



BreezeMAX™ CPEs

Product Manual

PRELIMINARY

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P/N**

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FCC Radiation Hazard Warning

Base Station - To comply with FCC RF exposure requirements in Section 1.1307 and 2.1091 of FCC Rules, the antenna used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meter from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Indoor CPE - To comply with FCC RF exposure requirements in Section 1.1307 and 2.1091 of FCC Rules, the antenna used for this transmitter must be kept at a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Outdoor CPE - To comply with FCC RF exposure requirements in Section 1.1307 and 2.1091 of FCC Rules, the antenna be used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 120 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

R&TTE Compliance Statement

This equipment complies with the appropriate essential requirements of Article 3 of the R&TTE Directive 1999/5/EC.

Safety Considerations - General

For the following safety considerations, "Instrument" means the BreezeMAX units' components and their cables.

Caution

To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

Line Voltage

Before connecting this instrument to the power line, make sure that the voltage of the power source matches the requirements of the instrument.

Radio

The instrument transmits radio energy during normal operation. To avoid possible harmful exposure to this energy, do not stand or work for extended periods of time in front of its antenna. The long-term characteristics or the possible physiological effects of radio frequency electromagnetic fields have not been yet fully investigated.

Outdoor Units and Antennas Installation and Grounding

Ensure that outdoor units, antennas and supporting structures are properly installed to eliminate any physical hazard to either people or property. Make sure that the installation of the outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes. Even where grounding is not mandatory according to applicable regulation and national codes, it is highly recommended to ensure that the outdoor unit and the antenna mast (when using external antenna) are grounded and suitable lightning protection devices are used so as to provide protection against voltage surges and static charges. In any event, Alvarion is not liable for any injury, damage or regulation violations associated with or caused by installation, grounding or lightning protection.

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Disposal of Electronic and Electrical Waste

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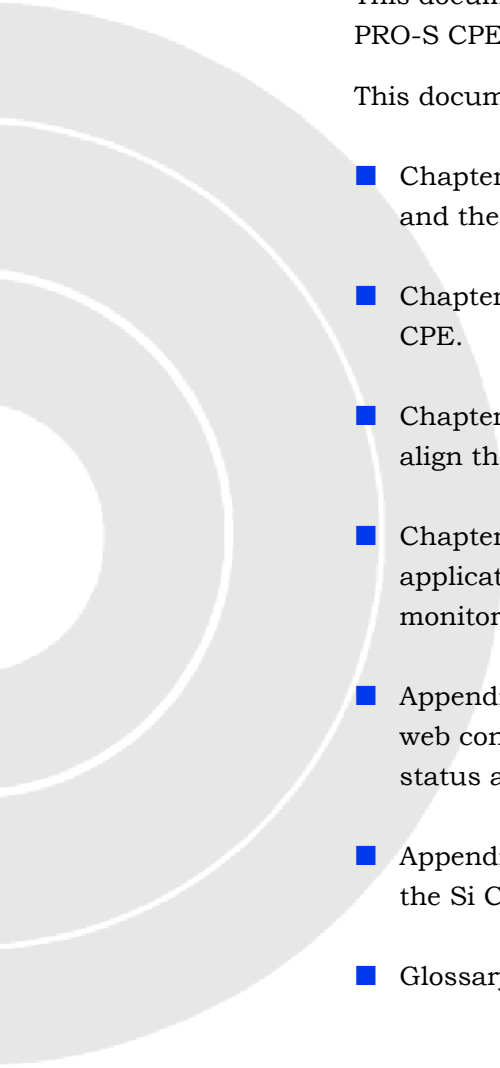
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About This Manual

This document describes and explains how to install and manage the BreezeMAX PRO-S CPE and Si CPE, Subscriber Units using SW Version 4.1.1.

This document contains the following chapters:

- Chapter 1 - Product description: Describes the PRO-S CPE and the Si CPE, and their specifications.
 - Chapter 2 - Installation: Describes how to install the PRO-S CPE and the Si CPE.
 - Chapter 3 - Commissioning: Describes how to configure basic parameters, align the antenna (where applicable) and validate unit operation.
 - Chapter 4 - Operation and Administration: Describes how to use the Monitor application for configuring parameters, checking system status and monitoring performance.
 - Appendix A - The Web Configuration Server: Describes how to use the SU's web configuration application for configuring parameters, checking system status and monitoring performance.
 - Appendix B - Si CPE Troubleshooting: Provides troubleshooting guidelines for the Si CPE.
 - Glossary - A listing of commonly used terms.
- 



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Chapter 1 - Products Description

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- “Introducing BreezeMAX PRO-S CPE” on page 4
- “Introducing BreezeMAX Si CPE” on page 6
- “Voice and Networking Gateways” on page 7
- “PRO-S CPE Specifications” on page 11
- “Si CPE Specifications” on page 16

1.1 BreezeMAX CPEs

The WiMAX-compatible PRO-S CPE and Si CPE Subscriber Units (SUs) are powered by Intel's WiMAX Connection 2250 chip. BreezeMAX CPEs serve as an efficient platform for a wide range of services, providing bridge functionality and supporting up to 512 MAC addresses.

BreezeMAX CPEs are currently available in the 2.3 GHz (WCS), 2.5 GHz (MMDS and MCS), 3.3 GHz and 3.5 GHz frequency bands.

BreezeMAX CPEs support dual operation modes, enabling detection of the protocol used in the wireless link (APD) and automatic switching between FDD and TDD operation modes provided they hold the appropriate SW versions (applicable only to CPEs in the 3.x GHz bands where both operation modes are supported).

Table 1-1: CPEs Frequencies

Band	TDD Frequencies	FDD Frequencies
2.3 GHz	2300 - 2360 MHz (2305 - 2360 MHz in Si CPE)	Not Applicable
2.5 GHz	2496 - 2690 MHz	Not Applicable
3.3 GHz (PRO-S only)	3300 - 3400 MHz	Uplink: 3366 - 3400 MHz Downlink: 3316 - 3350 MHz (Duplex Separation: 50 MHz)
3.5 GHz	3399.5 - 3600 MHz	Uplink: 3399.5 - 3500 MHz Downlink: 3499.5 - 3600 MHz (Duplex Separation: -100 MHz)

Configuration and performance monitoring of the unit can be performed using any of the following options:

- Remotely by the Base Station, where the Base Station is managed using either the Monitor program or SNMP.
- Locally via the Ethernet port, using Telnet to access the Installer Monitor program.
- Using a PC/Notebook or a PDA/Pocket PC with an http browser to access the built-in web configuration server.

- For the Self-Install Si CPE, several tools that support easy installation by non-professional users are available to support various business models. These include:
 - ◇ A user-friendly WiMAX Modem Application designed for the non-professional end user provides easy to follow installation instructions. The application includes pre-configuration of most of the relevant parameters, which are automatically loaded into the unit. It guides the user to enter the required credentials (User Name and Password) and optionally select the proper location. The application also includes simple but efficient performance monitoring tools to support easy identification of possible problems.
 - ◇ An optional Smart Card, that may be supplied either together with the unit or separately, can include all relevant configuration details, including location and end user specific parameters.
 - ◇ The unit may also be pre-configured prior to shipment to the end user, including all location and end user specific parameters.

1.2 Introducing BreezeMAX PRO-S CPE

The PRO-S CPE comprises an Outdoor Unit (ODU) and an Indoor Unit (IDU).

The ODU includes the modem, radio, data processing and management components of the SU. It also includes an integral high-gain flat antenna (SA models) or a connection to an external antenna (SE models), as described in Table 1-2. “L” (Limited Performance) models of the CPEs support a limited overall throughput of 2 Mbps maximum. These L-models can be upgraded to support maximum throughput through a suitable license. The ODU connects to the IDU and to the user's equipment through a 10/100BaseT Ethernet port.



Table 1-2: PRO-S CPE ODU Types

ODU Type	Description
BMAX-CPE-ODU-PRO-SA-x.x	Subscriber Outdoor Unit with an integrated vertical/horizontal polarization antenna.
BMAX-CPE-ODU-PRO-SE-x.x	Subscriber Outdoor Unit with a connection to an external antenna.
BMAX-CPE-ODU-PRO-L-SA-x.x	Subscriber Outdoor Unit with an integrated vertical/horizontal polarization antenna. The unit's total throughput is limited to 2 Mbps maximum.
BMAX-CPE-ODU-PRO-L-SE-x.x	Subscriber Outdoor Unit with a connection to an external antenna. The unit's total throughput is limited to 2 Mbps maximum.

* x.x indicates the radio band: 2.3, 2.5, 3.3 or 3.5

The indoor unit is powered from the mains and connects to the ODU via a Category 5E Ethernet cable carrying the Ethernet data between the two units, as well as power (-54 VDC) and control signals to the ODU and status indications from the ODU.

There are several types of indoor units:

- The BMAX-CPE-IDU-1D is the basic IDU, functioning as a simple power supply and interface unit with a 10/100BaseT Ethernet port that connects to the user's equipment.
- The IDU-NG-4D1W Wireless Networking Gateway IDU provides advanced routing capabilities and can also serve as a Wireless LAN Access Point.



- The IDU-1D1V and IDU-1D2V SIP Voice Gateway IDUs provide one or two telephony ports and include a backup battery to ensure uninterrupted service during power outages. The IDU-1D1V and IDU-1D2V are available with either RJ-11 or Terminal Board telephone connection(s).

To facilitate the configuration process, antenna alignment and performance monitoring during installation/testing, a special Y-cable is available. This enables connecting a Notebook or a PDA directly to the ODU for fast and easy completion of all the necessary operations.

A miniature SU Alignment Unit (SAU), that includes signal strength and status indicators, is also available to support easy and convenient antenna alignment and status verification.

1.3 Introducing BreezeMAX Si CPE

The Self Install Si CPE is a compact Subscriber Unit (SU) that is intended for indoor installations.

The Si CPE includes embedded capabilities and supplementary tools that support easy installation by a non-professional user, supporting fully automated network-entry, authentication and services provisioning. The Base Station equipment and the Si CPE also include advanced capabilities that significantly increase the link budget in both directions to ensure optimal performance in indoors installations, providing a highly effective solution for self-installation by end-users.



The Si CPE includes 6 internal antennas providing full 360° coverage, and a connection to an optional wall/window detached antenna. The Si CPE connects to the end-user equipment through either a 10/100 BaseT Ethernet interface (E model) or a USB interface (U model).

1.4 Voice and Networking Gateways

The following Gateways are currently available from Alvarion:

- IDU-NG-4D1W: A Networking Gateway with advanced routing capabilities that serves also as an IDU for the PRO-S CPE, supporting 4 data ports and 1 Wireless LAN port.
- VG-1D1V: A stand-alone (external) H.323 or SIP Voice Gateway, connecting to the Ethernet port of the CPE and supporting 1 data port and 1 POTS port.
- VG-1D2V: A stand-alone (external) H.323 or SIP Voice Gateway, connecting to the Ethernet port of the CPE and supporting 1 data port and 2 POTS ports.
- IDU-1D1V: A SIP Voice Gateway with battery backup that serves also as an IDU for the PRO-S CPE, supporting 1 data port and 1 POTS port. Available with either RJ-11 or Terminal Board telephone connection.
- IDU-1D2V: A SIP Voice Gateway with battery backup that serves also as an IDU for the PRO-S CPE, supporting 1 data port and 2 POTS ports. Available with either RJ-11 or Terminal Board telephone connections.

These Gateways incorporate an advanced protocol (DRAP) for automatic registration and allocation of wireless link resource.

In addition, the optional Service Residencial Unit (SRU) acts as a bridge between the Si CPE and the subscriber's LAN, with two POTS ports providing SIP based VoIP services and a battery backup for both the SRU and the Si CPE.

Details on installing, managing and using the Voice Gateways, the Wireless Networking Gateway and the SRU are provided separately in the relevant manuals.

1.4.1 DRAP (Dynamic Resources Allocation Protocol)

DRAP is a protocol based on IP/UDP between the Gateway (installed behind the SU) and the BreezeMAX system. The protocol provides an auto-discovery mechanism for the Gateway, so no specific configuration is required and the Gateway can automatically locate and register with the BreezeMAX base station. The protocol uses a few simple messages enabling a Voice Gateway to request resources when calls are made, and the BreezeMAX to dynamically allocate them.

Using the DRAP solution has the following advantages:

- Maintain telephony toll quality over the wireless network - dynamically allocate Continuous Grant (CG) connections for active calls, maintaining the QoS and low jitter needed for toll-quality voice services.
- Allocate Continuous Grant dedicated bandwidth only for the duration of the call - the air resources are allocated and released according to the DRAP messages, which are based on the VoIP signaling. This dynamic allocation ensures efficient use of the air resources.
- Prevent callers from placing calls if a sector is overloaded - the operator can control and limit the maximum number of concurrent calls per wireless sector and per end user voice gateway. Thus, the operator has complete control of its network and the resources in it.
- Automatic support of Codec changing in a VoIP call - the DRAP messages update the BreezeMAX equipment on any Codec change or subsequent bandwidth allocation change during the call, hence the exact required bandwidth is always provided. This is essential in fax transmissions where the call might begin with one Codec and switch to another to accommodate the fax transmission.
- VoIP stack is always in synch with the wireless transport - as the DRAP is integrated into the VoIP stack all calls are terminated according to the VoIP standard. Even if no resources are available, the voice gateway receives an appropriate message from the BreezeMAX system and sends the required signaling message according to the VoIP standard used.

1.4.2 IDU-NG-4D1W Wireless Networking Gateway IDU

Alvarion's Wireless Networking Gateway enables operators and service providers using Alvarion's BWA system to provide subscribers with a number of broadband services transparently.

The Wireless Networking Gateway IDU together with the SU-ODU comprises an SU that provides data connections to the Base Station. The four 10/100Base-T Ethernet ports connect to the user's data equipment, providing comprehensive routing



functionality and supporting various security features. User's data equipment equipped with either IEEE 802.11b (11M) or IEEE 802.11g (54M) compatible wireless adapters can connect to the unit via its built-in Wireless LAN port, functioning as an Access Point.

The Wireless Networking Gateway IDU is powered from the mains and connects to the ODU via a Category 5E Ethernet cable. This cable carries the Ethernet data between the two units as well as power (54 VDC) and control signals to the ODU. It also carries status indications from the ODU.

The Wireless Networking Gateway is designed for remote management and supervision using either the built-in internal web server or SNMP.

The Wireless Networking Gateway is easily updated and upgraded as it supports remote software and configuration file download.

1.4.3 VG-1D1V and VG-1D2V Voice Gateways

Alvarion's Voice Gateways enable operators and service providers to offer end users a combination of IP-telephony and broadband data services.

IP-telephony services are supported for standard analog phones or G3 fax machines. The VG-1D1V has a single POTS interface, and the VG-1D2V has two POTS interfaces. The Voice Gateways is built on the H.323 and SIP standards and support both narrow (compressed) and wideband (uncompressed) speech codecs, silence suppression with comfort noise, line echo cancellation and regional telephone parameters. Class 5 services such as call waiting and 3-party call are also supported.



Up to 3 telephones can be connected in series to each telephone port. Daisy chaining of Voice Gateways enables the service provider to offer certain end users, for example small offices, additional telephone numbers.

The Voice Gateway also supports Internet access or any other Ethernet based services. The unit can be installed behind a router/NAT due to NAT traversal support allowing signaling as well as voice packets to correctly reach Softswitch or Gatekeeper for bi-directional call initiations. The Gateway can handle up to 16 simultaneous VLANs, enabling the operator to offer different services to different end users behind the unit.

The Voice Gateways are designed for remote management and supervision using either the built-in internal web server or SNMP.

The Voice Gateways are easily updated and upgraded as they support remote software and configuration file download.

1.4.4 IDU-1D1V and IDU-1D2V Voice Gateways

The SIP Voice Gateways IDUs enable operators and service providers to offer end users a combination of IP-telephony and broadband data services, enabling uninterrupted operation of the CPE during power outages. The IDU-1D1V and IDU-1D2V provide the same features and capabilities as the SIP versions of the VG-1D1V and VG-1D2V described above, with the additional capability to serve as IDUs of the PRO-S CPE, including a backup battery to ensure uninterrupted services during power outages of up to two hours.

The Voice Gateway IDU are powered from the mains and connects to the ODU via a Category 5E Ethernet cable. This cable carries the Ethernet data between the two units as well as power (54 VDC) and control signals to the ODU. It also carries status indications from the ODU. The Voice Gateway IDUs are available with either RJ-11 or Terminal Board telephone connection(s).

1.4.5 SRU Service Residential Unit

The Service Residential Unit (SRU) offers users of the Self Install Si CPE uninterrupted voice connections, integrating voice and data services into a single unit. The SRU acts as a bridge between the Si CPE and the subscriber's LAN, and has two POTS lines that support analog telephones, faxes and modems with a SIP based VoIP service, operating with common available SIP servers, proxies and soft switches.

The SRU is powered from the mains, providing power also to the Si CPE, and has backup batteries that ensure uninterrupted service during power outages for at least 2 hours with 10% voice calls.

1.5 PRO-S CPE Specifications

1.5.1 Radio

Table 1-3: PRO-S CPE Radio Specifications

Item	Description		
Frequency	Band	TDD Frequencies (MHz)	FDD Frequencies (MHz)
	2.3 GHz	2300-2360	Not Applicable
	2.5 GHz g	2496-2690	Not Applicable
	3.3 GHz	3300 - 3400	Uplink: 3366-3400 Downlink: 3316-3350
	3.5 GHz	3399.5-3600	Uplink: 3399.5-3500 Downlink: 3499.5-3600
	3.65 GHz	3650-3675	Not Applicable
Operation Mode	<ul style="list-style-type: none"> ■ TDD, Half Duplex ■ FDD, Half duplex (3.x GHz band only) 		
Channel Bandwidth	<ul style="list-style-type: none"> ■ 1.75 MHz (only in FDD mode in the 3.x GHz bands) ■ 3.5 MHz ■ 5 MHz (only in TDD mode) 		
Central Frequency Resolution	0.125 MHz		
Antenna Port (PRO-SE CPEs)	N-Type, 50 Ohm		
2.3 GHz Integral Antenna (PRO-SA CPE)	14 dBi typical, 33°AZ x 27°EL, vertical/horizontal polarization, compliant with RoHS and EN 301 525, V1.1.1 (2000-06).		
2.5 GHz Integral Antenna (PRO-SA CPE)	14 dBi typical, 33°AZ x 27°EL, vertical/horizontal polarization, compliant with RoHS and EN 301 525, V1.1.1 (2000-06).		
3.x GHz Integral Antenna (PRO-SA CPE)	16.5 dBi typical (16 dBi in the 3.3-3.4 GHz band), 20°AZ x 20°EL, vertical/horizontal polarization, compliant with RoHS and EN 302 085, V1.2.2 (2003-08) Range 1		
Max. Input Power (at antenna port)	-20 dBm before saturation 0 dBm before damage		
Output Power (at antenna port)	19 dBm +/-1 dB maximum ATPC Dynamic range: 45 dB		
Modulation	Downlink: OFDM; Uplink: OFDMA-16 BPSK, QPSK, QAM16, QAM64		

Table 1-3: PRO-S CPE Radio Specifications

FEC	Convolutional Coding: 1/2, 2/3, 3/4
-----	-------------------------------------

1.5.2 Sensitivity

1.5.2.1 Sensitivity, 2.x GHz Units

Table 1-4: Sensitivity, 2.x GHz Units

Item	Description			
Typical Sensitivity (BER=1E-6), 2.x GHz units	Modulation & Coding	Minimum SNR (dB)	Sensitivity (dBm) @ 3.5 MHz BW	Sensitivity (dBm) @ 5 MHz BW
	BPSK 1/2	2.5	-98	-96
	QPSK 1/2	5.9	-95	-93
	QPSK 3/4	8.6	-92	-90
	QAM16 1/2	11.4	-89	-87
	QAM16 3/4	14.8	-86	-84
	QAM64 2/3	20	-81	-79
	QAM64 3/4	20.9	-80	-78

1.5.2.2 Sensitivity, 3.x GHz Units

Table 1-5: Sensitivity, 3.x GHz Units

Item	Description			
Typical Sensitivity (BER=1E-6), 3.x GHz units	Modulation & Coding	Minimum SNR (dB)	Sensitivity (dBm) @ 3.5 MHz BW	Sensitivity (dBm) @ 5 MHz BW
	BPSK 1/2	2.5	-99	-97
	QPSK 1/2	5.9	-96	-94
	QPSK 3/4	8.6	-93	-91
	QAM16 1/2	11.4	-89	-87
	QAM16 3/4	14.8	-86	-84
	QAM64 2/3	20	-81	-79
	QAM64 3/4	20.9	-80	-78

1.5.3 IDU/ODU Communication

Table 1-6: PRO-S CPE IDU/ODU Communication

Item	Description
Cable Type	Category 5E, Outdoor Data Cable, Double Jacket, 4x2x24# FTP
Maximum Length	90 meter

1.5.4 Data Communication (Ethernet Port)

Table 1-7: PRO-S CPE Data Communication (Ethernet Port)

Item	Description
Standard Compliance	IEEE 802.3 CSMA/CD
Maximum Packet Size (including 4 CRC bytes)	1550 Bytes
Speed	10/100 Mbps, Half/Full Duplex with Auto Negotiation

1.5.5 Configuration and Management

Table 1-8: PRO-S CPE Configuration and Management

Item	Description
Local Management/via Ethernet Port	<ul style="list-style-type: none"> ■ Telnet ■ Built-in web configuration server (using PC or PDA with http browser)
Remote Management	Via the Base Station
Software upgrade	<ul style="list-style-type: none"> ■ Using TFTP via the Base Station ■ Using TFTP via Ethernet port
Configuration upload/download	<ul style="list-style-type: none"> ■ Using TFTP via the Base Station ■ Using TFTP via Ethernet port

1.5.6 Environmental

Table 1-9: PRO-S CPE Environmental Specifications

Type	Unit	Details
Operating temperature	PRO-S CPE ODU	-40°C to 55°C
	PRO-S CPE IDU	0°C to 40°C
Operating humidity	Outdoor units	5%-95% non condensing, Weather protected
	Indoor equipment	5%-95% non condensing

1.5.7 Standards Compliance, General

Table 1-10: PRO-S CPE Standards Compliance, General

Type	Standard
EMC	<ul style="list-style-type: none"> ■ ETSI EN 301 489-1/4 ■ FCC part 15 Subpart B
Safety	<ul style="list-style-type: none"> ■ EN 60950-1 (CE) ■ UL 60950 (US) ■ AS/NZS 3260 (Australia / New Zealand)
Environmental	<p>ETS 300 019:</p> <ul style="list-style-type: none"> ■ Part 2-1 T 1.2 & part 2-2 T 2.3 for indoor & outdoor ■ Part 2-3 T 3.2 for indoor ■ Part 2-4 T 4.1E for outdoor
Radio	<ul style="list-style-type: none"> ■ ETSI EN 301 021 V.1.6.1 ■ ETSI EN 301 753 V.1.2.1 ■ FCC P.27.53, FCC P.90, FCC P.15

1.5.8 Physical and Electrical

1.5.8.1 Mechanical

Table 1-11: PRO-S CPE Mechanical Specifications

Unit	Dimensions (cm)	Weight (kg)
CPE-IDU-1D	14 x 6.6 x 3.5	0.3
CPE-ODU-PRO-SA	21 x 21 x 5.4	1.25
CPE-ODU-PRO-SE	21 x 21 x 5.4	1.13

1.5.8.2 Electrical

Table 1-12: PRO-S CPE Electrical Specifications

Item	
Power Consumption (IDU+ODU)	2.x GHz units: 25W 3.x GHz units: 22W
ODU Power Consumption	16.5W
CPE-IDU Power Input	100-240 VAC, 47-63 Hz
CPE-ODU-PRO Power Input	54 VDC from the IDU over the indoor-outdoor Ethernet cable

1.5.8.3 Connectors

Table 1-13: PRO-S CPE Connectors

Unit	Connector	Description
CPE-IDU-1D	ETHERNET	10/100Base-T (RJ-45).Cable connection to a PC: StraightCable connection to a hub: Crossed
	RADIO	10/100Base-T (RJ-45)
	AC IN	3 pin AC power plug
CPE-ODU-PRO-SA/SE	IDU COM	10/100Base-T (RJ-45)
	SAU	Special mini USB
	ANT (SE model)	N-Type jack, 50 Ohm, lightning protected

1.6 Si CPE Specifications

1.6.1 Radio

Table 1-14: Si CPE Radio Specifications

Item	Description		
Frequency	Band	TDD Frequencies (MHz)	FDD Frequencies (MHz)
	2.3 GHz	2305-2360	Not Applicable
	2.5 GHz g	2496-2690	Not Applicable
	3.5 GHz	3399.5-3600	Uplink: 3399.5-3500 Downlink: 3499.5-3600
	3.65 GHz	3650-3675	Not Applicable
Operation Mode	<ul style="list-style-type: none"> ■ TDD, Half Duplex ■ FDD, Half duplex (3.5 GHz band only) 		
Channel Bandwidth	<ul style="list-style-type: none"> ■ 1.75 MHz (only in FDD mode in the 3.5 GHz band) ■ 3.5 MHz ■ 5 MHz (only in TDD mode) 		
Central Frequency Resolution	0.125 MHz		
Internal Antennas (Si)	<p>A beam switching antennas array providing 360° coverage.</p> <p>Antenna gain (typical): 7 dBi for 2.3/2.5 GHz units, 9 dBi for 3.5 GHz units</p>		
External Antenna Port	SMA, 50 Ohm		
Max. Input Power (at antenna port)	<p>-20 dBm before saturation</p> <p>0 dBm before damage</p>		
Output Power (at antenna port)	<p>2.3 GHz: 23 dBm +/- 1 dB maximum</p> <p>2.5 GHz: 24 dBm +/- 1 dB maximum</p> <p>3.5 GHz: 23 dBm +/- 1 dB maximum for units with RF Version 11, 22 dBm +/- 1 dB maximum for all other units</p> <p>ATPC Dynamic range: 45 dB minimum</p>		
Modulation	<p>Downlink: OFDM; Uplink: OFDMA-16</p> <p>BPSK, QPSK, QAM16, QAM64</p>		
FEC	Convolutional Coding: 1/2, 2/3, 3/4		

Table 1-14: Si CPE Radio Specifications

Typical Sensitivity (BER=1E-6), 2.x GHz	Modulation & Coding	Minimum SNR (dB)	Sensitivity (dBm) @ 3.5 MHz BW	Sensitivity (dBm) @ 5 MHz BW
	BPSK 1/2	2.5	-96	-94
	QPSK 1/2	5.9	-93	-91
	QPSK 3/4	8.6	-90	-88
	QAM16 1/2	11.4	-87	-85
	QAM16 3/4	14.8	-84	-82
	QAM64 2/3	20	-78	-77
	QAM64 3/4	20.9	-78	-76
Typical Sensitivity (BER=1E-6), 3.x GHz	Modulation & Coding	Minimum SNR (dB)	Sensitivity (dBm) @ 3.5 MHz BW	Sensitivity (dBm) @ 5 MHz BW
	BPSK 1/2	2.5	-98	-96
	QPSK 1/2	5.9	-95	-93
	QPSK 3/4	8.6	-92	-90
	QAM16 1/2	11.4	-88	-86
	QAM16 3/4	14.8	-85	-83
	QAM64 2/3	20	-80	-78
	QAM64 3/4	20.9	-79	-77

1.6.2 Data Communication (Ethernet Port)

Table 1-15: Si CPE Data Communication (Ethernet Port)

Item	Description
Standard Compliance	IEEE 802.3 CSMA/CD
Maximum Packet Size (including 4 CRC bytes)	1550 Bytes
Speed	10/100 Mbps, Half/Full Duplex with Auto Negotiation

1.6.3 Configuration and Management

Table 1-16: Si CPE Configuration and Management

Item	Description
Local Management and Configuration	<ul style="list-style-type: none"> ■ Telnet via Ethernet Port ■ Built-in web configuration server (using PC or PDA with http browser) via Ethernet Port ■ Si CPE Installation Utility ■ Smart Card
Remote Management	Via the Base Station
Software upgrade	<ul style="list-style-type: none"> ■ Using TFTP via the Base Station ■ Using TFTP via Ethernet port
Configuration upload/download	<ul style="list-style-type: none"> ■ Using TFTP via the Base Station ■ Using TFTP via Ethernet port

1.6.4 Standards Compliance, General

Table 1-17: Si CPE Standards Compliance, General

Type	Standard
EMC	<ul style="list-style-type: none"> ■ ETSI EN 301 489-1/4 ■ FCC part 15 Subpart B
Safety	<ul style="list-style-type: none"> ■ EN 60950-1 (CE) ■ UL 60950 (US) ■ AS/NZS 3260 (Australia / New Zealand)
Environmental	<p>ETS 300 019:</p> <ul style="list-style-type: none"> ■ Part 2-1 T 1.2 & part 2-2 T 2.3 for indoor & outdoor ■ Part 2-3 T 3.2 for indoor ■ Part 2-4 T 4.1E for outdoor

Table 1-17: Si CPE Standards Compliance, General

Type	Standard
Radio	<ul style="list-style-type: none"> ■ ETSI EN 301 021 V.1.6.1 ■ ETSI EN 301 753 V.1.2.1 ■ FCC P.27.53, FCC P.90, FCC P.15

1.6.5 Environmental

Table 1-18: Si CPE Environmental Specifications

Type	Details
Operating temperature	-5°C to 45°C
Operating humidity	5%-95% non condensing

1.6.6 Physical and Electrical

1.6.6.1 Mechanical and Electrical

Table 1-19: Si CPE Mechanical and Electrical Specifications

Item	
Dimensions (mm)	167 (H) x 170 (L) x 79 (W)
Weight (g)	650
Power Consumption	10W typical, 12W maximum
DC Power Input (from Power Supply)	7.3 VDC
Mains Power Input (to Power Supply)	90-256 VAC, 47-63 Hz

1.6.6.2 Connectors

Table 1-20: Si CPE Connectors

Connector	Description
ETHERNET (E model)	10/100Base-T (RJ-45) with two embedded LEDs. Cable connection to a PC: Straight Cable connection to a hub: Crossed
USB (U model)	USB 1.1/2.0
DC IN	Standard DC power jack
Antenna	SMA jack, 50 Ohm

1.6.7 Detached 3.5 GHz Antenna

Table 1-21: Si CPE Detached 3.5 GHz Antenna Specifications

Item	
Frequency Range	3400 - 3700 MHz
Gain (excluding cable)	12 dBi
Polarization	Linear-Vertical
Beam Width	77° Horizontal, 17° vertical
Connector	SMA jack
Dimensions (cm)	33 x 9.3 x 2.1
Weight (g)	190

1.6.8 Detached 2.3/2.5 GHz Antenna

Table 1-22: Si CPE Detached 2.3/2.5 GHz Antenna Specifications

Item	
Frequency Range	2300-2700 MHz
Gain (excluding cable)	9.5~10.5 dBi
Polarization	Linear-Vertical
Beam Width	70° Horizontal, 20° vertical
Connector	SMA jack
Dimensions (cm)	32.7 x 8 x 2.2
Weight (g)	600

Chapter 2 - Installation

In This Chapter:

- “Installing the ODU of the PRO-S CPE” on page 24
- “Installing the IDU-1D Indoor Unit of the PRO-S CPE” on page 35
- “Installing the Si CPE” on page 39
- “Installing the 3.5 GHz Detached Antenna” on page 47
- “Installing the 2.3/2.5 GHz Detached Antenna” on page 55

2.1 Installing the ODU of the PRO-S CPE

The following sections describe how to install the outdoor unit (ODU) of the PRO-S CPE.

2.1.1 ODU Installation Requirements

2.1.1.1 Packing List

- ODU
- Pole mounting kit

2.1.1.2 Additional Installation Requirements

The following items are also required to install the ODU:

- Indoor-to-outdoor Category 5E Ethernet cable with two shielded RJ-45 connectors* (see [Section 2.1.3](#) for details on approved cables and maximum length), and an RJ-45 connectors crimping tool.
- For units that connect to an external antenna (SE model): Antenna* and RF cable* for connecting the antenna to the ODU.
- SAU* (SU Alignment Unit) for antenna alignment and status verification.
- Grounding cable with an appropriate termination.
- Installation tools and materials, including appropriate means (e.g. a 1" to 4" pole) for installing the ODU (and antenna where applicable).

2.1.1.3 Optional Items

- Tilt Pole Mounting kit*.
- To connect directly to the ODU for configuration/performance monitoring: A special Y-cable*, a Notebook or Pocket PC/PDA with web browser, and a straight Ethernet cable to connect the Notebook/PDA to the PDA connector (RJ-45 plug) of the Y-cable.

**NOTE**

Items marked with an asterisk (*) are available from Alvarion.

2.1.2 Guidelines for Positioning the ODU

This section provides key guidelines for selecting the optimal installation locations for the ODU.

**CAUTION**

ONLY experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities should install outdoor units and antennas.

Failure to do so may void the BreezeMAX product warranty and may expose the end user or Service Provider to legal and financial liabilities. Alvarion and its resellers or distributors are not liable for injury, damage or regulation violations associated with the installation of Outdoor Units or antennas.

Select the optimal locations for the equipment using the following guidelines:

- The ODU should be mounted on a 1"-4" pole. Its location should enable easy access to the unit and its connectors for installation and testing.
- The higher the placement of the antenna, the better the achievable link quality.
- The antenna should be installed to provide a direct, or near line of sight with the Base Station antenna. The antenna should be aligned to face the general direction of the Base Station.
- In some cases it might be necessary to up/down-tilt the antenna. An optional Tilt accessory for the ODU providing a tilt range of $\pm 15^\circ$ is available from Alvarion. The tilt option might be necessary to either improve the link conditions or, if the SU is too close to the Base Station, to reduce the receive signals strength. As a rule of thumb, if the SU is located at a distance of less than 300 meters from the Base Station, it is recommended to up-tilt the antenna by approximately 10° to 15° (especially in line-of-sight conditions) to avoid saturation of the receivers by too strong signals.
- Outdoor units with a connection to an external antenna should be installed as close as possible to the antenna.

2.1.3 IDU-ODU Cables



NOTE

The length of the Indoor-to-Outdoor cable should not exceed 90 meters. The length of the Indoor-to-Outdoor cable, together with the length of the Ethernet cable connecting the CPE-IDU-1D to the data equipment, should not exceed 100 meters.

Use only Category 5E Ethernet cables from either Alvarion or any of the approved manufacturers, listed in [Table 2-1](#). Consult with Alvarion's specialists on the suitability of other cables.

Table 2-1: Approved Category 5E Ethernet Cables

Manufacturer	Part Number
Superior Cables Ltd. www.superior-cables.com	612098
HES Cabling Systems www.hescs.com	H5E-00481
Teldor www.teldor.com	8393204101
Southbay Holdings Limited 11th Fl., 15, Lane 347, Jong Jeng Rd. Shin Juang City, Taipei County Taiwan, R.O.C. Attn: Eva Lin Tel. 886-2-2832 3339 Fax. 886-2-2206 0081 E-mail: eva@south-bay.com.tw	TSM2404A0D
GU-Tech., LLC . - A Member of OVIS Group Tel/Fax : 732 918 8221 Mobile: 718 909 4093 www.OVIS.COM.TW www.GU-TECH.COM	

In case of missing information in the manufacturer's WEB site (product specifications, ordering issues, etc.), it is highly recommended to contact the manufacturer's sales representative directly.

2.1.4 Pole Mounting the ODU

The ODU can be mounted on a 1" to 4" pole using one of the following options:

- A pole mounting kit is supplied with each unit. The kit includes a special clamp and a pair of threaded rods, flat washers, spring washers and nuts. There are two pairs of threaded holes on the back of the unit, enabling to use

the mounting kit for installing the unit using either vertical or horizontal polarization. The clamp enables installing the unit on diverse pole diameters from 1" to 4".

- A Tilt Pole Mounting kit, providing a tilt range of $\pm 15^\circ$ is available from Alvarion. The Tilt kit can be attached to the ODU and be mounted on a 1" to 4" pole using two 9/16" wide metal bands.

2.1.4.1 Polarization

The ODU with integral antenna can be pole mounted to provide either vertical or horizontal polarization.

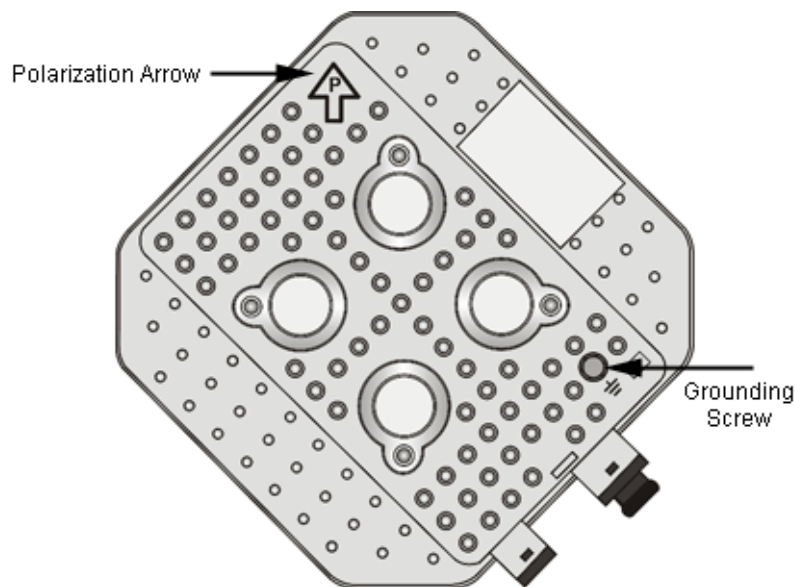


Figure 2-1: Back View of CPE-ODU-PRO-SA (integral antenna)

The Polarization Arrow on the back of the unit indicates the type of polarization.

- For vertical polarization install the unit with the Polarization Arrow pointing upward (as in the figure above).
- For horizontal polarization install the unit with the Polarization Arrow pointing sideward and the connectors facing downward.

2.1.4.2 Pole Mounting the ODU Using the Clamp

Figure 2-2 and Figure 2-3 illustrate how to mount an ODU on a pole, using the clamp and threaded rods.



NOTE

There is a groove on one end of the threaded rod. Insert the rods with the grooves pointing outward, and fasten them to the unit using a screwdriver. Install the unit with the bottom panel, which includes the connectors, facing downward.

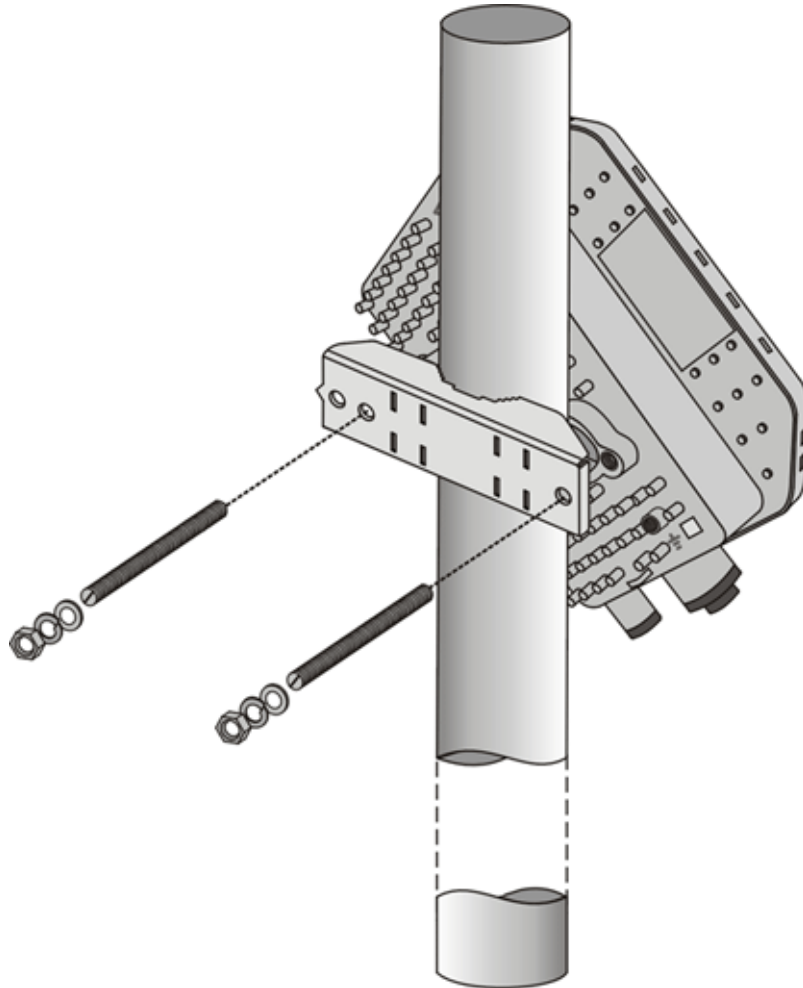


Figure 2-2: ODU Pole Installation Using the Special Clamp, Vertical Polarization

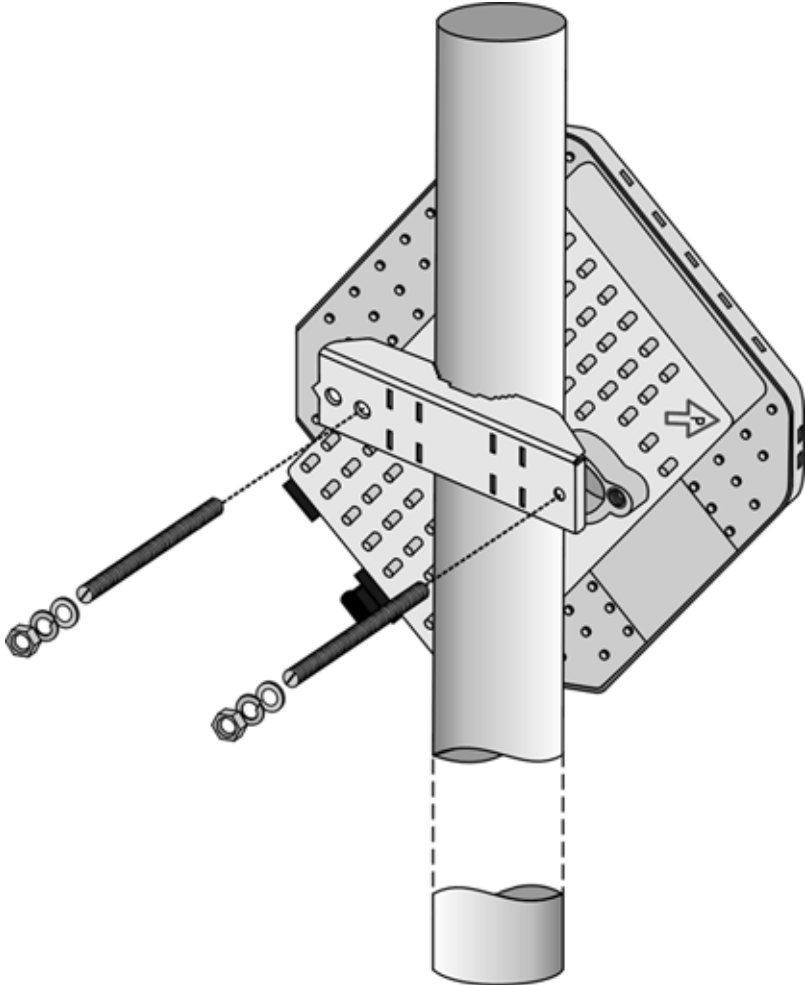


Figure 2-3: ODU Pole Installation Using the Special Clamp, Horizontal Polarization

2.1.4.3 Pole Mounting the ODU with the Tilt Accessory

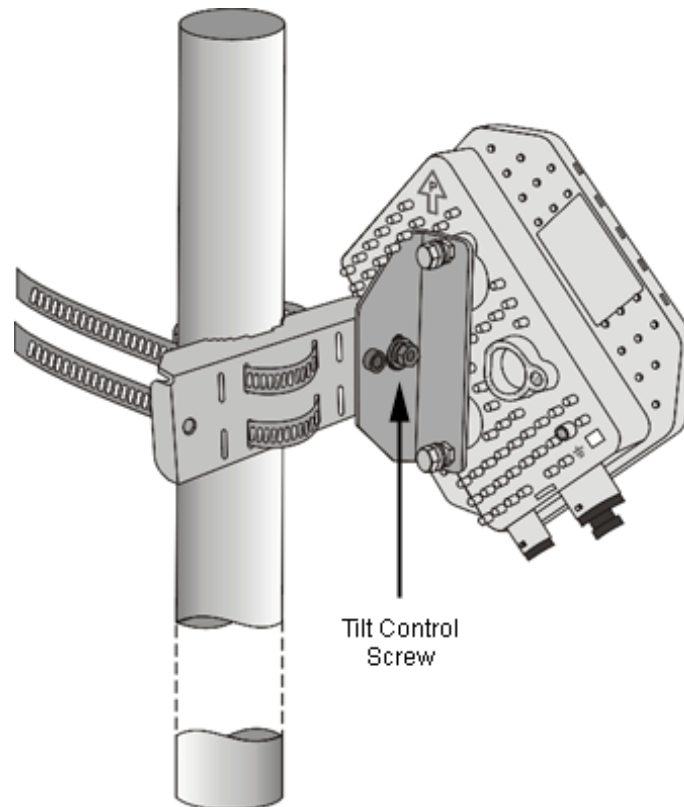


Figure 2-4: ODU Pole Installation Using the Tilt Accessory, Vertical Polarization



To mount the ODU on a pole using the Tilt accessory:

- 1** Attach the Tilt accessory to the ODU using the two pairs of flat washers, spring washers and nuts supplied in the Tilt kit.
- 2** Mount the Tilt accessory on a 1" to 4" pole using two 9/16" metal bands.
- 3** Release slightly the Tilt Control Screw, tilt the ODU downward/upward as required, and re-tighten the screw.

2.1.5 Connectors

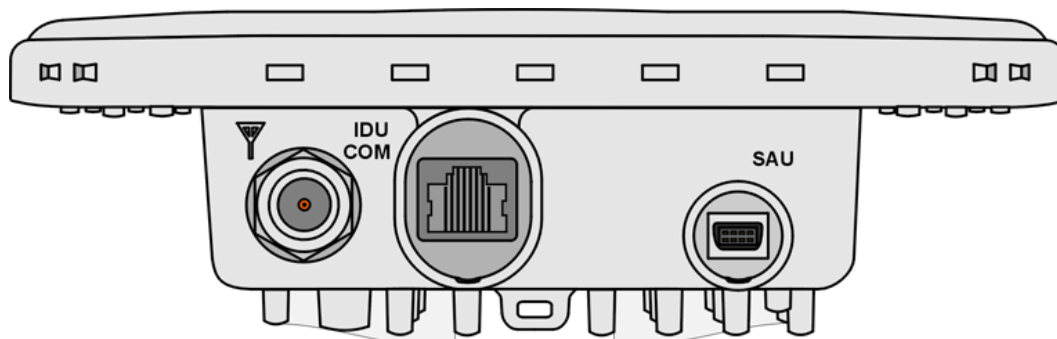


Figure 2-5: Bottom Panel of the ODU (SE model, without sealing covers)

Table 2-2: CPE-ODU-PRO Connectors

Name	Connector	Functionality
IDU COM	10/100Base-T (RJ-45)	Connection to the IDU
SAU	Special mini USB	Connection to SAU
ANT (ANT, only in SE model)	N-Type jack, 50 Ohm	Connection to an external antenna

2.1.6 Connecting the Cables

2.1.6.1 Connecting the Grounding Cable

The Grounding screw (marked \perp) is located on the back panel of the ODU (see Figure 2-1).




To connect the grounding cable:

- 1 Connect one end of a grounding cable to the grounding screw and tighten the grounding screw firmly.
- 2 Connect the other end of the grounding cable to a good ground (earth) connection.

2.1.6.2 Connecting the Antenna Cable



To connect the RF cable (units with external antenna):

- 1 Connect one end of the coaxial RF cable to the RF connector (marked ) located on the bottom panel of the unit.
- 2 Connect the other end of the RF cable to the antenna.
- 3 The RF connectors should be properly sealed to protect against rain and moisture.

2.1.6.3 Connecting the IDU-ODU Cable

CAUTION



Use only Category 5E 4x2x24# FTP outdoor cables from an approved manufacturer. See list of approved cables in [Table 2-1](#). The length of the Indoor-to-Outdoor cable should not exceed 90 meters. The length of the Indoor-to-Outdoor cable, together with the length of the Ethernet cable connecting the CPE-IDU-1D to the data equipment, should not exceed 100 meters.



To prepare the IDU-ODU cable:

Use a crimp tool for RJ-45 connectors to prepare the wires. Insert them into the appropriate pins and use the tool to crimp the connector. Make sure to do the following:

- Remove as small a length as possible of the external jacket. Verify that the external jacket is well inside the sealing cover when connected to the unit, to ensure good sealing.
- Pull back the shield drain wire before inserting the cable into the RJ-45 connector, to ensure a good connection with the connector's shield after crimping.

The IDU-ODU cable provides pin-to-pin connection on both ends.

The following figure shows the required wire pair connections.

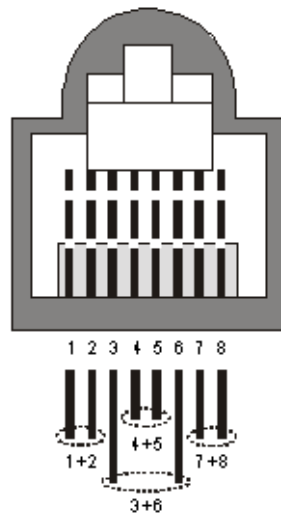


Figure 2-6: Ethernet Connector Pin Assignments

The color codes used in standard cables supplied by Alvarion are as listed in the following table:

Table 2-3: Cable Color Codes

Wire color	Pin
Blue	1
Blue/white	2
Orange	3
Orange/white	6
Brown	4
Brown/white	5
Green	7
Green/white	8



To connect the IDU-ODU cable:

- 1 The sealing cap has a special groove allowing to insert an ethernet cable with an already assembled RJ-45 connector through the cap. To expose the groove, lightly squeeze the cap. Carefully insert the cable with the assembled connector through the groove.

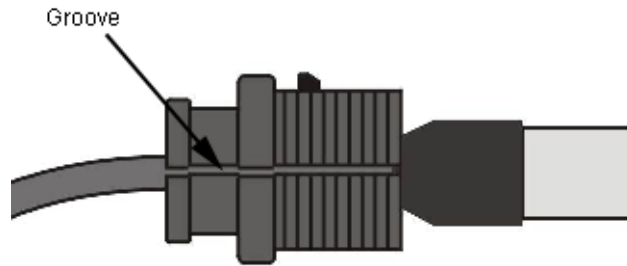


Figure 2-7: Inserting the IDU COM Cable into the Sealing Cap

- 2 Connect the Ethernet cable to the IDU COM RJ-45 connector.
- 3 Put the sealing cap back in its place. Make sure that the small protrusion on the side of the cap fits inside the hole on the connector's protective body.

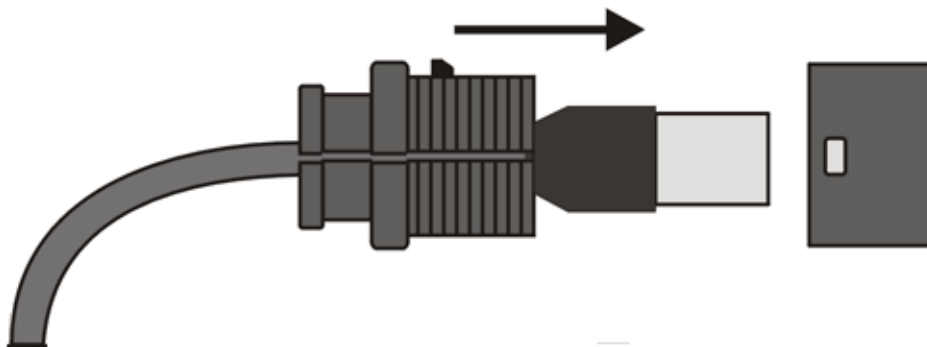


Figure 2-8: Connecting the IDU COM connector and inserting the Sealing Cap

- 4 Use appropriate sealing material to protect the connection against moisture and humidity. Use removable sealing material, such as a tar seal, to enable future access to the connector.
- 5 Route the cable to the location selected for the indoor equipment.
- 6 Assemble an RJ-45 connector with a protective cover on the indoor end of the IDU-ODU cable. Refer to the pin assignment and color codes in standard cables described above.

2.2 Installing the IDU-1D Indoor Unit of the PRO-S CPE

2.2.1 Installation Requirements

2.2.1.1 Packing List

**NOTE**

The IDU must be ordered separately. It is not supplied with the ODU.

- BMAX-CPE-IDU-1D
- Wall mounting kit
- Mains power cord

2.2.1.2 Additional Installation Requirements

- Ethernet cable(s): a crossed cable if connecting to a hub/switch and a straight cable if connecting directly to a PC Network Interface Card (NIC).

**NOTE**

The length of the Ethernet cable connecting CPE-IDU-1D to the user's equipment, together with the length of the IDU-ODU cable, should not exceed 100 meters.

- Mains plug adapter or termination plug (if the power plug on the supplied AC power cord does not fit local power outlets).
- Means for configuring parameters:
 - ◇ A Portable PC/Notebook and a straight Ethernet cable for configuring parameters using Telnet. TFTP server SW is required for downloading SW versions.

Or:

 - ◇ A Portable PC/Notebook or Pocket PC/PDA and a straight Ethernet cable for configuring parameters using a web browser.

- Other installation tools and materials (a drill for wall-mounting the unit, means for securing cables to walls, etc.)

2.2.2 Location

The unit can be placed on a desktop or a shelf. Alternatively, it may be wall-mounted using the mounting kit and guidelines supplied with the unit.

2.2.3 CPE IDU-1D Connectors and LEDs

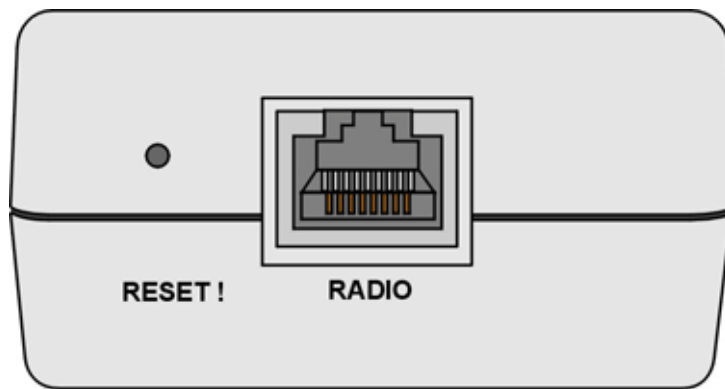


Figure 2-9: CPE-IDU-1D Front Panel

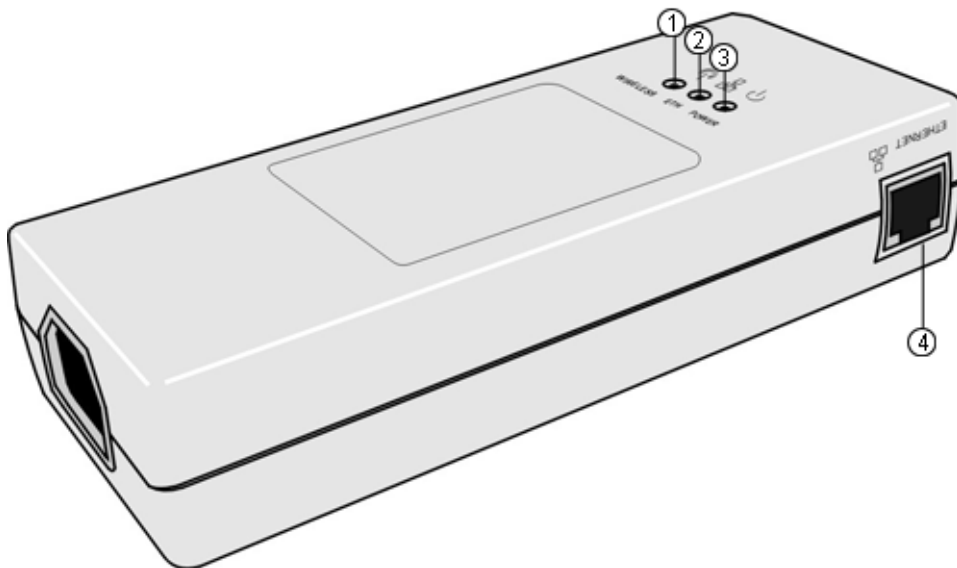


Figure 2-10: CPE-IDU-1D 3D View

Table 2-4: CPE-IDU-1D Connectors

Name	Connector	Functionality
ETHERNET (4) (on the side panel)	10/100Base-T (RJ-45) with 2 embedded LEDs	Connection to the user's LAN/PC Cable connection to a hub/switch/router: Crossed Cable connection to a PC: Straight
RADIO (on the front panel)	10/100Base-T (RJ-45)	Connection to the ODU
POWER (on the bottom panel)	3-pin AC	Mains power connection

Table 2-5: CPE-IDU-1D LEDs

Name	Description	Functionality
POWER (3)	Power Indication	<ul style="list-style-type: none"> ■ Off - IDU is not powered or power failed ■ Green - IDU power is OK
ETH (2)	Ethernet link status (Ethernet integrity)	<ul style="list-style-type: none"> ■ Off - No Ethernet connectivity has been detected between the outdoor unit and the device connected to the indoor unit's data port ■ Green - Ethernet connectivity has been detected between the outdoor unit and the device connected to the indoor unit's data port
WIRELESS (1)	Wireless link status	<ul style="list-style-type: none"> ■ Off - SU is not associated with a Base Station ■ Green - SU is connected with a Base Station (network entry completed) ■ Blinking Green - Authentication failed

* After power-up, the WIRELESS LED illuminates until self-test is finished.

2.2.4 RESET Button

The recessed RESET button is located on the front panel of the unit. When pressed, power to the ODU is disconnected (hard reset).

2.2.5 IDU Installation



To install the IDU:

- 1 It is assumed that the IDU-ODU cable is already connected to the ODU. Assemble an RJ-45 connector with a protective cover on the indoor end of the IDU-ODU cable. Refer to [Section 2.1.6.3](#) for instructions on preparing the cable.
- 2 Connect the IDU-ODU cable to the RADIO connector. The RADIO connector in the CPE-IDU-1D is located on the front panel as shown in [Figure 2-9](#).

CAUTION



Do not connect the data equipment to the RADIO port. The RADIO port supplies DC power to the ODU, and this may harm other equipment connected to it.

- 3 Connect the power cord to the unit's AC socket, located on the rear panel. Connect the other end of the power cord to the AC mains after verifying that the unit is rated for the voltage in the country of use; the AC range is indicated on the back side of the CPE-IDU-1D.

NOTE



The color codes of the power cable are as follows:

Brown	Phase	~
Blue	Neutral	0
Yellow/Green	Ground	⊥

- 4 Verify that the POWER LED located on the front panel is lit, indicating that the unit is supplying power to the radio port.
- 5 Configure the basic parameters and align the antenna as described in the applicable sections of [Chapter 3](#).
- 6 Connect the 10/100 Base-T ETHERNET connector(s) to the data equipment. The cable connection should be a crossed Ethernet if connecting to a hub/switch and a straight cable if connecting directly to a PC Network Interface Card (NIC).

NOTE



The length of the Ethernet cable connecting CPE-IDU-1D to the user's equipment, together with the length of the IDU-ODU cable, should not exceed 100 meters.

- 7 Verify proper operation as described in the applicable section of [Chapter 3](#).

2.3 Installing the Si CPE

The following sections describe how to install the Si CPE.

2.3.1 Installation Requirements

2.3.1.1 Packing List

- Si CPE
- Power Adapter and Mains Power Cord
- 2 meters Ethernet Cable (E model) or USB cable (U model)
- In a U model unit: A CD with a USB 1.1 driver for WIN-98, Windows-NT, Windows-Me, Windows-2000 and Windows-XP operating systems
- Wall Mounting Bracket kit for the Si CPE.
- Smart Card (optional)
- A CD with WiMAX Modem Application (optional)

2.3.1.2 Additional/Optional Items

- Wall/window mountable detached antenna kit, including wall/window mounting accessories and a 2 meters SMA-SMA (M/F) RF cable*.
- Wall mounting kit with pan/tilt capabilities for the detached antenna*.
- Mains plug adapter or termination plug (if the power plug on the supplied AC power cord does not fit local power outlets).
- Portable PC with an Ethernet card and a straight Ethernet cable for configuring parameters using either Telnet or web browser. TFTP server SW is required for downloading SW versions.
- Other installation tools and materials (means for securing cables to walls, etc.).

NOTE



Items marked with an asterisk (*) are available from Alvarion.

2.3.2 Si CPE Connectors and LEDs

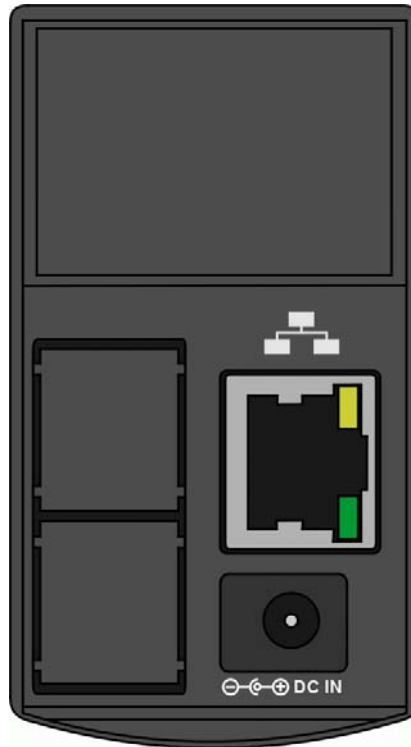


Figure 2-11: Si CPE Connectors (E model)

Table 2-6: Si CPE Front Panel Connectors

Name	Connector	Functionality
ETHERNET (E model)	10/100Base-T (RJ-45) with 2 embedded LEDs	Connection to the user's LAN/PC Cable connection to a hub/switch/router: Crossed Cable connection to a PC: Straight Green LED: Ethernet Integrity. Ethernet connection detected. Yellow LED: Ethernet Activity indication. Blinks during transmission/reception of Ethernet packets.
USB (U model)	USB 1.1/2.0 connector	Connection to the user's LAN/PC
POWER	DC Power Jack	Connection to Power Adapter

* After power-up, the Ethernet LEDs illuminate for a few seconds until self-test is finished.

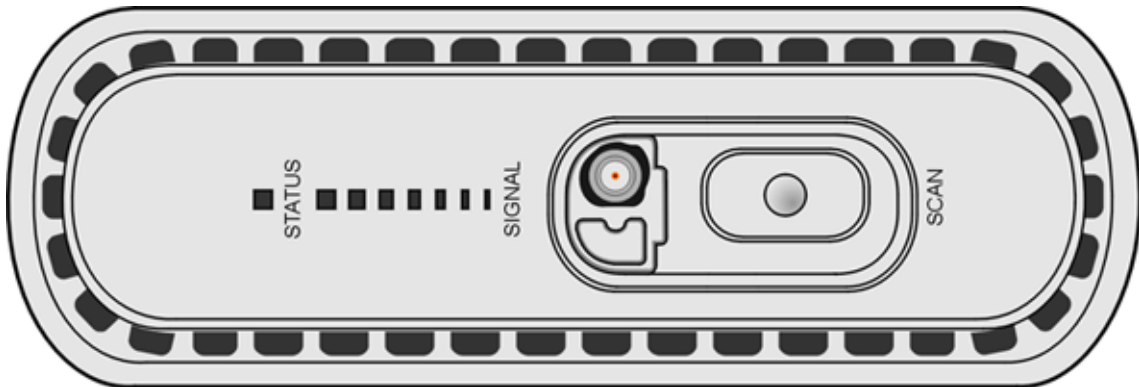


Figure 2-12: Si CPE Top View (Without RF Connector's Cover)

Table 2-7: Si CPE Top Panel Components

Name	Description	Functionality
STATUS	Status Indication	<ul style="list-style-type: none"> ■ Off - CPE is not powered or power failure ■ Green - CPE is connected with a base station ■ Red - CPE failure ■ Orange - After power-up (if power supply is ok) until start of self test, after passing self-test until network entry is completed, or upon restarting the network entry process. ■ Blinking Orange - CPE is being set to Factory Defaults (during 6 seconds after pressing the RESET button for more than 5 seconds). ■ Blinking Green - If SIGNAL LEDs 5, 6 and 7 are on: Authentication reject by RADIUS server. If SIGNAL LEDS 6 and 7 are on: Rejected by Base Station (Duplicate SU Name in database). If LED 7 is on: Authentication Timeout, re-authentication failure (connection to RADIUS server lost or Shared Secret mismatch).

Table 2-7: Si CPE Top Panel Components

Name	Description	Functionality
SIGNAL	Link Quality Indication	<ul style="list-style-type: none"> ■ LEDs 1 - 7 Off, STATUS is green: $3 \text{ dB} \leq \text{SNR} < 5 \text{ dB}$ ■ LED 1 On: $5 \text{ dB} \leq \text{SNR} < 8 \text{ dB}$ ■ LEDs 1 - 2 On: $8 \text{ dB} \leq \text{SNR} < 12 \text{ dB}$ ■ LEDs 1 - 3 On: $12 \text{ dB} \leq \text{SNR} < 15 \text{ dB}$ ■ LEDs 1 - 4 On: $15 \text{ dB} \leq \text{SNR} < 18 \text{ dB}$ ■ LEDs 1 - 5 On: $18 \text{ dB} \leq \text{SNR} < 20 \text{ dB}$ ■ LEDs 1 - 6 On: $20 \text{ dB} \leq \text{SNR} < 25 \text{ dB}$ ■ LEDs 1 - 7 On: $\text{SNR} \geq 25 \text{ dB}$ ■ LEDs 1 - 7 Blinking simultaneously ((300ms on, 300ms off): $\text{RSSI} \geq -20 \text{ dBm}$ (saturation) ■ LEDs 1 - 7 Blinking one after the other (LED-1: 200ms on then off, LED-2: 200ms on then off, up to LED-7 and then LED-1 again): During full frequency scan. ■ LEDs 1 - 7 Blinking as follows: LED 4 lights, after 200ms LEDs 3 & 5 light, after 200ms LEDs 2&6 light, after 200ms LEDs 1&7 light, after 200ms all the LEDs are extinguished and then the sequence is repeated. During Best AU selection process.
SCAN button	Initiating Scanning Mode	<ul style="list-style-type: none"> ■ Press for less than 3 seconds to initiate Best AU selection process without full scanning. It means that the CPE scans only the AUs detected in the last full scan. For each AU, all relevant antennas are scanned. The LEDs will be blinking as mentioned above for Best AU operation. ■ Press for 3 seconds or more to initiate full scan, prepare an updated best AU list and select the best AU. The LEDs will be blinking as mentioned above for full scan operation.
RF (behind cap)	SMA Jack	Connection to detached antenna

* After power-up, the SIGNAL LEDs illuminates for a few seconds until self-test is finished.

2.3.3 RESET Button



NOTE

RESET button is not available in units with RF Version 11.

The RESET button is located on the bottom side of the unit:

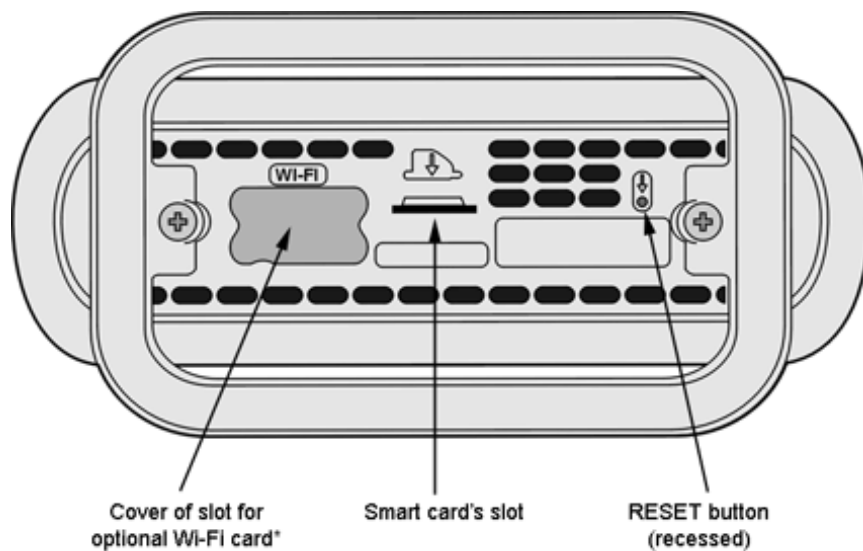


Figure 2-13: Si CPE Bottom View



NOTE

* WI-FI option is not supported in the current version.

Press the recessed RESET button briefly (for less than 5 seconds) to reset the unit and restart the network entry process. The unit will try for 60 seconds to connect to the last used AU. If not found, it will try the next AU in the best AU list. The same behavior shall be implemented for power-up.

Press the RESET button for 5 seconds and more to load the factory defaults and reset the unit after 6 seconds, to perform full scan with factory defaults. If the Installation Utility application is connected the user will be requested to confirm the operation.

2.3.4 Installation Guidelines

The unit can be placed on a desktop or a shelf. It can also be wall mounted using the optional bracket available from Alvarion. It can be configured to use either one of its six internal antennas or a detached antenna (optional). Instructions for the available installation options of the detached antenna are provided in the antenna package and in [Section 2.4](#).

- It is recommended to position the unit near a window facing the direction of the Base Station, with the selected antenna aimed at the direction of the Base Station. Do not cover the unit. Leave a free space of at least 50 cm around the unit. Do not place any object between the selected antenna and the window towards which the antenna is directed.
- When a detached antenna is used, install it on a window or on a wall according to specific conditions of the location. The antenna should be facing the required direction. Use only the RF cable supplied with the antenna (if needed, use a longer Ethernet cable).
- Avoid metal obstacles such as metal window frames or metal film anti-glare windows in the transmission path.
- Position the unit (or the detached antenna) away from electrical equipment, including the data equipment, monitor etc., metal furniture, and moving metal objects such as metal fans or doors.

2.3.5 Installing the Si CPE

2.3.5.1 Connecting the Si CPE



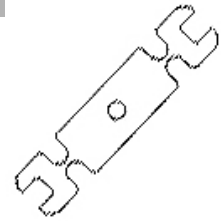
To install the Si CPE:

- 1 If a Smart Card for the unit is available, insert it in the intended slot at the bottom side of the unit.
- 2 If a CD with WiMAX Modem Application is supplied with the unit, refer to the documentation of the WiMAX Modem Application.
- 1 Connect the Power Adapter DC cable to the POWER jack. Connect the AC power cord to the Power Adapter. Connect the other end of the power cord to the AC mains.

**NOTE**

The color codes of the power cable are as follows:

Brown	Phase	~
Blue	Neutral	0
Yellow/Green	Ground	⏚



- 2 Verify that the orange Status LED located on the unit's top panel illuminates, indicating that the power supply to the unit is OK and the unit is not yet connected to a Base Station (the LED will change to green when the unit is connected to a Base Station).
- 3 If a detached antenna is used, remove the cap on the unit's top panel to expose the RF connector and connect to it the RF cable supplied with the antenna. Install the antenna using the instructions provided in [Section 2.4](#) on page 42, and connect to it the other end of the RF cable. To tighten the SMA connectors, use only the torque key supplied with the antenna.
- 4 Configure the basic parameters as described in [Section 3.3.1](#).
- 5 Align the antenna as described in [Section 3.5](#).
- 6 For E model units: Connect the 10/100 Base-T ETHERNET connector to the data equipment. The cable connection should be a crossed Ethernet if connecting to a hub/switch and a straight cable if connecting directly to a PC Network Interface Card (NIC).

Verify proper operation of the Ethernet link. The Ethernet Integrity green LED should be on and the Ethernet Activity yellow LED should blink when there is Ethernet traffic. To verify data connectivity from the end-user's PC or from a portable PC connected to the unit, ping a known device in the network, or try connecting to the Internet.

For U model units: Use a USB cable to connect the USB connector on the unit to the USB connector of the data equipment. If needed, install the USB driver provided with the unit. Refer to the README file in the USB driver installation CD supplied with the unit.

2.3.5.2 Wall Mounting the Si CPE

The wall mounting kit for the Si CPE includes a bracket, 2 screws, and 2 plastic anchors. Refer to [Figure 2-14](#).

- 1 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 6 mm drill bit and insert anchors. The distance between the

two holes should be 86 mm. Use the drilling template supplied with the Si CPE.

- 2 Fasten the two screws provided with the kit directly to the anchors.
- 3 Use the two hangers on the rear to hang the mounting bracket on the two screws. Make sure the bracket is stable.
- 4 Insert one side of the Si CPE's base diagonally under the designated rail.
- 5 Gently apply pressure on the opposite side of the Si CPE, until a clicking sound is heard and the two bracket studs are locked onto the Si CPE's base.

To dismount the Si CPE, gently push the two bracket studs in the direction of the wall and lift the CPE diagonally. Pull the CPE until free from the rail.

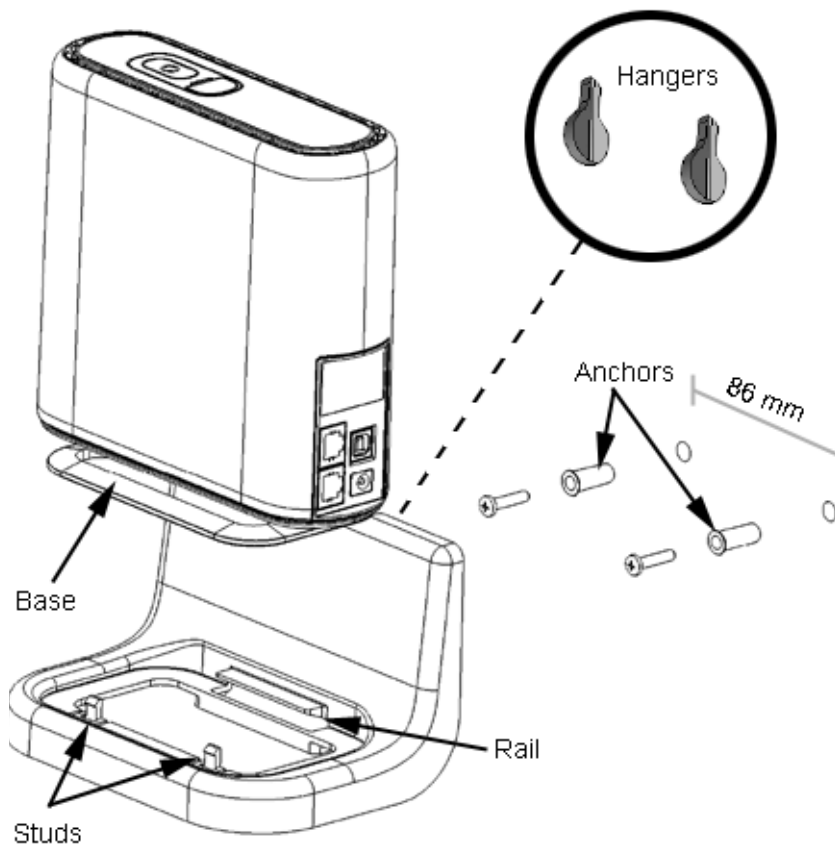


Figure 2-14: Si CPE Wall Mount

2.3.5.3 Wall Mounting the Power Adapter

Use the wall mounting kit included with the unit for wall mounting the Power Adapter.

2.4 Installing the 3.5 GHz Detached Antenna

The detached antenna kit includes the following components:

- ALA-12002 antenna
- Torque Key (see picture to the right) →
- 2 meter SMA-SMA (M/M) RF cable
- Simple wall mounting kit, enabling installation on a wall (without any capability for adjusting the direction). For installation instructions see [Section 2.4.1](#).
- Simple window mounting accessories, enabling installation on a glass window (without any capability for adjusting the direction). For installation instructions see [Section 2.4.2](#).
- Window mounting kit with tilt capability, enabling installation on a glass window (with rotation capability for adjusting the direction). For installation instructions see [Section 2.4.3](#).

A wall-mounting accessory that provides full adjustment capabilities (Pan/Tilt) is also available from Alvarion. For installation instructions see [Section 2.4.4](#).



NOTE

Ensure that the antenna is mounted vertical to the floor, with the connector facing downward, and the front of the antenna facing to the exterior of the building, preferably directed towards the Base Station.

2.4.1 Wall Mounting the 3.5 GHz Detached Antenna

The installation kit includes 2 plastic anchors and 2 #8 screws.

- 1 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 5 mm drill bit and insert anchors. Use a 9/64" drill bit for screwing directly into a solid surface (stud).
- 2 Fasten the antenna to the wall. Refer to [Figure 2-15](#) for directions. Use the two #8 screws provided with the kit. Do not over tighten.
- 3 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.

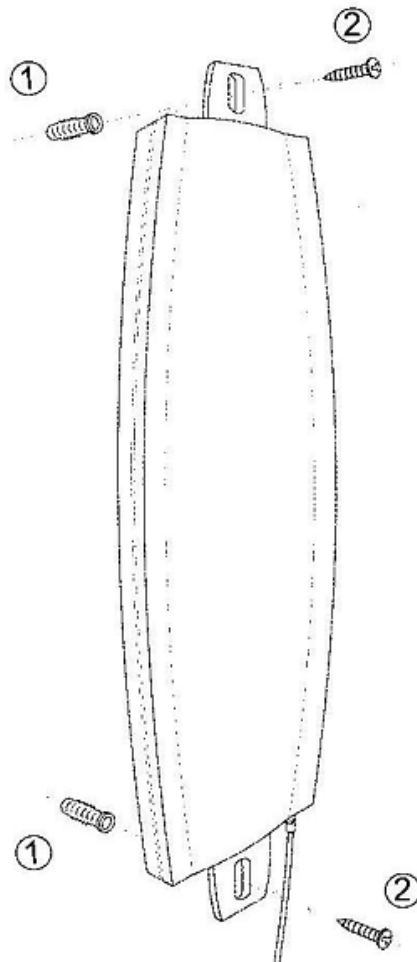


Figure 2-15: Wall Mounting the 3.5 GHz Detached Antenna

2.4.2 Window Mounting the 3.5 GHz Detached Antenna

The installation kit includes 2 suction cups.

- 1 Attach the suction cups to the antenna. Refer to [Figure 2-16](#) for directions.
- 2 Determine the location of the antenna on the glass. Attach it to the window by pressing the suction cups onto the glass.
- 3 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.

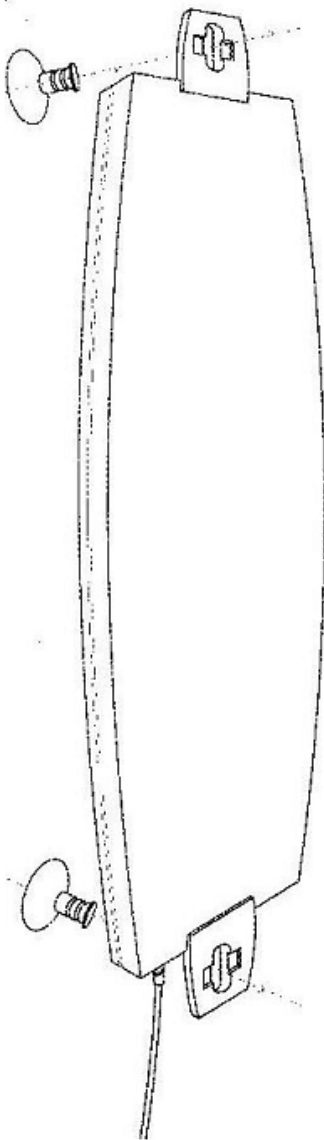


Figure 2-16: Window Mounting the 3.5 GHz Detached Antenna

2.4.3 Window Mounting the 3.5 GHz Detached Antenna, with Rotation Capability

The installation kit includes the following: 4 PHK40*16PT screws (1), 2 M4 washers (2), 2 rotation bars (3) and 2 suction cups (4).

- 1 Attach the rotation bars to the antenna and the suction cups to the rotation bars. Refer to [Figure 2-17](#) for directions.
- 2 Determine the location of the antenna on the glass. Attach it to the window by pressing the suction cups onto the glass.
- 3 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.
- 4 Rotate the antenna left or right so the domed surface of the antenna is facing the direction of the Base Station. Check the received Signal LEDs to ensure the antenna is aimed correctly.

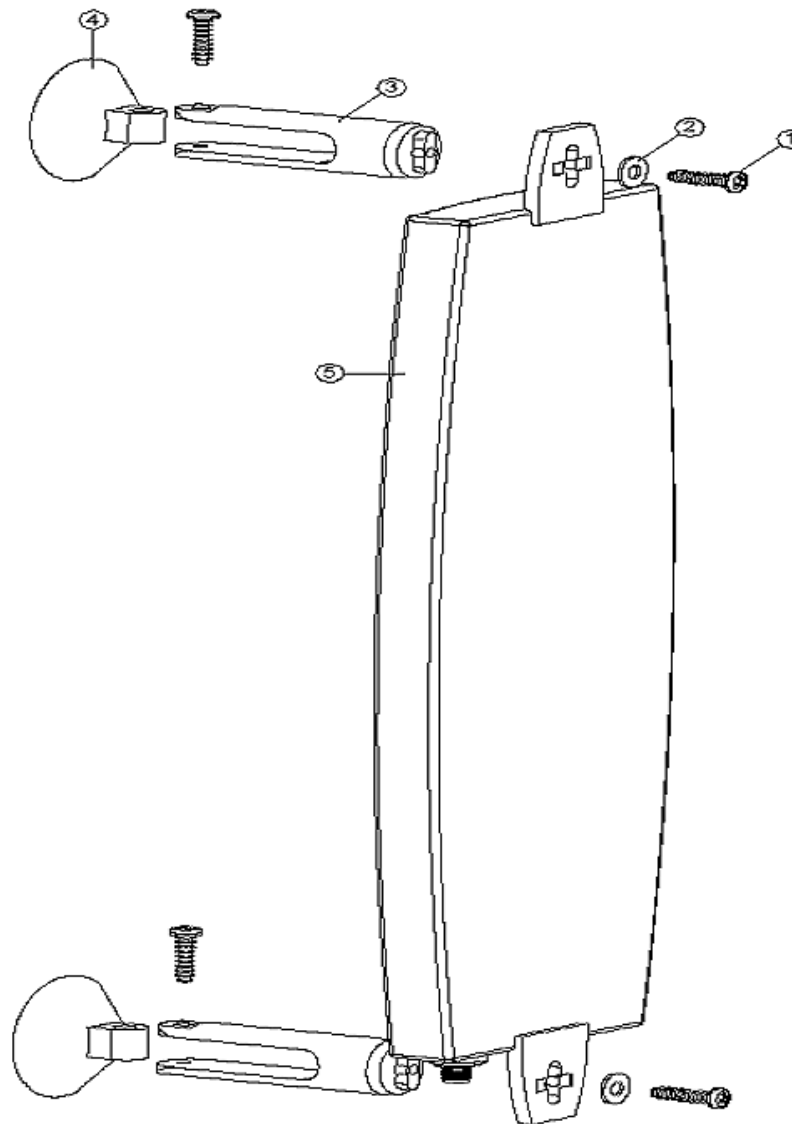


Figure 2-17: Window Mounting the 3.5 GHz Detached Antenna, with Rotation Capability

2.4.4 Wall Mounting the 3.5 GHz Detached Antenna, with Tilt & Pan Capabilities

The installation kit includes the following:

- 2 M3*8 Screws (1)
- 2 M3 washers (2)
- Antenna back plate (4)
- U-Joint Set (adjustable arm) (5)
- 4 5/32-16*1TP Wall Screws (6)
- 4 ¼" Wall anchors (7)
- Grounding Wire (8) - Not Used

- 1 Attach the adjustable arm to the wall following the directions in [Figure 2-18](#).
- 2 Assemble the antenna to back plate with supplied screws and washers.
- 3 Screw the back plate to the adjustable arm following the directions in [Figure 2-18](#).
- 4 Remove the cap from the antenna connector located on the bottom side of the antenna and connect the cable. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.
- 5 Align the antenna by releasing the spike knob located next to the base bracket. The bracket's arm can be adjusted sideways or tilted up and down. Position the antenna such that it faces the base station cell site. Tighten the spike knob to lock the antenna into position.
- 6 Check your receive signal strength (RSSI) LEDs in the Si CPE to ensure the antenna is optimally aligned. If necessary, re-align antenna following the steps described above.

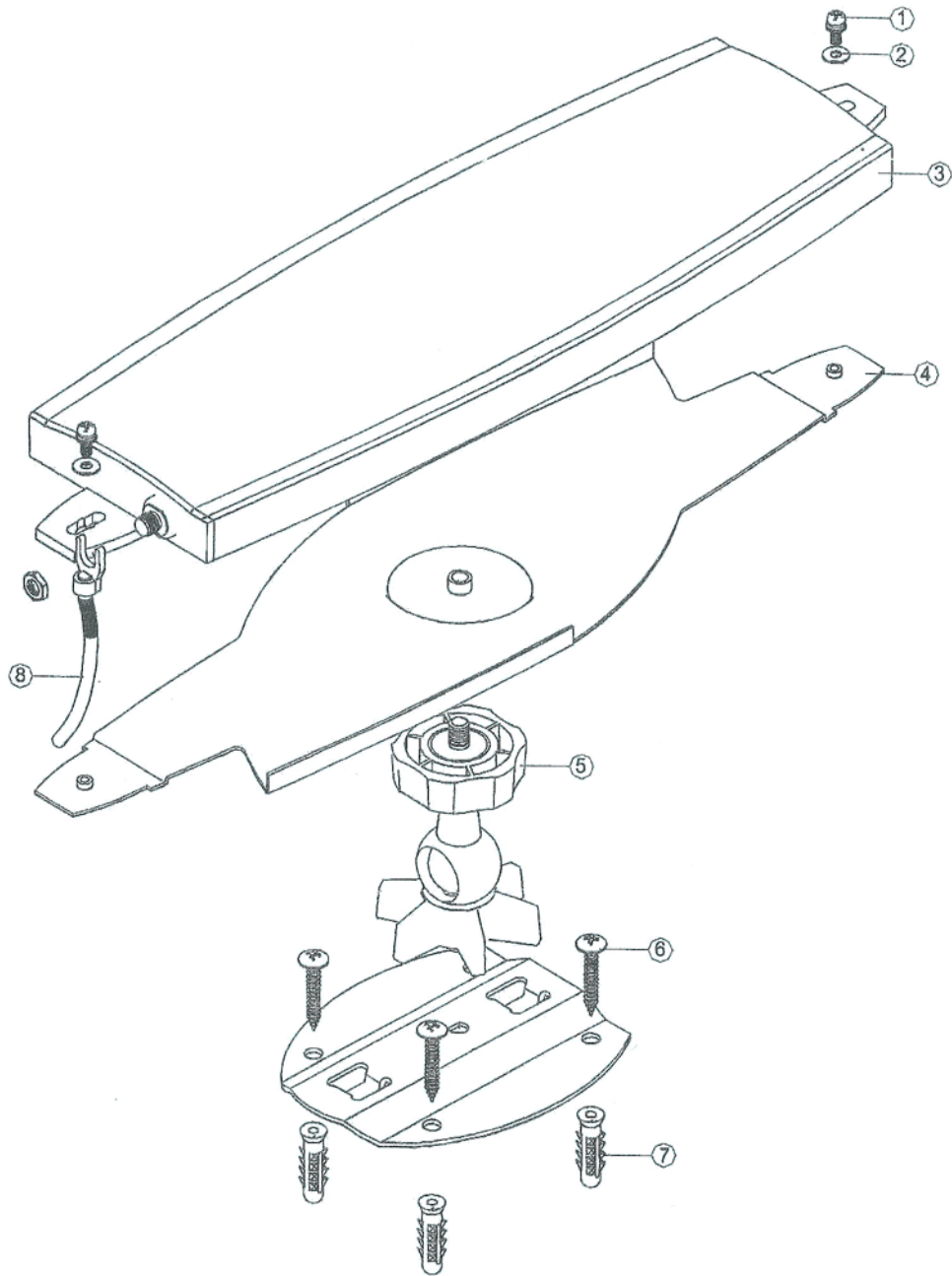


Figure 2-18: Wall Mounting the 3.5 GHz Detached Antenna, with Pan & Tilt Capabilities

2.5 Installing the 2.3/2.5 GHz Detached Antenna

The detached antenna kit includes the following components:

- ALA05-050320 antenna
- Torque Key (see picture to the right) →
- 2 meter SMA-SMA (M/F) RF cable
- Simple wall mounting kit, enabling installation on a wall (without any capability for adjusting the direction). For installation instructions see [Section 2.5.1](#).
- Window mounting kit with tilt capability, enabling installation on a glass window (with rotation capability for adjusting the direction). For installation instructions see [Section 2.5.2](#).
- Wall mounting kit with rotation capability. For installation instructions see [Section 2.5.3](#).



NOTE

Ensure that the antenna is mounted vertical to the floor, with the connector facing downward, and the front of the antenna facing to the exterior of the building, preferably directed towards the Base Station.

2.5.1 Wall Mounting the 2.3/2.5 GHz Detached Antenna

The installation kit includes 2 plastic anchors and 2 #8 screws.

- 1 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 5 mm drill bit and insert anchors. Use a 9/64" drill bit for screwing directly into a solid surface (stud).
- 2 Fasten the antenna to the wall. Refer to [Figure 2-19](#) for directions. Use the two #8 screws provided with the kit. Do not over tighten.
- 3 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.

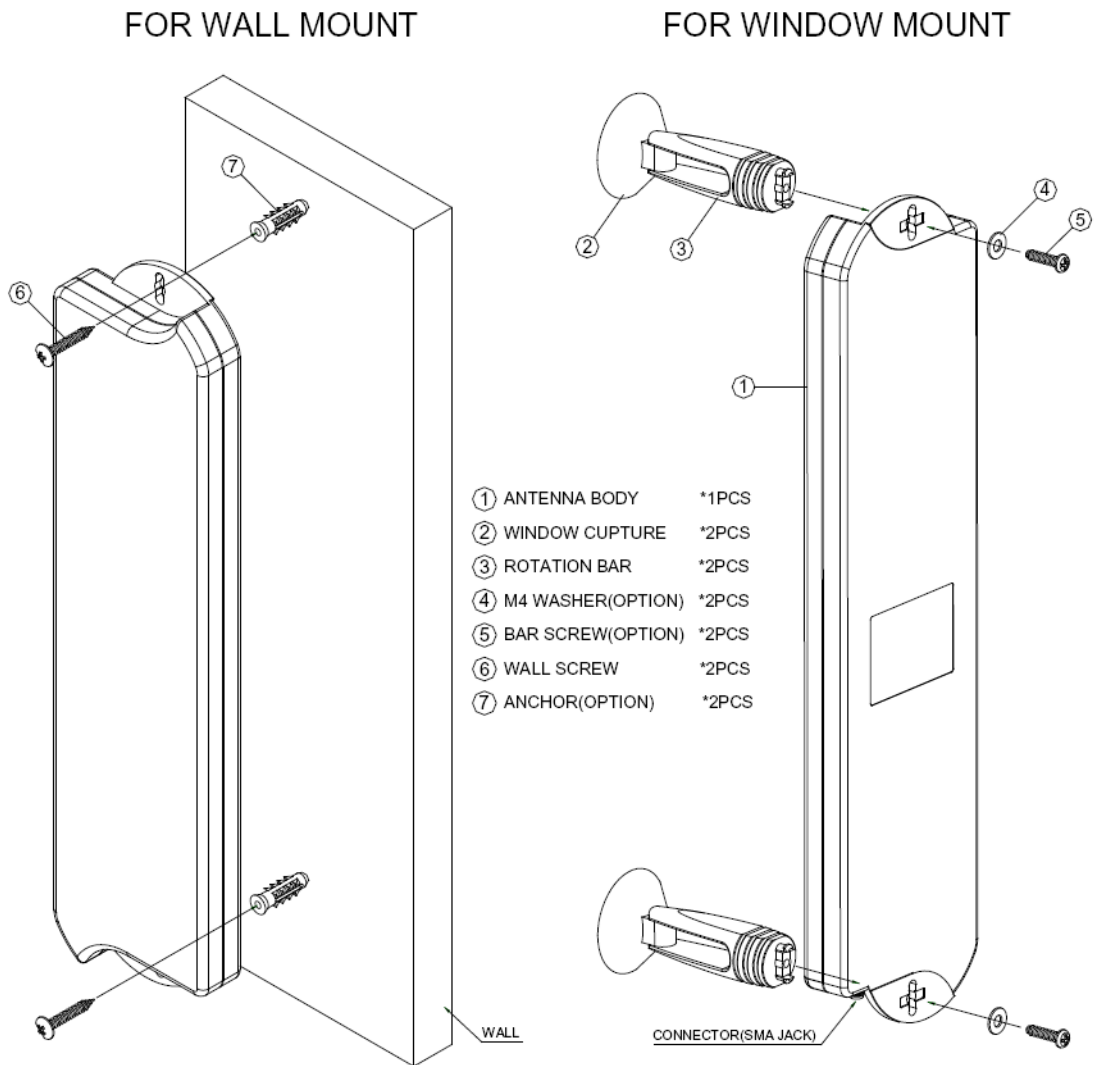


Figure 2-19: Wall/Window Mounting the 2.3/2.5 GHz Detached Antenna

2.5.2 Window Mounting the 2.3/2.5 GHz Detached Antenna, with Rotation Capability

The installation kit includes the following: 2 screws, 2 M4 washers, 2 rotation bars and 2 suction cups (4).

- 1 Attach the rotation bars to the antenna and the suction cups to the rotation bars. Refer to [Figure 2-19](#) for directions.
- 2 Determine the location of the antenna on the glass. Attach it to the window by pressing the suction cups onto the glass.
- 3 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.
- 4 Rotate the antenna left or right so the domed surface of the antenna is facing the direction of the Base Station. Check the received Signal LEDs to ensure the antenna is aimed correctly.

2.5.3 Wall Mounting the 2.3/2.5 GHz Detached Antenna, with Rotation Capability

The installation kit includes 4 L-type mounting plates (one top, one bottom, one Wall-V and one Wall-H), 6 M5 screws (with washers and spring washers), 2 plastic anchors and 2 #8 screws.

- 1 If anchors are needed (wall-board, plaster board, etc.), drill two holes (361 mm apart) for the anchors using a 5 mm drill bit and insert anchors. Use a 9/64" drill bit for screwing directly into a solid surface (stud).
- 2 Assemble the top L-type plate with the Wall-V L-type plate. Note, the Wall-V plate is the one with the vertical ellipse on the short side. Make sure the inscriptions are facing upwards. Use two M5 screws to fasten the plates together. Do not over tighten. See Figure 1.
- 3 Assemble the bottom L-type plate with the Wall-H L-type plate. Note, the Wall-H plate is the one with the horizontal ellipse on the short side. Make sure the inscriptions are facing upwards. Use two M5 screws to fasten the plates together. Do not over tighten.
- 4 Attach the assembled plates to the flat rear-side of the antenna. Use the two remaining M5 screws to fasten them.
- 5 Fasten the antenna to the wall. Use the two #8 screws provided with the kit. Do not over tighten.
- 6 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.
- 7 Rotate the antenna left or right so the domed surface of the antenna is facing the direction of the Base Station. Check the received Signal LEDs to ensure the antenna is aimed correctly.

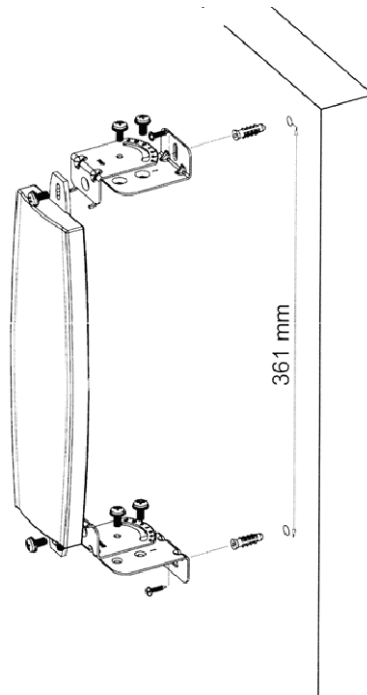


Figure 2-20: Wall Mounting the 2.3/2.5 GHz Detached Antenna with Rotation Capability

For the new antenna, the bracket pairs switch places such that the bottom pair is attached at the top and the top pair at the bottom:

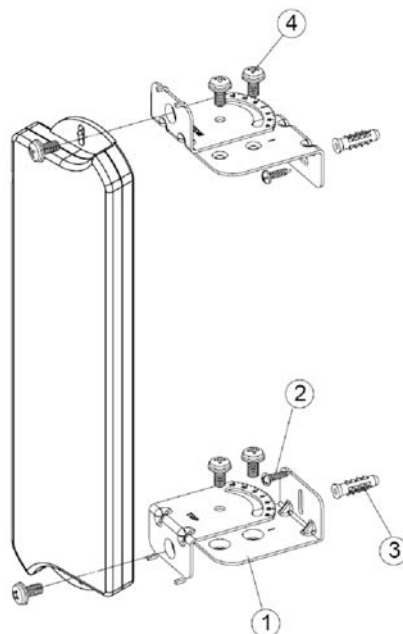


Figure 2-21: Wall Mounting the new 2.3/2.5 GHz Detached Antenna with Rotation Capability

Chapter 3 - Commissioning

In This Chapter:

- “Commissioning Steps” on page 62
- “Configuring Basic Parameters” on page 63
- “Fast Configuration and Antenna Alignment (PRO-S CPE)” on page 66
- “SU Alignment Unit (SAU)” on page 67
- “Using SAU for Aligning the PRO-S CPE's Antenna” on page 70
- “Aligning the Si CPE's Antenna” on page 72
- “Operation Verification” on page 74

3.1 Commissioning Steps

After completing the installation process, as described in the preceding chapter, several actions should be performed to ensure connectivity with the Base Station and provisioning of services. After the SU is connected with the Base Station, it can be fully managed via the wireless link from the Base Station or a central management system:

- 1 The basic parameters must be configured to ensure that the unit operates correctly and can communicate with the Base Station.
- 2 The antenna must be aligned to ensure optimal performance of the wireless link.
- 3 Proper operation should be verified, including data connectivity.

3.2 Configuring Basic Parameters

3.2.1 The Basic Parameters

Table 3-1: SU's Basic Parameters

Parameter	Default Value	Comment
Ethernet Port auto Negotiation Enable/Disable	Enabled	Applicable only to E-model units (with Ethernet interface).
Ethernet Port Speed and Duplex		Applicable only to E-model units (with Ethernet interface). Applicable only if Ethernet Port Auto Negotiation Enable/Disable is set to Disable
User Name	Null, changed automatically to MAC address if not configured to any other value	Should be supplied by system administrator
User Password	quickyunikynyoky	Should be supplied by system administrator
Organization Name		Optional - according to administrator policy
Address		Optional- according to administrator policy
Country		Optional- according to administrator policy
Best BST/AU Support	Enable	
BST/AU ID	186.190.0.0.250.206	
BST/AU ID ID Mask	0.0.0.0.0	
Preferred BST/AU ID	186.190.0.0.250.206	
Preferred BST/AU ID Mask	0.0.0.0.0	
Bandwidth	3.5 MHz	
Antenna (Si CPE only)	Automatic	
Scanning Start Frequency	Depend on Radio Band and Bandwidth	
Scanning End Frequency	Depend on Radio Band and Bandwidth	
Scanning Main Step	875 KHz	
Scanning Intermediate Steps	Enable for all eight Steps	
Discrete Frequencies	None	
Rx Attenuator (2.3 GHz units only)	0	



NOTE

Some parameters are changed to their new values only after reset (refer to [Section 4.11](#) for more details). Once the basic parameters are configured, the unit should be reset in order to activate the new configuration.

3.2.2 Configuration Tools

Two options for local configuration and monitoring are incorporated into all SUs:

- The Installer Monitor program, based on a user-friendly CLI (Command Line Interface). The Installer Monitor program can be accessed using Telnet.
- The web Configuration Server, providing a web-based GUI. The Web Configuration Server can be accessed using a PC/Notebook or a Pocket PC/PDA with a web browser.

The SU may be delivered with the operator's default settings already configured in the FLASH memory. If there is need to change these settings then the only parameters that should be configured are the end user's credentials (User Name and User Password). In certain scenarios (where the MAC address of the unit is known to the system administrator and services are provisioned based on this MAC address), there is no need to configure the credentials. the SU will automatically use the credentials User Name = MAC address, User Password = quickynikynyoky.

If a Smart Card is used in an Si CPE, the unit will always use the configuration incorporated into the Smart Card. Once the Smart Card is removed, the SU will load the configuration from the FLASH.

If a WiMAX Modem Application utility is used, the SU will load to the FLASH and use the operator's configuration from the WiMAX Modem Application CD. This configuration may be changed via the utility's configuration screens. For more details refer to the WiMAX Modem Application documentation.

3.2.3 Using the Configuration Tools



To configure the SU's basic parameters:

- 1 To configure parameters using Telnet, connect a PC/Notebook to the Ethernet port of the IDU, using a straight Ethernet cable.

To configure parameters using the Web Configuration Server, connect a PC/Notebook or a Pocket PC/PDA with a web browser to the Ethernet port of the SU, using a straight Ethernet cable.

In a PRO-S CPE, you can also connect directly to the ODU's IDU COM connector, using the special Y-cable.

- 2 Configure the PC's IP parameters to enable connectivity with the unit. The IP address of the SU for local management access is 192.168.254.251. The Subnet Mask is 255.255.255.0. The recommended IP address for the PC is 192.168.254.250, as this is also the default TFTP Sever IP Address (required for downloading SW versions and for downloading/uploading configuration files).
- 3 Run the Telnet program or open a web browser, and connect to 192.168.254.251. The "Enter the Password" prompt is displayed. Enter the password and press the Enter key.

NOTE



The default password is "installer".

- 4 The Main menu of the SU Installer Monitor program/Web Configuration Server is displayed, enabling access to the required parameters configuration and performance monitoring options. Refer to [Chapter 4](#) for instructions on using the SU Installer Monitor program and detailed information on the various parameters and other features supported by the program. Refer to [Appendix A](#) for instructions on using the Web Configuration Server.
- 5 Configure the basic parameters listed in [Table 3-1](#).
- 6 Reset the unit to apply the new settings and enable synchronization with the Base Station.

3.3 Aligning the PRO-S CPE's Antenna

3.3.1 Fast Configuration and Antenna Alignment (PRO-S CPE)

A special Y-cable, available from Alvarion, enables to connect a Pocket PC (or a portable PC) directly to the IDU COM port of the ODU. This enables the installer to perform the entire process of configuring basic parameters, aligning the antenna and verifying proper operation of the unit right after completing the installation, minimizing the number of times the installer must climb to the roof.



To use a Pocket PC/Notebook for completing the entire installation process on the roof:

- 1 Disconnect the IDU-ODU cable from the ODU.
- 2 Connect the Y-cable according to the following drawing:

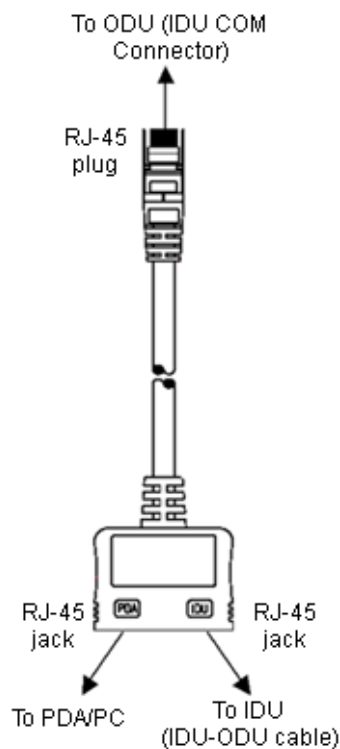


Figure 3-1: Connecting the Y-Cable

**NOTE**

When the Y-Cable is connected, there is no Ethernet connectivity between the ODU and the data device connected to the IDU.

- 3 From the Pocket PC/Notebook, connect to the SU and complete the process of configuring basic parameters.
- 4 Verify that the the unit is synchronized with a Base Station. If the SU is not synchronized with a Base Station, ensure that all parameters are configured properly. If the unit is still not synchronized with a Base Station, improve the quality of the link by changing the direction of the antenna or by placing the antenna at a higher or in an alternate location.
- 5 Rotate (and/or tilt if applicable) the ODU/antenna until the maximum link quality (SNR and RSSI) reading is achieved. If you encounter prolonged difficulty in achieving the expected link quality, try to improve the reception quality by placing the antenna at a higher point or in an alternate location.

**NOTE**

Ensure that the front of the antenna is always facing the Base Station. However, in certain conditions, such as when the line of sight to the Base Station is hampered, better reception may be achieved using a reflected signal. In this case, the antenna is not necessarily directed toward the Base Station.

- 6 Secure the ODU/antenna firmly to the pole.

**CAUTION**

In some cases, the antenna may need to be tilted to ensure that the level at which the SU receives transmissions from the AU (and vice versa) is not too high. When the RSSI reading is higher than -20 dBm, the received signal level is too high (saturation). This must be avoided, preferably by up-tilting the antenna. As a rule of thumb, if the SU is located at a distance of less than 300 meters from the AU, it is recommended to up-tilt the antenna by approximately 10° to 15°.

3.3.2 SU Alignment Unit (SAU)

The miniature SU Alignment Unit can be used during installation and testing to support an easy process of antenna alignment and provide the ODU's status indications.

**To connect the SAU to the ODU:**

- 1 Remove the sealing cap of the ODU's SAU connector.

- 2 Connect the cable attached to the SAU to the SAU connector.
- 3 After completing the installation, disconnect the cable and replace the cap as shown in the following figure. Make sure that the small protrusion on the side of the cap fits inside the hole on the connector's protective body:

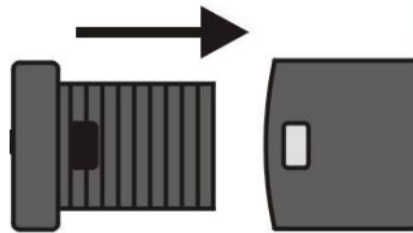


Figure 3-2: Inserting the SAU Sealing Cap

Use appropriate sealing material to protect the connection against moisture and humidity. Use removable sealing material, such as a tar seal, to enable future access to the connector.

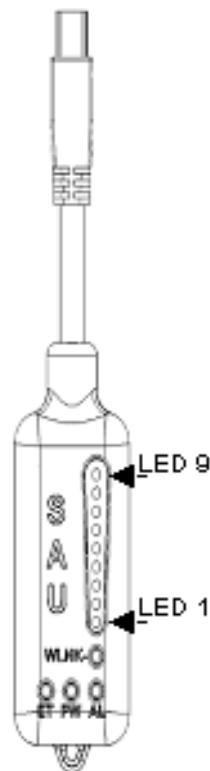


Figure 3-3: SAU

Table 3-2: SAU LEDs

Name	Description	Functionality
AL	Alarm indication	<ul style="list-style-type: none"> ■ Off - ODU is OK, diagnostic test passed ■ Red - ODU failure
PW	Power indication	<ul style="list-style-type: none"> ■ Off - ODU is not powered or 3.3 VDC failure ■ Green - ODU power to SAU is OK
ET	Ethernet link status indication (Ethernet integrity)	<ul style="list-style-type: none"> ■ Off - No Ethernet connectivity has been detected between the outdoor unit and the device connected to the indoor unit's Ethernet port ■ Green- Ethernet connectivity has been detected between the outdoor unit and the device connected to the indoor unit's Ethernet port
WLNK	Wireless link status indication	<ul style="list-style-type: none"> ■ Off - The SU is not connected with a Base Station ■ Orange on - The SU is connected with and receives services from the Base Station (Network Entry completed). Link Quality is indicated by LEDs 1-9 as described in Table 3-3. below. ■ Blinking orange - Authentication failed. The reason is provided by Link Quality Bar LEDs: If LEDs 6, 7 and 8 are on: Authentication reject by RADIUS server. If LEDs 7 and 8 are on: Rejected by Base Station (Duplicate SU Name in database). If LED 8 is on: Authentication Timeout, re-authentication failure (connection to RADIUS server lost or Shared Secret mismatch)

* After power-up of the ODU, the all LEDs illuminate until self-test has completed.

Table 3-3: SAU LINK QUALITY LEDs Functionality

Bar LEDs	SNR
LED 1 (green) is On	$5\text{dB} \leq \text{SNR} < 10\text{dB}$
LEDs 1-2 (green) are On	$10\text{dB} \leq \text{SNR} < 15\text{dB}$
LEDs 1-3 (green) are On	$15\text{dB} \leq \text{SNR} < 20\text{dB}$
LEDs 1-4 (green) are On	$20\text{dB} \leq \text{SNR} < 24\text{dB}$
LEDs 1-5 (green) are On	$\text{SNR} \geq 24\text{dB}$ and $\text{RSSI} < -75\text{dBm}$
LEDs 1-6 (green) are On	$\text{SNR} \geq 24\text{dB}$ and $\text{RSSI} \geq -75\text{dBm}$
LEDs 1-7 (green) are On	$\text{SNR} \geq 24\text{dB}$ and $\text{RSSI} \geq -70\text{dBm}$
LEDs 1-8 (green) are On	$\text{SNR} \geq 24\text{dB}$ and $\text{RSSI} \geq -60\text{dBm}$
LEDs 1-8 (green) and 9 (red) are On	$\text{RSSI} \geq -20\text{dBm}$ (saturation)
LEDs 1 - 8 Blinking one after the other	During full frequency scan
LEDs 1 - 9 Blinking as follows: LED 5 lights, after 200ms LEDs 4 & 6 light, after 200ms LEDs 3&7 light, after 200ms LEDs 2&8 light, after 200ms LEDs 1 lights, after 200ms all the LEDs are extinguished and then the sequence is repeated.	During Best AU selection process or short scan

3.3.3 Using SAU for Aligning the PRO-S CPE's Antenna

The LINK QUALITY bar display on the SAU comprises 9 LEDs:

- The WLNK LED indicates that the wireless link is active, and is lit when the SU has completed the Network Entry process.
- LEDs 1 to 8 (green) and 9 (red) indicate the quality of the received signal. The higher the number of LEDs illuminating, the better the quality of the received signal.
- If all LEDs, including LED 9 (red) are on, the received signal strength is too high. This must be avoided, preferably by up-tilting the antenna. As a rule of thumb, if the SU is located at a distance of less than 300 meters from the Base Station, it is recommended to up-tilt the antenna by approximately 10° to 15° .



To align the antenna:

- 1 Point the antenna toward the general direction of the Base Station.
- 2 Connect the SAU to the ODU.
- 3 Verify that the PWR (power) indication on the SAU is on.
- 4 Verify that the WLNK LED indicator is on, indicating that the unit is synchronized with the Base Station. If the SU is not synchronized with the Base Station, ensure that all parameters are configured properly. If the unit is still not synchronized with the Base Station, improve the quality of the link by changing the direction of the antenna or by placing the antenna at a higher point or in an alternate location.
- 5 Rotate (and/or tilt if applicable) the ODU/antenna until the maximum link quality reading is achieved. If you encounter prolonged difficulty in achieving the expected link quality, try to improve the reception quality by placing the antenna at a higher point or in an alternate location.

**NOTE**

Ensure that the front of the antenna is always facing the Base Station. However, in certain conditions, such as when the line of sight to the Base Station is hampered, better reception may be achieved using a reflected signal. In this case, the antenna is not necessarily directed toward the Base Station.

- 6 Secure the ODU/antenna firmly to the pole.

3.4 Aligning the Si CPE's Antenna

The Signal link quality 7-LEDs display is located on the top panel of the unit. The higher the number of LEDs that are on, the better the quality of the received signal. Refer to “[Si CPE Top Panel Components](#)” on page 41 for more details on the functionality of the LEDs.

The link quality can be estimated more accurately using the Link Quality Display option in the SU Installer Monitor program. Refer to [Section 4.9.1](#) for more details on this option.

This section describes how to align the Subscriber Unit antenna using either the Signal 7-LEDs display or the Start Link Quality Display option of the Monitor program.

In the following instructions, the term "antenna" means either the selected integral antenna or a detached antenna. The default active antenna is the internal antenna number 3 (opposite to the connectors' side). Refer to [Section 4.7.3](#) for instructions on changing the active antenna selection.



To align the antenna:

- 1 Point the antenna towards the general direction of the Base Station.
- 2 Verify that the power indication of the unit is on.
- 3 Verify that the green Status LED illuminates and at least one LED of the Signal LEDs is on, indicating that the unit is synchronized with the Base Station. If the SU is not synchronized with the Base Station, ensure that all parameters are configured properly. If the unit is still not synchronized with the Base Station, try improving the quality of the link by changing the direction of the antenna or by placing the antenna at a higher or alternate location.
- 4 Try changing the location/direction of the antenna until the maximum link quality reading is achieved. If you encounter prolonged difficulty in achieving the expected link quality, try improving the reception quality by placing the antenna at an alternate location.



NOTE

Ensure that the front of the antenna is always facing the Base Station. However, in certain conditions, such as when the line of sight to the Base Station is hampered, better reception may be achieved using a reflected signal. In this case, the antenna is not necessarily directed toward the Base Station.

3.5 Operation Verification

To verify proper operation of the PRO-S CPE, examine the LED indicators on the IDU (see [Table 2-5](#)) and the SAU (see [Table 3-2](#)).



NOTE

Verifying the correct operation of the ODU using the SAU LEDs is meaningful only after the configuration and alignment processes are completed, and the unit is synchronized with the Base Station.

To verify proper operation of the Si CPE, examine the LED indicators on the top panel (see [Table 2-7](#)).

To verify proper connection to the end-user's data equipment, examine the Ethernet Integrity and Ethernet Activity LEDs of the Ethernet connectors.

To verify data connectivity, from the end-user's PC or from a portable PC connected to the unit, ping a known device in the network, or connect to the Internet.

Chapter 4 - Operation

In This Chapter:

- “The SU Installer Monitor Program” on page 76
- “Using the Monitor Program” on page 77
- “The Main Menu” on page 79
- “Unit Control Menu” on page 81
- “Registration Parameters Menu” on page 92
- “BST/AU ID Parameters Menu” on page 94
- “Radio Parameters Menu” on page 98
- “Performance Monitoring Menu” on page 107
- “Multirate and ATPC Parameters Menu” on page 104
- “SU Parameters Summary” on page 112

4.1 The SU Installer Monitor Program

The SU Installer Monitor program enables configuration of basic parameters during installation to facilitate communication with the AU/Micro Base Station, including all parameters required for completion of the Network Entry process. It also enables downloading of SW files, control of the running SW version, and downloading/uploading of the configuration file, simplifying and accelerating the configuration process.

The SU Installer Monitor program also provides a selection of performance monitoring capabilities, allowing installers and technicians to view information on link quality and traffic counters. These monitoring capabilities enable performance verification and problem identification.

To further support local testing, the program also enables temporary control of the ATPC and Multirate mechanisms.

4.2 Using the Monitor Program

4.2.1 Accessing the Monitor Program



To access the Monitor program:

- 1 The Monitor program uses the fixed IP address 192.168.254.251 with the subnet mask 255.255.255.0. The PC used for accessing the Monitor program should be configured accordingly. It is recommended to set the PC's IP address to 192.168.254.250, which is the default TFTP Server IP address (required for downloading SW versions and for downloading/uploading configuration files).

NOTE



The IP address 192.168.254.251 is used only for the Monitor program. This is not the IP address used by the unit for other purposes. The IP parameters for management purposes are allocated by the NPU during the Network Entry process.

- 2 Connect the PC to the Ethernet port, using a straight cable.
- 3 Run the Telnet program connecting to 192.168.254.251. The Enter the password prompt is displayed. Enter the password and press the Enter key.

NOTE



Following three consecutive failures to enter the correct password, access to the Monitor program will be blocked for 5 minutes. The factory default password is "installer". If you forgot the password, type "help" to get a challenge string consisting of 24 characters. Contact Customer Service and give them the challenge string (after user identification) to receive a one-time password. You can use this password only for a single entrance to the program. The password must be changed during the session to a different "permanent" password. The administrator should be notified of this new password. Five consecutive errors in entering the one-time password will invalidate it, and a new challenge string should be used to receive a new one-time password.

- 4 The Main menu of the SU Installer Monitor program is displayed, enabling access to the required parameters configuration and performance monitoring options.

4.2.2 Using the Program

This section describes the Monitor program structure and navigation rules.

- Each menu or submenu displays a list of numbered options. To access an option, enter the number of the required option at the > prompt and press the Enter key.
- The header of each displayed item includes the unit identification (MAC Address), the running SW version and the name of the current item.
- The first selectable item in each menu is the Show option, enabling to view the current configuration of the applicable parameters. For some menus some additional status information is displayed.
- At any point in the program, you can use the Esc key to return to the previous menu (one level up) without applying any change.
- Configurable parameter's menus display the current value/status of the parameter and provide instructions for changing the configuration. These instructions may include the permitted value range for the parameter, the permitted format, or the selectable options.
- Each change in a parameter 's configuration must be confirmed using the Enter key. If the new value/option is a valid one, the program will return to the previous menu. Entry of a wrong value will be indicated by an appropriate error message, and the configuration change text will be displayed again.
- Changes to certain parameters are applied only after reset. For these parameters, if the configured value differs from the current value, the applicable Show menus display both current and configured values.
- If the Monitor program is not used for 10 minutes, the session will be terminated automatically.
- Select the Exit option in the Main menu to exit the program and terminate the session.

4.3 The Main Menu

The Main menu of the SU Installer Program includes the following options:

- Show All Parameters and Status
- Unit Control
- Registration Parameters
- Base Station ID Parameters
- Radio Parameters
- Multirate and ATPC Parameters
- Performance Monitoring
- FDD Parameters (3.x GHz units only)
- Exit

4.3.1 Show all Parameters and Status

Select this option to view the current values/selected options of all parameters as well as additional status information. The display includes all the items listed in the descriptions of the Show option in the sections explaining the Unit Control, Registration Parameters, Base Station ID Parameters, Radio Parameters, and Multirate and ATPC Parameters menus.

4.3.2 Unit Control

The Unit Control menu enables resetting the unit, reverting to the default configuration, changing the password, configuring the operation mode of the Ethernet port, and selecting the running SW version. It also enables to download a new SW version.

4.3.3 Registration Parameters

The Registration Parameters menu enables viewing and configuring authentication parameters that are required for services provisioning to the unit,

and some optional parameters that provide information on the ownership and location of the unit.

4.3.4 BST/AU Parameters

The BST/AU Parameters menu enables viewing and configuring the parameters that define the Base Station(s)/AU(s) with which the unit can synchronize, including parameters related to the Best BST/AU selection feature.

4.3.5 Radio Parameters

The Radio Parameters menu enables viewing and configuring the radio parameters necessary for communication with the Base Station, including parameters of the frequency scanning mechanism.

4.3.6 Multirate and ATPC Parameters

The Multirate and ATPC Parameters menu enables temporary control of the transmitted signal for testing purposes.

4.3.7 Performance Monitoring

The Performance Monitoring menu enables viewing continuously updated link quality parameters and traffic counters.

4.3.8 FDD Parameters

The FDD Parameters menu enables viewing/updating the Radio parameters for Standard operation mode. These parameters do not affect the operation of the unit when using Advanced Si operation mode. These parameters are provided to support the Automatic Platform Detection mechanism of the dual-mode CPEs, allowing pre-configuration of the relevant parameters before switching the sector to operate in FDD mode using Standard operation mode. These parameters will be applicable only to SUs in the 3.x GHz bands, when a SW version supporting APD in FDD mode will be available. This menu is not applicable to units in the 2.x GHz bands

4.3.9 Exit

Select the Exit option to exit the Monitor program and terminate the Telnet session.

4.4 Unit Control Menu

The Unit Control menu includes the following options:

- Show
- Reset Unit
- Change Password
- SW Versions Control
- Configuration Control
- Ethernet Port Operation Mode (not applicable for U-model)

4.4.1 Show

Select this option to view the current values/selected option of applicable parameters as well as general status information, as follows:

- HW Details
 - ◇ SU Type:
 - CPE (first generation CPE. Not applicable in TDD systems)
 - CPE PRO
 - CPR PRO-L
 - CPE PRO2
 - CPE PRO2-L
 - CPE Si
 - CPE Si-L (not applicable in current release)
 - CPE Si2
 - CPE-Si2-L (not applicable in current release)

CPE PRO, CPE PRO-L, CPE Si and CPE Si-L use first generation Intel WiMAX Connection 2250 chip. CPE PRO2, CPE PRO2-L, CPE Si2 and CPE

Si2-L use second generation (IEEE 802.16e-ready) WiMAX chip. The “L” suffix indicates that the SU was supplied with limited capabilities (limited bandwidth).

- ◇ Serial Number
- ◇ MAC Address



NOTE

The displayed MAC address is the unit's MAC address, used for management and communication. The Si CPE U model (USB) has an additional MAC addresses for the USB controller. Since the USB controller of the PC connected to the unit doesn't have an internal MAC address, the MAC address of the USB controller is used as the MAC Address of the PC. When managing the unit via the USB port (using any of the optional management tools), this MAC address can be viewed in the ARP table of the PC.

- ◇ MAC Address Control Number (a number computed from the MAC Address that can be used for verification purposes)
- ◇ Radio Band
- ◇ HW Version: The version of the digital module
- ◇ HW Configuration
- ◇ RF Version: The version of the radio module
- ◇ SU Interface Type (Si CPE): Ethernet or USB
- ◇ Smart Card Status (Si CPE): Installed/Not Installed/Fault
- Ethernet Port Operation Mode parameters and status (applicable only for E-model units)
 - ◇ Ethernet Port Auto Negotiation Enable/Disable
 - ◇ Ethernet Port Speed and Duplex
- Operation Mode: Advanced Si or Standard (not applicable in current version supporting only Advanced Si mode). Standard is the air protocol of the first generation BreezeMAX systems. Advanced Si is the air protocol used in the WiMAX-ready systems, providing full support for Self Install SUs. In the current release only Advanced-Si mode is applicable.
- Unit Status: the connectivity status of the unit. Possible statuses are:
 - ◇ Searching for Base Station

- ◇ Base station found
- ◇ Not Authorized
- ◇ Not Registered
- ◇ Registered

- SW Versions:
 - ◇ Boot Version
 - ◇ Main SW File Name
 - ◇ Main SW Version
 - ◇ Shadow SW File Name
 - ◇ Shadow SW Version
 - ◇ Running from: Main or Shadow, and the SW version.

- Upload/Download Parameters:
 - ◇ TFTP Server IP address: the IP address of the TFTP server used for SW version download.
 - ◇ SW File Name: the name in the TFTP server of the SW version to be downloaded to the unit.
 - ◇ Configuration File Upload Name
 - ◇ Configuration File Download Name

4.4.2 Reset Unit

Select this option to reset the unit. To avoid unintentional reset, you will be prompted to confirm the reset request. Changes to most of the configurable parameters are applied only after reset. Refer to [Section 4.11](#) for information on which parameters are changeable in run time and which changes are applied only after reset.

4.4.3 Change Password

Select this option to change the password. You will be prompted to enter the new password. After pressing enter, you will be prompted to re-enter the new password.



NOTE

Notify the administrator of the new password!

Valid passwords: Up to 20 printable characters.

Default password: installer

4.4.4 SW Versions Control

The SU can contain two SW versions:

- Main: Each time the SU resets it will reboot using the version defined as Main.
- Shadow: Normally the Shadow version is the backup version. Each time a new SW File is downloaded to the SU, it will be stored as a Shadow version, replacing the previous Shadow Version.

The typical process of upgrading to a new SW version includes the following steps:

- 1 Download the new SW File to the SU. It will be stored as the Shadow version.
- 2 Reset and run the unit from its Shadow version. Note that at this stage, after reset the unit will reboot from its previous Main version.
- 3 If you want to continue using the new version, swap the Shadow and Main versions. The new version is now defined as Main, and will be used each time the unit reboots. The previous version is defined now as Shadow.

The SU functions as a TFTP client, enabling the loading of SW files from a TFTP server.

The SW Versions Control submenu includes the following options:

- Show
- Reset and Run from Shadow
- Set Running Version as Main
- SW Download Parameters
- Perform SW Download

4.4.4.1 Show

Select this option to view the current available versions and the running version as well as the TFTP parameters:

- SW Versions:

- ◇ Main SW File Name
- ◇ Main SW Version
- ◇ Shadow SW File Name
- ◇ Shadow SW Version
- ◇ Running from: indicates whether the unit is currently running the Main or the Shadow version.

- Download Parameters:

- ◇ TFTP Server IP address: the IP address of the TFTP server used for SW version download.
- ◇ SW File Name: the name in the TFTP server of the SW version to be downloaded to the unit.

4.4.4.2 Reset and Run from Shadow

Select this option to reset the unit and run the Shadow version after power up. To avoid unintentional actions you will be prompted to confirm the request.

4.4.4.3 Set Running Version as Main

When the unit is running the Shadow version (after selecting Reset and Run from Shadow), it will boot from the Main version after the next reset. Select this option if you want to swap versions so that the running version will become the Main version and will be the version to be used after reset. To avoid unintentional actions you will be prompted to confirm the request.

4.4.4.4 SW Download Parameters

This submenu enables viewing or defining the parameters to be used for downloading a new SW version from a TFTP server. It includes the following options:

- Show

- TFTP Server IP Address

- SW File Name

4.4.4.4.1 Show

Select this option to view the current SW Download parameters:

- TFTP Server IP address: the IP address of the TFTP server used for SW version download.
- SW File Name: the name in the TFTP server of the SW version to be downloaded to the unit.

4.4.4.4.2 TFTP Server IP Address

Select this option to change the IP Address of the TFTP server.

The default TFTP Server IP address is 192.168.254.250.

4.4.4.4.3 SW File Name

Select this option to enter the name in the TFTP server of the required SW file.

4.4.4.5 Perform SW Download

Select this option to execute the SW download operation. To avoid unintentional actions you will be prompted to confirm the request.

**To perform SW download:**

- 1 The required SW file should be available in the TFTP Server directory in a PC connected to the unit.
- 2 Typically it is recommended to configure the IP address of the PC to 192.168.154.250, which is the default TFTP Server IP address of the unit. If a different IP address is configured in the PC with the TFTP, configure the TFTP Server IP Address to the same address.
- 3 Enter the name of the SW file (as called in the TFTP server) as the SW File Name.
- 4 Select Perform SW Download and confirm the download request. Wait to receive a success/failure message.
- 5 Following a successful download, the loaded SW version becomes the Shadow version in the unit.

4.4.5 Configuration Control

The Configuration Control Submenu includes the following options:

- Set Factory Defaults
- Configuration File Download Control
- Configuration File Upload Control

4.4.5.1 Set Factory Defaults

Select this option to reset the unit and revert to the default configuration. To avoid unintentional actions you will be prompted to confirm the request. All parameters except the Password will revert to the factory default values.

4.4.5.2 Configuration File Download Control

The Configuration File Download Control submenu enables to define parameters related to downloading a configuration file from a TFTP server to the SU, and to initiate the download operation. It includes the following options:

- Show
- TFTP Server IP Address

- Configuration File Download Name
- Perform Configuration Download

4.4.5.2.1 Show

Select this option to view the current Configuration File Download parameters:

- TFTP Server IP address: the IP address of the TFTP server used for configuration file download.
- Configuration File Download Name: the name in the TFTP server of the configuration file to be downloaded to the unit.

4.4.5.2.2 TFTP Server IP Address

Select this option to change the IP address of the TFTP server.

The default TFTP Server IP address is 192.168.254.250.

NOTE



- When the SU is synchronized with a base station, it receives the TFTP Server IP Address from the base station during the network entry process. This address is 1.7.1.1 for a Base Station (NPU) and 1.1.1.1 for a Micro Base Station. This will be the TFTP Server IP Address after each reset, as long as the SU is associated with a base station.
- The same TFTP Server IP Address parameter is used in the SW Download, Configuration File Download and Configuration File Upload processes.

4.4.5.2.3 Configuration File Download Name

Select this option to enter the name in the TFTP server of the required configuration file. A Configuration File Download Name consists of up to 50 characters.

The default Configuration File Download Name is SU_DOWNLOAD_CFG.

4.4.5.2.4 Perform Configuration Download

Select this option to execute the configuration file download operation. To avoid unintentional actions you will be prompted to confirm the request.



To perform configuration file download:

- 1 The required configuration file should be available in the TFTP Server directory in a PC connected to the unit.

- 2 Typically it is recommended to configure the IP address of the PC to 192.168.154.250, which is the default TFTP Server IP address of the unit. If a different IP address is configured in the PC with the TFTP server, configure the TFTP Server IP address to the same address.
- 3 Enter the name of the configuration file (as called in the TFTP server) as the Configuration File Download Name.
- 4 Select Perform Configuration Download and confirm the download request. Wait to receive a success/failure message.
- 5 Following a successful download, reset the unit to apply the new configuration.

4.4.5.3 Configuration File Upload Control

The Configuration File Upload Control submenu enables to define parameters related to uploading the configuration of the SU to a file in the TFTP server directory, and to initiate the upload operation. It includes the following options:

- Show
- TFTP Server IP Address
- Configuration File Upload Name
- Perform Configuration Upload

4.4.5.3.1 Show

Select this option to view the current Configuration File Upload parameters:

- TFTP Server IP address: the IP address of the TFTP server used for configuration file upload.
- Configuration File Upload Name: the name in the TFTP server directory of the configuration file to be uploaded.

4.4.5.3.2 TFTP Server IP Address

Select this option to change the IP address of the TFTP server.

The default TFTP Server IP address is 192.168.254.250.



NOTE

- When the SU is synchronized with a base station, it receives the TFTP Server IP Address from the base station during the network entry process. This address is 1.7.1.1 for a Base Station (NPU) and 1.1.1.1 for a Micro Base Station. This will be the TFTP Server IP Address after each reset, as long as the SU is associated with a base station.
- The same TFTP Server IP Address parameter is used in the SW Download, Configuration File Download and Configuration File Upload processes.

4.4.5.3.3 Configuration File Upload Name

Select this option to enter the name in the TFTP server directory of the configuration file to be uploaded. A Configuration File Upload Name consists of up to 50 characters.

The default Configuration File Upload Name is SU_UPLOAD_CFG.

4.4.5.3.4 Perform Configuration Upload

Select this option to execute the configuration file upload operation. To avoid unintentional actions you will be prompted to confirm the request.



To perform configuration file upload:

- 1 Typically it is recommended to configure the IP address of the PC to 192.168.254.250, which is the default TFTP Server IP address of the unit. If a different IP address is configured in the PC with the TFTP server, configure the TFTP Server IP address to the same address.
- 2 Enter the name of the configuration file (as will appear in the TFTP server) as the Configuration File Upload Name.
- 3 Select Perform Configuration Upload and confirm the dupload request. Wait to receive a success/failure message.

4.4.6 Ethernet Port Operation Mode

The Ethernet Port Control parameter enables viewing and defining the operation mode of the Ethernet port

The available options are:

- Show Ethernet Mode
- Set Ethernet Mode

4.4.6.1 Show Ethernet Mode

Upon selecting the Show Ethernet Mode option, the following parameters will be displayed:

- Ethernet Port Auto Negotiation Enable/Disable.
- Ethernet Port Speed and Duplex: If Ethernet Port Auto Negotiation is enabled, the detected speed and duplex will be displayed. If Ethernet Port Auto Negotiation is disabled, the current and configured values will be displayed (one value will be displayed if configured and current values are the same).

4.4.6.2 Set Ethernet Mode

The Set Ethernet Mode option enables configuring the following parameters:

- Ethernet Port Auto Negotiation Enable/Disable: To enable/disable Auto Negotiation.

The default is Enable.

If Ethernet Port Auto Negotiation Enable/Disable is set to Enable, you will return to the previous menu. If set to Disable, the speed and duplex operation setting options will be displayed:

- Ethernet Port Speed and Duplex: If Ethernet Port Auto Negotiation Enable/Disable is set to Disable, this parameters allows selecting one of the following options:
 - ◇ 10 Mbps, Half-Duplex
 - ◇ 10 Mbps, Full-Duplex
 - ◇ 100 Mbps, Half-Duplex
 - ◇ 100 Mbps, Full-Duplex

4.5 Registration Parameters Menu

The Registration Parameters menu includes the following options:

- Show
- User Name
- User Password
- Organization
- Address
- Country

4.5.1 Show

Select this option to view the registration parameters (excluding the User Password that is not shown for security reasons):

- User Name: the name of the unit, to be used for service provisioning. Changes to the User Name parameter are applied only after reset. Therefore, the actual value may differ from the configured value. In this case, both the actual and configured values are displayed.
- Organization: the name of the organization (customer) using the unit.
- Address: the location of the unit.
- Country: the country name.

4.5.2 User Name

The User Name consists of up to 32 printable characters, case sensitive.

The default User Name is “Not Set Yet”. This is a mandatory parameter - the User Name must be defined during the installation process for proper authentication and service provisioning. If not defined, the MAC address will be used as the User Name, enabling provisioning of default services based on the MAC address (if supported by the Base Station/RADIUS configuration).

4.5.3 User Password

The User Password consists of up to 32 characters, case sensitive.

The default User Password is quickynikynyoky. This password, together with the MAC Address as the default User Name, may be used for provisioning of default services. Otherwise, the User Password must be defined during the installation process for proper authentication and service provisioning.

4.5.4 Organization Name

Select this option to enter the name of the organization (customer) using the unit. This parameter is optional, and is intended for optional use by the Network management System.

The Organization Name can include up to 32 printable characters.

The default Organization Name is an empty string (no Organization name).

4.5.5 Address

Select this option to enter the location of the unit. This parameter is optional, and is intended for optional use by the Network management System.

The Address can include up to 32 printable characters.

The default Address is an empty string (no address).

4.5.6 Country

Select this option to enter the name of the country where the unit is located. This parameter is optional, and is intended for optional use by the Network management System.

The Country name can include up to 12 printable characters.

The default Country name is an empty string (no Country name).

4.6 BST/AU ID Parameters Menu

Each AU/Micro Base Station (logical sector) in the network is configured with a unique ID comprising an Operator ID, Cell ID and Sector ID. The BST/AU ID parameters in the SU define the Base Station(s)/AU(s) that can synchronize with the SU. These parameters include the base BST/AU ID and the BST/AU ID Mask. The SU can synchronize only with AUs/Micro Base Stations whose Base Station ID is included in the IDs range defined by the applicable parameters in the SU.

When the Best BST/AU Support is disabled, the SU will start searching for available AUs/Micro Base Stations in the range defined by the BST/AU ID and BST/AU ID Mask, and will try to connect to the first found AU/Micro Base Station whose Base Station ID is in the defined range.

An SU that can communicate with more than one BST/AU may become associated with the first BST/AU it "finds", not necessarily the best choice in terms of quality of communication. Changes in base station deployment and subscriber density can accumulate to create substantial changes in SU performance. The quest for load sharing together with the desire to create best throughput conditions for the SU created the need for the Best BST/AU feature, to enable an SU to connect to the best BST/AU in its neighborhood.

When the Best BST/AU feature is enabled, the SU scans all BSTs/AUs in a predefined range, using all defined scanning frequencies (see [“Frequency Scanning Parameters” on page 98](#)). Each of the BSTs/AUs with which the SU can communicate (perform initial phase of network entry) is given a quality mark based on the quality of the signal at which it is received by the SU. At the end of the scanning period, the SU reaches a Best BST/AU decision according to the information gathered. The BST/AU with the highest quality mark is selected as the Best BST/AU, and the SU will immediately try to associate with it at the relevant frequency.

The range used for scanning is defined by the BST/AU ID and BST/AU ID Mask parameters. The initial range can be limited by defining a preferred range of BST/AUs, and selecting the best BST/AU in the preferred range. If no BST/AU is found in the preferred range, the SU will scan the entire range.

If the SU loses communication with the Best BST/AU, it will continue searching for it for 5 minutes. If not found within 5 minutes, the SU will try to associate with the second BST/AU in the of Best BSTs/AUs Table. If not found immediately, the SU will initiate a short scan, checking all the BSTs/AUs in the table, and trying to associate with the best one. If no BST/AU from the is found, the Best BSTs/AUs

table will be deleted and the SU will initiate a Full Scan (all defined scanning frequencies and all BSTs/AUs in the defined range).

The same process will be executed following a reset of the SU, with one exception: The SU will search for the BST/AU to which it was previously connected for one minute only.

The BST/AU ID Parameters menu includes the following options:

- Show
- BST/AU ID
- BST/AU ID Mask
- Preferred BST/AU ID
- Preferred BST/AU ID Mask
- Selected BST/AU Parameters
- Best BST/AU Table

4.6.1 Show

Select this option to view the Best BST/AU parameters. These parameters are applied only after reset. Therefore, actual values may differ from configured values. For each parameter both the current and configured values are displayed. In addition, the details of the selected AU (if applicable) are shown, These details include the BS ID, RSSI (dBm) and SNR (dB) of the received signal.

4.6.2 BST/AU ID

Select this option to define the BST/AU ID. This is the base BST/AU ID used together with the BST/AU ID Mask to define the range of BSTs/AUs that can synchronize with the unit.

The BST/AU ID comprises 6 groups of up to 3 digits each, where the range of each group is 0 to 255. The first 3 groups form the Operator ID. The next 2 groups form the Cell ID, and the last group forms the Sector ID.

The default BST/AU ID is 186.190.0.0.250.206

4.6.3 BST/AU ID Mask

Select this option to define the BST/AU ID Mask. The BST/AU ID Mask, together with the BST/AU ID, define the range of BSTs/AUs that can synchronize with the SU.

The BST/AU ID Mask comprises 6 groups of up to 3 digits each, where the range of each group is 0 to 255. The first 3 groups form the mask for the Operator ID. The next 2 groups form the mask for the Cell ID, and the last group forms the mask for the Sector ID.

The default BST/AU ID Mask is 0.0.0.0.0.0.

4.6.4 Best BST/AU Support

The Best BST/AU Support parameter allows enabling or disabling the Best BST/AU feature in the SU. If the Best BST/AU Support feature is disabled, the SU will start scanning the range defined by the BST/AU ID and BST/AU ID Mask and select the first found AU.

The default option is Enable.

4.6.4.1 Preferred BST/AU ID

The Preferred BST/AU ID parameter defines the base BST/AU ID, that together with the Preferred BST/AU ID Mask define the initial range for scanning in order to find the best BST/AU. The SU will select the best BST/AU within this range. If no BST/AU is found within this range, the SU will continue searching in the entire range defined by the BST/AU ID and BST/AU ID Mask parameters.

The Preferred BST/AU ID consists of 6 groups of up to 3 digits each, where the range of each group is 0 to 255. The first 3 groups form the base ID for the Operator ID. The next 2 groups form the base ID for the Cell ID, and the last group forms the base ID for the Sector ID.

The Preferred BST/AU ID must be in the range defined by the BST/AU ID and the BST/AU ID Mask.

The default Preferred BST/AU ID is 186.190.0.0.250.206.

4.6.4.2 Preferred BST/AU ID Mask

The Preferred BST/AU ID Mask defines the mask, that together with Preferred BST/AU ID define the initial range for scanning in order to find the best BST/AU. The SU will select the best BST/AU within this range. If no BST/AU is found within this range, the SU will continue searching in the entire range defined by the BST/AU ID and BST/AU ID Mask parameters.

The Preferred BST/AU ID Mask consists of 6 groups of up to 3 digits each, where the range of each group is 0 to 255. The first 3 groups form the mask for the Operator ID. The next 2 groups form the mask for the Cell ID, and the last group forms the mask for the Sector ID.

The range defined by the Preferred BST/AU ID and Preferred BST/AU ID Mask must be within the range defined by the BST/AU ID and the BST/AU ID Mask.

The default Preferred BST/AU ID Mask is 0.0.0.0.0.0.

4.6.5 Selected BST/AU Parameters

Select this option to view the following details on the selected BST/AU:

- Selected BST/AU ID
- Selected Rx Frequency
- RSSI of the received signal, in dBm
- SNR of the received signal, in dB
- Selected Rx Antenna

4.6.6 Best BST/AU Table

Select this option to view the following details for each of the BST(s)/AU(s) found during the scanning process:

- BST/AU ID
- Rx Frequency
- SNR (dB)
- Antenna

4.7 Radio Parameters Menu

The Radio Parameters menu includes the following options:

- Show
- Frequency Scanning Parameters
- Antenna Parameters (applicable only for Si CPE)
- Rx Attenuator (applicable only in the 2.3 GHz band)
- Bandwidth (not applicable if the SU supports only a single bandwidth)

4.7.1 Show

Select this option to view the Bandwidth, Antenna Selection and Rx Attenuator parameters (if applicable). These parameters are applied only after reset. Therefore, actual values may differ from configured values. For each parameter both the current and configured values are displayed.

4.7.2 Frequency Scanning Parameters

The Frequency Scanning menu enables viewing and updating the set of frequencies to be used during the scanning process. The list of frequencies that participate in the scanning process includes a set of frequencies belonging to the scanning range and/or a set of up to 10 discrete frequencies.

The scanning range is defined by Start Rx Frequency, End Rx Frequency, Scanning Main Step and Intermediate Steps. The set of frequencies to be scanned is defined as follows:

The “Main Frequencies” are defined by the Start Frequency and Main Step, using the formula $F(N) = \text{Start Frequency} + N * \text{Main Step}$;
 $F(1) = \text{Start Frequency} + \text{Main Step}$, $F(2) = \text{Start Frequency} + 2 * \text{Main Step}$,...
End Frequency is the upper limit.

The Intermediate Steps can be used to define additional frequencies using a finer resolution. The intermediate steps are defined as follows:

Table 4-1: Intermediate Steps

Step	Effect on scanned frequencies set when Step is Enabled
1	Start Frequency is added to the set of "Main Frequencies"
2	All intermediate frequencies defined by "Main Frequency" + 125 KHz are added to the scanning set
3	All intermediate frequencies defined by "Main Frequency" + 250 KHz are added to the scanning set
4	All intermediate frequencies defined by "Main Frequency" + 375 KHz are added to the scanning set
5	All intermediate frequencies defined by "Main Frequency" + 500 KHz are added to the scanning set
6	All intermediate frequencies defined by "Main Frequency" + 625 KHz are added to the scanning set
7	All intermediate frequencies defined by "Main Frequency" + 750 KHz are added to the scanning set
8	For a bandwidth of 3.5 MHz: All intermediate frequencies defined by "Main Frequency" + 875 KHz are added to the scanning set For a bandwidth of 5 MHz: All intermediate frequencies defined by "Main Frequency" + 1250 KHz are added to the scanning set

For example, If Steps 1,2 and 5 are enabled and all other steps are disabled, the scanned frequencies are: Start Frequency, Start Frequency + 125 KHz, Start Frequency + 500 KHz, Start Frequency +N*Main Step, Start Frequency +N*Main Step + 125 KHz, Start Frequency +N*Main Step + 500 KHz (N=1, 2,...). End Frequency is the upper limit for the scanned frequencies.

In addition, the Discrete Frequencies option enables defining up to 10 discrete frequencies to be used in the scanning process in addition to the frequencies defined by the Frequency Scanning parameters.

The Frequency Scanning menu includes the following options:

- Show scanning parameters
- Show scanning Tables
- Start Rx frequency
- End Rx frequency
- Set main & intermediate steps
- Discrete scanning frequencies
- Update scanning Tables

- Clear Best AU Table
- Force full scanning

4.7.2.1 Show Scanning Parameters

The Show Scanning Parameters option enables viewing the following:

- Start Rx Frequency
- End Rx Frequency
- Scanning Main Step
- Scanning Intermediate Steps
- Discrete Frequencies

4.7.2.2 Show Scanning Tables

Select this option to view the Full Scanning Table, displaying a list of all current frequencies that participate in the full scanning process. At the end of the displayed list, the Best AU Scanning Table displays all the frequencies associated with AUs that are included in the current Best AU Table.

4.7.2.3 Start Rx Frequency (MHz)

The lowest frequency in the range of frequencies to be scanned.

The available values depend on the radio band of the unit and selected Bandwidth.

4.7.2.4 End Rx Frequency (MHz)

The highest frequency in the range of frequencies to be scanned.

The available values depend on the radio band of the unit and selected Bandwidth.

4.7.2.5 Scanning Main and Intermediate Steps

The Main Scanning Step, that together with the Intermediate Scanning Steps define the frequencies to be scanned between the Start and End Rx Frequencies.

For 2.x/3.x GHz units and a bandwidth of 3.5 MHz, the range is from 125 KHz to 1750 KHz, in steps of 125 KHz. The default is 875 KHz.

For 2.x/3.x GHz units and a bandwidth of 5 MHz, the range is from 125 KHz to 5000 KHz, in steps of 125 KHz. The default is 875 KHz.

The Intermediate Scanning Steps include 8 Steps that define the intermediate scanning steps as described above. The default is Enable for all eight steps.

The highest step defined by the Intermediate Scanning Steps cannot be higher than the Scanning Main Step.

4.7.2.6 Discrete Scanning Frequencies

The Discrete Scanning Frequencies menu enables viewing and editing the list of discrete frequencies that will be included in the Frequency Scanning Table. The Discrete Scanning Frequencies menu includes the following options:

- **Show List of Discrete Frequencies:** Select this option to view the current list of discrete frequencies (if any)
- **Update List of Discrete Frequencies:** Enter a list of up to 10 discrete frequencies, separated by commas (no space). This list will replace the current list of discrete frequencies.
- **Add One Discrete Frequency:** Enter one frequency to be added to the current list of discrete frequencies.
- **Delete One Discrete Frequency:** Enter one frequency to be removed from the current list of discrete frequencies.
- **Delete All Discrete Frequencies**

4.7.2.7 Update Scanning Table

Select this option to update the frequency scanning table in run time (without resetting the unit).

4.7.2.8 Clear Best AU Table

Select this option to clear the current Best AU Table. Typically this should be done prior to initiating a full scanning process (see below).

4.7.2.9 Force Full Scanning

Select this option to initiate a full scanning process.

4.7.3 Antenna Selection (Si CPE)

This option enables selection of either an internal antenna, an external (detached) antenna or automatic antenna selection.

The available options are 0 (External), 1 to 6 (Internal), or 7 (Automatic).

The default is Automatic.

In Automatic antenna selection mode, all antennas are scanned during the scanning process to find the best antenna. In addition, all antennas are scanned continuously during normal operation (using the selected BST/AU and Rx Frequency), and the selected antenna is always the best one. This fast scanning process guarantees uninterrupted connectivity and optimal performance upon possible occurrence of unintentional changes (such as a change in the placement of the unit or insertion of an obstacle in the communication path).

The numbering plan of the internal antennas is described in the following figure:

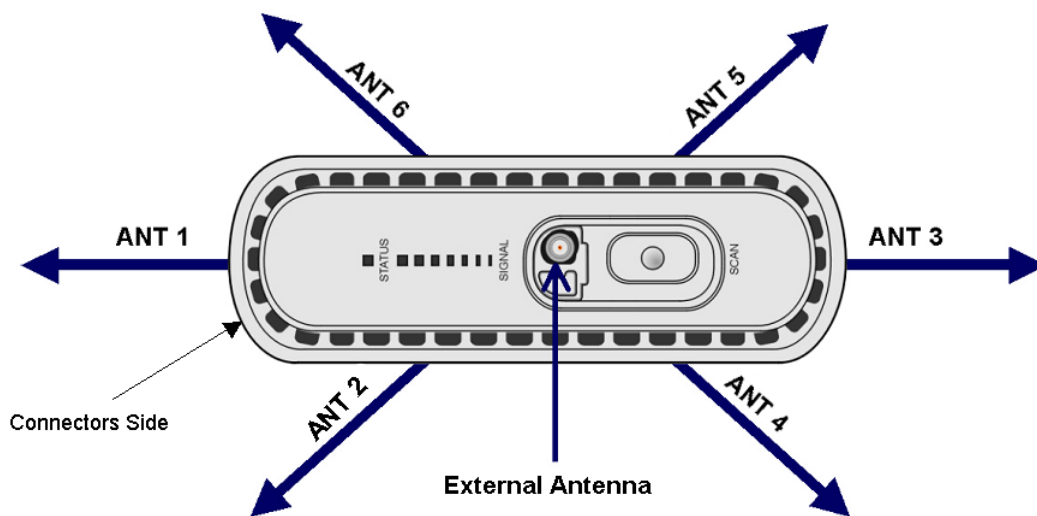


Figure 4-1: Si CPE Antennas Numbering Scheme

4.7.4 Rx Attenuator

The Rx Attenuator option is applicable only for units operating in the 2.3 GHz band. This option defines the attenuation that can be inserted in the receive path to improve performance under certain strong interference conditions. This optional attenuation is aimed primarily to reduce the impact of SDARS (Satellite Digital Audio Radio Service) in the 2320-2345 MHz frequencies band. It is

recommended to set this parameter to 10 db if an interfering signal in the SDARS band is received at the SU's site at a level exceeding -40 dBm.

The available options are 0 or 10 dBm.

The default is 0 dBm (no attenuation).

NOTE

RSSI readings do not take into account the Rx attenuation. This means that when the Rx Attenuator is set to 10 dB, the actual RSSI is higher by 10 dBm from the RSSI value in the Link Quality Display (see next section).

4.7.5 Bandwidth

The Bandwidth parameter may not be available in units that support a single bandwidth. In units where more than one Bandwidth option is available, select this option to define the bandwidth of the signal.

The options are 1.75 MHz, 3.5 MHz and 5 MHz. Only the options supported by the specific unit will be available.

The default 3.5 MHz.

4.8 Multirate and ATPC Parameters Menu

In regular operation, the transmitted signal is controlled by the ATPC mechanism. The ATPC mechanism in the SU is controlled by the Base Station.

The Multirate and ATPC Parameters menu enable temporary control of the signal transmitted by the SU. It is intended for test purposes only.

These settings will not be saved and will automatically return to original values as received from the Base Station when the unit resets or upon exiting the program (or upon termination).

The Multirate and ATPC Parameters menu includes the following options:

- Show
- Enable ATPC
- Disable ATPC and Set Tx Power
- Continuous Transmission Menu

4.8.1 Show

Select this option to view the current Multirate and ATPC parameters:

- Last Tx Rate
- Optimal Rx Rate: The current optimal rate for received signals.
- ATPC: The current status current status (Enabled/Disabled) of the ATPC mechanism
- Tx Power: The current Tx power.

4.8.2 Enable ATPC

Select this option to enable the ATPC mechanism after disabling it temporarily for testing purposes.

4.8.3 Disable ATPC and Set Tx Power

Select this option to temporarily disable ATPC for testing purposes. You will be prompted to enter the requested Tx Power. The minimum Tx Power is -26 dBm. The maximum depends on the unit's type and band.

The default Tx Power is the last power level used before the ATPC algorithm was disabled.

Upon completing the test, enable ATPC to resume normal operation. If not enabled manually, ATPC will be enabled automatically after the next reset or following termination of the Telnet session.

4.8.4 Continuous Transmission Menu

The Continuous Transmission Menu enables activating continuous transmission of specific signals for special testing purposes. The continuous transmission mode cannot be activated when the SU has either started a network entry process or is already synchronized with a Base Station.

The Continuous Transmission Menu includes the following options:

4.8.4.1 Transmission Type

The available Transmission Types are CW (Continuous Wave, or carrier only) and OFDM.

4.8.4.2 Transmission Duration

The Transmission Duration from 0 to 536 seconds. 0 means the unit will transmit continuously until it will be reset. After 15 minutes the unit will be reset automatically.

4.8.4.3 Transmission Tx Power

The Transmission Tx Power in dBm according to the range supported by the tested unit.

4.8.4.4 Transmission Frequency [MHz]

The Transmission Frequency in MHz according to the range supported

4.8.4.5 Start Transmission

Selected this option to start the continuous transmission test using the configured test parameters.

4.8.4.6 Show Current Parameters

Select this option to view the current test parameters and status (on/off).

4.9 Performance Monitoring Menu

The Performance Monitoring menu includes the following options:

- Start Link quality Display
- Counters

4.9.1 Start Link Quality Display

Select this option to get a continuously updated display of link quality indicators. Each displayed line includes:

- **DL SNR (dB)**: The average Signal to Noise Ratio of the signal received by the SU
- **DL RSSI (dBm)**: The average level of the signal received by the SU
- **Optimal Rx Rate**: The optimal Rx rate calculated by the SU and requested from the AU/Micro Base Station.
- **Last Rx Rate**
- **Last Tx Power (dBm)**
- **UL SNR (dB)**: The average Signal to Noise Ratio of the signal received by the AU/Micro Base Station
- **UL RSSI (dBm)**: The average level of the signal received by the AU/Micro Base Station

4.9.2 Counters

The Counters menu includes the following options:

- Display Counters
- Reset Counters

4.9.2.1 Display Counters

Select this option to display the current status of the traffic counters. The counts are the accumulated number of relevant Bytes since the last unit reset or the last Counters Reset.

The counters indicate the traffic at the Ethernet and Wireless ports. The displayed counters include:

■ Ethernet Port Counters

- ◇ **Data Bytes Received:** The total number of data bytes received from the Ethernet link. Management frames and frames with errors are not included.
- ◇ **Data Bytes Discarded on Rx:** The number of bytes discarded when a packet received from the Ethernet port is not forwarded to the Wireless port due to bridging or classification considerations.
- ◇ **Data Bytes Transmitted:** The total number of data bytes transmitted to the Ethernet link. Management frames and frames with errors are not included.
- ◇ **Data Bytes Discarded on Tx:** The number of bytes discarded when a packet received from the Wireless port is not forwarded to the Ethernet port due to bridging or VLAN considerations.

■ Wireless Port Counters

- ◇ **Data Bytes Received:** The total number of data bytes received from the Wireless link. Management frames and frames with errors are not included.
- ◇ **Data Bytes Discarded on Rx:** The number of bytes in packets received from the Wireless link and discarded due to MAC protocol receive errors, such as duplicate sequence number, wrong sequence number, etc. (not CRC errors).
- ◇ **Data Bytes Transmitted:** The total number of data bytes transmitted to the Wireless link. MAC Management frames and frames with errors are not included.
- ◇ **Data Bytes Discarded on Tx:** The number of bytes in packets discarded due to congestion in the wireless medium.

4.9.2.2 **Reset Counters**

Select this options to reset all the counters.

4.10 FDD Parameters (3.x GHz units only)

The FDD Parameters menu enables viewing/updating the Radio parameters for Standard operation mode. These parameters do not affect the operation of the unit when using Advanced Si operation mode. These parameters are provided to support the Automatic Platform Detection mechanism of the dual-mode CPEs, allowing pre-configuration of the relevant parameters before switching the sector to operate in FDD mode using Standard operation mode. These parameters are applicable only to SUs in the 3.x GHz bands.

4.10.1 BST/AU ID

Select this option to define the BST/AU ID. This is the base BST/AU ID used together with the BST/AU ID Mask to define the range of BSTs/AUs that can synchronize with the unit.

The BST/AU ID comprises 6 groups of up to 3 digits each, where the range of each group is 0 to 255. The first 3 groups form the Operator ID. The next 2 groups form the Cell ID, and the last group forms the Sector ID.

The default BST/AU ID is 186.190.0.0.250.206

4.10.2 BST/AU ID Mask

Select this option to define the BST/AU ID Mask. The BST/AU ID Mask, together with the BST/AU ID, define the range of BSTs/AUs that can synchronize with the SU.

The BST/AU ID Mask comprises 6 groups of up to 3 digits each, where the range of each group is 0 to 255. The first 3 groups form the mask for the Operator ID. The next 2 groups form the mask for the Cell ID, and the last group forms the mask for the Sector ID.

The default BST/AU ID Mask is 255.255.255.0.0.0.

4.10.3 Bandwidth

The Bandwidth parameter may not be available in units that support a single bandwidth. In units where more than one Bandwidth option is available, select this option to define the bandwidth of the signal.

The options are 1.75 MHz, 3.5 MHz and 5 MHz. Only the options supported by the specific unit will be available.

The default is 3.5 MHz.

4.10.4 Uplink (Tx) Frequency

Select this option to define the transmit frequency of the SU when operating in FDD (Standard) mode.

The available range and default value depend on the Radio Band of the unit and on the Bandwidth. The resolution is 0.125 MHz.

NOTE



Some frequencies are available only with a certain Bandwidth. For example, in 3.5 GHz units that support bandwidth options of either 1.75 MHz or 3.5 MHz, the frequencies 3400.375-3401.125, 3498.375-3499.125 are available only with bandwidth of 1.75 MHz. Prior to selecting any of these frequencies the Bandwidth must be configured to 1.75 MHz.

4.11 SU Parameters Summary

Table 4-2: SU Parameters Summary

Parameter	Range	Default	Run-Time Updated
Unit Control Parameters			
Password	Up to 20 printable characters, case sensitive	installer	No
TFTP Server IP Address	IP address	192.168.254.250	Yes
SW File Name			Yes
Ethernet Port Auto Negotiation Enable/Disable	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	No
Ethernet Port Speed and Duplex	<input type="checkbox"/> 10Mbps, <input type="checkbox"/> Half-Duplex10Mbps, <input type="checkbox"/> Full-Duplex100Mbps, <input type="checkbox"/> Half-Duplex100Mbps, <input type="checkbox"/> Full-Duplex		No
Registration Parameters			
User Name	Up to 32 printable characters, case sensitive		
User Password	Up to 32 printable characters, case sensitive		
Organization Name	Up to 32 printable characters	Empty	Yes
Address	Up to 32 printable characters	Empty	Yes
Country	Up to 12 printable characters	Empty	Yes
BST/AU ID Parameters			
BST/AU ID	6 groups of up to 3 digits each. Each group range is 0-255.	186.190.0.0.250.206	No
BST/AU ID Mask	6 groups of up to 3 digits each. Each group range is 0-255.	0.0.0.0.0.0	No
Best BST/AU Support	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	No

Table 4-2: SU Parameters Summary

Parameter	Range	Default	Run-Time Updated
Preferred BST/AU ID	6 groups of up to 3 digits each. Each group range is 0-255.	186.190.0.0.250.206	No
Preferred BST/AU ID Mask	6 groups of up to 3 digits each. Each group range is 0-255.	0.0.0.0.0.0	No
Radio Parameters			
Bandwidth	<input type="checkbox"/> 1.75 MHz <input type="checkbox"/> 3.5 MHz <input type="checkbox"/> 5 MHz Actually available options depend on HW	3.5 MHz	No
Antenna Selection(Si CPE)	<input type="checkbox"/> 0 (External) <input type="checkbox"/> 1 - 6 (Internal) <input type="checkbox"/> 7 (Automatic)	Automatic	Yes
Scanning Start Frequency	Depend on Radio Band and Bandwidth		Yes (after Update Scanning Table)
Scanning End Frequency	Depend on Radio Band and Bandwidth		Yes (after Update Scanning Table)
Scanning Main Step	Depend on Radio Band and Bandwidth	875 KHz	Yes (after Update Scanning Table)
Scanning Intermediate Steps 1 -8	Disable/Enable for each of the 8 Intermediate Steps	Enable for all Steps	Yes (after Update Scanning Table)
Discrete Frequencies	Up to 10. Available frequencies depend on Radio Band and Bandwidth.	Null (empty list)	Yes (after Update Scanning Table)
Rx Attenuator (2.3 GHz units)	0, 10 (dB)	0	
Multirate and ATPC Parameters			
Set Tx Power	-26 dBm to the highest value supported by the unit.	Last power used by ATPC	Yes

Table 4-2: SU Parameters Summary

Parameter	Range	Default	Run-Time Updated
FDD Parameters (3.x GHz units only)			
BST/AU ID	6 groups of up to 3 digits each. Each group range is 0-255.	186.190.0.0.250.206	No
BST/AU ID Mask	6 groups of up to 3 digits each. Each group range is 0-255.	255.255.255.0.0.0	No
Bandwidth	<ul style="list-style-type: none"> ■ 1.75 MHz ■ 3.5 MHz ■ 5 MHz <p>Actually available options depend on HW</p>	Depend on HW	No
Uplink (Tx) Frequency	Depends on the Radio Band and Bandwidth	Depends on Radio Band	No



A

Appendix A - The Web Configuration Server

In This Appendix:

- [“The Web Configuration Server” on page 116](#)
- [“Pocket PC/PDA Requirements” on page 117](#)
- [“Accessing the Web Configuration Server” on page 119](#)
- [“Using the Web Configuration Server” on page 120](#)
- [“Control Buttons” on page 122](#)
- [“Changing the Password” on page 123](#)
- [“Unit Reset” on page 124](#)

A.1 The Web Configuration Server

The Web Configuration Server enables the configuration of all SU parameters using a Pocket PC/PDA or a Notebook/PC with a web browser. The computing device can be connected either to the Ethernet port of the IDU, or to the IDU COM connector of the ODU (using a special Y-Cable available from Alvarion). It also enables downloading of SW files, control of the running SW version, and downloading/uploading of the configuration file, enabling simplified and faster configuration process.

The Web Configuration Server also provides a selection of performance monitoring capabilities, allowing installers and technicians to view information on link quality and traffic counters. These monitoring capabilities enable performance verification and problems identification.

To further support local testing, the program also enables temporary control of the ATPC mechanism.

A.2 Pocket PC/PDA Requirements

The following table displays the minimum/recommended requirement for a Pocket PC/PDA:

Table A-1: Pocket PC/PDA Minimum/Recommended Requirements

Item	Minimum/Recommended
CPU	Strong ARM, 200MHz
Memory	<ul style="list-style-type: none"> ■ RAM: 64MB ■ Flash: 32MB
Display & Backlight	3.5" diagonal, TFT 240x320, 64K colors + Backlight
Keys	Soft Keyboard on screen or compatible
Touch Panel	With Stylus
Expansion Slot	Compact Flash (CF)
Expansion Card	Recommended: CF Ethernet Card EA2902-139 from Socket
Connection to CPE	<ul style="list-style-type: none"> ■ Ethernet ■ W/L 802.11b/g (optional-for use with IDU-NG-4D1W and other future CPEs)
Carrying Concept	Neck Strap or Handle Strap
Operating System	Windows Mobile 2003
Software & Protocols	<ul style="list-style-type: none"> ■ TCP/IP ■ DHCP client ■ FTP ■ Telnet ■ WEB ■ TFTP Server ■ PPPoE Client ■ Ethernet/WL drivers

Table A-1: Pocket PC/PDA Minimum/Recommended Requirements

Item	Minimum/Recommended
Standards Compliance	<ul style="list-style-type: none"> <li data-bbox="596 371 1385 439">■ EN-300 019-2-2 (Storage & Transportation Temperature, Random Vibration, Shock) <li data-bbox="596 472 1318 539">■ EN-300 019-2-4 (Operating Temperature, Sun Light Visibility, Rain, Humidity, Drop) <li data-bbox="596 573 871 607">■ EN-300386 (EMC) <li data-bbox="596 640 900 674">■ EN-60950-1 (Safety)

The following PDAs from Hewlett-Packard were tested and approved for use with the Web Configuration Server:

- 1 IPAQ FA296A Hx2110
- 2 IPAQ FA282A Hx4700

A.3 Accessing the Web Configuration Server

To configure parameters using the Web Configuration Server, connect a PC/Notebook or a Pocket PC/PDA with a web browser to the Ethernet port of the IDU, using a straight Ethernet cable.

You can also connect directly to the ODU's IDU COM, using the special Y-cable.

- 1 Configure the PC's IP parameters to enable connectivity with the unit. The IP address of the SU for local management access is 192.168.254.251. The Subnet Mask is 255.255.255.0. The recommended IP address for the PC is 192.168.254.250, as this is also the default TFTP Sever IP Address (required for downloading SW versions and for downloading/uploading configuration files).
- 2 Open a web browser, and connect to <http://192.168.254.251>. The Enter Network Password window is displayed. Enter the Username and password and click OK.



NOTE

The **User Name** is "installer".
The default **Password** is "installer".

- 3 The Main menu of the Web Configuration Server is displayed, enabling access to the required parameters configuration and performance monitoring options.

A.4 Using the Web Configuration Server

The Web Configuration Server view when using a Notebook/PC consists of a number of menu links (to the left). Clicking on each of them will display the configuration/status page for the selected menu item, with the applicable content (configurable parameters/options or status information) in the main area.

Several pages include a page selection bar at the top of the page, enabling selection between several pages related to the same menu item.

When using a Pocket PC/PDA, the Home page includes the Main Menu with all menu links to the available pages.

Several pages include a Current Parameters area and a Configured Parameters area. The Current Parameters area displays the current unit's settings. To change the settings of the parameters, enter the new settings in the Configured Parameters area and click the Update button.

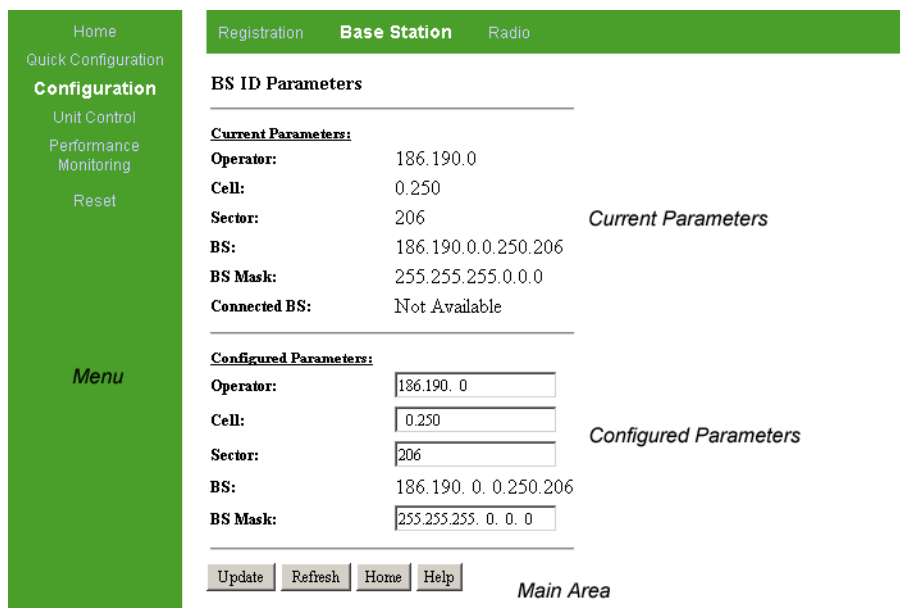


Figure A-1: Typical Web Configuration Page (Notebook/PC)

For information on each parameter, click on the Help button on the appropriate page.

Main Menu

- Unit Info
- Quick Configuration
- Registration
- Base Station
- Radio
- SW Versions Info
- SW Versions Control
- Configuration Control
- Ethernet Port
- Security
- Link Quality
- Counters
- ATPC
- Reset

Figure A-2: Web Configuration Main Menu (Pocket PC/PDA)

Changes to most of the settings are applied only after resetting the unit (refer to [Section A.7](#)).



NOTE

If invalid values are entered, they will be rejected by the managed unit.

A.5 Control Buttons

Many of the pages include the following buttons:

- **Update** - accepts the changes to the parameters setting. Click on the Update button before selecting another page/menu item, or before quitting the application. The Update functionality in many cases is per page - if you leave the page without clicking the Update button, all the changes in the page will be lost.
- **Refresh** - refreshes the values displayed. Changes made without clicking the Update button, are discarded upon clicking the Refresh button.
- **Home** - In the Notebook/PC, opens the Unit Info page while still highlighting the menu and submenu from which the Home button was clicked. In the Pocket PC/PDA, opens the Main Menu page.
- **Help** - opens the help page with information on the parameters/options in the currently displayed page.

A.6 Changing the Password



To change the unit's password:

- 1 Select the Security page in the Unit Control menu.
- 2 Enter the new password in the New Password field.
- 3 Re-enter the new password in the Confirm New Password field.
- 4 Click on the Save New Password button.



NOTE

Notify the administrator of the new password!

Valid passwords: Up to 20 printable characters.

Default password: installer

A.7 Unit Reset

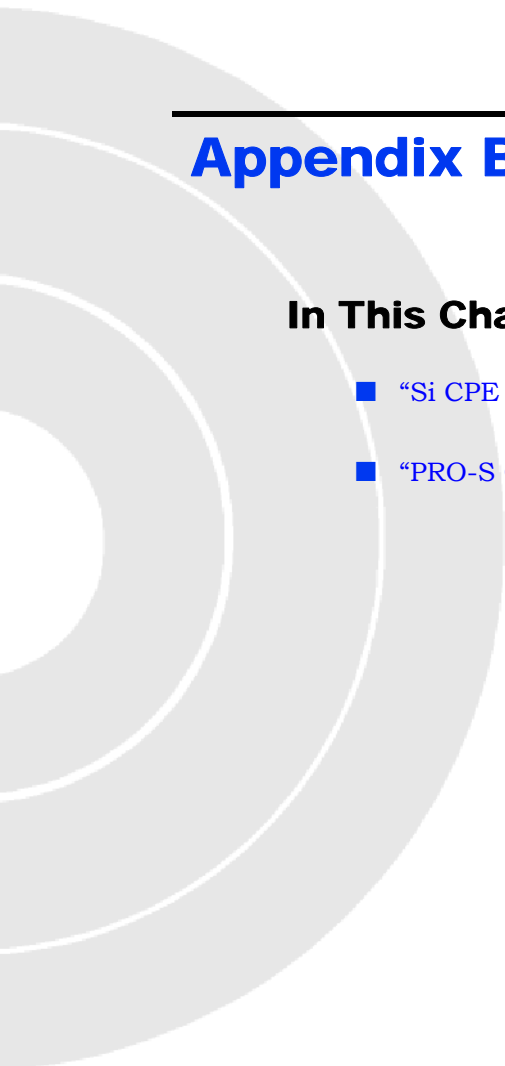
To reset the unit, select the Reset menu and click on the Reset Unit button. To avoid unintentional reset, you will be prompted to confirm the reset request. Changes to most of the configurable parameters are applied only after reset. Refer to [Section 4.11](#) for information on which parameters are changeable in run time and which changes are applied only after reset.



B

Appendix B - Troubleshooting

In This Chapter:

- “Si CPE Troubleshooting” on page 126
 - “PRO-S CPE Troubleshooting” on page 130
- 

B.1 Si CPE Troubleshooting

Refer to the BreezeMAX Troubleshooting Guide for additional information on troubleshooting,

Problem and Indication	Possible Cause	Corrective Action
Power Failure: None of the LEDs illuminate after connecting to power	Mains power problem	Verify mains power availability on the power outlet to which the power supply is connected. Try using a different outlet.
	Mains power connection problem	Verify that the AC jack of the power cord is connected properly to the power supply. Verify that the AC plug of the power cable is connected properly to the mains power outlet.
	DC power connection problem	Verify that the DC plug is connected properly to the power jack of the Si CPE.
	Unit failure	Contact the supplier.
When connected to the data equipment, the Ethernet Integrity Indicator (green LED) is off, and/or the Ethernet Activity Indicator (yellow LED) does not blink when there should be traffic on the Ethernet port.	Wrong type of Ethernet cable or faulty cable.	If connected directly to PC-use a straight cable. Otherwise-use a crossed cable. If the problem persists, try replacing the cable. If a hub or switch is installed between the PC and the CPE, verify first the Ethernet connection integrity between the hub/switch and the PC by checking the Ethernet LEDs at the hub/switch and at the PC's NIC card. If not ok, try replacing the cable.
	Unit failure	Contact the supplier

Problem and Indication	Possible Cause	Corrective Action
The Ethernet Activity and/or Integrity LEDs are on, but no management access using Telnet or web browser, and the unit does not respond to ping.	Wrong IP configuration	Make sure that the PC is on the same subnet as the unit. The unit's IP address for management purposes is 192.168.254.251, and the subnet mask is 255.255.255.0.
	Wrong Ethernet port operation mode	Make sure that the speed and duplex settings in the PC match the configuration in the unit. The default operation mode is Auto Negotiation, and supported speeds are 10/100 Mbps, Full or Half Duplex.
	ARP table in the PC contains a wrong MAC address for the 192.168.254.251 IP address (due to a recent connection to another SU).	Perform arpV-d at the DOS command prompt to clear the ARP table, and retry the Telnet command to the unit.
	Bridging table in SU is full (expected when Number of Supported Devices, configurable from the Base station's side, is set to a small number.	Reset the SU to clear the table and retry the Telnet command to the unit.
After power-up, STATUS LED does not illuminate, at least one of the SIGNAL LEDs illuminate	STATUS LED failure	Try completing the installation process.
	Unit failure	If the installation process fails, contact the supplier.

Problem and Indication	Possible Cause	Corrective Action
Scanning failed: STATUS LED is orange, none of the SIGNAL LEDs illuminate or all SIGNAL LEDs illuminate one after the other.	Configuration problem	<p>Verify proper configuration of Frequency Scanning parameters.</p> <p>If proper configuration parameters are not known, press the RESET button for more than 5 seconds to activate the factory default configuration</p>
	Poor link quality	<p>Verify that the correct antenna is selected.</p> <p>If an internal antenna is used, verify that the selected antenna is directed towards the Base Station.</p> <p>For either a selected internal antenna or automatic antenna selection, verify that all installation guidelines are followed (no interfering objects, proper distance from electrical equipment and metal objects, location as near as possible to the window, etc). Try changing the location of the unit to improve link quality using the SIGNAL LEDs.</p> <p>Try using a detached antenna. Verify that the antenna selected is external antenna. Verify proper antenna installation and cable connection. Improve antenna's location using the SIGNAL LEDs.</p>
Base Station not found: STATUS LED is orange, SIGNAL LEDs illuminate from the middle outwards (LED 4 lights, after 200ms LEDs 3 & 5 lights, after 200ms LEDs 2&6 lights,after 200ms LEDs 1&7 lights, after 200ms all the LEDs are extinguished and then the sequence is repeated)	Configuration problem	<p>Verify proper configuration of Base Station and Best AU parameters.</p> <p>If proper configuration parameters are not known, press the RESET button for more than 5 seconds to activate the factory default configuration</p>
Signal is too strong: STATUS LED is orange, All SIGNAL LEDs blink simultaneously	Signal is too strong-may cause saturation.	Change the location/direction of the unit/antenna to reduce signal strength using the SIGNAL LEDs

Problem and Indication	Possible Cause	Corrective Action
Authentication Failure: STATUS LED is blinking green, SIGNAL LED 7 is on, all other SIGNAL LEDs are off.	Authentication problem: a. Wrong User Name and/or User Password. b. Maximum number of Multiple Sessions (number of SUs that can receive the Service simultaneously) has been reached.	Enter User Name and User Password and reset the unit. If the problem persists, contact the operator.
Duplicate Name: STATUS LED is blinking green, SIGNAL LEDs 6 and 7 are on, all other SIGNAL LEDs are off.	User Name already exists in the Base Station's database, associated with another SU (MAC address)	Enter a correct User Name or contact the operator for a new User Name/Password. Reset the unit after configuring new authentication parameters.
Authentication Timeout: STATUS LED is blinking green, SIGNAL LEDs 5, 6 and 7 are on, all other SIGNAL LEDs are off.	The unit was not reauthenticated after authentication timeout.	Contact the operator.

B.2 PRO-S CPE Troubleshooting

Refer to the BreezeMAX Troubleshooting Guide for additional information on troubleshooting,

Problem and Indication	Possible Cause	Corrective Action
Power Failure: None of the IDU LEDs illuminate after connecting to power	Mains power problem	Verify mains power availability on the power outlet to which the power supply is connected. Try using a different outlet.
	Mains power connection problem	Verify that the AC jack of the power cord is connected properly to the unit. Verify that the AC plug of the power cable is connected properly to the mains power outlet.
	Unit failure	Replace the IDU.
IDU-ODU connection problem: None of the SAU's indicators illuminate	IDU-ODU connection problem	Verify that the IDU-ODU cable is connected properly.
	Unit failure	Try replacing the IDU. If the problem persists, try replacing the IDU-ODU cable. If the problem persists, try replacing the ODU.
When connected to the data equipment, the Ethernet Integrity Indicator (green LED) is off, and/or the Ethernet Activity Indicator (yellow LED) does not blink when there should be traffic on the Ethernet port.	Wrong type of Ethernet cable or faulty cable.	If connected directly to PC-use a straight cable. Otherwise-use a crossed cable. If the problem persists, try replacing the cable. If a hub or switch is installed between the PC and the CPE, verify first the Ethernet connection integrity between the hub/switch and the PC by checking the Ethernet LEDs at the hub/switch and at the PC's NIC card. If not ok, try replacing the cable.
	IDU-ODU cable problem.	Verify that the IDU-ODU cable is in order and connected properly. Using SAU, verify that PWR LED is on and ALRM LED is off.
	Unit failure	Try replacing the IDU. If the problem persists, try replacing the IDU-ODU cable. If the problem persists, try replacing the ODU.

Problem and Indication	Possible Cause	Corrective Action
The Ethernet Activity and/or Integrity LEDs are on, but no management access using Telnet or web browser, and the unit does not respond to ping.	Wrong IP configuration	Make sure that the PC is on the same subnet as the unit. The unit's IP address for management purposes is 192.168.254.251, and the subnet mask is 255.255.255.0.
	Wrong Ethernet port operation mode	Make sure that the speed and duplex settings in the PC match the configuration in the unit. The default operation mode is Auto Negotiation, and supported speeds are 10/100 Mbps, Full or Half Duplex.
	ARP table in the PC contains a wrong MAC address for the 192.168.254.251 IP address (due to a recent connection to another SU).	Perform arpV-d at the DOS command prompt to clear the ARP table, and retry the Telnet command to the unit.
	Bridging table in SU is full (expected when Number of Supported Devices, configurable from the Base station's side, is set to a small number.	Reset the SU to clear the table and retry the Telnet command to the unit.
Scanning failed and/or Base Station not found: None of the LINK QUALITY LEDs illuminate.	Configuration problem	Verify proper configuration of Frequency Scanning parameters. Verify proper configuration of Base Station and Best AU parameters. If proper configuration parameters are not known, press the RESET button for more than 5 seconds to activate the factory default configuration
	Poor link quality	Try changing the location of the unit/antenna to improve link quality using the LINK QUALITY LEDs.
Signal is too strong: All LINK QUALITY LEDs, including the red LED are on	Signal is too strong-may cause saturation.	Change the location/direction of the unit/antenna to reduce signal strength using the LINK QUALITY LEDs.

Problem and Indication	Possible Cause	Corrective Action
<p>Authentication Failure: LED 1 (ELNK-orange) of the LINK QUALITY bar blinks.</p>	<p>Authentication problem:</p> <ul style="list-style-type: none"> a. Wrong User Name and/or User Password. b. Maximum number of Multiple Sessions (number of SUs that can receive the Service simultaneously) has been reached. c. Duplicate Name: User Name already exists in the Base Station's database, associated with another SU (MAC address). d. Authentication Timeout: The unit was not reauthenticated after authentication timeout. 	<p>Enter User Name and User Password and reset the unit. If the problem persists, contact the operator.</p>



Glossary



APD

Automatic Platform Detection. A mechanism that detects the wireless link protocol used by the Base Station, enabling automatic selection of the Duplex Mode (FDD or TDD) to be used by the Subscriber Unit.

ATPC

Automatic Transmit Power Control

AU

Access Unit

BE

Best effort. A service where neither throughput nor delay guarantees are provided. The subscriber unit sends requests for bandwidth in either random access slots or dedicated transmission opportunities. The occurrence of dedicated opportunities is subject to network load, and the subscriber unit cannot rely on their presence. Service parameters include Committed Time (CT) and Maximum Information Rate (MIR).

BPSK

Binary Phase-Shift Keying. A data transfer technique. BPSK transmits data using two phase modulation signals, one phase representing a binary one, and the other representing a binary zero. The signal is divided into bits; their status is determined by the preceding wave. If the wave changes, for example, the signal is reversed.

BST

Base Station

BWA

Broadband Wireless Access

CF

Compact Flash. A popular memory card that uses flash memory to store data on a very small card.

CG

Continuous Grant. Also known as Unsolicited Grant Services (UGS), is tailored for carrying constant bit-rate (CBR) real-time services characterized by fixed size data packets on a periodic basis such as VoIP or E1/T1. Service parameters include unsolicited grant size (packet size) and normal grant interval (sample interval).

CIR

Committed Information Rate. The rate (in bits per second) at which a network guarantees to transfer information under normal conditions, averaged over a minimum increment of time.

CLI	Command Line Interface. A user interface where the user sees the command line on the monitor and a prompt that is waiting to accept instructions from the user. The user types in the command, the computer acts on that command and then issues a new prompt for the next instruction from the user.
CPE	Customer Premise Equipment. Communications equipment that resides on the customer's premises.
CPU	Central Processing Unit
CRC	Cyclical Redundancy Check. A common technique for detecting data transmission errors, in which the frame recipient calculates a remainder by dividing frame contents by a prime binary divisor and compares the calculated remainder to a value stored in the frame by the sending equipment.
CSMA/CD	Carrier Sense Multiple Access with Collision Detection. Media-access mechanisms wherein devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all colliding devices. This collision subsequently delays retransmissions from those devices for some random length of time. Ethernet and IEEE 802.3 use CSMA/CD access.
CT	Committed Time. The time interval used for measuring average information transfer rates.
DHCP	Dynamic Host Configuration Protocol. A protocol for dynamically assigning IP addresses from a pre-defined list to nodes on a network. Using DHCP to manage IP addresses simplifies client configuration and efficiently utilizes IP addresses.
DL	Down Link
DRAP	Dynamic Resources Allocation Protocol
EMC	Electro-Magnetic Compatibility. The capability of equipment or systems to be used in their intended environment within designed efficiency levels without causing or receiving degradation due to unintentional EMI (Electro Magnetic Interference). EMC generally encompasses all of the electromagnetic disciplines.
ETSI	European Telecommunications Standards Institute. A non-profit organization producing voluntary telecommunications standards used throughout Europe, some of which have been adopted by the EC as the technical base for Directives or Regulations.

FCC	Federal Communications Commission. A U.S. government agency that supervises, licenses, and controls electronic and electromagnetic transmission standards.
FDD	Frequency Division Duplex. Full duplex operation by using a pair of frequencies, one for transmission and one for reception.
FEC	Forward Error Correction. A method of communicating data that can corrects errors in transmission on the receiving end. Prior to transmission, the data is put through a predetermined algorithm that adds extra bits specifically for error correction to any character or code block. If the transmission is received in error, the correction bits are used to check and repair the data.
FFT	Fast Fourier Transform. An algorithm for converting data from the time domain to the frequency domain; often used in signal processing.
FTP	File Transfer Protocol. A protocol for exchanging files over the Internet. FTP uses the Internet's TCP/IP protocols to enable data transfer.
GUI	Graphical User Interface. In a GUI operating system, the user responds to graphic images on the screen instead of typing in commands in response to a prompt.
H.323	A protocol suite defined by ITU-T for voice transmission over internet (Voice over IP or VoIP). In addition to voice applications, H.323 provides mechanisms for video communication and data collaboration, in combination with the ITU-T T.120 series standards.
HTTP	HyperText Transfer Protocol. The protocol used to transmit and receive all data over the World Wide Web.
IDU	Indoor Unit
IEEE	Institute of Electrical and Electronics Engineers. IEEE (pronounced I-triple-E) is an organization composed of engineers, scientists, and students. The IEEE is best known for developing standards for the computer and electronics industry. In particular, the IEEE 802 standards for local-area networks are widely followed.
IEEE 802.3	A Local Area Network protocol suite commonly known as Ethernet. Ethernet uses Carrier Sense Multiple Access bus with Collision Detection CSMA/CD. This method allows users to share the network cable. However, only one station can use the cable at a time. A variety of physical medium dependent protocols are supported.

IEEE 802.11b	The IEEE 802.11b (also referred to as 802.11 High Rate or Wi-Fi). An extension to 802.11 standard for wireless Ethernet networks, that applies to wireless LANs and provides 11 Mbps transmission (with a fallback to 5.5, 2 and 1 Mbps) in the 2.4 GHz band.
IEEE 802.11g	An extension to 802.11 standard for wireless Ethernet networks, that applies to wireless LANs and provides 20+ Mbps in the 2.4 GHz band.
IP	Internet Protocol. The standard that defines how data is transmitted over the Internet. IP bundles data, including e-mail, faxes, voice calls and messages, and other types, into "packets", in order to transmit it over public and private networks.
LAN	Local area Network. A computer network limited to a small geographical area, such as a single building. The network typically links PCs as well as shared resources such as printers.
LED	Light Emitting Diode.
MAC Address	Standardized data link layer address that is required for every port or device that connects to a LAN. Other devices in the network use these addresses to locate specific ports in the network and to create and update routing tables and data structures. MAC addresses are 6bytes long and are controlled by the IEEE.
MCS	Multipoint Communications Systems. Applications licensed at 2500 MHz in Canada. A wide variety of applications are possible including one-way and two-way transmission and a diversity of distribution capacities.
MIR	Maximum Information Rate. Specifies the maximum rate of information that can be available to a user. The MIR is used by the traffic policing mechanism to prevent users from sending excess traffic to the network.
MMDS	Multichannel Multipoint Distribution Service. MMDS is a licensed wireless service that has the capability to provide broadband access. MMDS operates in several parts of the 2 GHz spectrum.
NA	Not Available or Not Applicable

NAT	Network Address Translation. Basic Network Address Translation (Basic NAT) is a method by which IP addresses are mapped from one group to another, transparent to end users. Network Address Port Translation, or NAPT is a method by which many network addresses and their TCP/UDP ports are translated into a single network address and its TCP/UDP ports. Together, these two operations, referred to as traditional NAT, provide a mechanism to connect a realm with private addresses to an external realm with globally unique registered addresses.
NIC	Network Interface Card. An expansion board you insert into a computer (or a built-in component) that enables the computer to connect to a network. Most NICs are designed for a particular type of network, protocol, and media, although some can serve multiple networks.
NPU	Network Processing Unit
NRT	Non Real Time. is very similar to the Real-Time polling service except that connections may utilize random access transmit opportunities for sending bandwidth requests. These Non Real Time Variable Bit Rate (NRT-VBR) services, such as file transfer and Internet access with a minimum guaranteed rate, are characterized by requirement for a guaranteed rate, but can tolerate longer delays and are rather insensitive to jitter. Service parameters include CIR, Committed Time (CT), and MIR that limit the rate as otherwise bandwidth-intensive services may expand to occupy full bandwidth.
ODU	Outdoor Unit
OFDM	Orthogonal Frequency Division Multiplexing: A method for multiplexing signals, which divides the available bandwidth into a series of frequencies known as tones. Orthogonal tones do not interfere with each other when the peak of one tone corresponds with the null. The rapid switching, frequency-hopping technique is intended to allow more robust data service.
OFDMA	Orthogonal Frequency Division Multiple Access. It's a logical extension of OFDM and a modulation/multiple access technique. OFDMA divides a signal into sub-channels (i.e. groups of carriers), with each sub-channel (or several sub-channels) being allocated to a different subscriber.
PDA	Personal Digital Assistant. A handheld computing device.

PER	Packet Error Rate. In a digital transmission, PER is the percentage of packets with errors divided by the total number of packets that have been transmitted, received or processed over a given time period.
PHY	PHYSical Layer. The physical, or lowest, layer of the OSI Network Model. In a wireless network, the PHY defines parameters such as data rates, modulation method, signaling parameters, transmitter/receiver synchronization, etc. Within an actual radio implementation, the PHY corresponds to the radio front end and baseband signal processing sections.
POTS	Plain Old Telephone System. A basic analog telephone equipment.
PPPoE	Point-to-Point Protocol over Ethernet. PPPoE relies on two widely accepted standards: PPP and Ethernet. PPPoE is a specification for connecting the users on an Ethernet to the Internet through a common broadband medium, such as a single DSL line, wireless device or cable modem. All the users over the Ethernet share a common connection, so the Ethernet principles supporting multiple users in a LAN combines with the principles of PPP, which apply to serial connections.
QAM	Quadrature Amplitude Modulation. A technique used in wireless applications to double the available bandwidth by combining two amplitude-modulated signals. The two combined signals differ in phase by 90 degrees; this technique doubles the bandwidth by combining the two signals at the source before transmission, transmitting digital data at a rate of 4 bits per signal change.
QoS	Quality of Service. Measure of performance for a transmission system that reflects its transmission quality and service availability.
QPSK	Quadrature Phase Shift Keying. A data transfer technique used in coaxial cable networks that sends data using modulating signals. Four different phases represent data, with each signal's information determined by the signal before it. For example, if a phase stays the same from one signal to the other, the information has not changed.
RADIUS	Remote Authentication Dial-In User Service, an authentication and accounting system used by many Internet Service Providers (ISPs). When you connect to the system you must enter your username and password. This information is passed to a RADIUS server, which checks that the information is correct, and then authorizes access to the system.
RF	Radio frequency. An AC signal of high enough frequency to be used for wireless communications.

RSSI	Received Signal Strength Indicator. A signal or circuit that indicates the strength of the incoming (received) signal in a receiver.
R&TTE	Radio & Telecommunications Terminal Equipment. The R&TTE Directive 1999/5/EC governs the marketing and use of R&TTE equipment. With the exception of a few categories of equipment, the Directive covers all equipment, which uses the radio frequency spectrum. It also covers all terminal equipment attached to public telecommunication networks.
RT	Real Time. Real Time service is designed to meet the needs of Real Time Variable Bit Rate (RT-VBR) like services characterized by requirements for guaranteed rate and delay such as streaming video or audio. These services are dynamic in nature, but offer periodic dedicated requests opportunities to meet real-time requirements. Because the subscriber equipment issues explicit requests, the protocol overhead and latency is increased, but capacity is granted only according to the real needs of the connection. Service parameters include CIR and CT.
Rx	Receive
SAU	SU Alignment Unit
SDARS	Satellite Digital Audio Radio Service. A satellite-based direct-broadcast radio service in which digitally encoded audio entertainment material is broadcast to earth-based receivers from an orbiting satellite, either directly or via a repeater station.
SIP	Session Initiation Protocol. An application-layer control IETF protocol that can establish, modify, and terminate multimedia sessions such as Internet telephony calls (VoIP). SIP can also invite participants to already existing sessions, such as multicast conferences. Media can be added to (and removed from) an existing session. SIP transparently supports name mapping and redirection services, which supports personal mobility - users can maintain a single externally visible identifier regardless of their network location.
SNMP	Simple Network Management Protocol. A network management protocol that provides a means to monitor and control network devices, and to manage configurations, statistics collection, performance, and security. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.

SNR	Signal to Noise Ratio. The ratio of the amplitude of a desired analog or digital data signal to the amplitude of noise in a transmission channel at a specific point in time. SNR is typically expressed logarithmically in decibels (dB). SNR measures the quality of a transmission channel or a signal over a network channel. The greater the ratio, the easier it is to identify and subsequently isolate and eliminate the effects of noise. SNR also is abbreviated as S/N.
SU	Subscriber Unit
TCP	Transmission Control Protocol. Connection-oriented transport layer protocol that provides reliable full-duplex data transmission. TCP is the part of the TCP/IP suite of protocols that is responsible for forming data connections between nodes that are reliable, as opposed to IP, which is connectionless and unreliable.
TCP/IP	Transmission Control Protocol/Internet Protocol. A set of protocols developed by the U.S. Department of Defense to allow communication between dissimilar networks and systems over long distances. TCP/IP is the de facto standard for data transmission over networks, including the Internet.
TDD	Time Division Duplex is a duplexing technique dividing a radio channel in time to allow downlink operation during part of the frame period and uplink operation in the remainder of the frame period.
TFTP	Trivial File Transfer Protocol. Simplified version of FTP that allows files to be transferred from one computer to another over a network, usually without the use of client authentication.
Tx	Transmit
μBST	Micro Base Station
UDP	User Datagram Protocol. Connectionless transport layer protocol in the TCP/IP protocol stack. UDP is a simple protocol that exchanges datagrams without acknowledgments or guaranteed delivery, requiring that error processing and retransmission be handled by other protocols. UDP is defined in RFC 768.
UL	Up Link
VLAN	Virtual Local Area Network. A group of devices on one or more LANs that are configured with the same VLAN ID so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Used also to create separation between different user groups.

VoIP	Voice over Internet Protocol. Provides an advanced digital communications network that bypasses the traditional public switched telephone system and uses the Internet to transmit voice communication. VoIP enables people to use the Internet as the transmission medium for telephone calls by sending voice data in packets using IP rather than by traditional circuit switched transmissions of the PSTN.
WCS	Wireless Communications Services. The variety of services available using frequencies in the 2.3 GHz band for general fixed wireless use.
WEEE	Waste Electronic and Electrical Equipment. The purpose of Directive 2002/96/EC on waste electrical and electronic equipment (WEEE) is, as a first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.
WL (or W/L)	Wireless LAN
WIMAX	The name commonly given to the IEEE 802.16 standard. Specifications for fixed broadband wireless metropolitan access networks (MANs) that use a point-to-multipoint architecture. WIMAX supports very high bit rates in both uploading to and downloading from a base station up to a distance of 30 miles.

