



# quantumCMD

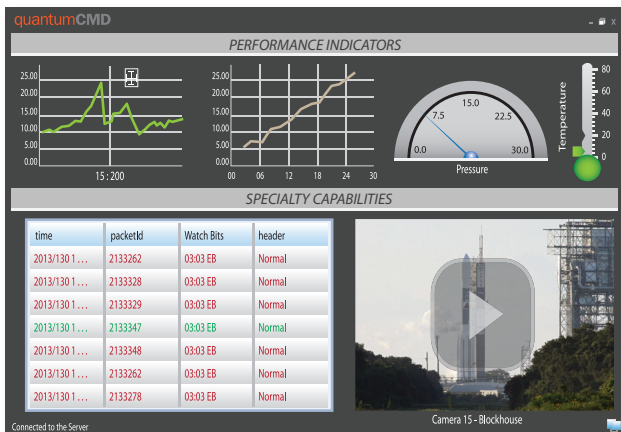
## Affordable C2 for Small Satellites . . . right out of the box

quantumCMD is the first commercial-off-the-shelf C2 product available at a price that fits small satellite budgets while assuring the functionality, reliability and security expected in traditional large satellite missions. quantumCMD is also scalable to support simple or complex missions, from single cube sats to small sat fleets.

### Total Turnkey Operations

The price of traditional C2 systems is not just about the hardware and software. Integration and unique mission customizations also drive costs during development and pre-launch operations. Operations and maintenance of the resulting complex ground system compounds Total Cost of Ownership (TCO) even after fully developed.

In contrast, quantumCMD relies upon industry standards such as Ground Equipment Monitoring Service (GEMS) and XML Telemetry and Command Exchange (XTCE) to streamline integration, reduce cost and dramatically shrink the time to full operation. A standardized command and telemetry database ingest format increases the efficiency of system set up, as well as consolidating the ingest of ground equipment variables and directives. In addition, standardized ground equipment interfaces allow quantumCMD to be plug-and-play with the rest of the ground system.



quantumCMD contains all necessary hardware and software for small sat C2, capitalizing on a standards-based architecture to enable out of the box mission operations in as little as weeks.

### Everything Needed, All In One Box



quantumCMD is a self-contained, pre-integrated, portable appliance designed from the bottom up to meet the specific technical, mission, schedule and budget of small satellite operations. Architected to support the core command, telemetry, trending and ground M&C needs common to small sat missions, out of the box functionality includes:

- Frame or Packet Decommutation
- Point Context Check
- Engineering Unit Conversion
- Measurand Limit Check and Alarming
- Point and Track File Generation
- Ground Device Monitor and Control
- Command Generation
- Command Formatting
- Command Authority Check
- Transmission & Tracking
- Verification
- Logging & Messaging
- Procedure Scripting
- Display Building
- Real-Time User Interface
- Ops Automation
- Plotting and Trending
- Raw Telemetry and Processed File Retrieval
- Mission Data File Generation

These match the requirements of most small sat missions, and quantumCMD can also serve as the core of a more complex system for advanced mission C2 needs. With more than 270 missions supported over 25 years, Kratos has the expertise to support all of your mission requirements.

## Features and Benefits

### Total Ground & Space Connectivity

- Complete telemetry and command processing
- Adaptable to evolving, dynamic ConOps and ageing vehicles
- Verification that commands are properly formatted and transmitted for proper execution
- Multiple databases for a single vehicle support all phases of mission life cycle from I&T through on-orbit operations

### Plug & Play Operations

- Self-contained appliance incorporates all needed hardware and software
- Industry-standard interfaces dramatically reduce system configuration and integration time
- Standard message format for exchanging spacecraft tracking data
- Built in database ingest tool

### Anywhere Access

- HTML5 web interface allows users to share common operational picture across networks
- No client software to install or maintain
- Drag-and-drop features make it easy for non-programmers to create custom dashboards that include graphs, charts, widgets, video feeds and more
- Built-in user access control and permissions management

### Full-Functioned Automation

- Support completely manual operations, “lights out” or anywhere in between
- Simplified scripting requires no programming experience to automate functions such as system pre- and post-contact ground system configuration, telemetry measurand checks, sending commands, ground equipment directives and more
- Pre-defined responses can be created for anomalous conditions, mission data triggers or repetitive actions required throughout the mission’s lifetime



## From The Leader In Satellite C2

*Kratos’ EPOCH IPS is the world’s leading satellite fleet management system used by more than 75% of commercial operators as well as government and military programs. Kratos has used its 25 years of TT&C leadership to design quantumCMD, the C2 system specifically for small sats.*

## Flexibility To Meet A Variety of ConOps

As a pre-configured appliance, quantumCMD can be online and supporting missions in a fraction of the time and cost of traditional C2 systems. Set up is reduced to a few steps for streamlined implementation and operation, leading to a Total Cost of Ownership far below traditional solutions. quantumCMD is available in three configurations:

	Educational	Essential	Enhanced
Focus	For missions that are solely sponsored by a qualified accredited educational institute	Core set of capabilities and functions needed to support a basic small sat mission	Complete set of capabilities that support more complex missions and ConOps. Includes playback utility.
Hardware	1RU rack server; Quad-core processor with 16 GB RAM; 2 x 500 GB Drives in RAID 1 array	1RU rack server; Quad-core processor with 16 GB RAM; 2 x 500 GB Drives in RAID 1 array	1RU rack server; Quad-core processor with 16 GB RAM; 2 x 500 GB Drives in RAID 1 array
Op System	Linux	Linux	Linux
Number of Spacecraft Supported	1	1	Up to 4
Number of Simultaneous Contacts	1	1	1
Number of Simultaneous Web Sessions	2	3	6
Maximum Telemetry and Command Database Size	1500 Telemetry Points 250 Commands	2000 Telemetry Points 500 Commands	2500 Telemetry Points 1000 Commands
Support Included	4 hours Q&A Support via telephone Tutorial Document	8 hours Q&A support via telephone Tutorial Document	16 hours Q&A support via telephone Tutorial Document
Automation	Yes	Yes	Yes