Overview of the **EtherWave Hub Radio**

The Etherwave Hub Radio is a high capacity microwave link designed for exceptional performance in all weather and in every environment.

It incorporates many unique features, including "non-invasive" test points so you can test the link without taking it off line. And its hub-based platform can run 10-20 megabit/second LANs plus voice or video (NTSC). Just plug a card in the Multimedia Hub at each end and away you go! Now you can send a 15 megabyte file in seconds with the Ethernet card and run as many as 4-T1's for up to 96 voice lines. Best of all, you own it so there's no monthly line or usage fees.

The Etherwave Hub Radio operates in the 23 gigahertz band, where there is no shortage of frequencies. And while unlicensed radios put convenience before interference protection, we offer the best of both by getting an FCC license, in your name, for added protection against radio interference ("RF").

The Etherwave Hub Radio consists of a parabolic (i.e., "dish shaped") Antenna, Radio Head and an indoor, rack-mounted, Multimedia Hub. The Antenna ranges in diameter from one to six feet depending on path distance. It attaches to a Pipe Mount above the Radio Head and connects to the Radio Head with a short (30"), rectangular cable called "waveguide".

The Radio Head is a weatherproof enclosure containing the microwave radio's transmitters and receivers. Two signal cables (RG-6) and one two conductor power cable (12AWG) connect the Radio Head to an indoor, rack-mounted Multimedia Hub in a computer or telephone room, up to 1,000 feet away. The Multimedia Hub supplies power to the Radio Head and provides test points, LED status indicators and a signal strength meter.

The Multimedia Hub also supports plug-in cards for Ethernet, T1 voice[1] or full-motion, broadcast quality video (NTSC). The card platform facilitates sparing and optimizes field serviceability while offering an easy upgrade path from a single T1 to a combination of LANs and T1 voice channels. Fully populated, the Multimedia Hub can support half or full duplex Ethernet (10-20 megabits/second) with up to four T1's.

Multimedia Hub
(shown with smoked glass front panel removed)
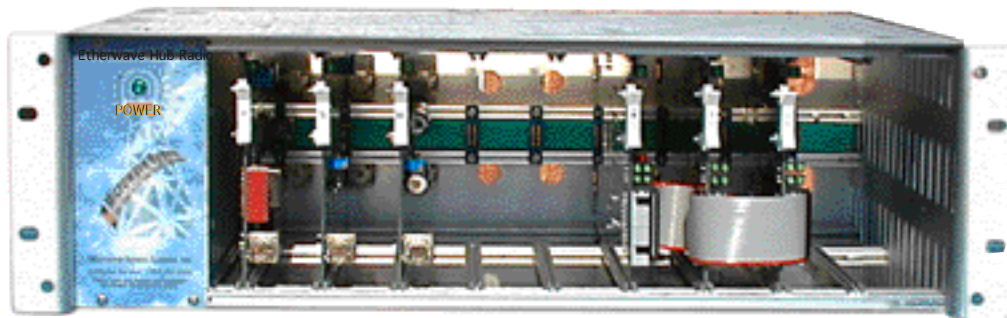
NOTES:

1   A European standard (1-4) E1 card is also available.

2   Unlike the Radio Head, which is frequency specific and dedicated to a particular site, the Multimedia Hub
      is identical and interchangeable at either end of the microwave link. For optimal performance always mate
      the Head A to Hub A and Head B to Hub B.

CHAPTER ONE

IN THIS CHAPTER...

INSTALLATION PREP WORK

Since your microwave link may arrive in several shipments you should locate all inventory before beginning installation.

The packing of your Etherwave Hub Radio is typically split, with half the link in an "A" box and the other half in a "B" box. Antennas, pipe mounts and cabling come in separate shipments,often direct from our vendors.

Refer below for the typical packing list for an Etherwave Hub Radio link:

1 -(Packing List

Item	Ship#	Box	Qty	Description
1	1	-	2	Pipe Mount for Antenna
2	2	-	2	Signal and Power Cable
3	3	-	2	Antenna with Mounting Bracket
4	4	A	1	Waveguide w/Hardware Kit
5	4	B	1	Waveguide w/Hardware Kit
6	4	A	1	Outdoor Radio Head (site A)
7	4	B	1	Outdoor Radio Head (site B)
8	4	A	1	Radio Head Mounting Struts
9	4	B	1	Radio Head Mounting Struts
10	4	A	1	Multimedia Hub (site A)
11	4	B	1	Multimedia Hub (site B)
12	4	A	1	"The Manual"

2-(Recommended Cable,Connectors & Conduit

Signal Cable & Connectors
For distances of under 500'between the Radio Head and Multimedia Hub
Use RG-6/U Coaxial cable. Belden #9248 (Plenum part # 89248).
For connectors use 2 pc.crimp-on,plug type BNC's. AIM Part #27-9002

For distances over 500'between the Radio Head and Multimedia Hub
Use RG-11/U Coaxial cable. Belden #9292 (Plenum part # 89292).
For connectors use 3 pc.crimp-on,plug type BNC's. AIM Part #27-9293.

For additional protection against interference,use quad shielded cable.
Belden #1189A. (Plenum part number 1152A). For RG-6/U quad shielded
cable,use 1 pc.twist-on,plug type BNC's. AIM #27-9052.

Power Cable & Connectors
Use 2-conductor shielded stranded 12-awg cable. Belden part #8718
(Plenum part #83802). For connectors,use terminal block,spade type crimp-
on #6 "Yellow".

Conduit
For Attachment to Radio Head use 1"outside diameter ("O.D."),PVC liquid
tight (Carlon #15008).

For other requirements use standard EMT 1". Go to 2"O.D.if you are running
coax for more than two Etherwave Hub Radio Links.

U-Bolts
All U-Bolts are full-circle type,zinc plated,galvanized or stainless steel.
For 2 and 3/8"O.D.antenna pipe mount use McMaster-Carr #3042T32
For 2 and 7/8"O.D.use McMaster-Carr #3042T34
For 4 and 1/2"O.D.use McMaster-Carr #3042T39

3-(Required Tools

Item	Description
1	Wire Cutters (12-18 AWG)
2	Wire Strippers (12-18 AWG)
3	Wire Crimp Tool (12-18 AWG)
4	Utility Knife
5	BNC Crimp Tool for RG-6
6	Screwdriver Set (Standard and Phillips Head)
7	Crescent Wrench 12"
8	Box or Socket Wrench 1/2",9/16",3/4"
9	Channel Lock Pliers 10"
10	Equipment as necessary for installation or attachment of antenna pipe mount (e.g.,hammer drill)
11	"Fish"for pulling cable
12	Electrical tape
13	Cable tie wraps (black, UVproof for outdoors/white for indoors)

Provided

14	Ball Driver 3/32"(Included in waveguide kit)

Optional

15	(2) Two Way Radios or cellular phones to facilitate antenna alignment

4-(Installation Overview

A typical microwave link can be installed by two people in two to three days. A complete installation involves the following tasks:

1. Conduct Site Survey:

    a. Verify line of sight.

    b. Take notice of any other radio antennas (whip or parabolic) and transmitters. Record their frequencies and contact your vendor, consultant or Microwave Bypass to determine whether they could pose a risk of interference.

       (There are always ways to cure an interference problem, either by changing frequencies, moving the new radio link further from the transmitter in question,or by using quad-shielded cable for greater isolation).

    c. Determine antenna placement and mounting.

    d. Determine Cable run paths between outdoor Radio Head and the Multimedia Hub.

2. Install antenna pipe mounts.

3. Run cables and conduit (if required) between antenna location and indoor equipment rack.

4. Attach antennas and Radio Heads to the pipe mounts.

5. Visually aim the antennas at each other.

6. Rack mount the Multimedia Hub and associated interface (e.g., switches, routers,hubs,etc.).

7. Power on radios and align antennas.

8. Test the radio link independent of the networks or PBX's.

9. Record test data on the "Benchmark Sheet." This data verifies optimal performance achieved at final installation and can save a lot of time and guesswork during troubleshooting.

10. Cutover to networks and final test.