



MOTOROLA
intelligence everywhere™

Canopy Application Note

Same Band and Cross Band Installations

August 30, 2002



TABLE OF CONTENTS

Notice	iii
Introduction	4
Same Band/Cross Band Installations	4
Standard Configuration – Cross Band Installations	5
Alternate Configuration	5
Custom Configuration – Same Band Installations	6
Cables	7

Notice

The information in this publication is subject to change without notice. Motorola shall not be liable for technical or editorial errors or omissions nor for any damages resulting from the use of this material.

Each configuration tested or described may or may not be the only available solution. This test is not a determination of product quality or correctness, nor does it ensure compliance with any federal, state or local requirements. Motorola does not warrant products other than its own strictly as stated in Motorola's product warranties.

MOTOROLA and the Stylized M Logo are registered in the US Patent & Trademark Office. Canopy is a trademark of Motorola, Inc. All other product or service names are the property of their respective owners. © Motorola, Inc. 2002.

Introduction

The FCC has allocated three different frequency bands for unlicensed operation in the Unlicensed National Information Infrastructure (*UNII*) bands. The Canopy system takes advantage of two of these frequency bands and operates in the 5.25 – 5.35 GHz and 5.725 – 5.825 GHz bands. Table 1 highlights the type of configurations available for the Canopy system.

Table 1. Canopy System Configurations

Configuration	Frequency	Range
Point-to-Multipoint	5.2 GHz	2 miles
	5.7 GHz	10 miles with Reflector
Point-to-Point	5.7 GHz	Up to 20 miles with Reflector

The 5.25 to 5.35 GHz is designated for outdoor operation, point-to-point and point-to-multipoint with one watt of effective radiated power. These requirements limit the Canopy system range to approximately two miles.

The 5.725 – 5.825 GHz band is also available for point-to-point and point-to-multipoint operation. At this frequency band, a point-to-multipoint operation can use approximately four watts (EIRP) of power. In point-to-point operation, the power level can be increased to 200 watts (EIRP). Table 1 details the available ranges for Canopy products in this frequency band.

This document provides supplemental information to the Canopy User Manuals and is specifically related to same band and cross band installations.

Same Band/Cross Band Installations

The Canopy system is extremely flexible and allows service providers with a great many alternatives designed to maximize performance of the system. One of the design considerations covers cross band (5.2 point-to-multipoint with 5.7 point-to-point) installation or a same band (5.7 point-to-multipoint with 5.7 point-to-point) installation. To achieve maximum system performance with the greatest amount of ease, Motorola recommends cross band installation. The following paragraphs describe these alternatives in greater detail.

Standard Configuration – Cross Band Installations

The standard Canopy configuration is based on using the 5.2 GHz for point-to-multipoint and 5.7 GHz for point-to-point taking advantage of its higher power and therefore longer range for connecting the access point clusters back to the carrier's network.

Specific deployment rules and installation issues are covered in further detail in the Canopy User Manuals. Important rules for a cross band installation include:

- The Access Points (APs) must be mounted at least two feet **below** the top of the structure.
- The APs must be synchronized with one another to ensure a harmonious RF environment.
- There must be at least six feet of vertical separation between the 5.2 GHz APs and the 5.7 GHz Backhaul (BH) Modules.
- The Global Positioning System (GPS) antennas must have a clear view of the sky (20° off horizon) and physically isolated from RF signals.
- The GPS antenna should *not* be located at or near the top of the tower as they are susceptible to environmental conditions (i.e., lightning).
- The Cluster Management Module (CMM gen II) can be located up to 328 feet from the APs.
- The CMM may be located up to 100 feet from the GPS antenna.
- The CMM and the GPS antenna should be connected using Best-Tronics LMR200 coaxial cable. Part number **BT-0564**. www.best-tronics.com/motorola
- The CMM and Canopy modules should be connected using Best-Tronics CAT5 Ethernet Cables.
- The BH modules must be located a minimum of 50 feet from the ground.
- Surge suppressors must be installed to protect customer equipment.
- All equipment must be grounded and installed on grounded structures.

Alternate Configuration

It is also acceptable to deploy a 5.7 PMP solution with 5.2 backhaul. 5.2 backhaul range is up to 2 miles. Follow the deployment rules as noted above.

Custom Configuration – Same Band Installations

In special circumstances, carriers may elect a same band installation. That is to say, 5.7 GHz in a point-to-multipoint configuration for the final link to the customer and 5.7 GHz point-to-point for connecting the access points back to the carrier's hub and back to the Internet. Same band Canopy system installations will require multiple iterations by the field service teams. Motorola recommends:

- There must be at least *100 feet* of vertical separation (rather than six feet for same band installation) between the 5.7 GHz APs and the 5.7 GHz Backhaul (BH) Modules in a fully populated six sector (360 degree) system.
- The vertical separation between the APs and BHs in a same band - 5.7 GHz system - may be reduced slightly if the system is 180 degrees or less and the APs and BH are pointed in opposite directions of one another.
- A reflector dish must be used for the backhaul in a same band installation.
- The Access Points (APs) must be mounted at least two feet below the top of the structure.
- The APs and BH timing master must be synchronized with one another, using the CMM, to ensure a harmonious RF environment. The BH timing slave cannot be at this location.
- The Global Positioning System (GPS) antennas must have a clear view of the sky and be physically isolated from RF signals.
- The GPS antennas should *not* be located at or near the top of the tower as it is susceptible to other environmental conditions (i.e., lightning).
- The Cluster Management Module (CMM gen II) can be located up to 328 feet from the APs.
- The CMM may be located up to 100 feet from the GPS antenna.
- The CMM and the GPS antennas should be connected using Best-Tronics LMR200 coaxial cable. Part number **BT-0564**. www.best-tronics.com/motorola
- The BH module must be located a minimum of 50 feet from the ground.
- Surge suppressors must be installed to protect customer equipment.
- All equipment must be grounded and installed on grounded structures.

Cables

Using proper cables is a critical element in the successful installation and operation of the Canopy system. The Canopy system requires UV protected cables for use outdoors in temperature ranges between -30° C to +55° C. Motorola has designated Best-Tronics Manufacturing as an authorized dealer of cables that meet our rigorous specifications. Visit their website today at www.best-tronics.com/motorola to take advantage of their aggressive pricing, custom cable lengths and one-day order turnaround.