RELEASE NOTES

450 Platform Series

System Release
16.2/16.2.1/16.2.2/16.2.3/16.2.3.1

Accuracy

While reasonable efforts have been made to assure the accuracy of this document, Cambium Networks assumes no liability resulting from any inaccuracies or omissions in this document, or from use of the information obtained herein. Cambium reserves the right to make changes to any products described herein to improve reliability, function, or design, and reserves the right to revise this document and to make changes from time to time in content hereof with no obligation to notify any person of revisions or changes. Cambium does not assume any liability arising out of the application or use of any product, software, or circuit described herein; neither does it convey license under its patent rights or the rights of others. It is possible that this publication may contain references to, or information about Cambium products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that Cambium intends to announce such Cambium products, programming, or services in your country.

Copyrights

This document, Cambium products, and 3rd Party software products described in this document may include or describe copyrighted Cambium and other 3rd Party supplied computer programs stored in semiconductor memories or other media. Laws in the United States and other countries preserve for Cambium, its licensors, and other 3rd Party supplied software certain exclusive rights for copyrighted material, including the exclusive right to copy, reproduce in any form, distribute and make derivative works of the copyrighted material. Accordingly, any copyrighted material of Cambium, its licensors, or the 3rd Party software supplied material contained in the Cambium products described in this document may not be copied, reproduced, reverse engineered, distributed, merged or modified in any manner without the express written permission of Cambium. Furthermore, the purchase of Cambium products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Cambium or other 3rd Party supplied software, except for the normal non-exclusive, royalty free license to use that arises by operation of law in the sale of a product.

Restrictions

Software and documentation are copyrighted materials. Making unauthorized copies is prohibited by law. No part of the software or documentation may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, without prior written permission of Cambium.

License Agreements

The software described in this document is the property of Cambium and its licensors. It is furnished by express license agreement only and may be used only in accordance with the terms of such an agreement.

High Risk Materials

Cambium and its supplier(s) specifically disclaim any express or implied warranty of fitness for any high-risk activities or uses of its products including, but not limited to, the operation of nuclear facilities, aircraft navigation or aircraft communication systems, air traffic control, life support, or weapons systems ("High Risk Use").

This product is not restricted in the EU. Any High Risk is unauthorized, is made at your own risk and you shall be responsible for any and all losses, damage or claims arising out of any High-Risk Use.

Contents

General Information

Version Information

The following shows the issue status of this document since it was first released:

Issue	Date of issue	System Release
2953_001v000	April 2020	System Release 16.2
3006_001v000	June 2020	System Release 16.2.1
3036_001v000	August 2020	System Release 16.2.2
3036_002v000	October 2020	System Release 16.2.3
3036_003v000	December 2020	System Release 16.2.3.1

450 Platform Release 16.2/16.2.1/16.2.2/16.2.3/16.2.3.1 Information

Introduction

This document provides information for 450 Platform series System Release 16.2/16.2.1/16.2.2/16.2.3/16.2.3.1.

Software updates for Cambium products are available from:

https://support.cambiumnetworks.com/files

System release 16.2 adds support for:

- CBRS

- 4.9 GHz support for PMP 450m

System release 16.2.1 is a maintenance release on 16.2 with primarily bug fixes.

System release 16.2.2 is a maintenance release on 16.2.1 with primarily bug fixes. Two new products are introduced in this release:

- PMP 450 MicroPoP with on-board GPS and either 13 dBi sector or 9 dBi omni integrated antennas

- 450b Retro with 9 dBi integrated patch antenna

System release 16.2.3 is a maintenance release on 16.2.2 with primarily bug fixes.

System release 16.2.3.1 is a maintenance release on 16.2.3 with primarily bug fixes.

Note
For CBRS customers using Google SAS, the latest Google SAS code expects bulk heartbeat requests with no more than 120 SMs per message. For compatibility, it is critical that any sectors using Google SAS and containing more than 120 SMs per sector be upgraded to System release 16.2.1 or a later build. In addition, Cambium suggests any customers with CBRS sectors using Google SAS and approaching 120 SMs per sector also upgrade those sectors ASAP to avoid any future problems.

Feature overview

System Release 16.2.2 includes:

Products Affected	Description
PMP 450 MicroPoP Series AP	The PMP 450 MicroPoP is designed to provide the full features and performance of the proven PMP 450, supporting up to 20 subscriber locations within a 2 mile radius in 5 GHz, using a 360 degree omni antenna or sectorised antenna.
450b Retro	The 450b Retro is designed to provide full features and performance of PMP 450 SM, with many new features and improvements. 450b Retro covers a much wider band in 5 GHz (from 4900 to 5925 MHz), compared to PMP 450 SM (5470 - 5875 MHz).

Features Description

PMP 450 MicroPoP Series AP

The PMP 450 MicroPoP is designed to provide the full features and performance of the proven PMP 450, supporting up to 20 subscriber locations within a 2 mile radius in 5 GHz, using a 360 degree omni antenna or sectorised antenna. Network operators can now offer services to remote clusters of customer operations. The solution is ideal for rural communities, video surveillance of enterprise facilities and other locations where connectivity is needed but the expense of a full AP does not meet the business case.

The optional License Key (C000045K201A) removes the limits of the 2 mile range and 20 subscriber count. After applying the key, operators can connect up to 238 SMs and up to 40 miles range (depending on signal strength, etc.).

450b Retro

The 450b Retro is designed to provide full features and performance of PMP 450 SM, with many new features and improvements. 450b Retro covers a much wider band in 5 GHz (from 4900 to 5925 MHz), compared to PMP 450 SM (5470 - 5875 MHz). It is designed to have the same patch antenna focal point as PMP 450 SM and can be it's drop-in replacement, allowing customers to upgrade their SM with an offset dish very easily, avoiding both install costs, as well as the cost of augmenting the gain of the radio. Further, 450b Retro brings a Gigabit Ethernet port, enhanced packet processing capabilities and 5 dBm higher transmit power. Below table compares PMP 450 SM and PMP 450b Retro SM.

Feature	PMP 450 SM	PMP 450b Retro SM
Supported frequency range	5470 - 5875 MHz	4900 - 5925 MHz
Max. Tx Power	+22 dBm	+27 dBm
Ethernet interface type	Fast Ethernet	Gigabit Ethernet
Packets per second	15,000 PPS	50,000 PPS
Integrated antenna gain	9 dBi	9 dBi

System Release 16.2 includes:

Products Affected	Features	Description
All PMP	CBRS	This release introduces new feature "Citizens Broadband Radio Service Subscription" for the CBRS-compliant devices in 3.6 GHz band (3550 MHz to 3700 MHz).
5 GHz PMP 450m		For any 450m operators, this is available for purchase as a feature upgrade.

Features Description

CBRS

FCC is making more spectrum available for wireless broadband applications in the 3 GHz band. The Citizens Broadband Radio Service (CBRS) band is the 3550-3700 MHz band, and new rules are set in place for spectrum sharing in this band. A Spectrum Access System (SAS) regulates access to the spectrum and assigns channels and EIRP limits devices can operate on Release 16.2 is the official release of Cambium's CBRS software support.

Following are the Cambium CBRS-compliant devices which operate in 3.6 GHz band frequency ranging from 3550 to 3700 MHz:

- 3 GHz 450i AP/SM/BHS/BHM

- 3.6 GHz 450 AP

- 3.6 GHz 450 SM/BHS/BHM

- 3 GHz 450m AP

- 3 GHz 450b SM/BHS/BHM

Note

Cambium supports maximum of 119 SMs per 450 AP when running with CBRS enabled for optimal performance. This 119 SM limit does not apply to 450m or 450i AP.

As CBRS is region-specific, set to either of the region code as follows:

- North America and the United States

- Other and FCC

Cambium Release 16.2 build official contains a key fix for tracking the proper device type/model number of each and every CBRS configured device. This is important for CBRS customers using the Federated Wireless SAS. Cambium requests that after installing 16.2 build official on all Cambium PMP devices, for any devices that were previously CBRS registered on a 16.0.2 or 16.2 BETA build and using FW SAS, operators force a de-registration and re-registration of these devices.

This can be done during maintenance window if an operator prefers. This is not necessary for operators using the Google SAS.

To do this, navigate to Home > Session Status on your AP. For each and every device, click on Deregister checkbox, then click on Perform Relinquish/Deregister. Then uncheck all the Deregister checkboxes to allow for a re-registration. After several minutes the sessions will re-register with the SAS – this time with an updated model type.

The Federated Wireless SAS's currently tracked model per device can be checked via a status report by logging into the SAS, navigating to Reports, then create a CBSD Status report. In the resulting spreadsheet, column CA will show the SAS current understanding of the model number.

Note that after deregistering any device that currently holds a grant with the FW SAS, FW will immediately Grant and Authorize a new grant request as long as the new grant request is made with the same parameters as the recently relinquished grant and that grant request is made any time before the next CPAS cycle starts. This is true even if the prior grant required a CPAS cycle to become fully Authorized. Note that the CPAS cycle typically occurs during the early hours of the morning (North American time zones).

Table 1 : System Release 16.2 CBRS SNMP Objects

GUI Name	OID	OID Label
Session Status - AP		
Grant Status	.1.3.6.1.4.1.161.19.3.1.14.2.1	apCbsdStatus
Time Elapsed in State	.1.3.6.1.4.1.161.19.3.1.14.2.2	apCbsdStateDuration
Last Heartbeat Time	.1.3.6.1.4.1.161.19.3.1.14.2.3	apCbsdLastHeartbeatTime
Heartbeat Duration	.1.3.6.1.4.1.161.19.3.1.14.2.4	apCbsdHeartbeatDuration
Grant Expiry Time	.1.3.6.1.4.1.161.19.3.1.14.2.5	apCbsdGrantExpiry
Tx Expiry Time	.1.3.6.1.4.1.161.19.3.1.14.2.6	apCbsdTxExpiry
Channel Type	.1.3.6.1.4.1.161.19.3.1.14.2.7	apCbsdChannelType
EIRP - Requested	.1.3.6.1.4.1.161.19.3.1.14.2.8	apCbsdEirpRequested
EIRP - Granted	.1.3.6.1.4.1.161.19.3.1.14.2.9	apCbsdEirpGranted
Total Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.10	apCbsdHeartbeatTotal
Missed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.11	apCbsdHeartbeatMissed
Failed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.12	apCbsdHeartbeatFailed
Session Status - SM		
LUID	.1.3.6.1.4.1.161.19.3.1.14.3.1.1	cbsdLuid
Grant Status	.1.3.6.1.4.1.161.19.3.1.14.3.1.2	cbsdStatus
Time Elapsed in State	.1.3.6.1.4.1.161.19.3.1.14.3.1.3	cbsdStateDuration
Heartbeat Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.4	cbsdLastHeartbeatTime
Heartbeat Duration	.1.3.6.1.4.1.161.19.3.1.14.3.1.5	cbsdHeartbeatInterval
Grant Expiry Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.6	cbsdGrantExpiry

GUI Name	OID	OID Label
Tx Expiry Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.7	cbsdTxExpiry
Channel Type	.1.3.6.1.4.1.161.19.3.1.14.3.1.8	cbsdChannelType
EIRP - Requested	.1.3.6.1.4.1.161.19.3.1.14.3.1.9	cbsdEirpRequested
EIPR - Granted	.1.3.6.1.4.1.161.19.3.1.14.3.1.10	cbsdEirpGranted
Total Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.11	cbsdHeartbeatTotal
Missed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.12	cbsdHeartbeatMissed
Failed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.13	cbsdHeartbeatFailed
Relative Bulk Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.14	cbsdHeartbeatRelativeBulk
Skipped Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.15	cbsdHeartbeatSkipped
AP -CBRS		
Configuration		
CBRS Service	.1.3.6.1.4.1.161.19.3.1.14.1.1	cbrsEnable
User ID	.1.3.6.1.4.1.161.19.3.1.14.1.2	cbsdUserID
CPI Encoded Data	.1.3.6.1.4.1.161.19.3.3.21.1	cbsdCpiEncodedData
Latitude	.1.3.6.1.4.1.161.19.3.3.21.2	cbsdLatitude
Longitude	.1.3.6.1.4.1.161.19.3.3.21.3	cbsdLongitude
Height	.1.3.6.1.4.1.161.19.3.3.21.4	cbsdHeight
Height Type	.1.3.6.1.4.1.161.19.3.3.21.5	cbsdHeightType
Horizonal Accuracy	.1.3.6.1.4.1.161.19.3.3.21.6	cbsdHorizontalAccuracy
Vertical Accuracy	.1.3.6.1.4.1.161.19.3.3.21.7	cbsdVerticalAccuracy
Antenna Parameters		
Azimuth	.1.3.6.1.4.1.161.19.3.3.21.8	cbsdAntennaAzimuth
Downtilt	.1.3.6.1.4.1.161.19.3.3.21.9	cbsdAntennaDownTilt
Gain	.1.3.6.1.4.1.161.19.3.3.21.10	cbsdAntennaGain
BeamWidth	.1.3.6.1.4.1.161.19.3.3.21.11	cbsdAntennaBeamwidth
EIRP Capability	.1.3.6.1.4.1.161.19.3.3.21.12	cbsdEirpCapability
CPI ID	.1.3.6.1.4.1.161.19.3.3.21.13	cbsdCpiInstallerId
CPI Name	.1.3.6.1.4.1.161.19.3.3.21.14	cbsdCpiInstallerName
Install Certification Time	.1.3.6.1.4.1.161.19.3.3.21.15	cbsdCpiInstallCertTime
SM		
AP Eval CBRS Failure Count	.1.3.6.1.4.1.161.19.3.2.10.1.44	evalCbrsFail

GUI Name	OID	OID Label
CBRS Enabled Status on SM	.1.3.6.1.4.1.161.19.3.2.2.151	cbrsStatus

Table 2 :System Release 16.2.1 CBRS SNMP Objects

GUI Name	OID	OID Label
Session Status - AP		
Grant Suspend Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.13	apCbsdHeartbeatFailedSuspend
Grant Terminate Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.14	apCbsdHeartbeatFailedTerminate
Unsync Failure Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.15	apCbsdHeartbeatFailedUnsync
CBSD ID	.1.3.6.1.4.1.161.19.3.1.14.2.16	apCbsdId
Relinquish	.1.3.6.1.4.1.161.19.3.1.14.1.4	apCbsdSelectRelinquishment
Deregistration	.1.3.6.1.4.1.161.19.3.1.14.1.5	apCbsdSelectDeregistration
Perform Relinquish/Deregistration	.1.3.6.1.4.1.161.19.3.1.14.1.6	performRelinquishDeregister
Session Status – SM (Available on AP)		
Grant Suspend Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.16	cbsdHeartbeatFailedSuspend
Grant Terminate Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.17	cbsdHeartbeatFailedTerminate
Unsync Failure Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.18	cbsdHeartbeatFailedUnsync
CBSD ID	.1.3.6.1.4.1.161.19.3.1.14.3.1.19	cbsdId
Mac Address of the CBSD	.1.3.6.1.4.1.161.19.3.1.14.3.1.20	cbsdMacAddress
Standalone Hearbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.21	cbsdHeartbeatStandalone
AP - CBRS		
Configuration		
Select the AP for Spectrum Relinquishment	.1.3.6.1.4.1.161.19.3.1.14.1.4	apCbsdSelectRelinquishment
Select the AP for Deregistration	.1.3.6.1.4.1.161.19.3.1.14.1.5	apCBSDSelectDeregistration
Perform Relinquish/Deregister	.1.3.6.1.4.1.161.19.3.1.14.1.6	performRelinquishDeregister
CPI Encoded Data	.1.3.6.1.4.1.161.19.3.3.21.1	cbsdCpiEncodedData
Logs – CBRS Log		
AP		
Current CBSD	.1.3.6.1.4.1.161.19.3.1.14.2.1	apCbsdStatus
CBSD State Time	.1.3.6.1.4.1.161.19.3.1.14.2.2	apCbsdStateDuration
Last Heartbeat Time	.1.3.6.1.4.1.161.19.3.1.14.2.3	apCbsdLastHeartbeatTime

GUI Name	OID	OID Label
Heartbeat Duration	.1.3.6.1.4.1.161.19.3.1.14.2.4	apCbsdHeartbeatDuration
Grant Expire Time	.1.3.6.1.4.1.161.19.3.1.14.2.5	apCbsdGrantExpiry
Transmit Expire Time	.1.3.6.1.4.1.161.19.3.1.14.2.6	apCbsdTxExpiry
Channel Allocation Type	.1.3.6.1.4.1.161.19.3.1.14.2.7	apCbsdChannelType
EIRP Requested	.1.3.6.1.4.1.161.19.3.1.14.2.8	apCbsdEirpRequested
EIRP Granted	.1.3.6.1.4.1.161.19.3.1.14.2.9	apCbsdEirpGranted
SM		
SM LUID	.1.3.6.1.4.1.161.19.3.1.14.3.1.1	cbsdLuid
Current CBSD	.1.3.6.1.4.1.161.19.3.1.14.3.1.2	cbsdStatus
CBSD State Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.3	cbsdStateDuration
Last Heartbeat Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.4	cbsdLastHeartbeatTime
Heartbeat Duration	.1.3.6.1.4.1.161.19.3.1.14.3.1.5	cbsdHeartbeatInterval
Grant Expire Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.6	cbsdGrantExpiry
Transmit Expire Time	.1.3.6.1.4.1.161.19.3.1.14.3.1.7	cbsdTxExpiry
Channel Allocation Type	.1.3.6.1.4.1.161.19.3.1.14.3.1.8	cbsdChannelType
EIRP Requested	.1.3.6.1.4.1.161.19.3.1.14.3.1.9	cbsdEirpRequested
EIRP Granted	.1.3.6.1.4.1.161.19.3.1.14.3.1.10	cbsdEirpGranted
Statistics - CBRS		
AP		
Total Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.10	apCbsdHeartbeatTotal
Missed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.11	apCbsdHeartbeatMissed
Failed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.12	apCbsdHeartbeatFailed
Grant Suspend Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.13	apCbsdHeartbeatFailedSuspend
Grant Terminate Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.14	apCbsdHeartbeatFailedTerminate
Unsync Failure Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.2.15	apCbsdHeartbeatFailedUnsync
CBSD ID	.1.3.6.1.4.1.161.19.3.1.14.2.16	apCbsdId
SM		
Total Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.11	cbsdHeartbeatTotal
Missed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.12	cbsdHeartbeatMissed
Failed Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.13	cbsdHeartbeatFailed

GUI Name	OID	OID Label
AP Relative Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.14	cbsdHeartbeatAp
Skipped Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.15	cbsdHeartbeatSkipped
Grant Suspend Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.16	cbsdHeartbeatFailedSuspend
Grant Terminate Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.17	cbsdHeartbeatFailedTerminate
Unsync Failure Heartbeat Count	.1.3.6.1.4.1.161.19.3.1.14.3.1.18	cbsdHeartbeatFailedUnsync
CBSD ID	.1.3.6.1.4.1.161.19.3.1.14.3.1.19	cbsdId
CBSD MAC address	.1.3.6.1.4.1.161.19.3.1.14.3.1.20	cbsdMacAddress
Standalone heartbeat count	.1.3.6.1.4.1.161.19.3.1.14.3.1.21	cbsdHeartbeatStandalone

Table 3 : System Release 16.2.1 Other SNMP Objects

GUI Name	OID	OID Label
Configuration - General		
Current EIRP on 450m AP	.1.3.6.1.4.1.161.19.3.3.1.303	activeEIRP
Allow GPS to set System Time	.1.3.6.1.4.1.161.19.3.1.1.267	SystemSetTime
Enable CP CNUT AutoUpdate File Server	.1.3.6.1.4.1.161.19.3.1.1.269.0	autoUpdateFileServer

Table 4 : System Release 16.2.2 SNMP Objects

GUI Name	OID	OID Label
LUID	.1.3.6.1.4.1.161.19.3.2.2.159.0	smLUID

Table 5 :System Release 16.2.3.1 SNMP Objects

GUI Name	OID	OID Label
Scan Selection List	.1.3.6.1.4.1.161.19.3.2.1.177.0	RfScanListFrequencyAdd
Scan Selection List	.1.3.6.1.4.1.161.19.3.2.1.178.0	RfScanListFrequencyRemove

4.9 GHz support for PMP 450m

For any PMP 450m operators, this is available for purchase as a feature upgrade.

Release 16.2.3.1 System Documentation

Provided with this release are several documents for your reference:

- [PMP 450 Series Specification Sheets](#): Includes up-to-date specifications for the 450 Series product line.

- [PMP 450i Series Specification Sheets](#): Includes up-to-date specifications for the 450i Series product line.

- [PMP 450b Specification Sheets](#): Includes up-to-date specifications for the 450b.

- [PMP 450m Series Specification Sheets](#): Includes up-to-date specifications for the 450m Series product line.

- [LINKPlanner](#): Includes up-to-date information about Cambium product performance.

Embedded Software

Prior to upgrading, please read section Upgrading Software. System Release 16.2.3.1 may be installed via CNUT (Canopy Network Updater Tool) using the following software package:

- CANOPY16_2_3_1BUILDOFFICIAL_PXP45x_S.pkg3

- Or via cnMaestro: CANOPY_16.2.3.1.tar.gz

Upgrading Software

Use version 4.13.3 of the Canopy Network Updater Tool (CNUT) to upgrade to Release 16.2/16.2.1/16.2.2/16.2.3/16.2.3.1.

CNUT 4.13.3 supports legacy Cambium products.

CNUT and its release notes can be downloaded from the Cambium support web site: https://support.cambiumnetworks.com/files/cnut/

> **Note**
>
> As of Software Release 16.2 and later, CNUT AutoUpdate using PMP 450 AP as the File Server no longer supports update of 450b and 450i SMs. Use cnMaestro or CNUT HTTP File Server option to upgrade these SMs.

The below 3 tables describes the compatibility between AP and SM versions.

PMP 450/450b/450i/450m Compatibility			
AP Version	SM Version		
	20.0+	16.2.X - 15.2	15.1.5 & earlier
20.0+	Y	2X MIMO-B	N
16.2.X - 16.1	Y	Y	N
16.0.1.1 & earlier	Y	Y	Y

PMP 430 SM Compatibility				
AP Version	**430 SM Version**			
	16.0.1.1 - 14.2	14.1.2 - 14.0	13.4.1 - 12.2	12.1.3 & earlier
16.1+	N	N	N	N
16.0.1.1 - 14.2	450 mode	450 mode	450 mode	N
14.1.2 - 14.0	450 mode	450 mode	450 mode	N
13.4.1 & earlier	430/450 mode	430/450 mode	430/450 mode	430 mode

CBRS 450/450b/450i/450m Compatibility				
AP Version	**SM Version**			
	20.0+	16.2.X - 16.2	16.1.1.1 - 15.2	15.1.5 & earlier
20.0+	Y	2X MIMO-B	2X MIMO-B*	N
16.2.X - 16.2	Y	Y	N*	N
16.1.1.1 & earlier	N*	N*	N*	N*
	*Y if CBRS Disabled on AP			
	N* indicates compatibility for non CBRS sectors.`			

Release	Feature or Hardware First Supported
20.0	Addition of Intermediate Modulation Modes (3X/5X/7X MIMO-B). Upgrade SM first when upgrading to 20.0+. Otherwise, the link will connect at 2X MIMO-B until the SM is upgraded to 20.0.
16.2.3	PMP 450m 3 GHz P4.4
16.2.1	PMP 450 MicroPoP 5 GHz , PMP 450b 3 GHz High Gain, PMP 450b 5 GHz Retro
16.2	CBRS
16.2 BETA	CBRS -If running pre 16.2 BETA-5: Upgrade both SM and AP from the older software first to 16.2 BETA-5; After reconnect, upgrade the AP to 16.2 official or later; Upgrade the SMs to 16.2 official or later.
16.1	PTP 450b
16.1	PMP 430 SM no longer supported. Also if AP is on 16.1, SMs need to be on 15.2 or later to connect to AP on 16.1 or later.
16.0.1.1	Last PMP 430 SM release load; Recommended upgrade release stepping stone from earlier releases
16.0	PMP 450m 3 GHz, Uplink MU-MIMO
15.2.1	PMP 450i 5 GHz P6 SMs previously configured for DES will register to APs configured to AES

	(assuming correct encryption key config) and also to APs with encryption disabled.
15.2	**AES-256 added and DES no longer supported. SMs configured for DES will not register to AP with encryption enabled. AP will need to disable encryption for SMs configured to DES to register.**
15.1.5	PMP 450b High Gain 5 GHz
15.1.2	PMP 450b Mid-Gain 5 GHz
15.1	40 MHz and PMP 450i 3 GHz
15.0	PMP 450m 5 GHz
14.2	cnMaestro, 15 and 30 MHz Channel Bandwidths
14.1.2	**PMP 430 SM last release line in with support for ability to reboot and switch to/from "PMP 430 mode" / "PMP 450 mode". All PMP 430 radios first need to be upgrade to this release, "450 mode" selected and rebooted before able to be upgraded to a later release.**
14.1	PMP 450i 5.1 and 5.2 GHz band support
14.0	PMP 450i 5 GHz
13.4.1	Last release line for PMP 100, PMP 430 AP
13.3	5 ms frame, 7 MHz Channel Bandwidth
13.0	PMP 450 3 GHz
12.1.1	5 MHz Channel Bandwidth
12.1	PMP 450 2.4 GHz
12.0	PMP 450 5 GHz

Network Management

Wireless Manager v4.5.6 may be used to manage Cambium PMP networks, including managing the RADIUS features. For additional information, see the Wireless Manager website at:

http://www.cambiumnetworks.com/products/management-tools/wireless-manager

A RADIUS dictionary file is available from the software site:
https://support.cambiumnetworks.com/files/pmp450/

cnMaestro

cnMaestro may also be used to manage Cambium devices. Additionally, cnMaestro is required if using the CBRS feature. See the cnMaestro release notes for more information. For additional information, see the cnMaestro website at:

http://www.cambiumnetworks.com/products/software-tools/cnmaestro

Canopy MIB

The Cambium Enterprise MIB (Management Information Base) consists of 7 MIB definition files and supports SNMP access to Canopy modules. The MIB files are available for download from:

https://support.cambiumnetworks.com/files/pmp450/

MIB files are used by Network Management Systems and Element Management Systems, such as the Wireless Manager system to support a host of surveillance, monitoring, control, and operational tasks.

If you are using an SNMP network management system (NMS) or element management system (EMS) other than Wireless Manager: Load the MIBs per the instructions for your NMS or EMS.

	Note
	When loading the MIB files:
	1. First, load the standard MIB files
	2. Then, load the radio specific MIB files

Some NMSs are not sensitive to order, but some require a specific loading order to build a MIB tree. Loading in the recommended order avoids these issues.

Problems and Limitations Corrected in 16.2.3.1

Problems and limitations, which have been corrected in system release 16.2.3.1 are listed below:

Table 6 :System Release 16.2.3.1 problems and limitations corrected

Products Affected	Tracking	Description
Any radar detected SM/BHS	CPY-17011	Fatal Error during DFS event
450m	CPY-16995	CBRS service rebooting radio after unexpected time set from NTP after a reboot.
450	CPY-16989	AP in DFS band (s) when region = Europe alternate frequency (1,2) option is not available.
450m	CPY-16982	Event Logs and SNMP Sync Source SNMP Traps fix
450m	CPY-16977 /16594	3.6 GHz 450m CBRS enabled running into repeatedly RFLinkSyncQueue failure and repeatedly FatalError reset
All SM	CPY-16972	OID rfScanList keywords "allwhole" and "allhalf"
All SM	CPY-16958	Updated description of **rfScanListFrequency**, new OIDs are **rfScanListFrequencyAdd** and **rfScanListFrequencyRemove.**
450 AP	CPY-16955	MPU violation
450b	CPY-16950	SM in NAT mode throws FPM error
All PMP	CPY-16943	Allows 15 MHz support for Oceania/Australia
450	CPY-16936	SM reset due to MPU violation due to specific received packet in 16.2 – 16.2.3
450i	CPY-16932	AP software watchdog reset due to "Data Abort exception"
3 GHz CBRS	CPY-16873	CBRS SM reparenting causes unwanted deregistration/Parent ID Missmatch
450b	CPY-16818	High Gain SM LQI is not displayed
450b MicroPoP	CPY-16776	SNMP Sync Loss Trap indicates wrong Sync Source
450 AP	CPY-16937	PMP450 failing to resolve URLs correctly when DNS Response contains Message Compression.

Known Problems or Limitations in 16.2.3.1

Known open issues in System release 16.2.3.1 are listed in below table.

Table 7 :System Release 16.2.3.1 known problems and limitations

Products Affected	Tracking	Description
450 AP with CBRS	CPY-16748	Occasionally with CBRS enabled the AP resets due to "Invalid NiBuf".
All	CPY-15912	When Link Test is performed with Bridging and MIR, while there is significant user traffic, Link Test throughput results are low, when compared to Link Test results with Bridging.
BHM	CPY-16826	BHM does not show CBSD logs for BHS in engineering.cgi
450m	CPY-16975	3 GHz 450m looses connection to main Ethernet port and requires a pwer-cycle
450b	CPY-16965	450b SM in NAT mode, with VPN end point on it's LAN, stops passing traffic when NAT table entry > 1500
450m	CPY-16820	5 GHz 450m locks up until it is recovered by a power-cycle

Problems and Limitations Corrected in 16.2.3

Problems and limitations, which have been corrected in Software Release 16.2.3 are listed below:

Table 8 :System Release 16.2.3 problems and limitations corrected

Products Affected	Tracking	Description
All CBRS	CPY-16835	Modified handling of CBRS 400 response code in a grant response. When a radio requests a higher EIRP than previously authorized on FW SAS, and SAS responds with a 400 grant response suggesting the previously authorized lower value, the radio will now send another grant request with the previously authorized lower value.
CBRS with Domain Proxy	CPY-16829	Difficulty establishing CBRS AP to Domain Proxy connection when upgrading to System release 16.2.2. This fixes a problem when using cnMaestro as an HTTP proxy for CBRS messaging as documented in field service bulletin FSB9082
All 3.6 GHz	CPY-16843	Re-allow scanning of 3.6 GHz 7 MHz in FCC region (can be used by operators with CBRS disabled)
450	CPY-16142	450 SM reporting SNR on the wrong path
450m	CPY-16864	Session drops with 450m and heavy downlink broadcast or multicast traffic.
All CBRS	CPY-16871	SMs sometimes not adjusting power after enabling CBRS
450 AP	CPY-16854	PMP 450 AP resetting due to BufNum/Head mismatch
450 AP	CPY-16735	PMP 450 AP Reset due to MPU Violation
450 AP	CPY-16580	Multiple MPU violation error crashed across two APs at the same time.
All	CPY-16816	Unable to claim device in cnMaestro due to serial number on device did not properly terminate.
All CBRS	CPY-16823	Update grant expire time. Grant will now be renewed 24 hours or 1 week prior to the Grant Expire time, depending on the SAS vendor, rather than a few minutes prior as was done in 16.2.2 and previous releases
450b PTP and MicroPoP	CPY-16585	For 3 GHz 450b PTP and MicroPoP units, the SES/SYN LED falsely indicates sync when "Free Run Before GPS Sync" was disabled.

Known Problems or Limitations in 16.2.3

Known open issues in System release 16.2.3 are listed in below table.

Table 9 :System Release 16.2.3 known problems and limitations

Products Affected	Tracking	Description
450 SM	CPY-16936	450 SM reset due to MPU violation due to specific received packet in 16.1 - 16.2.3.
450 AP with CBRS	CPY-16748	Occasionally with CBRS enabled the AP resets due to "Invalid NiBuf".
All	CPY-15912	When Link Test is performed with Bridging and MIR, while there is significant user traffic, Link Test throughput results are low, when compared to Link Test results with Bridging.

Additional Enhancements in System Release 16.2.2

Additional enhancements in system release 16.2.2 are listed in below table:

Table 10 : Additional enhancements in system release 16.2.2

Products Affected	Tracking	Description
All AP	CPY-16672	Added GPS stats (SNR and DoP) to webpage.
All SM	CPY-16719	Added an SNMP OID for SM LUID.
CBRS on 450 and 450i	CPY-16750	Increase of the Max EIRP limits for 450i and 450 radios operating in CBRS. FW SAS: • 450 SM: old limit = 45 dBm, new limit = 46 dBm • 450 AP: old limit = 45 dBm, new limit = 46 dBm • 450i AP/SM: old limit = 46 dBm, new limit = 47 dBm Google SAS: • 450i: old limit = 46 dBm, new limit = 47 dBm Any operators currently holding CBRS grants on their radios that desire to get this extra 1 dB increase • For an AP, they can relinquish their existing grant, modify the requested EIRP on the AP's Configuration > Radio Page, then wait for the new grant request to be automatically re-requested from the AP after 1 minute. • For an SM, simply relinquish their existing grant from the AP, uncheck the checkbox on the Home > Sessions Status page, then wait for the new grant to be automatically requested at the higher value cnMaestro release 2.4.1's CBRS Management tool also supports these higher values. cnMaestro release 2.4.0 does not support these higher values.

Problems and Limitations Corrected in 16.2.2

Problems and limitations, which have been corrected in Software Release 16.2.2 are listed below:

Table 11 :System Release 16.2.2 problems and limitations corrected

Products Affected	Tracking	Description
All	CPY-16714	Variable bindings sent in "WhispRegFailure" trap does not match with the ones in the MIB.
450 BHM	CPY-16716	System release 16.2.1 introduced an enhancement called "Enable CP CNUT autoUpdate File Server". System release 16.2.2 correction removes an impact on PTP 450 BHM.
All CBRS	CPY-16719	Improved handling for CBRS heartbeat timing and timeouts.
All CBRS	CPY-16718	Fixed a bug in handling a action to CBRS deregister all SMs in a sector at the same time.
All CBRS	CPY-16725	Unexpected RF loss and grant request following SAS SM Termination.
All CBRS	CPY-16763	cnMaestro incorrectly shows SM in deregistered and not synced state (live status update issue).
All CBRS	CPY-16565	CBRS sometimes does not start when cnMaestro is disabled.
All CBRS	CPY-16662	SMs requesting a Max EIRP below the correct value. In certain CBRS scenarios/configurations it had been observed that the radios were not using the grant obtained from the CBRS Admin tool but were asking for their own and the grant.
450 AP with CBRS	CPY-16748	AP reset due to Fatal Error when running CBRS.
All AP	CPY-16535	When "Spectrum Analyzer on Bootup" is enabled, AP does not start transmitting after the spectrum analysis has completed.
All AP	CPY-14415	LLDP not working when AP has management VLAN assigned.

Reference Information

Specifications

Refer the Spec Sheets listed on the Cambium Networks website for the most up-to-date specifications:

http://www.cambiumnetworks.com/resources/

Cambium Networks

Cambium Networks provides professional grade fixed wireless broadband and microwave solutions for customers around the world. Our solutions are deployed in thousands of networks in over 153 countries, with our innovative technologies providing reliable, secure, cost-effective connectivity that's easy to deploy and proven to deliver outstanding metrics.

Our flexible Point-to-Multipoint (PMP) solutions operate in the licensed, unlicensed and federal frequency bands, providing reliable, secure, cost effective access networks. With more than three million modules deployed in networks around the world, our PMP access network solutions prove themselves day-in and day-out in residential access, leased line replacement, video surveillance and smart grid infrastructure applications.

Our award-winning Point to Point (PTP) radio solutions operate in licensed, unlicensed and defined use frequency bands including specific FIPS 140-2 solutions for the U.S. Federal market. Ruggedized for 99.999% availability, our PTP solutions have an impeccable track record for delivering reliable high-speed backhaul connectivity even in the most challenging non-line-of-sight RF environments.

Cambium Networks' solutions are proven, respected leaders in the wireless broadband industry. We design, deploy and deliver innovative data, voice and video connectivity solutions that enable and ensure the communications of life, empowering personal, commercial and community growth virtually everywhere in the world.

Feedback

We appreciate feedback from the users of our documents. This includes feedback on the structure, content, accuracy, or completeness of our documents. To provide feedback, visit our support website.

Contacting Cambium Networks

Support website	https://support.cambiumnetworks.com
Support enquiries	
Repair enquiries	
Main website	http://www.cambiumnetworks.com
Sales enquiries	solutions@cambiumnetworks.com
Telephone number list	http://www.cambiumnetworks.com/contact-us/
Address	Cambium Networks Limited, Unit B2, Linhay Business Park, Eastern Road Ashburton, United Kingdom, TQ13 7UP.