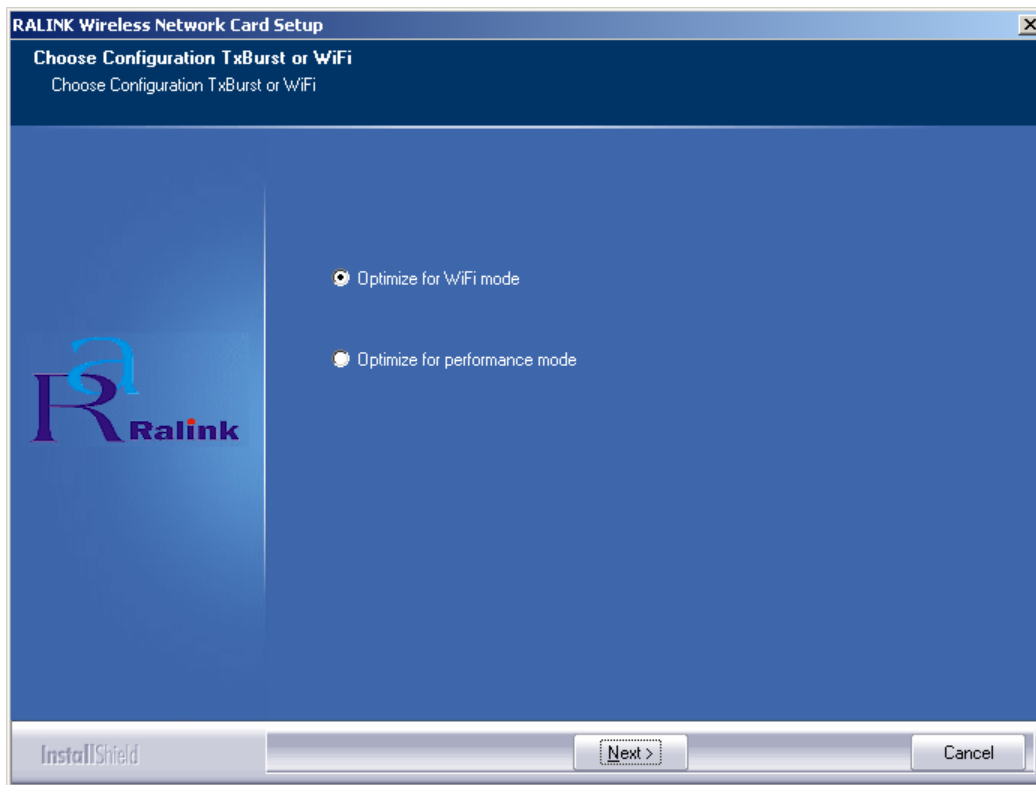
The iWAP400 may be used either with the Ralink configuration software or with the Windows 'Zero-config' utility. The Ralink software does not currently support multiple BSSIDs, whereas the Windows 'Zero-config' utility does.



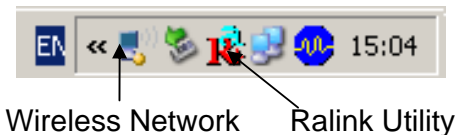
You will come to the screen below, this gives you the option of how you would like to configure the wireless network adaptor, selecting the Ralink configuration tool will allow you to use the Ralink software to setup or the iWAP400, or alternatively selecting the Microsoft option will allow you to use the built in Windows zero configuration utility.



The next screen allows you to choose the configuration option for the IWAP400, either select WiFi mode or performance mode (TxBurst), if in doubt leave the option selected as WiFi mode.



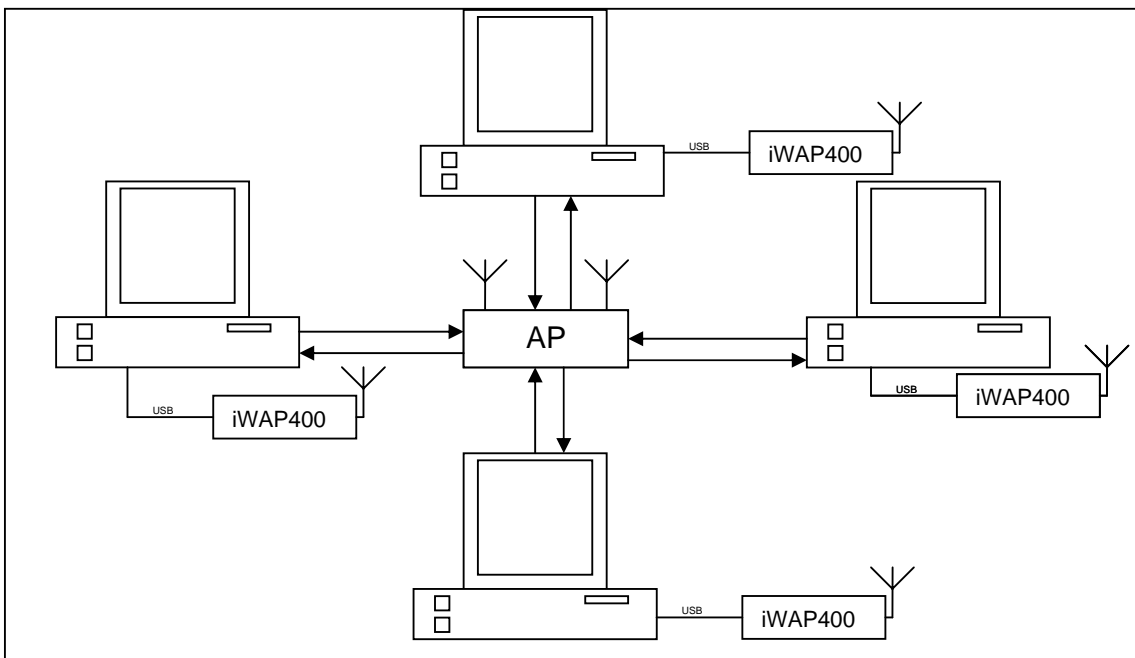
Clicking next will install the drivers, then click finish and the iWAP400 software and drivers should now be installed correctly. This will be indicated by a new wireless icon on the taskbar and the Ralink wireless utility icon also in the task bar



3.4.1 Setting Network Connections

There are various ways to connect to a WLAN using the iWAP400 - infrastructure, Ad-hoc or soft-AP.

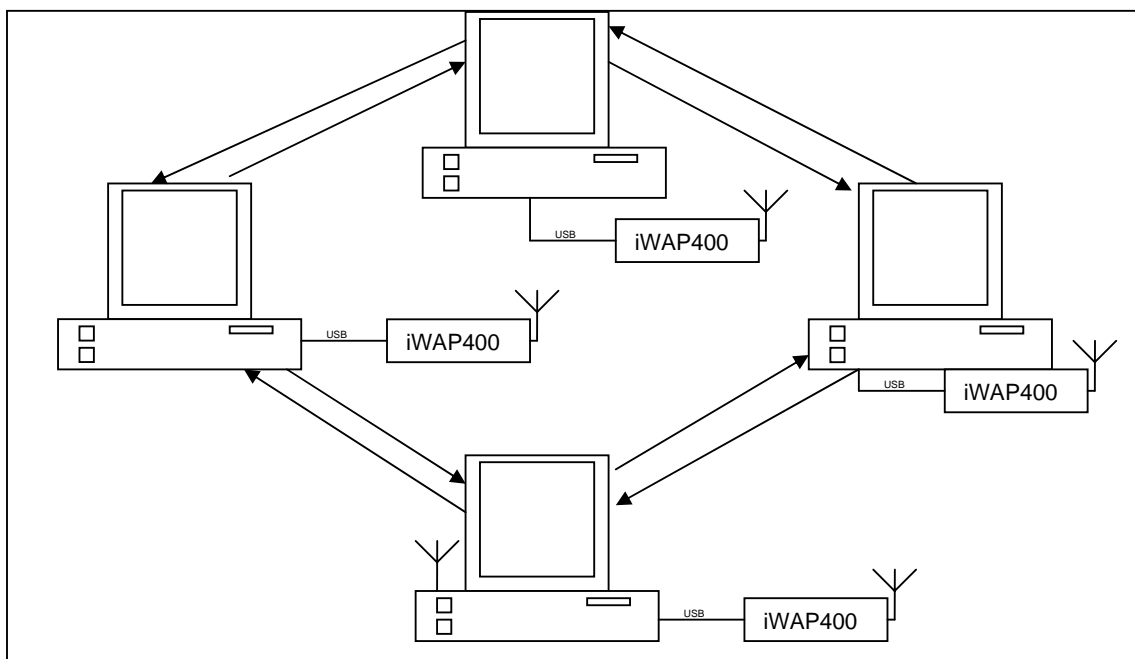
In infrastructure mode the IWAP400 connects to an access point located in its vicinity. To connect to an existing access point you may need to speak with your network administrator to obtain a security passkey, SSID name etc.



Infrastructure Network Connection

Ad-hoc mode is a peer to peer connection where each node will forward data on to other nodes within a network. This eliminates the need for an access point but can produce slow networks (among other disadvantages) if lots of peers try to connect.

Connecting through an access point can easily create a bridge between a wired network and wireless network. This is harder to achieve in Ad-Hoc mode as one node must be connected to the wired network and always switched on.

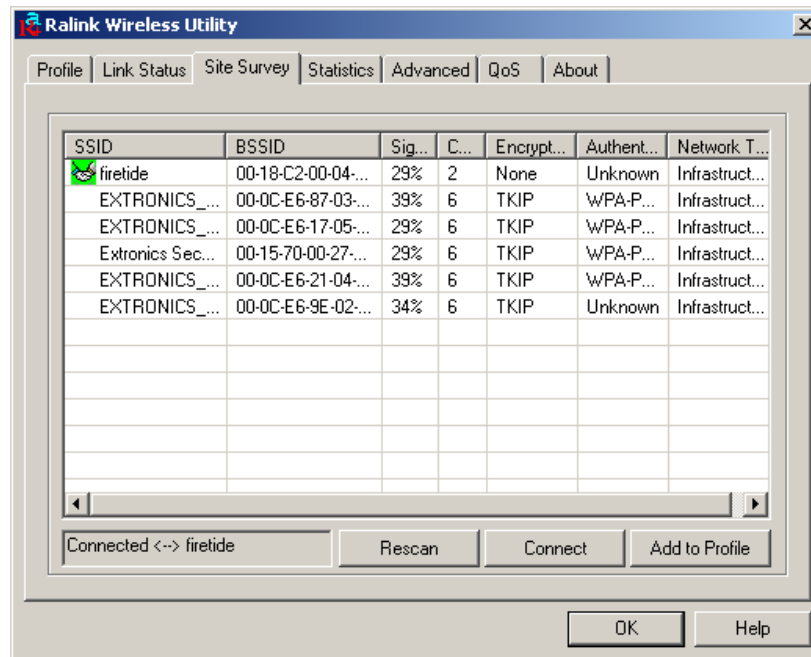


Ad-Hoc Network Connection

Soft-AP mode allows a PC with an iWAP400 connected to it, to be used as an access point. This is a good option if you wish to set up a temporary wireless network where all peers will communicate through the soft-AP. Using the iWAP400 as a soft-AP long term however, will consume more power than a standalone purpose built access point and likely have lower performance and data rates. Also the PC must always be on for the network to be able to operate.

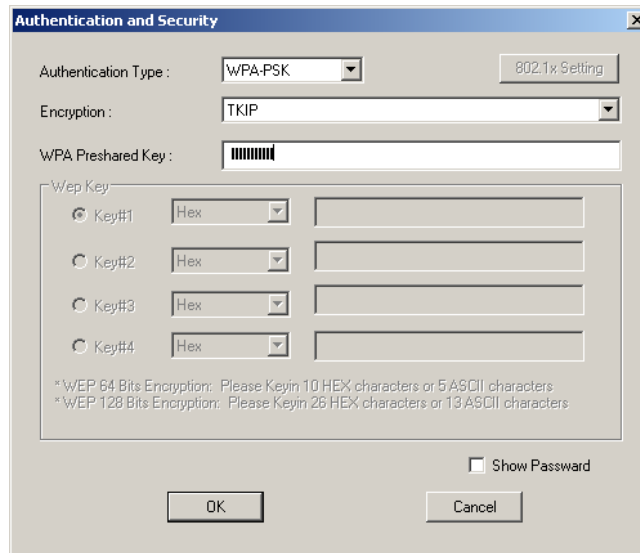
3.4.2 Using Ralink configuration tool

To open the network configuration for the iWAP400 double click on the Ralink icon. The following screen should be displayed.

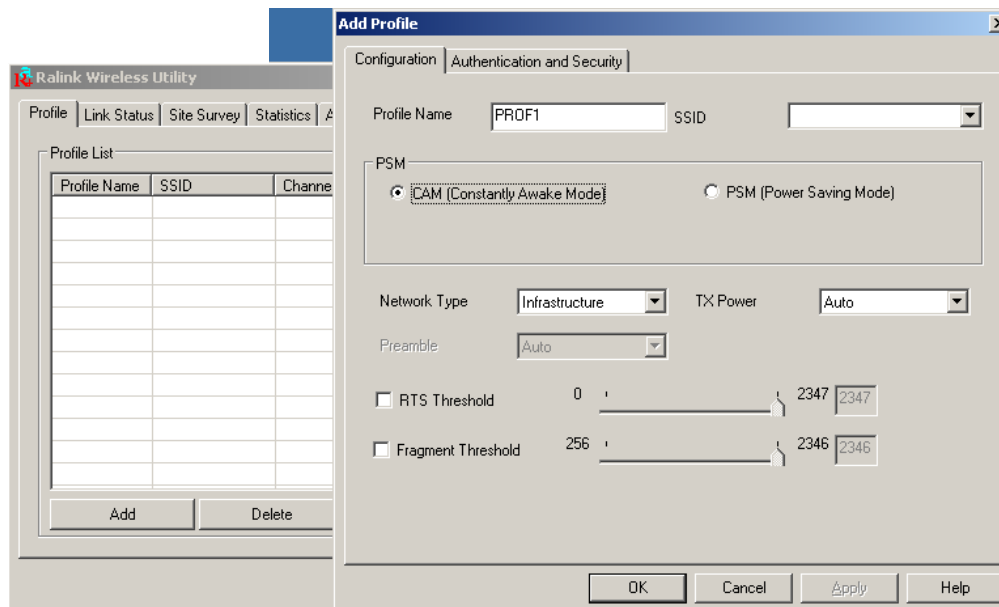


Site survey displays all available wireless networks within range of the iWAP400, and provides details on security options and network type etc.

To connect to the required network select it and click connect, if the network is encrypted with a security system you will be prompted to enter your security credentials.



The network you wish to connect to may not be displayed in this list if your network administrator has switched off SSID broadcasting. You can still connect to this network however, provided that you have obtained all required information from your network administrator, by clicking the profile tab, then clicking the add button and entering all the required information.



Information For more information on setting up the iWAP400 and information on what each Ralink configuration tool tab does, click the help button at the bottom of any tab. These help menus will provide all the information required to setup the iWAP400 correctly.

Information If you are using Microsoft's Zero Configuration utility please consult the documentation supplied with Windows for help on setting up a network.

4 Intended Purpose Usage

Important	Before setting the units to work, read the technical documentation carefully.
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Important	The latest version of the technical documentation or the corresponding technical supplements is valid in each case.
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The iWAP400 is built using modern components and is extremely reliable in operation; however it must only be used for its intended purpose. Please note that the intended purpose also includes compliance with the instructions issued by the manufacturer for installation, setting up and service.

Any other use is regarded as conflicting with the intended purpose. The manufacturer is not liable for any subsequent damage resulting from such inappropriate use. The user bears the sole risk in such cases.

4.1 Transportation and Storage

Important	The iWAP400 must not be stored or operated outside of its rated temperature range (-20°C to +60°C)
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4.2 Authorized Persons

Only persons trained in ATEX installations are authorized to handle the iWAP400; they must be familiar with the unit and must be aware of the regulation and provisions required for explosion protection.

4.3 Cleaning and Maintenance

The iWAP400 and all its components require no maintenance. All work on the iWAP400 by personnel who are not expressly qualified for such activities will cause the Ex approval and the guarantee to become void.

4.4 Safety Precautions

Important	For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable regulations and provisions concerned with explosion protection (EN60079-0:2006, EN 60079-14:2003) as well as the Accident Prevention Regulations.
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4.5 Cleaning and Maintenance Intervals

The iWAP400 should be cleaned only with cleaning products compatible with an epoxy powder-coated paint finish.

No maintenance of the iWAP400 is required, beyond the standard maintenance requirements for the user's site.

4.6 Aggressive substances and environments

The iWAP400 is not designed to come into contact with aggressive substances or environments, please be aware that additional protection may be required, such as installation inside a protective enclosure.

4.7 Exposure to external stresses

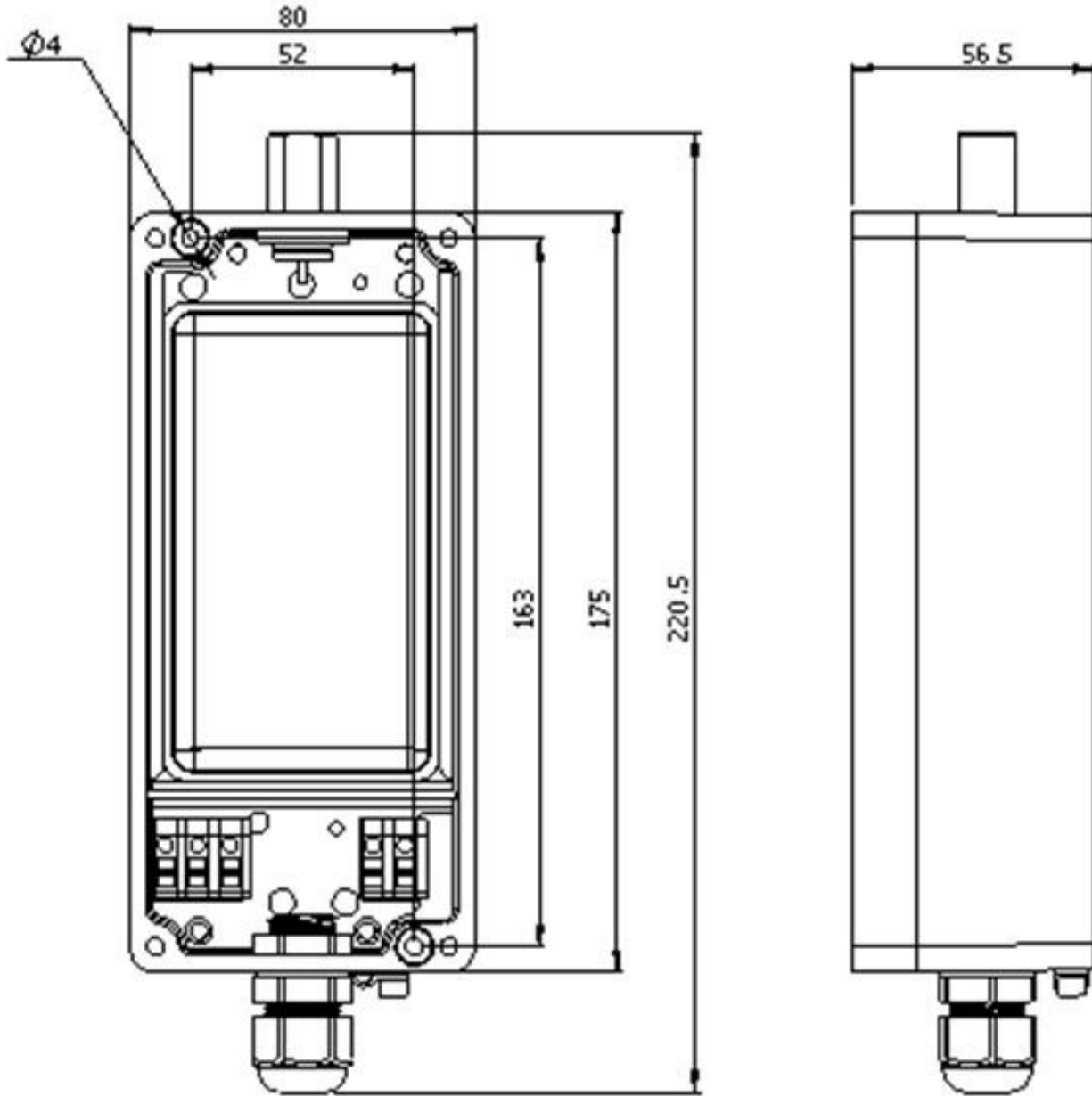
The iWAP400 is not designed to be subjected to excessive stresses e.g. vibration, heat, impact. Additional protection is required to protect against these external stresses.

5 Technical Data

5.1 Specifications

Power Supply	5 VDC \pm 5%, USB Power
Host Interface	USB 1.1 and USB 2.0
Maximum USB Cable Length	Standard Cable—USB 1.1 = 3m, USB 2.0 = 5m High Quality Cat-6—USB 1.1 = 10m, USB 2.0 = 5m
Power Consumption	Tx: <400mA Rx: <250mA
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps Note: The data rates above are only applicable if using a USB 2.0 port. If using a USB1.1 port the maximum throughput, using 802.11b or 802.11g, will typically be < 4Mbps at layer 3
Typical Receive Sensitivity	-80dBm @ 11Mbps -65dBm @ 54Mbps
Typical Transmit Power	CCK: 15dBm - 802.11b OFDM: 12dBm - 802.11g
Security Encryption and Authentication	WEP 64/128, TKIP, AES, WPA, WPA2, 802.11e, 802.11i security specifications, Advanced Encryption Standard (AES) IEEE802.1x client, QoS, WMM/Direct Link, Cisco CCX V1.0, V2.0 and V3.0 compliant (e.g. LEAP, EAP-FAST)
Modulations Technology	802.11b: DSSS Direct Sequence Spread Spectrum (CCK @ 11 and 5.5Mbps, DQPSK @ 2 Mbps) 802.11g: OFDM Orthogonal Frequency Division Multiplexing (64QAM @ 48 and 54 Mbps, 16QAM @ 24 and 36, QPSK @ 12 and 18 Mbps, BPSK @ 6 and 9 Mbps)
Network Standards	WECA (Wi-Fi @ WiFi5), IEEE802.11, IEEE802.11b, IEEE802.11g, IEEE802.11d, IEEE802.11f, IEEE802.11i, Cisco CCX V1.0, V2.0 and V3.0 compliant (e.g. LEAP, EAP-FAST)
Media Access Protocol	Carrier sense multiple access with collision avoidance (CSMA/CA)
Frequency Bands, Channels and Country Selections	802.11b/g global coverage
Network Architecture Types	Support for Ad-hoc, Infrastructure and soft-AP
Antenna	Choose from Extronics extensive range of approved antennas
Enclosure Material	Diecast Aluminium (powder coated)
Ingress Protection	IP66
Weight	Approx 1Kg
Ambient Temperature	-20°C to 60°C
ATEX Certification	II (1) G Ex e mb [ia] IIC T4
Certificate Number	EPSILON 07 ATEX 2316

5.2 Dimensions



6 ATEX Certificate

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CH1 6DD

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www.epsilonex.com




Epsilon



- 1 **EC - Type Examination Certificate**
- 2 Equipment intended for use in potentially explosive atmospheres
- 3 Certificate Number: EPSILON 07 ATEX 2316
- 4 Equipment: iWAP400
- 5 Manufacturer: Extronics
- 6 Address: Meridian House
Roe Street
Congleton, Cheshire, CW12 4PG, UK
- 7 This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
- 8 Epsilon, Notified Body number 1712 in accordance with Article 9 of the Council directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems for use in potentially explosive atmospheres given in Annex II to the directive

The examination and test results are recorded in confidential report no RETS(A)2577/A/1
- 9 Compliance with the applicable Essential Health and Safety Requirements has been assured by compliance with:

BS EN 60079-0: 2006, BS EN 60079-7: 2007, BS EN 60079-11: 2007, BS EN 60079-18: 2004
- 10 If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- 11 This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.
- 12 The marking of the equipment shall include the following:

 II (1) G Ex emb [ia] IIC T4 (-20°C ≤ T_{amb} ≤ 60°C)



On behalf of Epsilon

S D'Henin
Director

Date: 29 January 2008

Certificate 07 ATEX 2316



This certificate may only be reproduced in its entirety and without any change, schedule included.
The certificate is only valid when it carries an original signature and holographic security label.
For help or assistance relating to this certificate, contact cs@epsilonex.com.

Epsilon Compliance Services Limited is a trading name of Epsilon Technical Services Limited



Epsilon Compliance Services
Deeside Lane, Chester
CH1 6DD

Tel: +44 (0)1244 882590
Fax: +44 (0)1244 882599
www.epsilonex.com



13 Schedule

14 Certificate Number: EPSILON 07 ATEX 2316

15 Description of Equipment or protective system

The iWAP400 is an USB compatible 'WiFi certified' adaptor. It has an encapsulated circuit board inside in a metal enclosure, power is via the USB interface at 5.0V and 500mA. ATEX safety concepts used are encapsulation 'm', increased safety 'e' and an intrinsically safe 'i' RF output.

The intrinsically safe output electrical characteristics are:-

$$U_o = 8.10V$$

$$I_o = 2.96A \text{ (transient)}$$

The equipment has an ingress protection rating of IP54.

16 Descriptive Documents

16.1 Report No: RETS(A)2577/A/1

16.2 Drawings:

Number	Sheet	Date	Issue	Description
319383	1 to 2	26/11/2007	REL01	iWAP400 GA
319900	1 of 1	31/10/2007	1	iWAP400 ATEX Label Drawing
319156	1 of 1	31/10/2007	01	iWAP400 USB protection circuit schematic
319362	1 to 13	01/11/2007	01	iWAP400 PCB Main Board PCB Layout
319307	1 of 1	31/10/2007	01	Bill of Materials for iWAP400
319959	1 of 2	06/11/2007	01	iSOLATE200 Schematic
319962	1 of 1	06/11/2007	01	iSOLATE200 PCB Layout
319960	1 of 1	06/11/2007	01	Bill of Materials for iSOLATE200

17 Conditions of Certification

17.1 Special Conditions for Safe Use
None

17.2 Conditions for Use
None

18 Essential Health and Safety Requirements

Essential Health and Safety Requirements not covered by section 9:
Are covered by manufacturer's instructions.

The manufacturer shall inform the notified body of any modifications to the design of the product described by this schedule

Certificate 07 ATEX 2316

This certificate may only be reproduced in its entirety and without any change, schedule included.
For help or assistance relating to this certificate, contact cs@epsilonex.com.

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7 EC Declaration of Conformity



Specialists for intrinsically safe
& explosion proof equipment

EC Declaration of Conformity

Extronics Ltd, Meridian House, Roe street, Congleton, CW12 1PG UK

Declare under sole responsibility that the product;

iWAP400 Zone 1 USB WiFi Adapter

Certification:

To which this declaration relates is in accordance with the provision of the following directives

94/9/EC Equipment and protective systems intended for use in potentially explosive atmospheres.

93/465/EC EMC Directive

And is in conformity with the following standards or other nominative documents

EN60079-0:2006 Electrical apparatus for explosive gas atmospheres - General requirements

EN60079-7:2007 Electrical apparatus for explosive gas atmospheres - Increased safety 'e'

EN60079-18:2004 Electrical apparatus for explosive gas atmospheres - Construction, test & marking of type 'm'

EN60079-11:2007 Explosive atmospheres - Equipment protection by intrinsic safety 'I'

EN55022:2006 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

EN55024:1998 Information technology equipment - Immunity characteristics - Limits and methods of measurement

EN61000-3-2:2006 Electromagnetic compatibility (EMC). Limits for harmonic current emissions

EN61000-4-2:1995 Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test. Basic EMC publication

EN61000-4-3:2006 Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test

EN610000-4-4:2004 Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrical fast transient/burst immunity test

EN61000-4-6:1996 Electromagnetic compatibility (EMC). Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields

Signed:

Date: 22/11/07

Nick Saunders
Technical Service Manager

8 Manual Revision

Revision	Description	Date	By
01	Initial Release For ATEX Certificate.	01/11/2007	AJR
02	Change IP Rating to IP54.	14/01/2008	AJR
03	Change IP Rating to IP66, amended RF output power, added notes about cable length.	15/06/2009	AJR
04	General update, added ATEX certificate & EC D of C documents.	12/02/10	NE
05	Dimension information added	14/07/10	NE