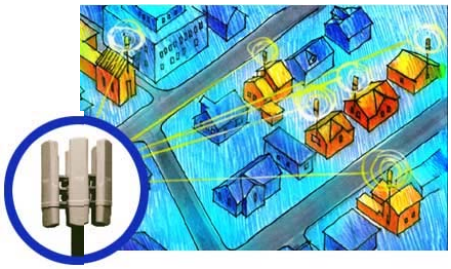
MOTOROLA



Canopy™ 5.4 & 5.7 GHz 30/60 Mbps OFDM Backhaul

5x45-07-00
Software Release Notes

For Canopy 45 and 30/60 Mbps Backhaul Only

Note: 5x45 Software Load supports both the Canopy 5.4GHz and 5.7GHz 30/60 Mbps Backhaul

CAN5x45-SRN-en
Issue 1
March 2006

MOTOWI4

CANOPY™
Motorola Wireless Broadband Platform

Notices
See important regulatory and legal notices in Section 5 on page14.

Trademarks, Product Names, and Service Names

MOTOROLA, the stylized M Logo and all other trademarks indicated as such herein are trademarks of Motorola, Inc. ® Reg. US Pat & Tm. Office. Canopy is a trademark of Motorola, Inc. All other product or service names are the property of their respective owners.

© 2006 Motorola, Inc. All rights reserved

http://www.motorola.com/canopy

http://canopywireless.com/solutions/backhaul/

Canopy 45 & 30/60 Mbps Backhaul Connectorized[1]

Canopy 45 & 30/60 Mbps Backhaul Integrated

Note: 5x45 software load is the base release for the Canopy 5.4GHz 30/60 Mb BH and is an upgrade for the Canopy 5.7GHz 30/60 Mb BH.

The 5x45 software upgrades all existing Canopy 45 Mbps Backhaul radios to the Canopy 60 Mbps Backhaul. There is no change in radio hardware between a Canopy 45 Mbps Backhaul and a Canopy 60 Mbps Backhaul. It is only a name change based on the enhanced data throughput provided by the 5x45 software release.

[1] Connectorized antennas sold separately from radio
See User Guide for a complete list of single and dual pole flat panel (1'-2') and parabolic antennas (2'-6')

Table of Contents

List of Figures

List of Tables

The following abbreviations are used throughout these notes:

BH	Backhaul Radio
ODU	Outdoor Unit (Integrated or Connectorized Radio)
DFS	Dynamic Frequency Selection

Motorola Canopy 5.4GHz & 5.7GHz 30/60 Mbps Backhaul
5x45 Software Release 07-00

1.0 Introduction

This document provides information for the Canopy 5.4GHz and 5.7GHz 30/60 Mbps Backhaul 5x45 Software Release 07-00.

The 5x45 software upgrades all existing Canopy 5.7GHz 45 Mbps Backhaul radios to the Motorola Canopy 5.7GHz 60 Mbps Backhaul. There is no change in radio hardware between a Canopy 45 Mbps Backhaul and a Canopy 30/60 Mbps Backhaul. It is only a name change based on the enhanced data throughput provided by the 5840 software release. Follow the upgrade procedure outlined in section 4.0 on page 14.

The Canopy Network Updater Tool (CNUT v2.0) supports upgrading the Canopy 5.4GHz and 5.7GHz 30/60 Mb BH. Refer to CNUT v2.0 Release Notes.

It is strongly recommended that the 5x45-07-00 software release be applied to deployed Canopy 5.7GHz 45 and 30/60 Mbps Backhaul Radios. This release fixes a number of issues found in previous releases and is also the baseline for further releases and technical support.

1.2 Documentation and Downloads

The Canopy 5.4GHz/5.7GHz 30/60 Mbps Backhaul User Guide can be downloaded from the Motorola website at:
http://www.motorola.com/canopy. (Click on Support and then Software Updates)

The 5x45 MIB, Operational Software and this Release Note can be downloaded as a ZIP file from:

http://www.motorola.com/canopy (Click on Support and then Software Updates)

1.3 Getting Additional Help

To get information or assistance as soon as possible for problems that you encounter, use the following sequence of action:

1. Search this document, the user manuals that support the modules, and the software release notes of supported releases
   a. in the Table of Contents for the topic.
   b. in the Adobe Reader® search capability for keywords that apply.[1]
2. Visit the Canopy systems website at http://www.motorola.com/canopy.
3. Ask your Canopy products supplier to help.
4. Gather information such as
   - the IP addresses and MAC addresses of any affected Canopy modules.
   - the software releases that operate on these modules.
   - data from the Diagnostics Download web page of the modules.
   - the System Administration Configuration web page on these modules.
5. Escalate the problem to Canopy systems Technical Support (or another Tier 3 technical support that has been designated for you) as follows. You may either
   - send e-mail to technical-support@canopywireless.com.
   - call 1 888 605 2552 (or +1 217 824 9742).

For warranty assistance, contact your reseller or distributor for the process.

1.4 Sending Feedback

We welcome your feedback on Canopy system documentation. This includes feedback on the structure, content, accuracy, or completeness of our documents, and any other comments you have. Please send your comments to technical-documentation@canopywireless.com.

[1] Reader is a registered trademark of Adobe Systems, Incorporated.

2.0 New To This Document

Issue 1 – Software Load 5x45-07-00

Changes in 5x45-07-00

- Introduction of a 5.4GHz 30/60 Mb BH variant. The new 5.4GHz hardware variant operates between 5.470 to 5.725GHz (defined as the ETSI 5 GHz band B.)
- Packet Filtering default setting changed. Packet Filtering is required when a link is bridging "non-switch-based" networks (i.e. the units are connected to 10/100 Base-T Hubs) to prevent unnecessary traffic being bridged across the wireless link.
    - However; the vast majority of installations use switch-based networks, and so the additional packet filtering capability in the 30/60 Mb BH system provides no benefit.
    - In addition, an increasing number of installations include a parallel backup/standby mechanism, and in such installations having packet filtering enabled in the 30/60 Mb BH can result in a temporary interruption of traffic flow across the wireless link.
    - Therefore, as from 5x45-07-00, Packet filtering within the 5.4 and 5.7GHz 30/60 Mb BH has been disabled by default.
    - *IF YOU ARE USING A NON-SWITCHED-BASED NETWORK THEN YOU SHOULD RE-ENABLE PACKET FILTERING AFTER YOU HAVE UPGRADED TO 5x45-07-00.*

Known Issues in 5x45-07-00: Known

Previous 5840 Software Load supports only 5.7GHz 30/60. Customers should upgrade to 5x45 software load.

Changes in previous release 5840-06-06:

- Software enhancements enabling improved wireless vector error performance
- Changes to support production

Changes in previous release 5840-06-05:

- Regulatory: Support for new regulatory regions
- Performance Improvements:
    - Improved demodulator performance at high receive signal power levels.
    - Improved demodulator performance at high signal strength ratios.

Changes in previous release 5840-06-04:

- Software upgrades to 5840 following a configuration reset could possibly cause a master wireless unit to revert back to a slave unit.

Changes in previous release 5840-06-03:

- The incorrect reporting of the 'Out of Calibration' alarm on the wireless unit homepage has been resolved.

Changes in previous release 5840-06-02:

- Regulatory certified against UK standard VSN2107 (IR2007).
- Resolved Issues:
    - SNMP Traps not generated when the top bit of the trap destination IP address is set i.e. when the first octet of the address is greater than 127 (>127.n.n.n).
    - Configuration and Remote Management web pages not remembering previously entered values.

3.0 5x45-07-00 Software Release Features

This software release is a major release that will upgrade existing 5.7GHz 30/60 Mb BH running 5830 and 5840 equipment to the newly available 5x45 software load.

This software release is also the base release to support the 5.4GHz 30/60 Mb BH. 5x45 software is a common load used by both the 5.4GHz and 5.7GHz 30/60 Mb BH.

The 5x45 Software Release incorporates these features:

1) Support for the 5.4GHz Hardware Variant:

The Canopy 30/60 Mbps Backhaul product range has a new frequency variant to compliment its existing 5.7GHz product range. The new Canopy 5.4GHz 30/60 Mb BH variant operates between 5.470 to 5.725GHz (defined as the ETSI 5 GHZ band B), utilizing 11MHz channels widths and variable base 12MHz raster.

2) Graphical Installation Tools

To aid the installation of wireless links two graphical installation aids have been introduced in 5x45:

a. PDA installation screen (accessed at http://<IP Address>/pda.cgi)

b. Larger installation screen available from the main HTTP management interface.

The installation screen design has been deliberately kept simple and uncluttered. An example of the installation screen is shown in Figure 1. Both the PDA and the larger format installation screen have the same content and only differ in size. The PDA installation screen is 232 by 220 pixels and the larger installation screen is 464 x 300.

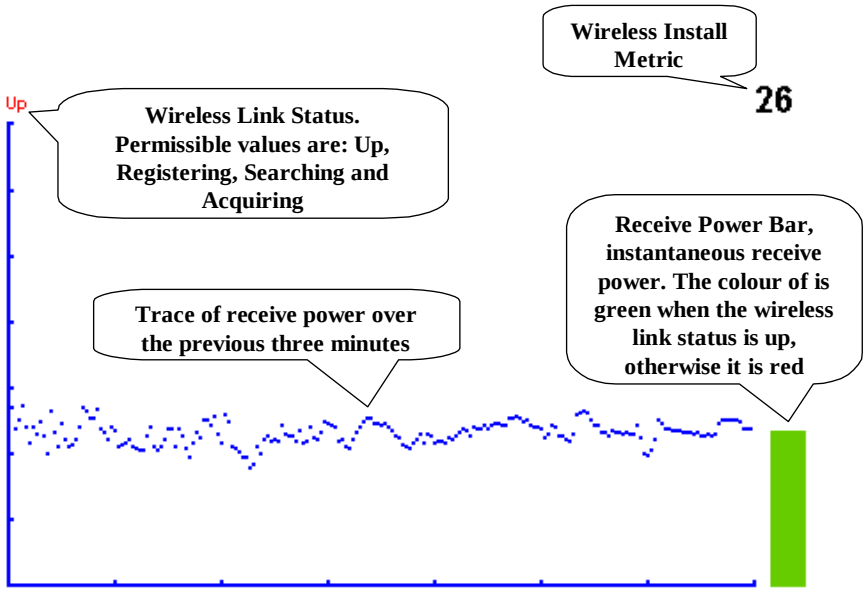


Figure 1: PDA Installation Screen

The screen displays the receive power of the last three minutes. This will allow the installer to slowly sweep the antenna during installation and monitor the variation in signal strength with angular position. The screen automatically refreshes every three seconds.
The screen also displays the current state of the wireless link in two ways. Firstly the actual state of the wireless link is written in the top left hand corner of the screen. The instantaneous receive power bar also encodes the state of the wireless link using green to signify that the wireless link is up and red for all other states.
Lower skilled installation teams use the wireless install metric; the objective is to maximize the metric to perform a good upgrade. For the more technically aware the installation metric is simply the instantaneous receive power in dBm + 100.
It is hoped that the installation screen will aid the small population of installers that find it difficult to differentiate the small changes in tonal output when peaking up long range and or marginal links.

3) Enhanced Diagnostic Tools:

To further enhance the diagnostic capabilities of the Canopy 30/60 Mbps BH the storage of link performance histograms has been extended to 31 days of storage. 5x45 introduces three levels of cascading histograms:

- Histogram 1: 1 hour at a resolution of 1 second
- Histogram 2: 24 hours at a resolution of 1 minute
- Histogram 3: 30 days at a resolution of 1 hour

3.1 Diagnostic Plotter

New for 5.4GHz and 5.7GHz 30/60 Mb BH is the system administration diagnostic plotter facility (see Figure 2).

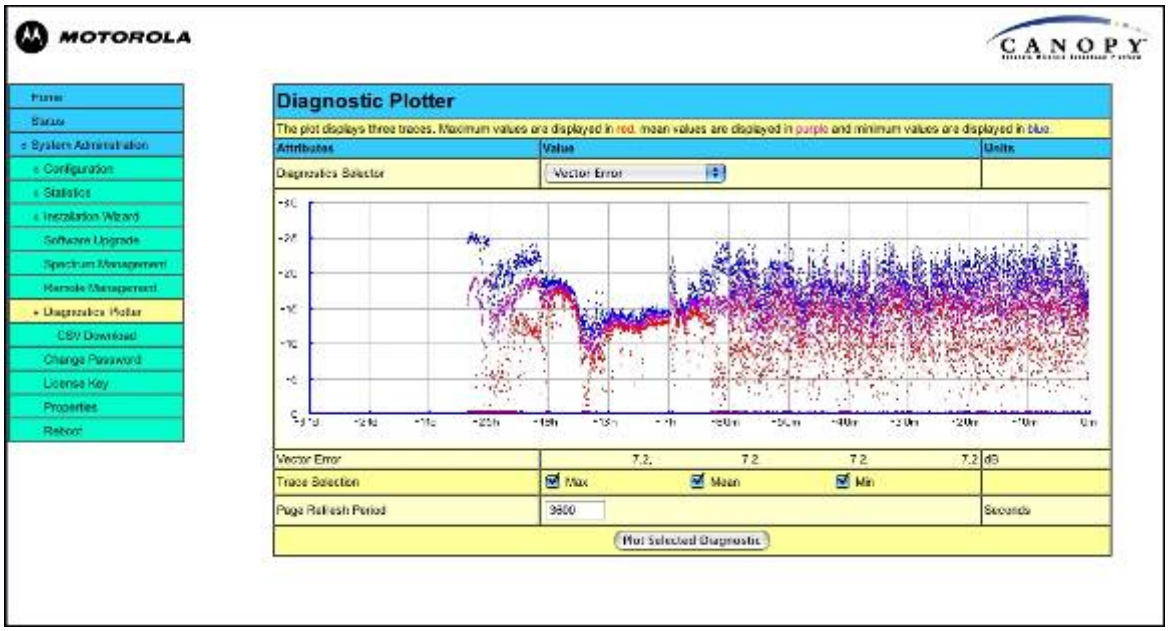


Figure 2: Diagnostic Plotter

The diagnostic plotter allows the system administrator to view the cascading histogram data in an easily accessible graphical form. The plot always displays three traces, maximum, minimum and mean by default. The diagnostic selector allows the user to select the various categories of histogram. The available histograms are:

- Vector Error
- Rx Power
- Tx Power
- Signal Strength Ratio V/H
- Link Loss
- Rx Data Rate
- Tx Data Rate
- Aggregate Data Rate
- Receive SNR
- Rx Gain

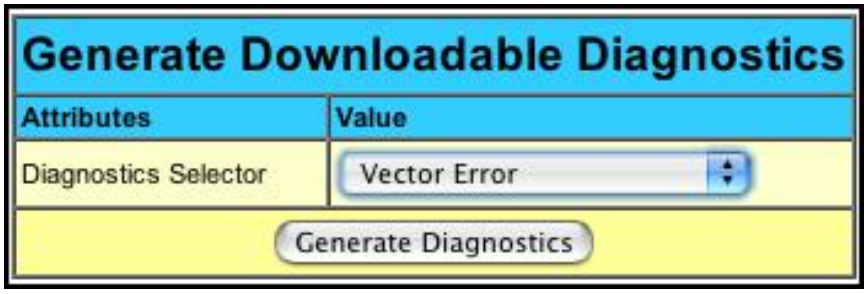
The diagnostic plotter itself uses a bespoke x-axis which compresses the timeline of the plot without sacrificing resolution.

The Trace selection allows the user to control which traces are plotted (maximum, mean and minimum).

As with other management pages the page refresh period can be used to interactively monitor the wireless link.

3.2 CSV Download

The histogram data is made available as CSV[1] files via the system administration CSV download facility.



1 CSV is an ASCII text based comma separated variable format that is usually associated to the Microsoft Excel spreadsheet application, but the file can be opened by any text based editing software.

4.0 Upgrading to Software Release 5x45-07-00

3.1 Before You Begin

3.1.1 Applicability

Release 5x45 is applicable to the Canopy 5.4GHz and 5.7GHz 30/60 Mbps Backhaul radios only. This release can also be applied to Canopy 5.7GHz 45Mbps Backhaul radios.

The Canopy Network Updater Tool (CNUT v2.0) supports upgrading the Canopy 5.4GHz and 5.7GHz 30/60 Mb BH. Refer to CNUT v2.0 Release Notes.

Follow the steps outlined in section 3.2 to upgrade via http interface.

3.1.2 Preparing for Upgrade

WARNING! Make sure to write the radio's current system configuration in Table 1: System Configuration Table **on Page 13, as you will need it if you wish to restore the original state of the system**.

3.2 Procedures to Upgrade to Software Release 5x45-07-00

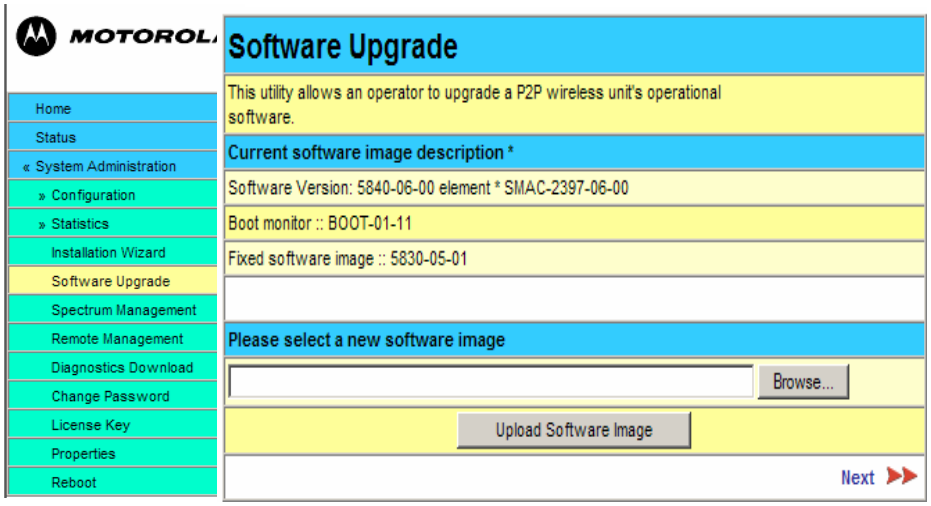
WARNING! The same version of software must be run at both ends of the link. Failure to follow this requirement may result in loss of connectivity with the other end of the link necessitating a site visit for resolution.

Step 1 Download the 5x45 software release (5x45-07-00.dld) to a suitable place on your PC.

Step 2 Start up two web browsers and connect one to each end of the link.

Step 3 On the master end of the link select: **System Administration – Spectrum Management.** Make a note of any channel barring that has been applied.

Step 4 On **each** end of the link select: **System Administration – Software Upgrade**. Browse to the location containing 5x45-07-00.dld and select it. Upload the software image and when prompted program the image into non-volatile memory, but **DO NOT** reboot the unit.



Step 5 Both ends of the link should now contain the 5x45-07-00 software image programmed into non-volatile memory and will be displaying a **Reset unit** button. If they do not, rectify the problem by repeating the above steps.

Step 6 Reboot the **FAR END** unit by pressing the web page **Reset unit** button.

WARNING! Failure to reboot the far end first will result in the near end running 5x45 and the far end running an older version of code. Under these circumstances link connectivity will be lost and a site visit to the far end will be required.

Step 7 Reboot the **NEAR END** unit by pressing the web page **Reset unit** button

Step 8 Wait until the link recovers.

If upgrading from 5810 or 5815, the following additional steps will be required:

Step 9 It is now necessary to run through the installation wizard at both ends of the link to enable new functionality and store the link range for fast link acquisition. This is done by:

- selecting **Systems Administration – Installation Wizard**,
- pressing **next** until you get to page 3, and then
- pressing the **Confirm Configuration and Reset Unit** button.

This should again be carried out **FAR END FIRST**.

Step 10 Wait until the link recovers. This is indicated on the home and status web pages.

WARNING! Failure to do this before proceeding to Step 10 will prevent the link range from being stored correctly.

Step 11 At both ends of the link select **System Administration – Installation Wizard** and press the **Disarm**[1] **Installation Agen**t button. Provided the link is up, the range will be stored. You will be given a warning at this point if this process has failed.

Step 12 At the master end of the link select **System Administration – Spectrum Management** and re-apply any channel bars that are required.

[1] Until both units are disarmed, the link will not be active.

System Configuration Table

Prior to changing the software running on the link, the table below may be used to record the current radio configuration.

Configuration	Near End Unit	Far End Unit
Link Name		
Link Location		
IP Address		
Subnet mask		
Gateway IP address		
MAC address		
Target MAC address		
Master/Slave mode		
Link Mode Optimization		
Link Symmetry		
Throughput Optimization		
ARQ State		
Max transmit power		
Ranging mode/dist		
Barred Channels		
Spectrum Management Control		
Lower Center Frequency / Fixed Tx & Rx Frequencies		
Ethernet config		
Ethernet Auto MDIX		
Local packet filter en/dis		
License Keys		

Table 1: System Configuration Table

5.0 Legal and Regulatory Notices

5.1 Important Note on Modifications

Intentional or unintentional changes or modifications to the equipment must not be made unless under the express consent of the party responsible for compliance. Any such modifications could void the user's authority to operate the equipment and will void the manufacturer's warranty.

5.2 National and Regional Regulatory Notices

U.S. Federal Communication Commission (FCC) and Industry Canada (IC) Notification

This system has achieved Type Approval in various countries around the world. This means that the system has been tested against various local technical regulations and found to comply. The frequency band in which the system operates is 'unlicensed' and the system is allowed to be used provided it does not cause interference. Further, it is not guaranteed protection against interference from other products and installations.

This device complies with part 15 of the US FCC Rules and Regulations and with RSS-210 of Industry Canada. 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. In Canada, users should be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of 5250 – 5350 MHz and 5650 – 5850 MHz and these radars could cause interference and/or damage to license-exempt local area networks (LELAN).

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the US FCC Rules and with RSS-210 of Industry Canada. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with these instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to correct the interference by one or more of the following measures:

- Increase the separation between the affected equipment and the unit;
- Connect the affected equipment to a power outlet on a different circuit from that which the receiver is connected to;
- Consult the dealer and/or experienced radio/TV technician for help.
- FCC IDs, Brazil ANATEL and Industry Canada Certification Numbers are listed in

Table 2: US FCC ID, Brazil ANATEL and Industry Canada certification numbers

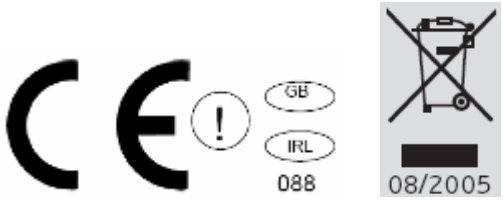
Where necessary, the end user is responsible for obtaining any National licenses required to operate this product and these must be obtained before using the product in any particular country. Contact the appropriate national administrations for details on the conditions of use for the bands in question and any exceptions that might apply. Also see www.ero.dk for further information.

European Union Notification

The 5.7 GHz connectorized product is a two-way radio transceiver suitable for use in Broadband Wireless Access System (WAS), Radio Local Area Network (RLAN), or Fixed Wireless Access (FWA) systems. It is a Class 2 device and uses operating frequencies that are not harmonized throughout the EU member states. The operator is responsible for obtaining any national licenses required to operate this product and these must be obtained before using the product in any particular country.

This equipment complies with the essential requirements for the EU R&TTE Directive 1999/5/EC. The use of 5.7GHz for Point to Point radio links is not harmonized across the EU and currently the product may only be deployed in the UK and Eire (IRL). However, the regulatory situation in Europe is changing and the radio spectrum may become available in other countries in the near future.

This equipment is marked



to show compliance with the European R&TTE directive 1999/5/EC.

European Union (EU) Waste of Electrical and Electronic Equipment (WEEE) directive
The European Union's WEEE directive requires that products sold into EU countries must have the crossed out trash bin label on the product (or the package in some cases). As defined by the WEEE directive, this cross-out trash bin label means that customers and end-users in EU countries should not dispose of electronic and electrical equipment or accessories in household waste. Customers or end-users in EU countries should contact their local equipment supplier representative or service center for information about the waste collection system in their country.

UK Notification

The 5.7 GHz connectorized product has been notified for operation in the UK, and when operated in accordance with instructions for use it is compliant with UK Interface Requirement IR2007. For UK use, installations must conform to the requirements of IR2007 in terms of EIRP spectral density against elevation profile above the local horizon in order to protect Fixed Satellite Services. The frequency range 5795-5815 MHz is assigned to Road Transport & Traffic Telematics (RTTT) in the U.K. and shall not be used by FWA systems in order to protect RTTT devices. UK Interface Requirement IR2007 specifies that radiolocation services shall be protected by a Dynamic Frequency Selection (DFS) mechanism to prevent co-channel operation in the presence of radar signals.

5.3 Exposure

5.3.1 Preventing Overexposure to RF Energy

Caution! To protect from overexposure to RF energy, install Canopy radios so as to provide and maintain the minimum separation distances from all persons.

When the system is operational, avoid standing directly in front of the antenna. Strong RF fields are present when the transmitter is on. The Outdoor Unit (ODU) must not be deployed in a location where it is possible for people to stand or walk inadvertently in front of the antenna.

5.3.2 Details of Calculations for Separation Distances and Power Compliance Margins

Limits and guidelines for RF exposure come from:

- US FCC limits for the general population. See the FCC web site at http://www.fcc.gov, and the policies, guidelines, and requirements in Part 1 of Title 47 of the Code of Federal Regulations, as well as the guidelines and suggestions for evaluating compliance in FCC OET Bulletin 65.
- Health Canada limits for the general population. See the Health Canada web site at http://www.hc-sc.gc.ca/rpb and Safety Code 6.
- ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines for the general public. See the ICNIRP web site at http://www.icnirp.de/ and Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields.

The applicable power density exposure limits from the documents referenced above are

- 10 W/m^2 for RF energy in the 2.4-, 5.2-, 5.4-, and 5.7-GHz frequency bands.

Peak power density in the far field of a radio frequency point source is calculated as follows:

$$S = \frac{P \cdot G}{4 \pi d^2}$$

where
S = power density in W/m^2
P = RMS transmit power capability of the radio, in W
G = total Tx gain as a factor, converted from dB
d = distance from point source, in m

Rearranging terms to solve for distance yields

$$d = \sqrt{\frac{P \cdot G}{4 \pi S}}$$

Table 2: Exposure Separation Distances

5.4 Legal Notices

5.4.1 Software License Terms and Conditions

Now, therefore, in consideration of the promises and mutual obligations contained herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby mutually acknowledged, you and Motorola agree as follows:

Grant of License. Subject to the following terms and conditions, Motorola, Inc., grants to you a personal, revocable, non-assignable, non-transferable, non-exclusive and limited license to use on a single piece of equipment only one copy of the software contained on this disk (which may have been pre-loaded on the equipment)(Software). You may make two copies of the Software, but only for backup, archival, or disaster recovery purposes. On any copy you make of the Software, you must reproduce and include the copyright and other proprietary rights notice contained on the copy we have furnished you of the Software.

Ownership. Motorola (or its supplier) retains all title, ownership and intellectual property rights to the Software and any copies, including translations, compilations, derivative works (including images) partial copies and portions of updated works. The Software is Motorola's (or its supplier's) confidential proprietary information. This Software License Agreement does not convey to you any interest in or to the Software, but only a limited right of use. You agree not to disclose it or make it available to anyone without Motorola's written authorization. You will exercise no less than reasonable care to protect the Software from unauthorized disclosure. You agree not to disassemble, decompile or reverse engineer, or create derivative works of the Software, except and only to the extent that such activity is expressly permitted by applicable law.

Termination. This License is effective until terminated. This License will terminate immediately without notice from Motorola or judicial resolution if you fail to comply with any provision of this License. Upon such termination you must destroy the Software, all accompanying written materials and all copies thereof, and the sections entitled Limited Warranty, Limitation of Remedies and Damages, and General will survive any termination.

Limited Warranty. Motorola warrants for a period of ninety (90) days from Motorola's or its customer's shipment of the Software to you that (i) the disk(s) on which the Software is recorded will be free from defects in materials and workmanship under normal use and (ii) the Software, under normal use, will perform substantially in accordance with Motorola's published specifications for that release level of the Software. The written materials are provided "AS IS" and without warranty of any kind. Motorola's entire liability and your sole and exclusive remedy for any breach of the foregoing limited warranty will be, at Motorola's option, replacement of the disk(s), provision of downloadable patch or replacement code, or refund of the unused portion of your bargained for contractual benefit up to the amount paid for this Software License.

THIS LIMITED WARRANTY IS THE ONLY WARRANTY PROVIDED BY MOTOROLA, AND MOTOROLA AND ITS LICENSORS EXPRESSLY DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OF IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. MOTOROLA DOES NOT WARRANT THAT THE OPERATION OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT DEFECTS IN THE SOFTWARE WILL BE CORRECTED. NO ORAL OR WRITTEN REPRESENTATIONS MADE BY MOTOROLA OR AN AGENT THEREOF SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS WARRANTY. MOTOROLA DOES NOT WARRANT ANY SOFTWARE THAT HAS BEEN OPERATED IN EXCESS OF SPECIFICATIONS, DAMAGED, MISUSED, NEGLECTED, OR IMPROPERLY INSTALLED. BECAUSE SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF IMPLIED WARRANTIES, THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Limitation of Remedies and Damages. Regardless of whether any remedy set forth herein fails of its essential purpose, IN NO EVENT SHALL MOTOROLA OR ANY OF THE LICENSORS, DIRECTORS, OFFICERS, EMPLOYEES OR AFFILIATES OF THE FOREGOING BE LIABLE TO YOU FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR SIMILAR DAMAGES WHATSOEVER (including, without limitation, damages for loss of business profits, business interruption, loss of business information and the like), whether foreseeable or unforeseeable,

arising out of the use or inability to use the Software or accompanying written materials, regardless of the basis of the claim and even if Motorola or a Motorola representative has been advised of the possibility of such damage. Motorola's liability to you for direct damages for any cause whatsoever, regardless of the basis of the form of the action, will be limited to the price paid for the Software that caused the damages. THIS LIMITATION WILL NOT APPLY IN CASE OF PERSONAL INJURY ONLY WHERE AND TO THE EXTENT THAT APPLICABLE LAW REQUIRES SUCH LIABILITY. BECAUSE SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Maintenance and Support. Motorola shall not be responsible for maintenance or support of the software. By accepting the license granted under this agreement, you agree that Motorola will be under no obligation to provide any support, maintenance or service in connection with the Software or any application developed by you. Any maintenance and support of the Related Product will be provided under the terms of the agreement for the Related Product.

Transfer. In the case of software designed to operate on Motorola equipment, you may not transfer the Software to another party except: (1) if you are an end-user, when you are transferring the Software together with the Motorola equipment on which it operates; or 2) if you are a Motorola licensed distributor, when you are transferring the Software either together with such Motorola equipment or are transferring the Software as a licensed duly paid for upgrade, update, patch, new release, enhancement or replacement of a prior version of the Software. If you are a Motorola licensed distributor, when you are transferring the Software as permitted herein, you agree to transfer the Software with a license agreement having terms and conditions no less restrictive than those contained herein. You may transfer all other Software, not otherwise having an agreed restriction on transfer, to another party. However, all such transfers of Software are strictly subject to the conditions precedent that the other party agrees to accept the terms and conditions of this License, and you destroy any copy of the Software you do not transfer to that party. You may not sublicense or otherwise transfer, rent or lease the Software without our written consent. You may not transfer the Software in violation of any laws, regulations, export controls or economic sanctions imposed by the US Government.

Right to Audit. Motorola shall have the right to audit annually, upon reasonable advance notice and during normal business hours, your records and accounts to determine compliance with the terms of this Agreement.

Export Controls. You specifically acknowledge that the software may be subject to United States and other country export control laws. You shall comply strictly with all requirements of all applicable export control laws and regulations with respect to all such software and materials.

US Government Users. If you are a US Government user, then the Software is provided with "RESTRICTED RIGHTS" as set forth in subparagraphs (c)(1) and (2) of the Commercial Computer Software-Restricted Rights clause at FAR 52 227-19 or subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, as applicable.

Disputes. You and Motorola hereby agree that any dispute, controversy or claim, except for any dispute, controversy or claim involving intellectual property, prior to initiation of any formal legal process, will be submitted for non-binding mediation, prior to initiation of any formal legal process. Cost of mediation will be shared equally. Nothing in this Section will prevent either party from resorting to judicial proceedings, if (i) good faith efforts to resolve the dispute under these procedures have been unsuccessful, (ii) the dispute, claim or controversy involves intellectual property, or (iii) interim relief from a court is necessary to prevent serious and irreparable injury to that party or to others.

General. Illinois law governs this license. The terms of this license are supplemental to any written agreement executed by both parties regarding this subject and the Software Motorola is to license you under it, and supersedes all previous oral or written communications between us regarding the subject except for such executed agreement. It may not be modified or waived except in writing and signed by an officer or other authorized representative of each party. If any provision is held invalid, all other provisions shall remain valid, unless such invalidity would frustrate the purpose of our agreement. The failure of either party to enforce any rights granted hereunder or to take action against the other party in the event of any breach hereunder shall not be deemed a waiver by that party as to subsequent enforcement of rights or subsequent action in the event of future breaches.

5.4.2 Limit of Liability

IN NO EVENT SHALL MOTOROLA BE LIABLE TO YOU OR ANY OTHER PARTY FOR ANY DIRECT, INDIRECT, GENERAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OR OTHER DAMAGE ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION OR ANY OTHER PECUNIARY LOSS, OR FROM ANY BREACH OF WARRANTY, EVEN IF MOTOROLA HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.) IN NO CASE SHALL MOTOROLA'S LIABILITY EXCEED THE AMOUNT YOU PAID FOR THE PRODUCT.

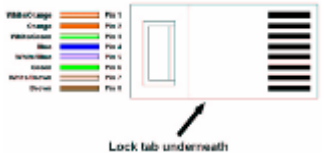
6.0 Additional Resources

Canopy provides two additional resources where you can raise questions and find answers:

- Canopy User Community at http://motorola.canopywireless.com/support/community/ This resource facilitates communication with other users and with authorized Canopy experts. Available forums include General Discussion, Network Monitoring Tools, and Suggestions.

- Canopy Knowledge Base at http://motorola.canopywireless.com/support/knowledge/ This resource facilitates exploration and searches, provides recommendations, and describes tools. Available categories include
  - General (Answers to general questions provide an overview of the Canopy system.)
  - Product Alerts
  - Helpful Hints
  - FAQs (frequently asked questions)
  - Hardware Support
  - Software Support
  - Tools

7.0 General Troubleshooting



Problem: No Ethernet Link light on Power IDU

Solution: Check CAT5e cable to verify wired straight through
Try swapping out PIDU to rule out PIDU.
Try swapping out cable with known good cable.
What do you see on the PIDU LED's (power-Led solid green which is normal or something else…if flashing disconnect power). Ethernet LED/ should flash 10 times on startup to indicate the correct startup sequence has occurred and then go solid amber.

Problem: No RF link, lots of interference on one end of the link (orange bars on the spectrum management page)

Solution: Enable Asymmetric DFS and re-run the installation wizard and:

- Insure range is set the same on both master and slave radios
- Verify target MAC address
- Verify AES keys match if applicable

Problem: Slow throughput only 1.5 Mbps across the link

Solution: Disarm the installation agent. During installation the radio modulation is fixed at BPSK 1.5Mbps and TX power is +24dBm

Problem: Can not ping or manage the radio, forgot the IP address, and forgot the password

Solution: Reset factory IP (Master 169.254.1.2) (Slave 169.254.1.1) by powering up radio, then press and hold reset button on the Power IDU for 20 seconds. This will reset the IP and password (no password) and default to Slave.

Reset Button Depression	Action
More than 20 seconds, while the unit is already powered up.	This resets the configuration to factory defaults.
While connecting power for more than 40 seconds after power is applied	This resets to factory defaults and erases any user loaded software images leaving the factory loaded image intact.
None	Power cycle by switching off at the AC receptacle (mains). All settings remain the same.

Problem: Still can not get the radio to behave properly after visiting the Canopy Knowledge Base and following the detailed trouble shooting guide found in the User Guide.

Solution: Reset radio to "Gold Code" (Factory default settings) by pressing and holding the Power IDU reset button while applying power, continue to hold for 45 seconds. This resets the radio back to "Gold Code", then upgrade to the current version of firmware. Default IP will be (Master 169.254.1.2) (Slave 169.254.1.1)

Problem: Incorrect mounting/installation procedures with the OFDM Backhaul.

Solution: Verify existing BH pole mount installations were performed correctly and in accordance with mounting instructions outlined in the Users Guide. Verify that the twist section (wall mount only) assembly has not been used for pole mounting the ODU. The ODU rear mounting bracket should never be removed or repositioned for any reason as part of the normal mounting/installation procedures for the ODU. Some customers have repositioned the rear mounting bracket of the ODU 90 Deg from the original factory position to allow the improper use of the twist section (wall mount only) assembly for a pole mounting. The twist section should only be used for wall mounting and never for pole mounting. Incorrectly using the twist section for pole mounts in this manner will make the ODU less stable and more prone to wind induced vibration.

8.0 Aggregate Ethernet Throughput Rate

The equipment capability is given in Table 3 and 4. It gives the Ethernet throughput rate vs. link loss for the Canopy 30 and 60 Mbps Backhaul in both modes. The link loss is the total attenuation of the wireless signal between the two Point-to-Point radios. Adaptive modulation will ensure that the highest throughput that can be achieved instantaneously will be obtained taking account of propagation and interference. When the link has been installed, the Status Page on the management interface provides information about the link loss currently measured by the equipment both instantaneously and averaged. The averaged value will require maximum seasonal fading to be added and then the radio reliability of the link can be computed.

	Aggregate Ethernet Throughput Rate (Mbps) [1] Hi = High Throughput Mode Lo = Low Latency Mode								5.7 GHz Max Path Budget (dB) [2]	5.4 GHz Max Path Budget (dB) [2]
	0-5km		0-40km		0-100km		0-200km			
	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo		
64QAM⅞	42.5	39.7	39.5	34.7	35.2	28.5	29.8	22	138.1	139.8
64QAM¾	36.4	34	33.8	29.7	30.2	24.5	25.5	18.9	142.3	142.5
64QAM⅔	32.4	30.2	30.1	26.4	26.8	21.8	22.7	16.8	144.4	144.3
16QAM¾	24.3	22.7	22.6	19.8	20.1	16.3	17	12.6	150.4	150.9
16QAM½	16.2	15.1	15	13.2	13.4	10.9	11.3	8.4	155.2	153.5
QPSK⅔	10.8	10.1	10	8.81	8.93	7.25	7.56	5.6	160.7	160.3
QPSK½	8.1	7.55	7.52	6.61	6.7	5.44	5.67	4.2	163	162.8
BPSK½	3.6	3.36	3.34	2.94	2.98	2.42	2.52	1.87	168.5	168.6

Table 3: Canopy 60 Mbps Backhaul - Aggregate Ethernet throughput rate vs. maximum link loss

	Aggregate Ethernet Throughput Rate (Mbps) [1] Hi = High Throughput Mode Lo = Low Latency Mode								5.7 GHz Max Path Budget (dB) [2]	5.4 GHz Max Path Budget (dB) [2]
	0-5km		0-40km		0-100km		0-200km			
	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo		
64QAM⅞	21.3	19.8	19.7	17.3	17.6	14.3	14.9	11.0	138.1	139.8
64QAM¾	18.2	17.0	16.9	14.9	15.1	12.2	12.8	9.4	142.3	142.5
64QAM⅔	16.2	15.1	15.0	13.2	13.4	10.9	11.3	8.4	144.4	144.3
16QAM¾	12.1	11.3	11.3	9.9	10.1	8.2	8.5	6.3	150.4	150.9
16QAM½	8.1	7.6	7.5	6.6	6.7	5.4	5.7	4.2	155.2	153.5
QPSK⅔	5.4	5.0	5.0	4.4	4.5	3.6	3.8	2.8	160.7	160.3
QPSK½	4.1	3.8	3.8	3.3	3.4	2.7	2.8	2.1	163	162.8
BPSK½	1.8	1.7	1.7	1.5	1.5	1.2	1.3	0.9	168.5	168.6

Table 4: Canopy 30 Mbps Backhaul - Aggregate Ethernet throughput rate vs. maximum link loss

[1] These data rates are reduced when AES or ARQ are enabled.

[2] AMOD link margin of 1.5dB applied