MOTOROLA

HotZone Duo 1.0

IAP and MWR Users Guide

July 2006

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Chapter 1:   Product Introduction

This guide will provide you with technical specifications, installation guidelines, and testing procedures for the HotZone Duo Infrastructure Devices: the IAP4300 and the MWR4300.

Figure 1-1   MWR4300 Device

HotZone Duo Infrastructure Devices

Though both, IAPs, and MWRs, have a similar external appearance, each device has its own individual role within the HotZone Duo system. This document will address both of these devices and their differences. Both devices support maximum continuous data up to 54 Mbps for stationary 2.4 / 5.8 GHz 802.11 devices.

The Intelligent Access Point (IAP) acts as the transition point from the wireless network to the wired core network and from there, through media gateways, out to the Internet. The Mesh Wireless Router (MWR) is a wireless device that is primarily deployed to seed and extend the range between IAPs and Wireless Clients while simultaneously increasing the spectral efficiency of the network. The MWR includes an optional Ethernet connector. This allows a network of IP-enabled devices (such as a camera) to be directly addressed, accessed and managed over the HOTZONE DUO network.

IAP functionality includes:

- Transition Point between the wired and wireless network

- Dynamic Route Selection

MWR functionality includes:

- Dynamic Route Selection

- Range Extension for all other network devices

- Automatic Load Balancing

- Network capacity optimization through small packet consolidation

IAPs and MWRs within a HOTZONE DUO Wireless Network

The **MWRs** and the **IAPs** are considered as fixed **Infrastructure** devices. Infrastructure devices provide area coverage access to wireless clients to the wired network. IAPs act as the principal network management interface for associated MWRs.   In turn, MWRs provide standard 802.11 authentications and access to the Radius server.

Figure 1-2   MWR and IAP Devices in Context of the HOTZONE DUO Network
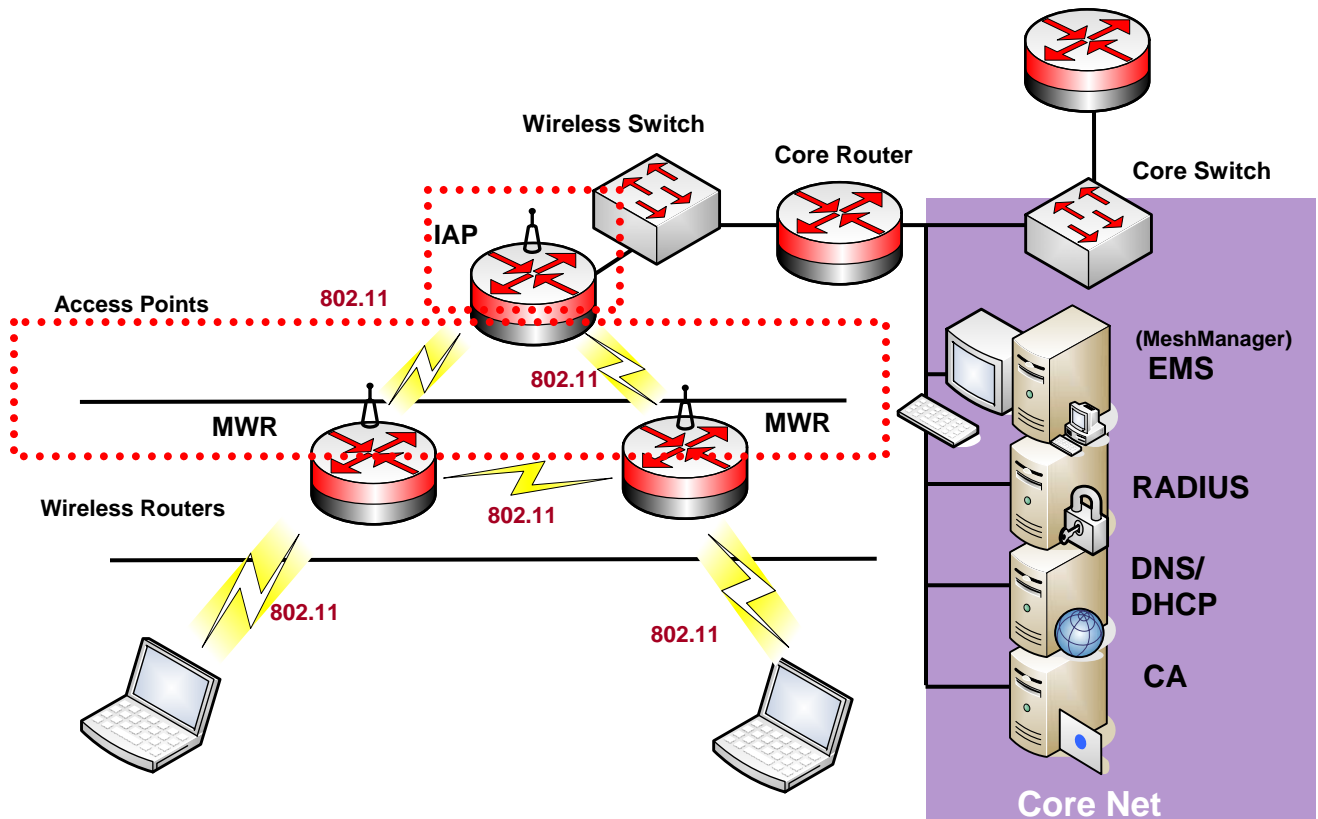
HotZone Duo Infrastructure Device Specifications

The following specifications apply to the HotZone Duo Infrastructure Devices as described in the table below:

Table 1-1   HotZone Duo Device Specifications

HotZone Duo Radio Characteristics	
Primary Radio Operating Freq. (GHz)	2.4 to 2.4835 (2nd ISM band)
Secondary Radio Operating Freq. (GHz)	5.725 to 5.825 (U-NII band)
Wi-Fi Support	802.11b/g at 2.4GHz; 802.11a at 5.8GHz
RF Modulation	CCK / OFDM
Output Power (Maximum)	36 dBm EIRP
Power Control	1dB increments
Receive Sensitivity	-77 dBm (at 54 Mbps) to -100 dBm (at 1 Mbps)
Antenna Type	Two (2) omnidirectional, 8 dBi (for 2.4 GHz Radio) and 10 dBi (for 5.8 GHz Radio)
Antenna Connector	N-Type
Routing	
Routing Engine	MeshConnex Layer 2 routing with Layer 1 situational-awareness
Routing Protocol	Patented, hybrid proactive/reactive routing (low latency & fast route convergence)
IEEE 802.11s Support	Upgradeable to final IEEE 802.11s standard via OTA software updates
Network	
Network Management Software	MeshManager Element Management System via secure SNMP v.3
Network Interface	Ruggedized 10/100Mbps Ethernet (RJ-45) port with surge suppression
Network Segmentation	Multiple SSIDs with VLAN mapping
Quality of Service (QoS)	802.11e, weighted fair queuing and IP precedence bits (ToS) supported via DSC
Security	
Virtual LAN (VLAN)	Supports up to sixteen (16) per node, or 4094 per network
Client Encryption Support	WEP, WPA (TKIP) and WPA2 (AES, 802.11i)
Internodal Encryption	Intra-Mesh Security
Authentication	802.1X (Infrastructure/Client) and MAC address hardware authentication
Power	
Power Requirements	120-240 VAC (with +/- 20% variation at 50-60Hz)
Power Connector	AC, NEMA 5-15 power cord • 8 ft (2.44m)

Power Consumption	15W (with both radios operating at 50% duty cycle)
Power over Ethernet (PoE)	Support for Canopy PoE connection
Physical	
Dimensions	9"x 6"x 3.5" (23.1cm x 15.2cm x 8.9cm)
Weight	4.5 lbs (2.04kg)
Packaging	Outdoor, all-weather enclosure (NEMA 4)
Mounting	3" (7.62cm) diameter post mounting
Environment	
Temperature Range	-35 to 60 °C
Humidity	0 to 100%, non-condensing
Certifications	FCC Part 15 & 90, UL, CSA
Available Options	
Mounting	Lamp post mount bracket assembly
Power	AC photo cell adapter
DC Input	HotZone Duo with 5-15 VDC input

Chapter 2: Infrastructure Device Installation

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This chapter will provide hardware and software installation information for the HOTZONE DUO Infrastructure Devices.

Software Requirements

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The MWR4300 device must be setup using the HOTZONE DUO MeshManager application suite.

MeshManager Element Manager System is used for device setup, configuration, and management of HotZone Duo infrastructure devices. Prior to using the MeshManager software for device installation and configuration, ensure that it is installed and running on a network computer. MeshManager will be used during the device setup process to validate the installation of the device and to manage it within the wireless network.

Detailed information about the MeshManager application is found in the *HOTZONE DUO MeshManager Users Guide*.

MWR and IAP Hardware Installation Notes

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For a HOTZONE DUO deployment, a permanent power source for each MWR must be provided. All infrastructure devices require professional installation to ensure that the installation is performed in accordance with FCC licensing regulations

Infrastructure devices are fitted with two mounting brackets designed to be attached to light poles and other probable installation sites. Alternate mounting hardware is available for mounting directly to posts or structures that are too large for the standard brackets. Optional remote antenna mount hardware is also available for use with the alternate mounting hardware.

Equipment Specification

The specifications listed in the following table apply for all Infrastructure devices.

Table 2-2   HOTZONE DUO Infrastructure Device Radio Characteristics

Characteristic	2.4GHz 802.11 b/g	5.8GHz 802.11a
Output Power	30 dBm	30 dBm
RF Modulation	CCK/OFDM	OFDM
Operating Frequency (GHz)	2.4-2.4835	5.725-5.825
Maximum Burst Data Rate	54 Mbps	54 Mbps
Spectrum Used	20 MHz	20 MHz

Ports and Connections

The following list defines the standard ports and connections on IAPs and MWRs:

- Device Enclosure with 2 N-type Female Antenna Connector
- 120V A/C Power Cable with flying leads
- One RJ45. (On IAP devices only: External power supported on only one. Canopy Connect POE Only.)
- On-board switch to supply power on Ethernet lines (for Canopy connectivity)
- Three pin RS232 connector
- Mounting Bracket (Standard and Optional)

Operator Supply List

The Network Operator must supply the following equipment:

- Mounting Location
- Power Source (120V A/C depending on IAP configuration)
- Ethernet connection between the IAP and MiSC.

Optional Antennas

The following antennas are recommended for use with Infrastructure Devices.

Table 2-3   Recommended Antennas for Infrastructure Devices

Manufacturer	Part Number	Gain	Usage
Maxrad	MFB2408NMDC	8 dBi	2.4 GHz Infrastructure
Radiall-Larsen	R380.700.212	10 dBi	5.8 GHz Infrastructure

HotZone Duo Infrastructure Device Label

The MAC address for each device subcomponent is recorded on a label located on the device enclosure. Record this number in the provided MWR MAC Address Table section. The MAC Addresses will be required later to configure and test the device.

Figure 2-1   IAP Infrastructure Device Product Label (sample)
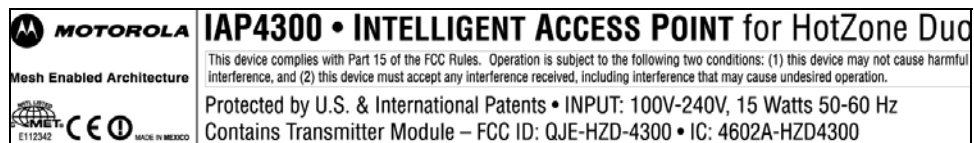
Figure 2-2   MWR Infrastructure Device Product Label (sample)

Infrastructure Device MAC Address Table

Table 2-4   MAC Address Table

IAP or MWR	Device Name	2.4 GHz 802.11 b/g	5.8 GHz 802.11a

Infrastructure Device Assembly

Figure 2-3 shows the external connection points for the MWR device.

Figure 2-3   Infrastructure Device External Connection Points

N-Type
Antenna
(2.4)

Gore Vent

N-Type
Antenna
(5.8)

Ethernet
Port

AC Power

Device Hinges
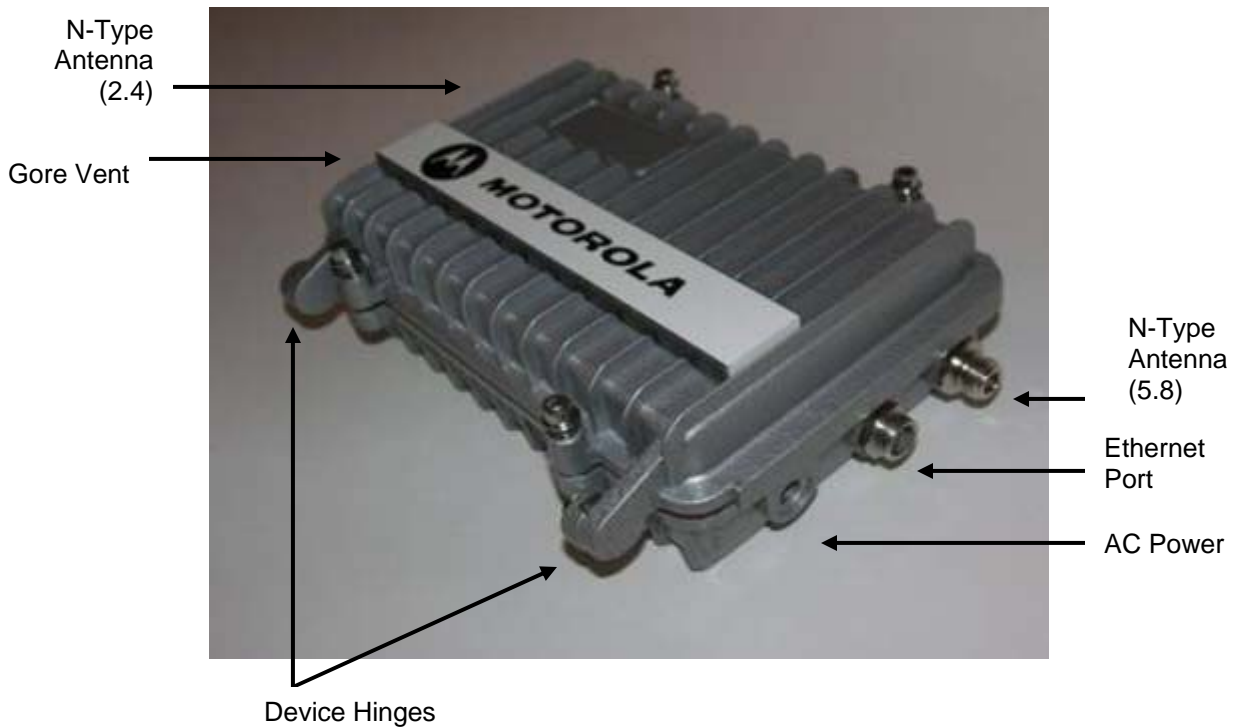
NOTE

Please note that the infrastructure device shown above does not represent the latest device design as of the time of this publication, however the device labels show the correct port designations and locations.

Infrastructure Device Deployment and Installation

The MWR and the IAP devices require professional installation to ensure that the installation is performed in accordance with FCC licensing regulations. All common precautions for grounding and electrostatic discharge protection should be observed during deployment and installation.

Observe the following additional guidelines when deploying fixed Infrastructure devices (MWR and IAP):

- The MWR or IAP may be mounted on a pole having a diameter of 1-3.5 inches, utilizing the provided brackets.

- The antenna must have a separation distance of at least 2 meters from the body of all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

- Users and installers must be provided with antenna installation and transmitter operating conditions to satisfy RF exposure compliance.

- When deploying the MWR or IAP, the antenna should be a minimum of 30 inches from any nearby metal poles to avoid distortion of the RF pattern.

- The installation location must provide power to the MWR and IAP.

- It is the responsibility of the Network Operator to ensure that the installation complies with any local building codes and permits.

Grounding Considerations

In order for a grounding system to be effective, a low impedance path to earth ground must be present. The grounding system must have conductors of sufficient size to withstand the high fault currents that must be shunted along this path. The lower the impedance the grounding system displays, the better its capability to perform its task. The impedance requirement for a communications site is determined by the classification of the site. Sites are broken down into 2 categories: Type A-Light Duty and Type B-Light Industrial/Commercial. Type A-Light Duty sites have impedance requirements of 25 ohms or less to ground whereas Type B- Light Industrial/Commercial sites have impedance requirements of less than 5 ohms to ground. HotZone Duo networks fall into the Type B-Light Industrial/Commercial category, and therefore must be treated with greater considerations as far as grounding requirements are concerned.

Since Type B grounding requirements stipulate 5 ohms or less impedance to earth ground, things such as soil pH, type of grounding rods, size of conductors, and ground enhancing materials must be taken into account to achieve this goal. To verify the impedance requirements are met, a special Earth/Ground Resistance Tester (megohmmeter) may be necessary.

To help the HotZone Duo product supply an easy way to be connected to a grounding electrode system, it is recommended that the following addition be added to the exterior of the enclosure:

- The installation of a high strength, thin sheet mounting dog point stud to allow for a mechanical connection to the grounding system. The stud should be of the HFH PEM style and of a suitable size to allow for the proper size conductor to be attached via irreversible crimp style ring terminal. The stud should also employ an anti cross-threading technology since devices will be field swappable and the devices will be returned and reused via a RMA policy. The specification recommends using #6 gauge, stranded wire for the connection of the cabinet to the grounding electrode system. This wire should be connected to the grounding system with a split bolt compression fitting. The wire used to make the connection should be green or green with a yellow stripe. The supplied grounding stud will be specifically designated as the grounding system attachment point. This stud will be used to connect the HotZone Duo product to any grounding electrode enhancements needed should the site not conform to Type B grounding requirements and additional means of grounding electrodes are installed.

- If the HotZone Duo product is attached to a light arm and the attachment point meets the Type B grounding requirements, then the grounding stud attachment point is not required to be used.

Assembling the IAP and the MWR Device

Use the following procedure to assemble an IAP and MWR Devices.

Procedure 2-1 Assembling the MWR and IAP Device

1	Place the brackets at the desired position on the pole.
2	Adjust the position of the box so that the antenna connecters are positioned vertically. Align the antennas with the N-type connectors on the box and rotate to close.
3	Insert the cable into the external Ethernet port and tighten the connector to ensure a weatherproof seal.
4	Insert the Power Plug into the 4-pin connector.

Initial Infrastructure Device Configuration Information

Prior to attempting configuration of an IAP or an MWR device, the device must be powered up and have connectivity to the MiSC.

Device Connectivity Testing

When a MiSC has been setup on the network, verify connectivity to the device using the following procedure:

Procedure 2-2 Testing Infrastructure Device Connectivity

1	Apply power to the device, the device should be operation in 60 to 120 seconds
2	Obtain the 802.11 MAC addresses for the device subcomponents that were recorded in the MAC Address Table earlier in this manual. The address will be in the format 02-05-12-30-xx-yy.
3	Within MeshManager's Device Manager screen, right-click on the appropriate MWR or IAP device in the Device Tree and select the **Ping Device** option.
4	Check for a successful response to the **Ping** command in the *Named Device* results dialog box. A successful response to the ping commands verifies connectivity to the device (MWR or IAP).
5	Repeat steps 1-4 for additional MWR or IAP devices.

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Chapter 3:   Device Configuration

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This chapter contains information which will assist you with the available configuration options.

Use HOTZONE DUO MeshManager Device Manager application to configure HotZone Duo Infrastructure devices. For additional device configuration information, see the *HOTZONE DUO MeshManager Users Guide* and the *HOTZONE DUO Network Setup and Installation Guide*.

Adding an Infrastructure Device in MeshManager

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An Infrastructure device must be added to the network through the MeshManager Device Manager before it can be managed. Infrastructure Devices (IAP or WR) can be added to the network using the **Add New Device** menu option or the Add New Device Toolbar button.

When you select the type of device to be added, an **Add New Device** panel will be displayed. The example below is the **Add New Device** panel for an MWR.

NOTE: Prior to adding an infrastructure device on the network, its security features first need to be prepared or staged. See the *HOTZONE DUO Network Setup and Installation Guide* for more information on this topic.

Figure 3-1   Add New Device Panel - MWR
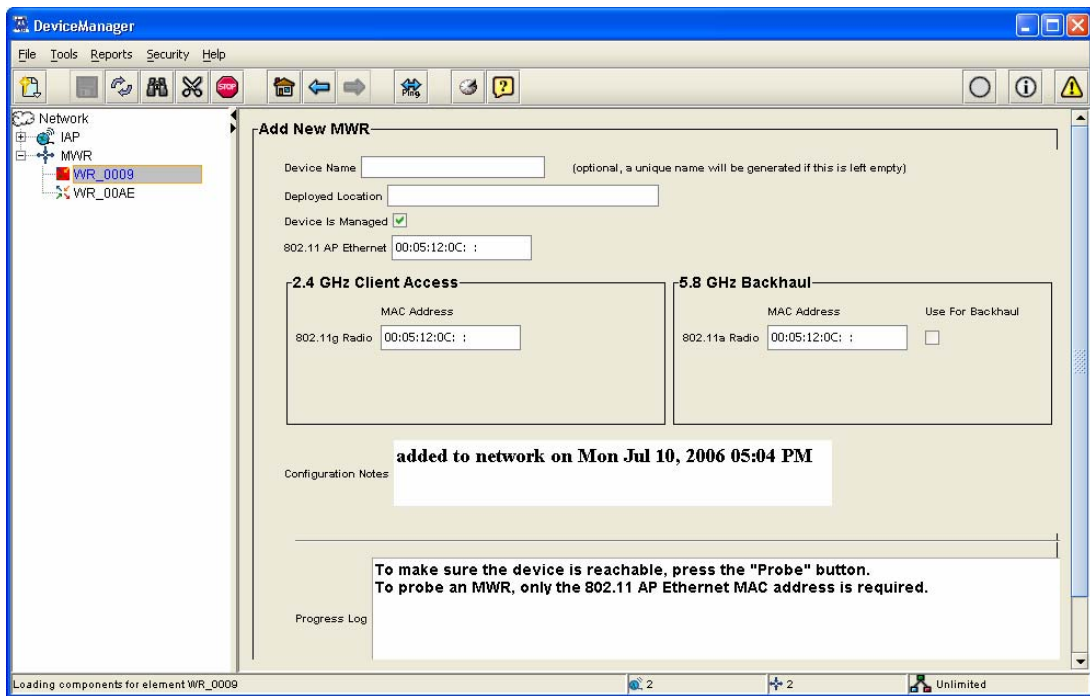
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       Authenticator and RADIUS authentication server
================================================================

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Chapter 5:   Customer Information

This chapter provides information about how to obtain customer service support from Motorola and describes the type of information you should have available prior to making the support call.

Customer Service Information

If you have read this document and made every effort to resolve installation or operation issues yourself and still require help, please contact Motorola System Support Center (SSC) using the following contact information:

Hours of Operation

7 days a week, 24 hours

Technical Support: 800-221-7144 (USA)

Obtaining Support

Motorola provides technical support services for your system and recommends that you coordinate warranty and repair activities through the Motorola System Support Center (SSC). When you consult the Motorola SSC, you increase the likelihood that problems are rectified in a timely fashion and that warranty requirements are satisfied. Check your contract for specific warranty and service information.

System Information

To be provided with the best possible opportunity for support, collect the following system information and have it available when obtaining support.

- Location of the system
- Date the system was put into service
- Software or firmware version information for components of your system

- Serial number(s) of the device(s) or component(s) requiring support
- A written description of the symptom or observation of the problem:

  - When did it first appear?

  - Can it be reproduced?

  - What is the step-by-step procedure to cause it?

- Do other circumstances contribute to the problem? For example, changes in weather or other conditions?
- Maintenance action preceding problem:

  - Upgrade of software or equipment

  - Change in the hardware or software configuration

  - Software reload - from backup or from CD-ROM (note the version and date)

Return Material Request

After collecting system information, contact the Motorola System Support Center for assistance or to obtain a Return Material Authorization (RMA) number for faulty Field Replaceable Entities (FREs):

North America: 800-221-7144

Radio Products and Services Division

The Radio Products and Services Division is your source for manuals and replacement parts.

Radio Products and Services Division Telephone Numbers

The telephone numbers for ordering are: (800)-422-4210 (US and Canada orders)

The fax numbers are: (800)-622–6210 (US and Canada orders)

The number for help identifying an item or part number is   (800)-422-4210; select choice "3" from the menu

Returning System Components to Motorola

Motorola's service philosophy is based on field replaceable entities (FREs). FREs are system components identified by Motorola to be returned to Motorola for repair.

Returning FREs

Return faulty FREs to Motorola for repair. When you return an assembly for service, follow these best practices:

- Place any assembly containing CMOS devices in a static-proof bag or container for shipment.
- Obtain a return authorization (RA) number from the Motorola System Support Center.

- Include the warranty, model, kit numbers, and serial numbers on the job ticket, as necessary.

- If the warranty is out of date, you must have a purchase order.

- Print the return address clearly, in block letters.

- Provide a phone number where your repair technician can be reached.

- Include the contact person's name for return.

- Pack the assembly tightly and securely, preferably in its original shipping container.

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Chapter 6:   Certification and Safety Information

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This chapter lists the relevant FCC Certification and Product Safety Information for the HOTZONE DUO devices described in this manual.

FCC Regulatory Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received; including interference that may cause undesired operation.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received; including interference that may cause undesired operation.

The IAP4300 (Intelligent Access Point, Transmitter Module FCC ID: QJE-HZD-4300 – IC: 4602-HZD4300) is an infrastructure device that is positioned at a fixed location such as a building rooftop. The IAP requires professional installation to ensure that the installation is performed in accordance with FCC licensing regulations.

The MWR4300 (Mesh Wireless Router, Transmitter Module FCC ID: QJE-HZD – IC: 4602-HZD4300) is an infrastructure device positioned in a fixed location, such as on a pole, wall, or rooftop. The MWR requires professional installation to ensure the installation is performed in accordance with FCC licensing regulations..

Federal Communications Commission (FCC) Statement:

IAP/MWR

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by Motorola could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 2 meters between the radiator and your body.

Safety Information for the HOTZONE DUO Products

The Federal Communications Commission (FCC) with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. Motorola HOTZONE DUO products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio according to the instructions found in this manual and the hardware and software guides on the HOTZONE DUO CD will result in user exposure that is substantially below the FCC recommended limits.

- Do not touch or move the antenna(s) while the unit is transmitting or receiving.

- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.

- Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.

- Do not operate the radio or attempt to transmit data unless the antenna is connected; otherwise, the radio may be damaged.

Safety Certification

Conforms to UL STD ANSI/UL 60950 3rd Edition

Certified to CAN/CSA C22.2 NO. 60950-00

Equipment shall be suitable for use in Air pressure: 86kPa to106kPa.

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Glossary

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IAP – Intelligent Access Point

MiSC – Mobile Internet Switching Controller

MWR– Mesh Wireless Router

TFTP - Trivial File Transfer Protocol. A network utility that is simpler to use than the File Transfer Protocol (FTP).

WR – Wireless Router (same as MWR)

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