Harmony Enhanced - Quick Reference Guide

All health and safety procedures and recommendations must be followed as detailed in the Product User Manual. This product is to be installed and maintained by experienced telecommunications personnel only. Installations must adhere to specifications listed in the Product User Manual. DragonWave Enhanced systems must be installed with proper grounding, and lightning/surge protection as detailed in the Product User Manual.

Description

The Harmony Enhanced is DragonWave's high capacity, packet-microwave solution, operating in licensed or unlicensed spectrum from 6 to 42 GHz. The Enhanced system delivers industry leading capacity and system gain in an integrated outdoor unit (zero-footprint), eliminating rack congestion and minimizing collocation space. Equipped with DragonWave's Bandwidth Accelerator+ technology, the Harmony Enhanced achieves the highest degree of spectral efficiency (through 2048QAM, MIMO and wider channel sizes), delivering more capacity per channel with a longer reach than any other all-outdoor microwave system. Harmony Enhanced delivers industry leading capacities up to 2Gbps in a single radio and 4Gbps in a single channel with MIMO or a single antenna with XPIC.

Mechanical

ODU dimension (no antenna)	21.6cm x 25.4cm x 12.8cm (8.5in x 10in x 5.05in)
ODU weight (no antenna)	4.1kg (9lbs)

Power, Connections, Payload

Operating Temperature	-40°C to + 55°C (-40°F to +135° F)
Humidity	100% Condensing
Power Input Options:	
Port 1	PonE/PoE++, -48 VDC Nominal (-40.5 VDC to -57.5 VDC) isolated
Port 4	P+E, -48 VDC Nominal (-40.5 VDC to -57.5 VDC) isolated
Direct DC Port	-48 V Nominal (-30 VDC to -57.5 VDC at radio) isolated
Consumption (per link end)	43 - 60Watts depending on RF frequency
Payload (+ Inband NMS)	Shielded RJ45 or optical LC (SFP)
Interface	2 x Dedicated GigE copper (P1/P4) + 2 x GigE SFP (P2/P3)
Latency GigE	< 200µs, Typical 120µs GigE
Base Capacity	Variable: 10 to 500 Mbps full duplex CIR
MTU Size	64 to 1600 Bytes, up to 9600 (GigE Mode)
Prioritization	SP + WFQ. 8 queues; 802.1p/q, MPLS, DSCP ToS mapping
Hitless Modulation Shifting	Yes

Network Management (NMS)

Alarm Management	SNMP Traps, Enterprise MIB
NMS Compatibility	NetViewer NMS (v1 & v2c), any SNMP based NMS (v1, v2c, v3)
Security	Licensable feature to support HTTPS, SSH, SFTP, SNMP v3
EMS	SNMP (v1, v2c), TELNET, HTTP, FTP
User Management	2 level Authentication (RADIUS, Internal)

Typical Installation List

1 x 6 AWG grounding cable per ODU (bolt and hardware pre-installed on ODU)
4 x RJ45 connectors per Cat5e cable run
1 x AC/DC power converter and cables for AC installing per ODU
1 x power injector/surge arrestor per ODU

Installation

Pre-installation Requirements

NOTE: With respect to the antenna mount, make sure that the horizontal and vertical positioning bolts are centered prior to installation to ensure that the full alignment range is available once the antenna has been mounted (equal left/right, up/down adjustment range)

Enhanced ODU installation Tools

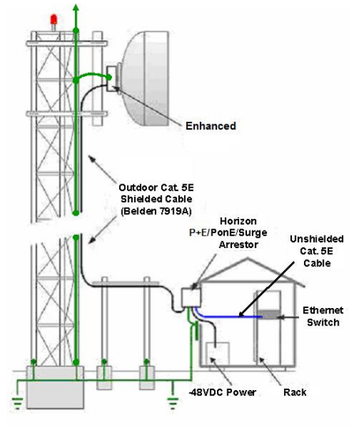
Installation Tool List: *11/16" socket or wrench for antenna mount adjustments * Phillips screw driver to remove the PoE+ lid & Enhanced cable enclosure ***** Small flathead screwdriver for power injector (PonE) DC terminal block connections.*

Device must be properly grounded / earthed in order to protect against lightning strikes and surges

Grounding, Power and Lightning Protection

There is one grounding point available on the Harmony Enhanced chassis. (see diagram under "Ports"). Use 6 AWG wire (minimum) to connect the casing to lightning protection system (LPS) grounding conductors, or structure ground. Use shortest length, avoiding loops and sharp bends.

When utilizing the Power-on-Ethernet (PonE) or Power + Ethernet (P+E) powering options, the powering device must also be grounded using the same methods described above. Once properly grounded, the powering device will provide surge protection to all downstream network equipment (Ethernet) as well as the power source equipment.



Grounding:
The grounding points can be found on the bottom of the ODU chassis (beside the expansion port) and on the side of the PonE

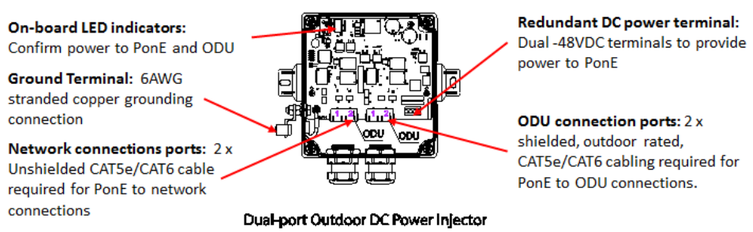
Device Interfaces

There are four methods to power the Harmony Enhanced:

- PonE - Note that the ODU PonE implementation is a DragonWave proprietary PSE and does not follow IEEE standards. Used to power an Enhanced device over Ethernet via port 1
- PoE++ - New IEEE standard PoE powering method – powers Enhanced via port 1
- P+E – Proprietary power source method. Used to power an Enhanced device via port 4
- Direct DC – Enhanced chassis is equipped with an on board DC terminal allowing for direct power connections in applications where PonE/P+E powering methods are not available

Power Injector Interface & Connections

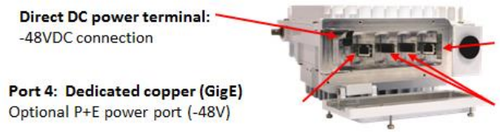
In addition to providing surge protection for downstream network equipment, the PonE device also provides power to the Enhanced ODU using a proprietary power sourcing method. The PonE is equipped with an on-board LED indicator that allows the user to confirm power to the PonE/PoE++/P+E device and when connected, whether the appropriate power is being provided to the ODU.



Dual-port Outdoor DC Power Injector

Enhanced (ODU) Interface & Connections

The Enhanced ODU is equipped with 2 dedicated 1000BaseT copper Ethernet ports (P1/P4), and two SFP ports (P2/P3). All 4 ports can be configured as data and/or management ports.



Ethernet Cabling

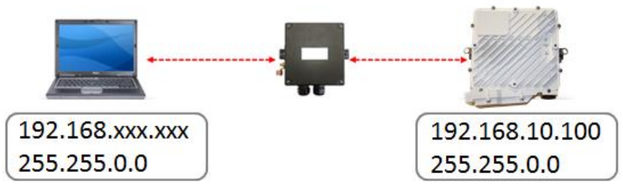
To ensure proper grounding, shielded, outdoor rated CAT5E/CAT6 Ethernet cable is required for the PonE/P+E to Enhanced ODU connection. Although the Enhanced is equipped with four ports, all capable of carrying management and/or data traffic, power can only be applied over Ethernet on port 1 (PonE/PoE++) or Port 4 (P+E).

NOTE: The PonE device IS NOT an Ethernet repeater. The total cable distance from the network to PonE and PonE to ODU cannot exceed 100m or 320ft. Please consult the user manual for specific total cable distance limitations.

Configuration

Logging In

The Enhanced system comes equipped with the following default management settings. The diagram below lists these addresses and provides an example of the static IP requirements for a connecting laptop



Logging In

Super User: Default username is **admin** Default password is **sysManager**.
Default IP Address**: 192.168.10.100** subnet mask 255.255.0.0
By default, Harmony Enhanced management interface is accessible via Port 1 (in-band).

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Command Line Interface (CLI) Overview

The majority of commands begin with either **configure** or **show**.

Context sensitive help: enter a partial command followed, or preceded, by "?".

Example 1: **configure radio ?** returns a list of all commands that start with **configure radio**

Example 2: **radio ?** returns all commands that include the word "radio"

Pressing the Tab key after entering a partial command will complete that command, though this is not required as partial commands are accepted by system provided they are unique.

The up and down arrows (↑ and ↓) will recall previously input command lines (up to 20).

An unrecognized CLI entry will be acknowledged with **Invalid command**.

Configuration changes are applied dynamically but the "**save running-config"** command must be issued to ensure that the changes are retained in the event of a power cycle/system reset.

CLI BASIC Configuration Steps

1. Configure Radio Parameters

   enhanced# configure <enter>

   enhanced(config)# radio profile ?

   enhanced(config)# radio profile etsi 56 en56_500_2048qam

   enhanced(config)# radio frequency 14550000 15000000

   enhanced(config)# radio transmit power 20

   enhanced(config)# radio transmit state enable

2. Configure IP parameters

   enhanced# configure

   enhanced(config)# management ip 192.168.10.101 netmask 255.255.0.0 gateway192.168.10.1

WARNING: *The above commands may be used to change the radio configuration of an existing working link. If management of the far end Harmony Enhanced is only accessible via the radio link, then configure the far end radio first. Otherwise, if you configure the near end radio first, you will lose the link to the far end radio and be unable to configure it. If you change IP settings you may have to reconfigure your management device (e.g.PC) in order to communicate with Harmony Enhanced.*

Detailed configuration information for advanced configuration settings can be found in the Harmony Enhanced Product Manual

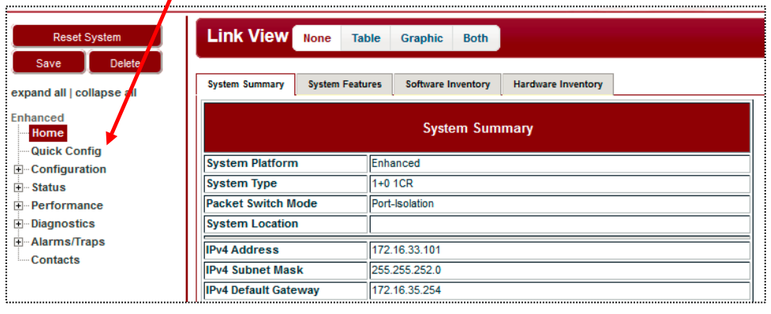
Web Interface Access

To access the Harmony Enhanced embedded CLI and webGUI, open a web browser, enter the same default IP address in the URL window and hit "enter".You will be prompted with a login screen. Default UN & PW are:

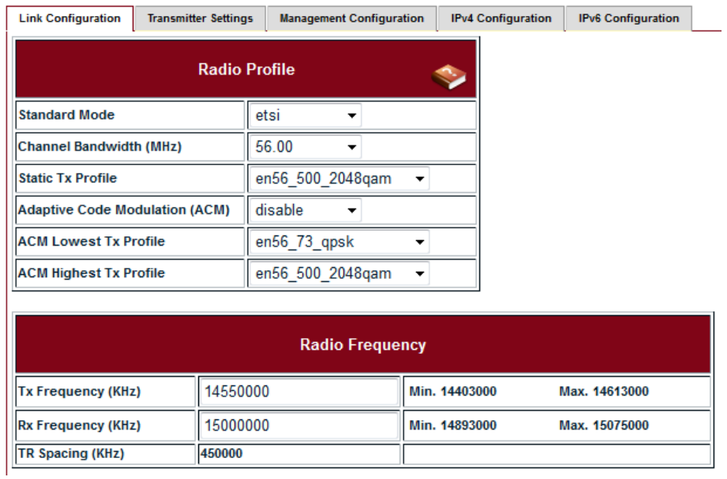
USERNAME: admin **PASSWORD: sysManager**

WebGUI Configuration Steps

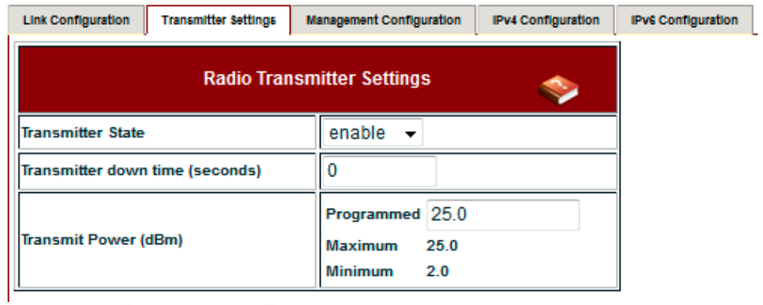
All standard RF configuration changes can be issued via the "Quick Config" configuration tab



WebGUI Configuration Steps – Radio Profile



WebGUI Configuration Steps – Transmitter Settings



Antenna Alignment Procedure

VISUAL Alignment & Antenna Prep

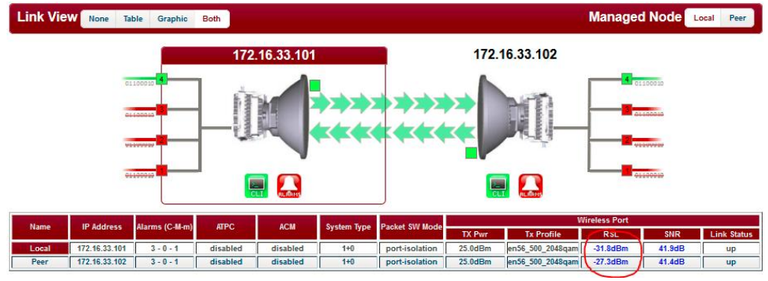
Loosen the bolts clamping the mounting bracket to the post sufficiently to allow the mounting bracket assembly to be rotated on the post or tower by hand. Visually align with the far end installation. Note - use a compass or landmarks to verify the bearing in situations where the remote end is difficult to identify. Once the link is visually aligned, tighten the mounting assembly to the pole.

Alignment monitoring - BNC

The Enhanced system comes equipped with an external BNC port that can be used (with a digital voltmeter) to monitor the signal quality and strength during alignment. Once the radios have been configured, both radios are transmitting and when the alignment process has been started, the BNC port will provide a voltage output that corresponds directly to the RSL values being reported by the system (1V = 1dBm). The BNC port is always enabled.

Alignment monitoring – WebGUI

Alternatively, the alignment (RSL) can also be monitored from the LinkView page of the WebGUI by selecting the "table" view option.



Alignment

SITE A

Loosen the horizontal adjustment bolt slightly until the antenna can be adjusted by hand. Observing the voltmeter readout (or webGUI interface), adjust the horizontal alignment slowly and gradually over the entire antenna mount range (far left and far right) and ensure that any/all side lobes are identified.

When performing alignment it is important to rotate the fine adjustment nuts ***no more than ¼ of a turn at a time*** (1/8th recommended). Note: A 360° rotation of the adjustment bolt can skip over the entire main lobe.

Although the BNC and WebGUI track the RF performance in real-time, it is also good practice to allow 1 to 2 seconds settle time between each adjustment.

Identify

Tighten the horizontal adjustment bolt and repeat the above process for the vertical alignment.

SITE B – Repeat procedure from Site A

The final received signal strength (RSL) should be within ±3 dB of the link budget figure.

For more detailed information on proper installation techniques, configuration options and troubleshooting methods please refer to the DragonWave Harmony Enhanced product manual and installation guide.