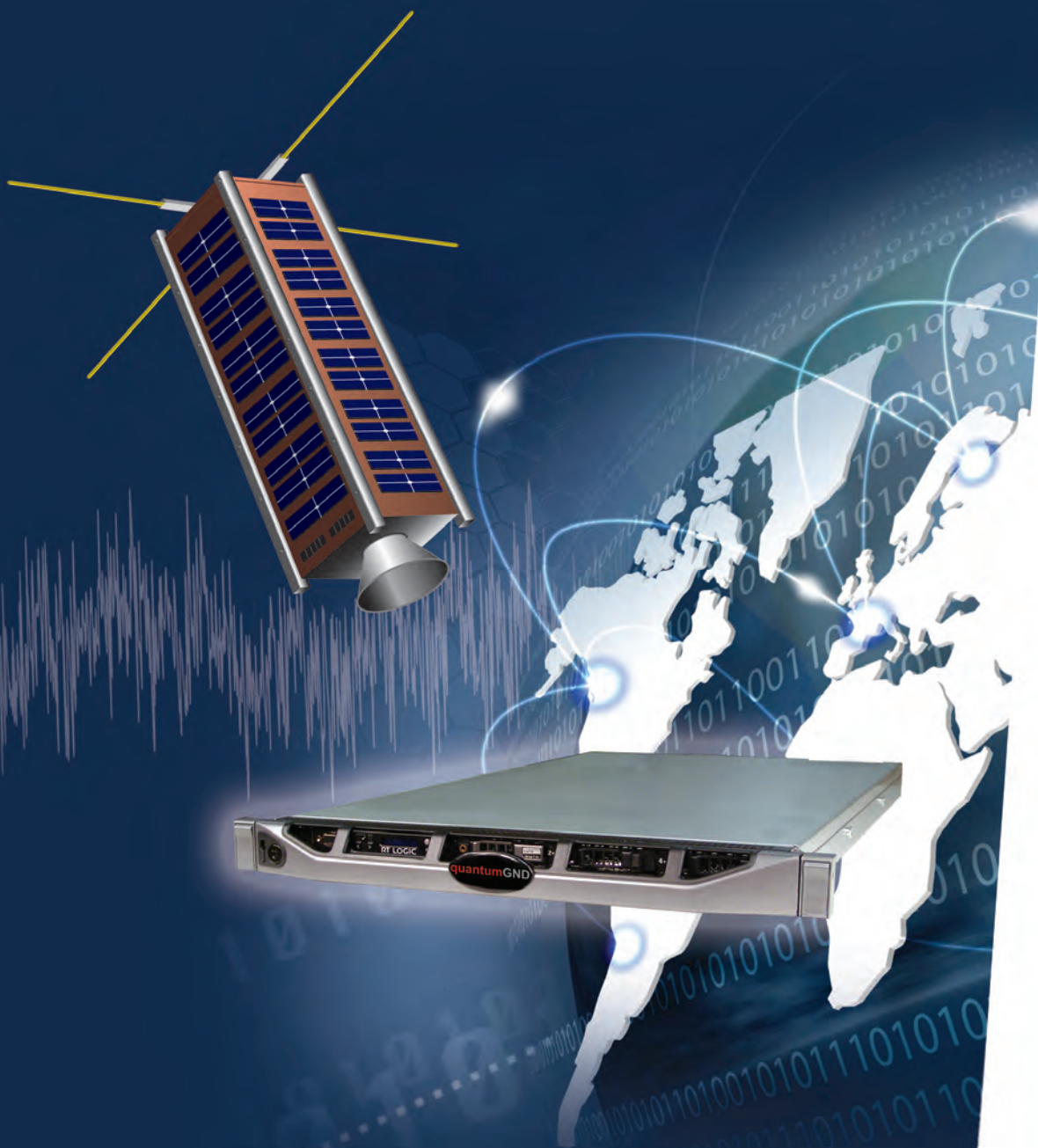


Ground Systems for Small Satellites



Transcend the complexity of traditional ground systems with quantumGND™, a pre-integrated, low cost, low risk turnkey C2 to RF solution for small satellites

quantumGND: Just Add Your Antenna and Go!

KRATOS[®]

C2 to RF Signal Processing For Small Satellites

Small satellites, from single satellites to small sat constellations, demand new and innovative methods of manufacture, launch and control. The growth of the small sat industry has been driven by design and manufacturing advances that have reduced satellite size, production costs and time by orders of magnitude; by new and cutting-edge launch technologies that are driving down launch costs; and now with a new and consolidated approach to small sat C2 and RF Signal Processing...a turnkey solution that is simple to install and operate, fits tight budgets, and can meet aggressive mission schedules! In short, an approach that avoids the complexity associated with ground systems designed for traditional, large satellites.

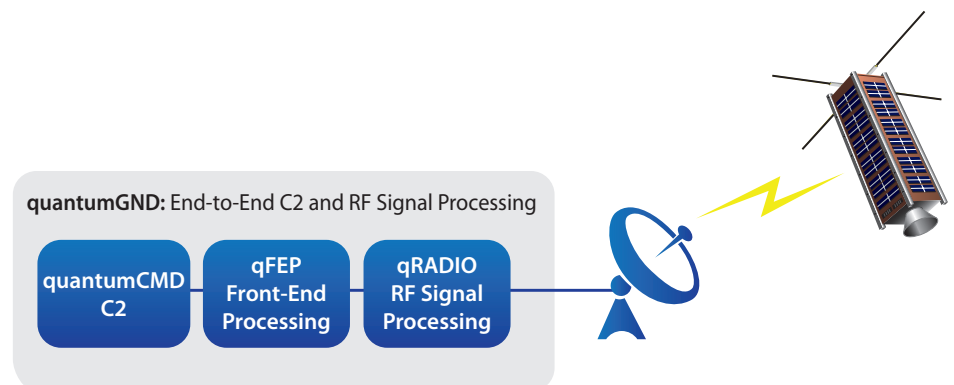
Just Add Your Antenna and Go

quantumGND is a complete small sat ground system package that includes everything you need from the C2 system, through the ground network, to the ground modem – giving you a pre-integrated, affordable, easy to use solution – just add your antenna and go. Rather than create your own small sat alternative to the traditional ground system, focus your attention on your payload and mission...and let quantumGND handle small sat ground.

Built on a virtual machine architecture that leverages Kratos' and RT Logic's proven experience in RF and C2 algorithms and software, quantumGND is modular and extensible, a ready for use "out of the box" solution specifically developed to satisfy the unique needs of the small sat market. Proven C2 and radio link performance, including compatibility with common space radios and third party ground station networks, is just the start of the key benefits you will realize with a solution that addresses your immediate needs and is primed for enhancement as your mission requirements change or constellations expand.

"New Space" Demands New Ground Solutions

Fully integrated and tested at our factory so that your installation and test and schedule risks are minimized, **quantumGND** is comprised of three pre-integrated components. quantumCMD provides C2 for a small satellite or a small sat fleet. It manages contact scheduling and execution on all passes, provides a single portal for viewing all ground and space status and consolidates



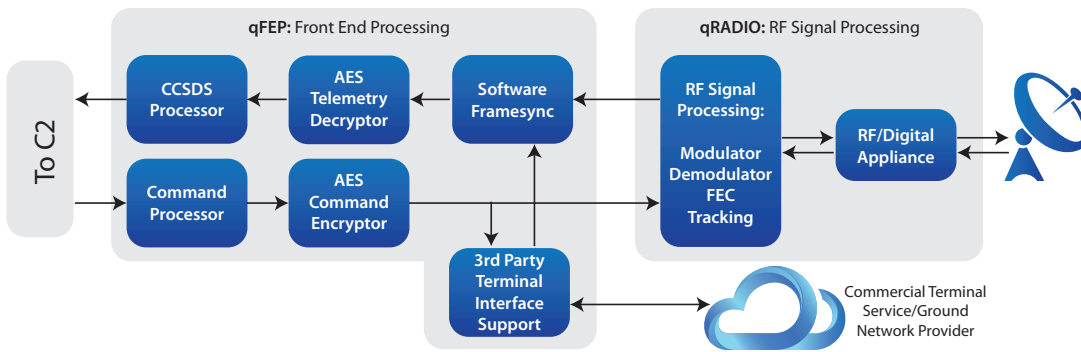
data, security, and system administration tasks. qFEP and qRADIO provide the baseband processing functions as required between the C2 system and the antenna – front end

processing, encryption/decryption, network transport and RF signal processing, while supporting a wide range of uplink/downlink frequency bands and low to high data rates. The three components deliver a virtual machine architecture solution specifically designed for small sat requirements. This pre-integrated solution features:

- Simplified set up with plug and play design
- Powerful automation tools provide an easy path to lights-out operation
- Complete situational awareness in one customizable dashboard
- Fully Web-based, HTML5 user interface
- Proven signal processing algorithms
- Integrated test functions allow you to “test-like-you-fly”
- Modular architecture scales single satellite to full constellations



Thin client, web-enabled user interface from any HTML5 browser



Everything you need from C2 to RF signal processing

Designed as a turnkey system, quantumGND’s modular components are available independently for small sat operators with existing or planned C2 or RF ground system elements. Whether your requirements are for a turnkey, end-to-end solution, or just for the C2 or RF Signal Processing elements, Kratos/RT Logic products empower you to focus on your spacecraft and overall mission – we’ve got the ground covered.

Industry Standard Software Interfaces streamline integration efforts and dramatically shrink the time to full operations while providing maximum flexibility for future enhancement. quantumGND software complies with all of the relevant interface standards, including the Ground Equipment Monitoring Service (GEMS, for monitoring & control), XML Telemetry and Command Exchange (XTCE, for telemetry database setup), and REST interface for external application control status. With quantumGND your ground system investment is protected, both for planned and unplanned future requirement changes.

Focus on your payload and mission...
...let quantumGND handle your small sat C2 to RF



About Kratos

For more than 30 years Kratos has been the acknowledged leader in the development and integration of ground segment solutions that are key to providing secure management, delivery and distribution of data and information from space and terrestrial-based platforms into networks for defense, intelligence, government and commercial satellite and communication service provider partners.

Kratos offers enterprise-grade ground system solutions encompassing Command & Control, integrated RF management solutions, including signal monitoring, geolocation and mitigation; satellite and terrestrial communications, network monitoring and control, service quality management and a broad array of sophisticated, yet cost effective, antennas. Kratos products and services are used by more than 75 percent of the world's commercial satellite operators and 90% of U.S.-based space missions.

Kratos subsidiaries include RT Logic, the leading supplier of ground-based equipment for space/ground communications and SAT Corporation, the leading provider of RF management solutions.



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www.kratostts.com/solutions/satellite-and-space/

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