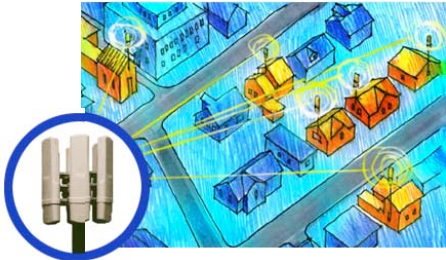




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**MOTOROLA CANOPY™
WIRELESS BROADBAND
INTERNET ACCESS PLATFORM**

October 2002

**CONFIGURATION
GUIDE**



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Introduction

The Motorola Canopy™ Wireless Internet Platform is a broadband wireless communication system that supports high-speed Internet access. With the Canopy platform, Motorola brings radio technology to the Internet service provider marketplace. It is simply one of the best solutions for providing high-speed wireless Internet to customers. The Canopy system is available in a variety of configurations. This document provides a brief overview of the Canopy system and details the configurations and their associated components. Deployment rules and installation issues are discussed in the publications entitled:

- *Canopy Access Point Cluster and Gen I Cluster Management Module User Manual*
APCMM102-UM-E R 03 01
- *Canopy Access Point Cluster and Gen II Cluster Management Module User Manual*
APCMM202-UM-E R 03 01
- *Canopy Subscriber Module User Manual*
SM02-UG-E R 03 01
- *Canopy Backhaul Module User Manual*
BH02-UM-E R 03 01
- *Canopy Surge Suppressor User Manual*
SS00-UM-E R 03 01
- *Canopy Reflector Kit User Manual*
- *Canopy Universal Mounting Bracket User Manual*

Canopy System Overview

The Motorola Canopy system is a family of broadband wireless products that provide high-speed Internet access for residential and business customers. As shown in Figure 1, the Canopy system has five basic building blocks:

- The Access Point (AP) Cluster
- Subscriber Module (SM)
- Backhaul (BH) Module
- Cluster Management Module (CMM)
- Surge Suppressor

This system uses the unlicensed UNII bands (5.25 – 5.35 GHz and 5.725 – 5.825 GHz) and all radios are approved by the United States Federal Communication Commission (FCC) Part 15, Class B, and RSS-210 of Industry Canada (IC). The AP, SM, BH and Surge Suppressors are all UL approved.

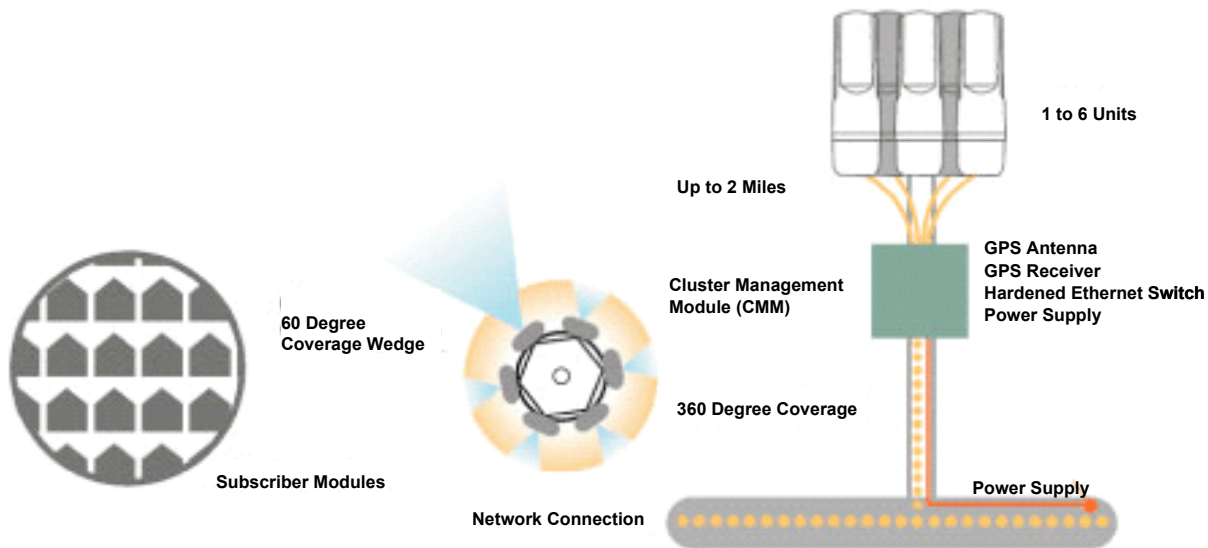


Figure 1. The Motorola Canopy System

Components

The following sections highlight each of the Canopy components.

Access Point (AP) Cluster

The AP Cluster is a base station that can incorporate between one and six AP Modules and up to two Backhaul Modules (BH). Each module operates with a 60-degree directional antenna to provide coverage to one sector.

One of the unique capabilities of the Canopy system is its ability to synchronize the transmission timing of the AP Modules in all of the AP Clusters. The GPS receiver in the CMM is the key to delivering this system level synchronization. The synchronization of the AP transmission along with the specially designed Canopy Time Division Duplex (TDD) air interface ensures that all AP Modules transmit at the same time while all Subscriber Modules (SM) are in a listen mode. This synchronization also ensures that when the SMs are transmitting, all the AP Modules are listening. This synchronization, enabled by the Cluster Management Module (CMM), ensures that the Canopy system does not interfere with itself, since the AP Modules do not interfere with each other and the SMs do not interfere with each other. This unique characteristic delivers an ability to scale the network where Canopy AP Clusters can be added to the network to improve system coverage or capacity without increasing the system interference.

The AP Module operates with a raw data rate of 10 Mbps and has a range of approximately two miles (5.2 GHz) or ten miles (5.7 GHz SM with reflector). Each AP requires a 24-volt power

source and uses a single 10/100 BaseT Half/Full duplex connection to interface into the CMM or appropriate network connection.

The AP Cluster has eight usable ports that may be configured to contain five main components:

- Cluster Management Module (CMM)
 - *GPS Receiver*
 - *Hardened Ethernet Switch*
- AP Modules (A cluster can support up to six APs)
- Surge Suppressor (A single cluster requires one surge suppressor to protect the network connection to the CMM when the BH Module is not used with the CMM.)
- BH Modules (Up to two modules are typically used)
- Power Source (the AP Cluster is powered by the CMM which requires a 110 or 220 VAC or 24 VDC power source)

Subscriber Module (SM)

The SM is the subscriber termination unit or the Customer Premise Equipment (CPE). It consists of a single module that operates with an integrated 60-degree antenna. Each SM can communicate to a single AP Module at any given time. SM synchronization and control is accomplished via the received AP signal. SMs are typically located outdoor and Line of Sight (LOS) from the APs. Once the SM is initialized, it scans the Radio Frequency (RF) channels and automatically registers with the appropriate AP. Each SM requires a Category 5 cable for its Ethernet connection to the premise IP equipment with DC power supplied to the SM through that same cable. The SM uses a 110 VAC power supply (ACPS110-01 or -02) or the 90V-230V switching power supply (ACPSSW-01) and associated RJ45 connector to power the SM. The Universal Mounting Bracket (SMMB1) is available for mounting the SM to the customer site. One SMMB1 is required for each SM. It is recommended to use a Canopy Ethernet Surge Protector (300SS) mounted at the Ethernet entry point on the outside wall of the premise.

Backhaul (BH) Module

The BH Module is a Point-To-Point radio that carries traffic to and from AP Clusters. A set of Point-to-Point BH Modules can also be used as a low latency Ethernet bridge between any two networks or between a network and a single remote computer. In the event no convenient fiber or cable connection is available for IP connectivity to an AP Cluster, a set of BH Modules can be used. Each BH Module (5700BHRF) communicates to another BH Module using a highly directional antenna. The BH Module operates with a raw data bit rate of 10 Mbps with an approximate throughput of 7+ Mbps and has a maximum range of approximately 35 miles. The BH uplink/downlink bandwidth ratio for a single BH link is configurable by the operator (i.e. 75 percent downlink and 25 percent uplink or 50 percent uplink and 50 percent downlink – set at timing master). When two BH pairs are configured back-to-back in a daisy chain configuration, they each need to be configured for symmetrical load with 50 percent allocated for uplink and downlink. Each BH Module receives its 24VDC power from a 110-power supply (ACPS110-01

or -02) or the 90V-230V switching power supply (ACPSSW-01) and associated RJ45 connector. The BH Module can also be connected to the CMM, which will supply power to the BH Module and networking with the AP Modules at the AP Cluster.

Note: In release R3 of the Canopy software the backhaul modules can be configured to be timing master or timing slave through the WEB interface.

Canopy Configurations

The Motorola Canopy Wireless Internet Platform is available in two baseline configurations – Point-to-Point and Point-to-Multipoint. The following sections detail these baseline configurations.

Point-to-Point System

The Canopy Wireless Internet Platform can be configured to form a Point-to-Point network connection that can be used in wireless backhaul, bridging and other data applications. The 5.7 GHz Point-to-Point configuration, as shown in Figure 3, can span distances up to 35 miles using the Reflector Kit. The Reflector Kit also can significantly reduce external interference issues. Distances of greater than 35 miles can be achieved by daisy chaining the units. The Point-to-Point system operates at 5.7 GHz with a raw data rate of 10 Mbps and measurable data throughput rates of 7+ Mbps. Motorola also offers a 5.2 GHz Point-to-Point system which has a range of two miles without the reflector kits. The reflector kits used with the 5.7 GHz Point-to-Point solution cannot be used with the 5.2 GHz Point-to-Point solution due to FCC EIRP limits in the 5.2 GHz band.

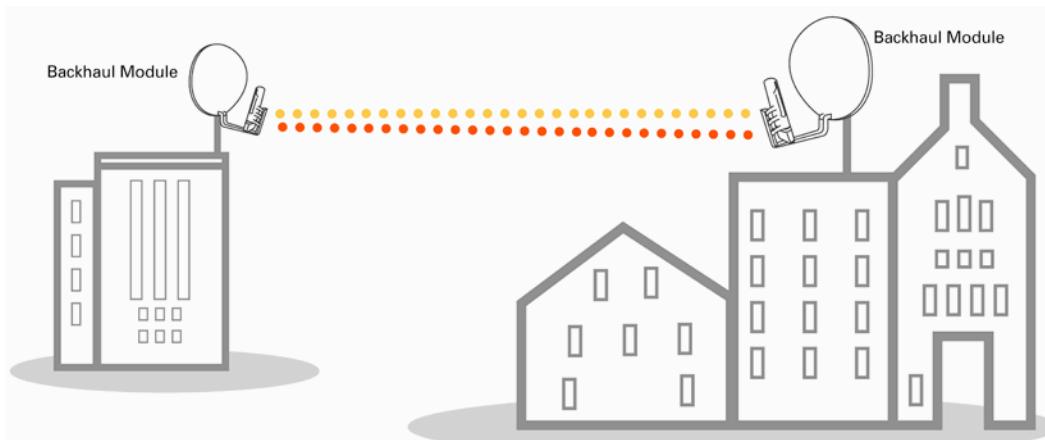


Figure 2. A Canopy System in a Point-to-Point Configuration

Part Numbers and Components

Table 1 details the part numbers and component list for a single Canopy Point-to-Point link.

Table 1. Point-to-Point Backhaul Components

Quantity	Canopy Part Number	Description
2	5700BHRF	Backhaul Module with Reflector Kit
2	ACPS110-01	110VAC Single Module Power Supply
2	300SS	Surge Suppressor
<i>The power supply is only required if the BH Module is not connected to the CMM</i>		

Point-to-Multipoint System

The Canopy Point-to-Multipoint configuration is available in either the 5.2 GHz or the 5.7 GHz frequency bands. Either the 5.7 GHz or the 5.2 GHz system provide a Line of Site (LOS) range of approximately two miles (5.2 GHz) or ten miles (5.7 GHz with reflector) between the AP Module and SM using their internal Canopy antennas. The 5.7 Point-to-Multipoint configurations can support a 5.7 SM with the reflector kit (27RD). The reflector kit increases the transmit and receive gain of the SM by approximately 17 dB, thereby increasing the range between the AP Module and the SM to approximately 10 miles LOS. The Point-to-Multipoint system enables the delivery of broadband access to multiple locations from a single AP Module. The system, as shown in Figure 3, was developed to optimize its performance in high density and low-density environments in the presence of external interference sources. Therefore, a Canopy Point-to-Multipoint configuration can be deployed in both rural and metropolitan environments.

A wireless AP Cluster can contain anywhere from one to six AP Modules. Each AP Module can deliver up to 6+ Mbps of effective data throughput with connectivity to a maximum of 200 subscribers. Six AP Modules in a cluster can deliver 360-degree coverage with approximately two-mile (5.2GHz) or ten-mile (5.7GHz with a reflector) radius. A single SM is capable of a maximum effective data rate of 4+ Mbps. (The short and long-term throughput averages of a SM can be configured within the AP Module to less than the maximum)

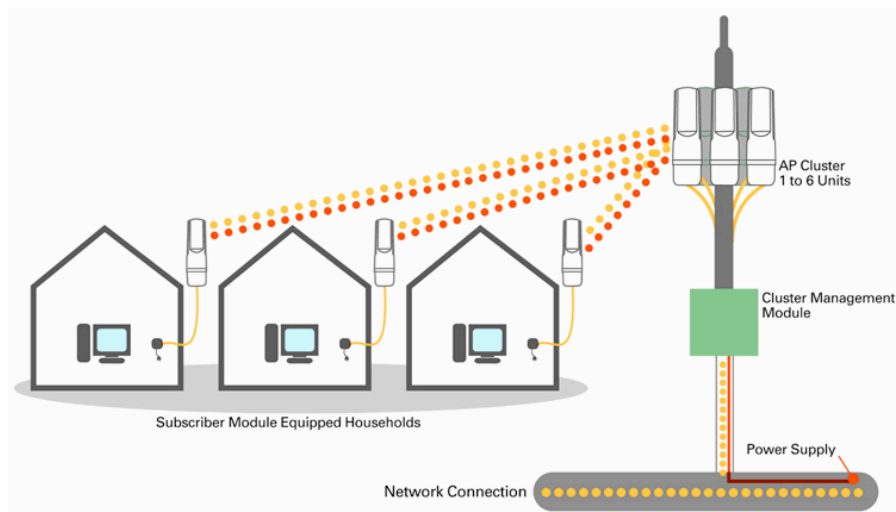


Figure 3. A Canopy System in a Point-to-Multipoint Configuration

Trial Kit

Motorola offers the TK10003 and TK10004 Trial Kits for initial training and evaluation of the Canopy system. The kits include a baseline configuration of one AP and two SMs. The AP can support additional growth up to 200 subscribers on the single AP Module. The kits also include two training CDs that are designed to introduce both the sales/marketing and technical aspects of the Canopy system. The Canopy Sales Overview (CPY001-CD) contains the contents of Motorola's Canopy systems sales and marketing class. This CD is for a general audience interested in gaining an understanding of the Canopy system from a feature/benefit perspective as well as methods for positioning the Canopy system against competitive technologies and fixed wireless offerings. The Canopy Technical Overview (CPY002-CD) contains the content of Motorola's technical class and is for system designers, installers, operations engineers and support teams. These kits also include one SMMB1 Universal Mounting Bracket and one 300SS Surge Suppressor.

Part Numbers and Components

Tables 2 and 3 detail the components of the TK10003 and the TK10004 Trial Kits.

Table 2. Canopy 5.2 GHz Trial Kit (TK10003)

Quantity	Canopy Part Number	Description
1	5200AP	5.2 GHz Access Point (AP) Module
2	5200SM	5.2 GHz Subscriber Module
3	ACPS110-01	110 VAC Single Module Power Supply
3	N/A	Straight Through CAT5 Cable
1	N/A	Crossover CAT5 Cable
1	SMMB1	Universal Mounting Bracket
1	300SS	Outdoor Surge Suppressor
1	CPY001-CD	Canopy Sales Overview Training Course on CD
1	CPY002-CD	Canopy Technical Overview Training Course on CD
1	N/A	Canopy Trial Kit Quick Starter Guide
1	CPY003-CD	Canopy User Guides (Coming Soon)

Table 3. Canopy 5.7 GHz Trial Kit (TK10004)

Quantity	Canopy Part Number	Description
1	5700AP	5.7 GHz Access Point (AP) Module
2	5700SM	5.7 GHz Subscriber Module
3	ACPS110-01	110 VAC Single Module Power Supply
3	N/A	Straight Through CAT5 Cable
1	N/A	Crossover CAT5 Cable
1	SMMB1	Universal Mounting Bracket
1	27RD	Reflector Kit
1	300SS	Outdoor Surge Suppressor
1	CPY001-CD	Canopy Sales Overview Training Course on CD
1	CPY002-CD	Canopy Technical Overview Training Course on CD
1	N/A	Canopy Trial Kit Quick Starter Guide
1	CPY003-CD	Canopy User Guides (Coming Soon)

Starter Kits

Motorola offers two starter kits for the Canopy Wireless Internet Platform. The first starter kit - TK10031 - is designed for implementation of an initial 5.2 GHz Point-To-Multipoint Canopy system. This configuration provides a complete AP Cluster with six AP Modules, a CMM and 30 SMs. The system supports growth of up to 200 subscribers on any AP Module. This configuration will ensure 360-degree coverage within approximately a two-mile radius. A Point-to-Point backhaul link can be ordered separately to connect the AP Cluster to an Internet Point of Presence (POP). This kit also includes the necessary CMM, surge suppressors and 110 VAC power supplies for the SMs. 30 SMMB1 universal mounting brackets are also included for mounting the SMs to the end customer's site.

The second starter kit - TK10032 - is for a 5.7 GHz Point-to-Multipoint Canopy system. This starter kit also provides a complete AP cluster with six AP Modules, a CMM and 30 SMs. The main difference in the starter kits, apart from the frequencies that they operate in, is their range.

The 5.7 system’s range is up to 10 miles when the SM is configuration with the optional 27RD reflector kit. Fifteen reflector kits are included in the TK10032. Fifteen SMMB1 universal mounting brackets are also included for mounting the SMs without the reflector kits at the customer’s site.

Part Numbers and Components

Table 4 details the part numbers and component list for the 5.2 GHz Point-to-Multipoint Starter Kit. Table 5 details the part numbers and component list for the 5.7 GHz Point-to-Multipoint Starter Kit

***Table 4. The Canopy Systems 5.2 GHz Starter Kit
(Part Number: TK10031)***

Quantity	Canopy Part Number	Description
6	5200AP	5.2 GHz Access Point (AP) Module
30	5200SM	5.2 GHz Subscriber Module
1	1008CK	Cluster Management Module (CMM)
31	300SS	Outdoor Surge Suppressor
30	SMMB1	Universal Mounting Bracket
30	ACPS110-01	110 VAC Single Module Power Supply
1	CTCAT5-01	Category Five Cable Tester
1	N/A	Starter Kit Quick Start Guide
1	CPY003-CD	Canopy User Guides <i>(Coming Soon)</i>

**Table 5. The Canopy Systems 5.7 GHz Starter Kit
(Part Number: TK10032)**

Quantity	Canopy Part Number	Description
6	5700AP	5.7 GHz Access Point Module
30	5700SM	5.7 GHz Subscriber Module
1	1008CK	Cluster Management Module (CMM)
31	300SS	Outdoor Surge Suppressor
30	ACPS110-01	110 VAC Single Module Power Supply
1	CTCAT5-01	Category Five Cable Tester
15	27RD	Reflector Kit
15	SMMB1	Universal Mounting Bracket
1	N/A1	Start Kit Quick Start Guide
1	CPY003-CD	Canopy User Guides (Coming Soon)

Motorola also offers individual components to support implementations that require additional capacity and coverage beyond the Starter Kit. Table 6 details the related optional part numbers and components.

Table 6. The Canopy System Optional Components

Category	Canopy Part Number	Description
Subscriber Modules	5200SM	5.2 GHz Subscriber Module
	5700SM	5.7 GHz Subscriber Module
	5700SMRF	5.7 GHz Subscriber Module with Reflector
	BP5200SM-100*	Bulk Purchase of (100) 5200 Subscriber Modules
	BP5700SM-100*	Bulk Purchase of (100) 5700 Subscriber Modules
Access Points	5200AP	5.2 GHz Access Point Module
	5700AP	5.7 GHz Access Point Module
Point-to-Point	5200BH	5.2 GHz Backhaul
	5700BHRF	5.7 GHz Backhaul Module with Reflector Kit
Cluster Management Module	1008CK	Cluster Management Module (CMM)
Accessories	300SS	Outdoor Surge Suppressor
	27RD	Reflector Kit
	SMMB1	Universal Mounting Bracket
	ACPS110-01	110 VAC Single Module Power Supply (For U.S. only)
	ACPS110-02	110 VAC XCVR Power Supply (U.S. & Canada)
	ACPSSW-01	90-230 VAC / 50-60 Hz Power Supply (Includes Europlug (CEE 7/16) Adaptor)
	CTCAT5-01	Category 5 Cable Tester (Only for US usage)
Training	CPY001-CD	Canopy Sales Overview Training Course on CD
	CPY002-CD	Canopy Technical Overview Training Course on CD
	CPY003-CD	Canopy User Guides (Coming Soon)
<i>*Note: Not Available To Distributors – Only Available as Drop Ship Item Directly to Authorized Resellers</i>		

Cables

The Canopy system requires UV protected cables for use outdoors in temperature ranges between -30°C to $+55^{\circ}\text{C}$. 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.

ACRONYMS

AP	Access Point
BH	Backhaul
CMM	Cluster Management Module
CPE	Customer Premise Equipment
FCC	Federal Communications Commission
GPS	Global Positioning System
LOS	Line of Sight
RF	Radio Frequency
SM	Subscriber Module
TDD	Time Division Duplex



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