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CPE INSTALLATION MANUAL Chapter 1

revision 0.3

Software Version 0.9.7

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OVERVIEW / DESCRIPTION

The Clearwire™ Wireless ISP Direct point-to multipoint wireless, wideband metropolitan area network 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).

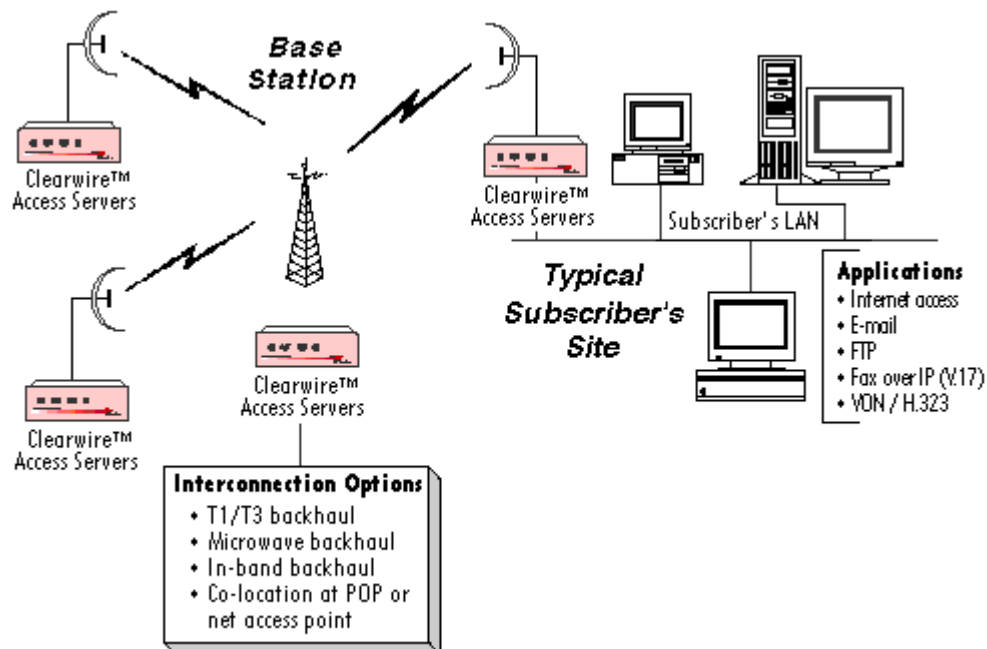


Figure 1-1. Typical Clearwire™ Wireless Network

FEATURES:

Internet Connection - Secure, carrier class connection for Internet, intranet, extranet, virtual private network access, and all IP applications including H.323.

- 10Base-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.

Wireless - Real time configurable and controllable software radio.

- 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, with frequency hopping for security.
- 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 three types), and connecting cables.

- 9714-2100 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 panel indicators. [Figure 1-3](#) shows the IDU rear panel. [Table 1-2](#) describes the rear panel connectors.



Figure 1-2. IDU Front View

STATUS	PWR — Lit indicates power on. CPU — Blinking indicates CPU active.
LAN	TX - Blinking indicates ODU is sending Ethernet Packets. RX - Blinking indicates ODU is receiving Ethernet Packets. LINK — Lit indicates Ethernet link is established.
RADIO	TX - Blinking indicates unit is transmitting radio packets. RX - Blinking indicates unit is receiving valid radio packets. LINK — Lit indicates valid network connection established with base station.
FAULT	IDU — Lit indicates IDU fault detected by self test. ODU — Lit indicates ODU fault (or faulty connection to ODU) detected by IDU self test.

Table 1-1. Front Panel LEDs



Figure 1-3. IDU Rear View

DC PWR	Power input port (+5V and ± 12 V DC power from power supply).
LAN	10Base-T Ethernet LAN connection port.
RF	RF connection port (cable connection to ODU)
SYNC	75-ohm coax connection to sync multiple units together (used only at base station installations).
CONSOLE	RS-232 connection to terminal for maintenance / configuration.

Table 1-2. Back Panel Connectors

- 9714-0020 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.

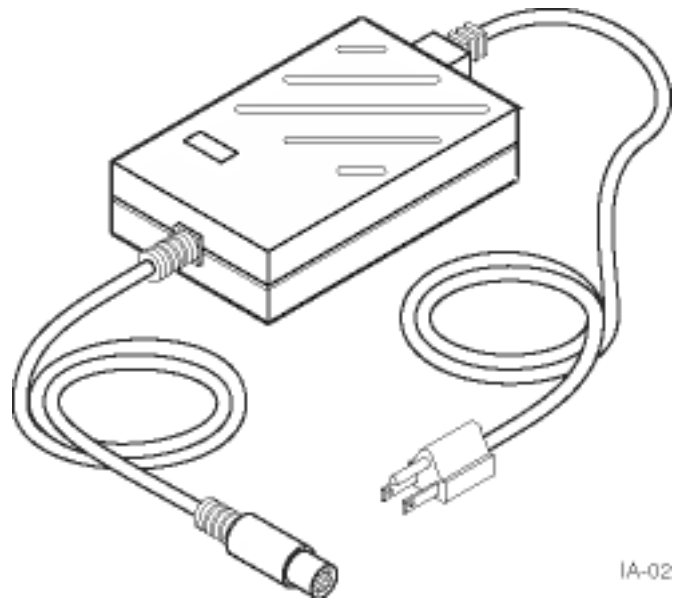


Figure 1-4. 9714-0020 Power Supply

- 9714-2900 Outdoor Unit (ODU). The ODU (see [Figure 1-5](#)) 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. The ODU is included as part of the antenna assembly. 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. 9714-2900 ODU

- 9714-2800 High Gain Panel Antenna Assembly. The high gain panel antenna assembly (see [Figure 1-6](#)) is usually used for sites 6 to 25 miles from the base station, with minimal signal path obstructions. It comprises a Clearwire™ 9714-2800 panel antenna, permanently connected to the ODU mounted on a 9714-2808 bracket.



Figure 1-6. 9714-2800 High Gain Panel Antenna Assembly

- 9714-2810 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 18T-2400 reflector antenna, permanently connected to the ODU mounted on a 9714-2818 bracket.



Figure 1-7. 9714-2810 High Gain Reflector Antenna Assembly

- 9714-2820 Low Gain Panel Antenna Assembly. The low gain panel antenna assembly (see [Figure 1-8](#)) is usually used for sites less than 5 miles from the base station. It comprises a Clearwire™ 9714-2820 panel antenna, permanently connected to the ODU mounted on a 9714-2828 bracket.



Figure 1-8. 9714-2820 Low Gain Panel Antenna Assembly

- 9714-???? Omni Antenna Assembly. The Omni antenna assembly (see Figure 1-9) includes a Clearwire™ 9714-???? Omni antenna, mounted on a 9714-???? Bracket, ideally attached to the exterior frame of a window.



Figure 1-9. 9714-???? Omni Antenna Assembly

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

