



## CPE INSTALLATION MANUAL

Chapter 1

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### OVERVIEW / DESCRIPTION

The Clearwire® Wireless Access Server is a multiple access, wireless, metropolitan area network device that enables ISP's to provide their subscribers direct local Internet access. [Figure 1-1](#) shows a typical Clearwire® network. Each Clearwire® subscriber site has a radio link to the ISP, either direct or through a base station. Customer Premise Equipment (CPE) at each subscriber site includes an antenna with co-located Outdoor Unit (ODU), and an Indoor Unit (IDU).

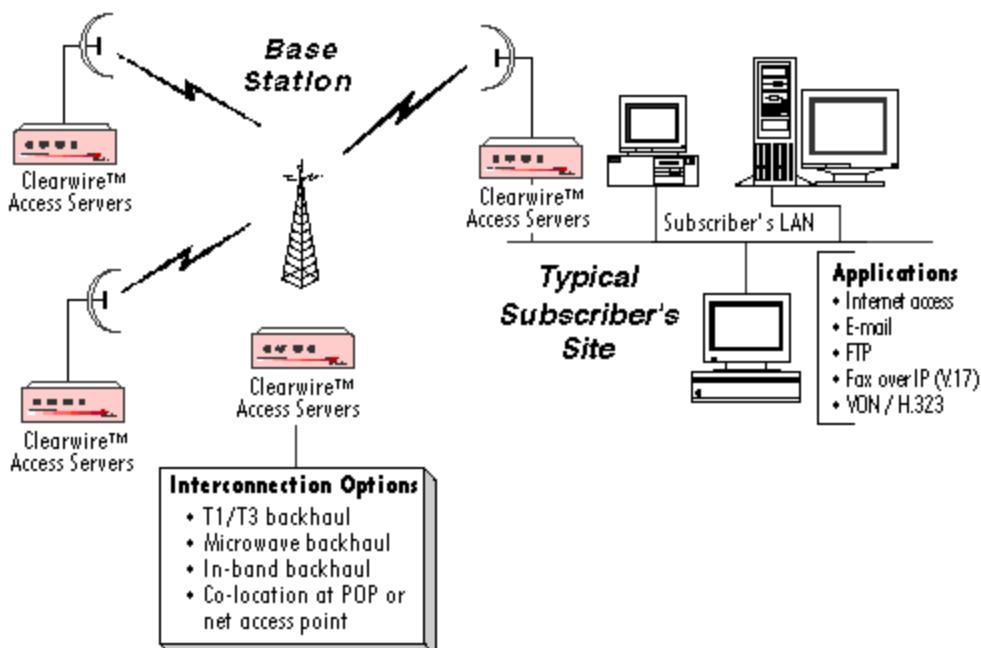


Figure 1-1 Typical Clearwire® Wireless Network

## FEATURES:

- Internet Connection - Secure, carrier class connection for Internet, intranet, extranet, virtual private network access, and all IP applications.
- Wireless - Real time configurable and controllable software radio
- 100Base-T 802.3 Ethernet connection to subscriber LAN using TCP/IP protocol.
- No router required.
- 100% reliable connection with retransmissions.
- Broadband — Up to 2 Mbps to each customer.
- Radios operate in Industrial, Scientific and Medical (ISM) spectrum (2.4000 — 2.4835 GHz) under FCC Regulation Part 15.247. No license is required in the U. S. and Canada.
- Frequency tunable Direct Sequence Spread Spectrum (DSSS) waveform for interference rejection.
- Reed-Solomon error correction encoding and decoding for accurate data transmission.
- Scalability - Add users and base stations as needed to cover a large metropolitan area.
- Network Management — Real time configuration control and monitoring by network manager at ISP site.
- Customized SNMP compatible network management software, supporting MIB II, and enterprise specific MIB for configuration and monitoring.
- Over-the-network upgrades of base station and CPE software.

## EQUIPMENT SUPPLIED:

Clearwire® CPE hardware for subscriber sites includes the IDU, power supply, ODU/ antenna (one of two types), and connecting cables.

- Indoor Unit (IDU). The IDU is a computation capable radio. Its processor, a high speed communications engine, is capable of running standard TCP/IP and Ethernet protocol stacks as well as processing its node's role in the proprietary Clearwire® air protocol. Processing includes precision timing, error control, and radio configuration/control. [Figure 1-2](#) shows the IDU front panel. [Table 1-1](#) describes the front indicators. [Figure 1-3](#) shows the IDU bottom panel. [Table 1-2](#) describes the bottom panel connectors.



**Figure 1-2 IDU**

STATUS	Blue— Lit indicates power on.
FAULT	IDU — Lit indicates IDU fault detected by self test.

**Table 1-1 LEDs**



**Figure 1-3 IDU Bottom View**

DC PWR	Power input port (+5V DC power from power supply).
LAN	10Base-T Ethernet LAN connection port.
RF	RF connection port (cable connection to ODU)

**Table 1-2 Bottom Panel Connectors**

- ASY\_Power 5V Power Supply. The power supply (see [Figure 1-4](#)) uses 95 to 250 Vac, 47 to 63 Hz power to provide +5V and  $\pm$ 12V DC power to the IDU.



**Figure 1-4 Power Supply**

- The ODU is included as part of the antenna assembly (see [Figure 1-5](#)) and contains the receiver front end and the final stage of transmit power amplification. Power, signal and control all flow through a single thin coax cable to allow remote ODU location without a separate power source. Connector J1 is used for connection to the IDU by coax cable. Connector J2 is permanently attached to the antenna port by coax cable.



**Figure 1-5 ODU (for illustration only, Part of the Antennae**

- ANT\_3X3 High Gain Panel Antenna Assembly. The high gain panel antenna assembly (see [Figure 1-6](#)) is usually used for sites 1 to 25 miles from the base station, with minimal signal path obstructions. It comprises a Clearwire® panel antenna, permanently connected to the ODU.



Figure 1-6 ANT\_3X3 High Gain Panel Antenna

- ANT\_CONIFER High Gain Reflector Antenna Assembly. The high gain reflector antenna assembly (see [Figure 1-7](#)) is usually used for sites 6 to 25 miles from the base station, with moderate signal path obstructions. It comprises a Conifer 26T-2400 reflector antenna, permanently connected to the ODU.

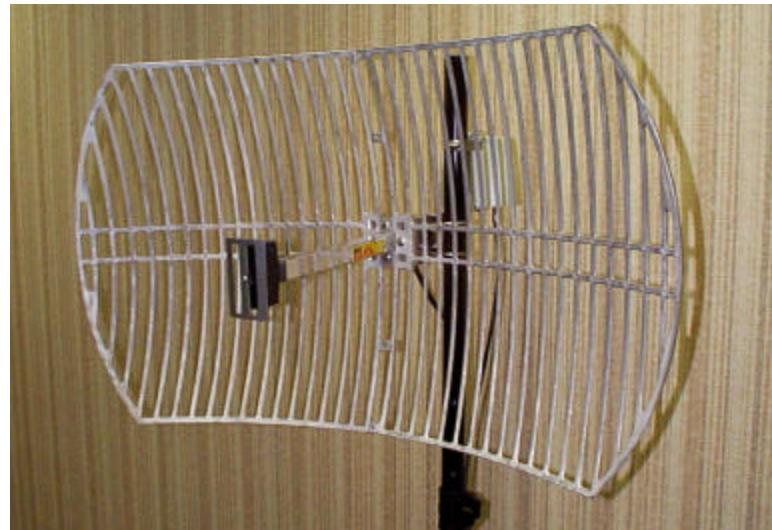


Figure 1-7 ANT\_CONIFER High Gain Reflector Antenna

## Glossary

BER	Bit Error Rate
CPE	Customer Premise Equipment
DBPSK	Differential Binary Phase Shift Keying
DQPSK	Differential Quadrature Phase Shift Key
IDU	Indoor Unit
ISM	Industrial, Scientific and Medical
ISP	Internet Service Provider
LAN	Local Area Network
MIB	Management Information (data) Base
ODU	Outdoor Unit
PVC	Permanent Virtual Circuit
SNMP	Simple Network Management Protocol
SVC	Switched Virtual Circuit
TCP/IP	Transport Control Protocol/Internet Protocol
WAN	Wide Area Network