

BC|Commander

BreadCrumb® Network Management Software

BC|Commander is a feature-rich monitoring and management application for Kinetic Mesh® networks built with Rajant BreadCrumb wireless nodes. The software helps to configure, monitor, and manage individual BreadCrumbs or groups of BreadCrumbs. Available for both Microsoft® Windows® and Linux® workstations, BC|Commander provides a global view of a network through an easy-to-use, intuitive graphical user interface and offers many advanced features that are helpful for deploying and managing large or complex networks. The system uses a secure encrypted link to each BreadCrumb to protect your network information. Also included is the BCIMeshMapper, built to support mobile and autonomous mesh operations.



While a BreadCrumb-based network can be deployed without BC|Commander, BC|Commander provides a wealth of features for those network managers who want to exercise greater administrative control over their Rajant networks. As BreadCrumbs are added to the mesh network, maintaining optimal configurations and detecting inconsistencies become increasingly more difficult. BC|Commander provides a number of analysis tools that generate summary and detail data. That data can be viewed in BC|Commander and exported as PDF reports with a snapshot of the analyzed data as an attachment.

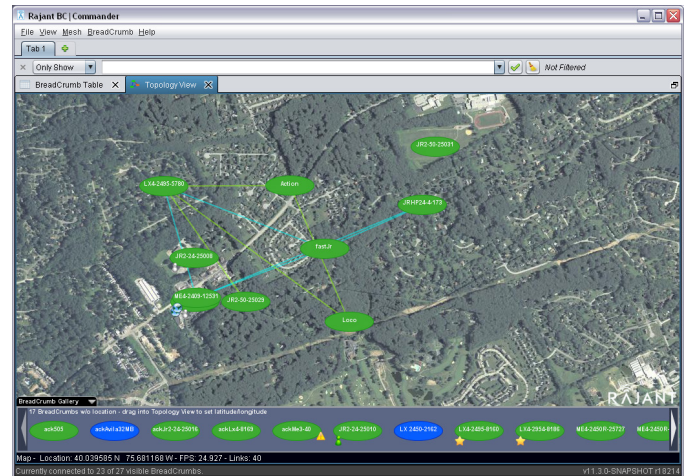
BC|Commander Features Overview

Major BC|Commander time-saving features include:

- Point-and-click configuration of multiple BreadCrumbs simultaneously
- Remote firmware updates on multiple BreadCrumbs simultaneously
- Real-time tabular views of the network with customizable columns
- Real-time topological views with a number of network graph layout options such as circle and bullseye layouts
- Wireless client displays showing information, such as which Wi-Fi clients are associated with which BreadCrumbs and real-time roaming of those clients
- Configuration of wireless encryption and authentication
- Radio frequency (RF) status displays for all mesh and client links
- Real-time map views of BreadCrumb devices using aerial or street views (via optional GPS receiver or manual location configuration)
- Network configuration reporting and analysis
- InstaMesh® trace to view the path from any node to any device at any moment with auto-refresh and a reverse path display
- Loading of previously saved network snapshots for analysis and troubleshooting
- Configurable units for input and display (metric, imperial, various GPS coordinate formats)
- Control of all other configurable BreadCrumb features such as radio settings, VLANs, access points, ESSID, security credentials, and TRoIP (Tactical Radio over IP)
- Real-time detailed view of each peer link in the mesh showing information such as transmit power, signal to noise ratio (SNR), distance, and associated link rate
- Ability to associate group icons to BreadCrumbs, view the icons in various topological views, and add new user-defined group icons as desired
- Configurable and savable view filters and screen layouts for various administrative tasks such as configuring a map view of trucks and a table view of towers
- Per-BreadCrumb alerts and warnings such as excessive RF noise detection and DFS channel avoidance in effect
- View diagnostic snapshots with snapshot comments
- Control of Dynamic Frequency Selection (DFS) and Dynamic Transmit Power (DTP)
- BCIMeshMapper to generate connectivity heat maps to analyze, diagnose, and optimize the performance of the Kinetic Mesh network; also provides visibility into how well infrastructure placements cover the active areas to analyze the overall health of InstaMesh links.

View Your Complete Network Instantly via BC|Connector

BC|Connector is our next-generation network management service that constantly discovers and maintains connections to the mesh network. At any time, BC|Commander can connect to BC|Connector for instant information about the mesh and its BreadCrumbs. This greatly reduces administrative overhead, provides much faster BC|Commander startup, and simplifies remote network monitoring by authorized administrators.

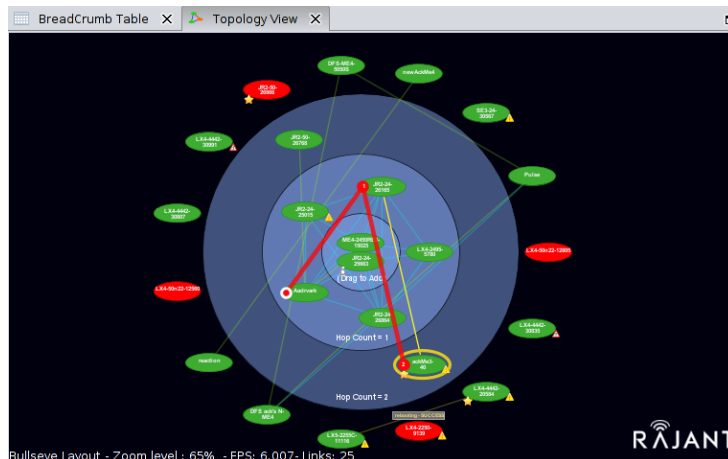


Optimize Your Rajant Kinetic Mesh® Network with BC|Commander

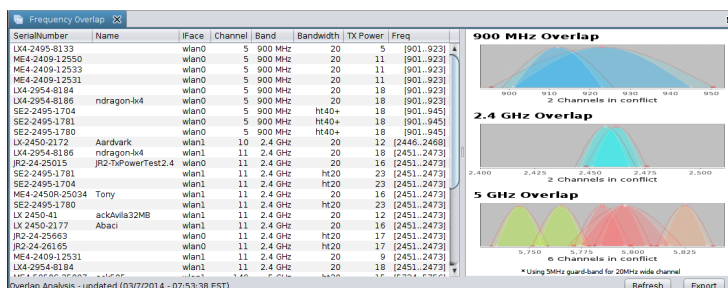
As your private wireless mesh network evolves and expands to support new applications and changing communication requirements, achieving optimal reliability, performance, and security requires a first-rate network management solution. BC|Commander is a best-in-class network management application with rich functionality that gives you the real-time information and time-saving tools you need to keep your communications flowing continuously and efficiently. And, we regularly update BC|Commander as new technologies become available.

For optimal Kinetic Mesh network performance, you can pair BC|Commander with BC|Enterprise, our always-on mesh network monitoring and alerting system. BC|Enterprise provides strategic data on historical mesh network performance with automatic system alerts to identify and diagnose potential network anomalies. Together BC|Commander and BC|Enterprise offer a comprehensive network monitoring and management solution for your Kinetic Mesh network.

With these sophisticated yet easy-to-use network management tools, you have the right information at the right time and the right tools to optimize your Rajant wireless mesh network. BC|Commander and BC|Enterprise are available from Rajant Corporation and its authorized channel partners.



Flags	Name or Serial	Session IP Address	Peers	Groups	Temperature	Uptime
	fastlr	10.50.12.1	7		1 day, 6:05:39	
	JR2-24-25008	10.97.176.1	3		42.0 °C 4 days, 0:54:54	
	JR2-24-25010	10.97.176.1	3		41.0 °C 3 days, 3:53:06	
	JR2-24-25029	10.97.197.1	1		42.0 °C 4 days, 0:54:54	
	JR2-50-25031	10.97.199.1	1		45.0 °C 2 days, 22:25:08	
	JRHP24-4-173	10.0.173.1	6		3 days, 23:20:04	
	Loco	10.97.196.1	3		45.0 °C 4 days, 0:54:51	
	LX-2450-2162	10.8.114.1				
	LX-2450-5780	10.22.148.1	8		44.5 °C 3 days, 23:58:02	
	LX-2450-8180	10.31.224.1	9		48.0 °C 6 days, 20:18:34	
	LX-2450-8186	10.31.250.1	1		51.0 °C 3 days, 23:58:48	
	ME4-2409-12531	10.48.243.1	7		43.3 °C 3:29:25	
	ME4-2450R-25...	10.100.127.1	1		34.6 °C 0:02:14	
	ME4-2450R-25...	10.100.128.1	1		34.1 °C 0:01:59	



Analyze, Diagnose and Optimize Your Kinetic Mesh Network with BCIMeshMapper

Integrated into BCICommander is the BCIMeshMapper, a network performance active survey utility that illustrates how the Kinetic Mesh connection quality varies by geographic location within a mesh network.

This diagnostic tool generates connectivity heat maps to help end users analyze, diagnose, and optimize a Kinetic Mesh network's performance. When changes happen in the topography of a network, running BCIMeshMapper immediately and after topography changes will give the network administrator excellent visibility into how well the current infrastructure placements cover the active area with the metrics most important to analyze the health of InstaMesh links.

How BCIMeshMapper Works

As a mobile BreadCrumb travels through a Kinetic Mesh infrastructure, data is obtained from the node with a GPS device and is combined with Signal-to-Noise Ratio (SNR), the cost to each BreadCrumb peer, and the total cost for a live trace. BCIMeshMapper then uses this data to generate a connectivity "heat map" in the KMZ file and saves the file onto the BCICommander host. This KMZ file can be then opened in a KML viewer, such as Google Earth. In the KML viewer, the data can be viewed for the trace path, or one can click a data placemark to view specific information for that location.

BCIMeshMapper assists network designers and administrators by visualizing coverage and connectivity challenges across their site. It automatically generates data files for use with Google Earth to illustrate how the mesh network performs over a traveled route. Visualizations include both the traced path along a route and the complete set of gathered data points. Both visualizations are colored according to customizable performance criteria.

Minimum requirements to operate include:

- BCICommander v11.22.6 or newer
- Firmware v11.17 or newer
- Functional GPS, such as the GlobalSat-BU-353S4 USB GPS receiver.



The Advantages of Using BCIMeshMapper

BCIMeshMapper collects signal strength and InstaMesh cost data from a designated mobile BreadCrumb enabled with GPS as it travels throughout the site. It then displays it visually and incorporates all of Rajant's NetCrumbler capabilities right inside BCICommander, except using cost instead of latency.

The color-coded heat maps generated by BCIMeshMapper depict the paths traveled and assessments of the paths. This can be used in roundtrip engineering to validate propagation models and to gauge the "Total Path Cost" between the mobile device and the gateway device (SlipStream or Gateway router IP address) to the wired network. The maps also contain other pertinent information, such as signal strengths, path costs, and further details about each BreadCrumb peer along the selected path. All deliverables need to be configurable by the end-user before the run commences.

Note the colors from map-to-map will vary as different thresholds are appropriate for various networks and applications.

In summary, BCIMeshMapper gives the network administrator yet another weapon in the arsenal against network drift. Monitoring, along with using BCIEnterprise, Rajant's historical network monitoring tool, provides the administrator with full visibility into the condition of their network health.