



ODC.Space
DATA CENTER SERVICES

SERVICE USER GUIDE

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1 Introduction

ODC.Space is the marketplace for data center customers to buy turn-key orbital data center (ODC) solutions. We make purchasing ODC services simple: just select a power and data plan that works for you, ship your hardware to us, and we handle the rest. This user guide outlines everything that you need to fly your hardware with us.

Powered by Atomic-6 Light Wing™ solar arrays and cooled by Atomic-6 Hot Wing™ radiators, ODC.Space data centers offer the highest performance in the world at the lowest price. Through our supplier partnerships, our ODCs are equipped with the latest communications technology to enable secure, high speed data flow between you and your ODC.

2 Logistics Operations

This section outlines our process for getting your hardware to orbit and starting your ODC service.

2.1 Customer Hardware Receiving (1 day)

When you are ready, ship your hardware to our integration facility at:

ODC.Space
1690 Enterprise Way SE
Suite D
Marietta, GA 30067

We will receive your hardware, accept it into our inventory system, and schedule it for integration. You will receive an email notification when your hardware is received and scheduled for integration.

2.2 ODC Integration (1 week)

Customer hardware is mechanically installed into the ODC rack using electronically controlled torque drivers. Once installed, coolant connections are made and verified leak tight. Electrical connections are then mated and inspected. Once all hardware is integrated, power on software checkouts are performed to validate the installation. Customers may elect to remotely participate in the software checkouts if desired. You will receive an email notification when the integration is completed.

2.3 Shipping to Launch Site (1 day)

After the ODC integration is completed, the ODC spacecraft is shipped to the launch site via ground transport, typically Cape Canaveral Space Force Station (CCSFS). You will receive an email notification when the ODC has shipped to the launch site.

2.4 Launch Site Operations (30 to 90 days)

After arrival at the launch site, we coordinate all launch vehicle operations with the launch services provider. You will receive an email notification when the launch services integration is completed, and the launch date is finalized.

2.5 On-Orbit Checkout (up to 30 days)

After release from the launch services provider, the ODC spacecraft automatically deploys solar arrays, charges batteries, orients for communications, and established communications with the ground station. Once the spacecraft is power positive, we perform detailed checkouts. Low Earth Orbit collision deconfliction is coordinate with JSPOC through electronic messaging prior to start of maneuvering. The ODC spacecraft then raises its orbit to the final orbital altitude.

2.6 ODC Service Operations

Once reaching operational orbit, the ODC will start your ODC service. You will receive an email notification when the service is ready to go-live. Service will be provided for 5 years after go-live.

2.7 ODC Service Extension

After 5 years of service, you have the option to renew for up to 2 additional years of service.

2.8 Decommissioning

When the service term is completed, we dispose of the ODC spacecraft according to regulatory requirements for Low Earth Orbit ODCs, this would be a deorbit disposal. For non- LEO ODCs, we move the spacecraft to an allowable disposal orbit.

3 Ground Segment Data Service Interface

The ground segment provides the interface between your systems and the orbital data service by exposing access only to the onboard data center's compute and storage capacity, not to the spacecraft itself. User interaction is delivered through a dedicated virtual machine (VM) hosted on a secure commercial cloud platform, such as Amazon Web Services (AWS) and Microsoft Azure, selected at the time of order. This VM represents your ODC access point and serves as the sole boundary where user workloads, data exchange, and security controls are applied. From first principles, this separation reduces system complexity and risk by eliminating direct user interaction with flight systems.

Access to the ODC VM is established using standard remote connection mechanisms (e.g., SSH or RDP), secured through multi-factor authentication and role-based access control. Once authenticated, users interact with a controlled environment that mirrors the onboard data center's interfaces and services. Data submitted to the VM is treated as compute input or retrieval requests rather than spacecraft commands. All communication between the cloud-hosted VM and the onboard data center is handled automatically by the service and protected using encrypted links, ensuring confidentiality and integrity without exposing spacecraft-level controls.

To use onboard compute resources, users upload data sets, processing jobs, or configuration files into designated directories or service endpoints within the VM. These inputs are validated and queued for execution on the onboard data center according to defined resource and scheduling constraints. Resulting processed data products are returned to the VM and made available through structured directories or APIs. This model enforces deterministic data flow: users request computation and receive results, with no capability to alter spacecraft state or behavior.

Users manage their applications, data handling, and post-processing entirely within the cloud VM. Platform-provided monitoring tools expose objective metrics such as job status, execution time, storage utilization, and data transfer volumes. By abstracting spacecraft operations and providing access only to onboard compute outputs, the ground segment delivers scalable orbital data processing while maintaining strict isolation between user activities and spacecraft control systems.

4 Space Segment Service Interfaces

4.1 Mechanical Service

The Orbital Data Center (ODC) racks conform to the ANSI/EIA-310 and IEC 60297 standards, implementing the standard mechanical envelope and mounting interface commonly used in terrestrial 19-inch rack systems. This ensures dimensional compatibility, predictable load paths, and repeatable installation using well-characterized mechanical interfaces rather than custom fittings. Customer-furnished equipment must also comply with the ANSI/EIA-310 and IEC 60297 standards and shall be delivered in modular form factors ranging from 1U to 7U in height. Adhering to these constraints enables deterministic integration, efficient volume utilization, and mechanically robust operation within the ODC environment.

4.2 Cooling Services

The ODC cooling system provides a closed-loop liquid coolant to each rack to remove waste heat in a controlled and quantifiable manner. The delivered cooling medium is a water–glycol mixture composed of approximately 60% water and 40% glycol, selected to provide stable thermal performance and freeze margin across the operating envelope. Coolant is supplied at a nominal mass flow rate of 0.35 kg/s with an allowable variation of ±30%, defining the available heat rejection capacity for customer equipment. Supply and return lines are routed to interfaces using 1-inch tubing terminated with 1-inch female Swagelok® nut and ferrule assemblies, providing a standardized, repeatable mechanical and sealing interface. Customer hardware must be designed to operate within these flow and interface constraints to ensure predictable thermal performance. Customer hardware shall present an inlet and outlet cooling connection for each 7U of rack space utilized. All cooling connections shall be 316 stainless steel male straight-thread Swagelok® fittings to mate with 1" female Swagelok® nut and ferrule assembly.

4.3 Power Services

The ODC provides regulated DC power to each rack in a manner consistent with terrestrial data center practices for high-density deployments. Each rack receives a nominal input voltage of 48 V DC with an allowable tolerance of ±5%, ensuring stable operation of installed equipment. The available current is specified at a maximum of 23.4 A per 1U of rack space, allowing users to estimate and provision power for their hardware with predictable thermal and electrical load profiles. Power is distributed through standardized connectors (to be negotiated with the customer at time of purchase) designed to support the per-U allocation. Customers are responsible for ensuring their equipment can operate reliably within the provided voltage, current, and distribution limits. This arrangement mirrors typical high-density, DC-powered colocation or HPC environments, offering familiar planning and integration workflows for terrestrial data center users.

Customer furnished equipment shall present a male D38999 Series III connector P/N D38999/24FE6SN. The connector, less contacts, should be available to customers at <\$100 through retail channels. The connector pinout is shown in the table below.

Pin	Wire Gauge	Conductor	Image
A	14	Power 48V+	
B	14	Power 48V+	
C	14	Chassis	
D	14	Bus Return	
E	14	Bus Return	
F	14	Chassis	

4.4 Onboard Data Services

The 1U rack element provided by the customer interfaces with the spacecraft communications system via a 10 GbE digital link over a D38999 connector with Quadrax contacts, designed for 100 Ω ±10 Ω differential impedance. Data is transmitted in packetized Ethernet format, supporting high-throughput telemetry, command, and data while maintaining error detection and flow control to ensure integrity under orbital conditions. The connector provides a space-qualified, low-crosstalk physical interface; pinouts and electrical levels must match the spacecraft adapter specifications.

The spacecraft link manages uplink and downlink coordination, automatically framing incoming data from the 1U element for transmission to ground stations. Downlinked data is delivered in the same Ethernet format, with buffering to accommodate temporary link interruptions. Operational procedures include initialization handshakes, link status monitoring, and error reporting, all accessible via onboard diagnostic tools or ground command sequences. The interface supports remote configuration of data rates, packet prioritization, and redundancy routing, providing sufficient bandwidth for the majority of orbital applications.

5 Ground Phase Environments

5.1 Integration Environment

All integration activities within the orbital data center are conducted in a controlled environment designed to maintain system integrity and component reliability. Temperature and humidity are actively regulated to prevent condensation, static discharge, and thermal stress, supporting safe handling of sensitive electronics and mechanical assemblies. The environment is maintained to ISO 8 cleanroom standards, ensuring controlled levels of airborne particles. Customer equipment is enclosed during launch services integration. Customer furnished equipment should be verified free of foreign object debris prior to shipment to the integration facility.

Parameter	Value
Cleanliness	ISO 14644-1 Class 8 <ul style="list-style-type: none"> • ≥ 0.5 μm: 3,520,000 • ≥ 1.0 μm: 832,000 • ≥ 5.0 μm: 29,300
Temperature	20°C +/-3°C
Humidity	25% to 60%

5.2 Transportation Environment

Transportation environments are enveloped by the launch environments.

5.3 Launch Environment

The launch environment is enveloped by the SpaceX Payload Rideshare User’s Guide Version 10, September 2024. Refer to the following sections:

Environment	User Guide Section
Quasi-Static Loads	4.1.2
Sine Vibration	4.1.3
Acoustic	4.1.4
Shock	4.1.5

Random Vibration	4.1.6
Electromagnetic	4.1.7
Pressure Decay	4.1.8

6 Orbital Phase Environments

6.1 Venting

Customer furnished equipment shall be designed to fully vent during the launch phase.

6.2 Outgassing

Customer furnished equipment shall be compliant with ASTM E595 with a Total Mass Loss (TML) \leq 1.0%, Collected Volatile Condensable Material (CVCM) \leq 0.1%.

6.3 Thermal

Customer furnished equipment should be designed to operate between 0°C and 80°C.

6.4 Electromagnetic

Customer furnished equipment should be designed to comply with MIL-STD-461G emission and susceptibility limits for spacecraft systems. Customer furnished equipment detected to cause interference once on-orbit, will be notified and power turned off until the issue is resolved or deemed irresolvable.

6.5 Radiation

Customer furnished equipment should expect to experience typical radiation experienced in Low Earth Orbit (LEO) over a 5 to 7 year mission life, typically 5krad to 7krad.

7 Requirements Tailoring and Design Support

ODC.Space has developed this user guide to be as simple as possible for customer equipment. We understand that some customers may require tailoring of the above requirements and/or support in their equipment design. ODC.Space is available to work with customers under contract to assist them in requirements tailoring and design at an additional service cost. Please contact your ODC.Space sales team member to request support.