



KESTREL™
u5

Kestrel™ u5 User Manual

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Table of contents

1	Introduction	1
1.1	Intended audience	1
1.2	Acronyms and definitions	1
2	Product overview	3
2.1	Key features	4
2.2	System components	4
2.2.1	User terminal	4
2.2.2	Router	4
2.2.3	External GEO modem (optional)	5
2.2.4	Customer network equipment	5
2.3	Supported product configurations	5
2.3.1	u5 LEO configuration for Rail	5
2.3.2	u5 LEO/GEO configurations	5
2.3.3	SKU descriptors definitions	7
3	Technical specifications	8
3.1	UT specifications	8
3.2	Router specifications	9
4	Safety and handling	10
4.1	General safety information	10
4.2	Handling precautions	10
4.3	Electrical safety	10
4.4	Electrostatic discharge (ESD) precautions	11
4.5	Information for operators and maintenance technicians	11
4.6	RF energy exposure	11
4.7	Hazard zones	13
4.8	Hazard zone coordinate system	13
5	Planning the installation	15
5.1	Verifying required equipment	15
5.1.1	Verifying software requirements	15
5.2	Evaluating the installation site	16
5.2.1	Verifying line-of-sight requirements	16
5.2.2	Identifying nearby RF transmitters	17
5.3	Verifying environmental and thermal conditions	18
5.4	Verifying electrical service	19

5.4.1	General electrical requirements	19
5.4.2	Power requirements	19
5.4.3	Supported power solutions	19
5.4.4	Grounding requirements	20
5.5	Selecting a mounting solution	20
5.6	Planning GEO modem integration (optional)	21
6	Installing the Kestrel u5 UT	22
6.1	Understanding the installation process	22
6.2	Unpacking and inspecting the equipment	22
6.2.1	Unpacking the equipment	22
6.2.2	Inspecting the equipment	23
6.3	Preparing for installation	23
6.4	Installing the mounting hardware	23
6.5	Mounting the UT	23
6.6	Installing the router and power equipment	24
6.6.1	Installing the router	24
6.6.2	Installing power equipment	24
6.7	Connecting interfaces	25
6.7.1	Connecting the UT and router	25
6.7.2	Connecting an external GEO modem (optional)	25
6.7.3	Connecting a computer or mobile device	26
6.7.4	Verifying cable installation	26
6.7.5	Routing and securing cables	26
6.8	Verifying the installation	26
7	Setting up and commissioning the system	28
7.1	Preparing for system setup	28
7.2	Powering on the system	28
7.3	Verifying system start-up	28
7.4	Activating and commissioning services	29
7.4.1	Activating OneWeb LEO services	29
7.4.2	Loading an ephemeris file	29
7.4.3	Activating GEO services	30
7.5	Completing system setup	30
7.6	Verifying service operation	30
7.7	Powering off the system	31
7.8	Preparing the system for operation	31

8	Managing the Kestrel u5	32
8.1	Accessing the Kymeta u5 Access GUI	32
8.1.1	Accessing the GUI using Ethernet	32
8.1.2	Accessing the GUI using Wi-Fi	32
8.1.3	Verifying access	33
8.2	Viewing system status	33
8.3	Monitoring system performance	34
8.4	Managing hazard zones	34
8.4.1	Understanding hazard zones	34
8.4.2	Defining hazard zones	35
8.5	Managing modem selection	35
8.5.1	Selecting LEO modem	35
8.5.2	Selecting an external GEO modem	36
8.6	Managing EMCON operation	36
8.6.1	Understanding EMCON states	36
8.6.2	Understanding EMCON behavior	38
8.6.3	Verifying EMCON status	38
8.7	Understanding licensed features	38
8.7.1	Understanding feature entitlements	38
8.7.2	Obtaining licensed features	39
8.8	Running diagnostics	39
8.8.1	Viewing diagnostic logs	39
8.8.2	Monitoring signal quality	39
8.8.3	Verifying GNSS operation	39
8.8.4	Reviewing modem status	40
8.8.5	Monitoring hazard zone events	40
8.8.6	Collecting diagnostic information	40
8.8.7	Viewing hazard zone events in the SSM log (LEO)	41
9	Accessing the REST API documentation	42
9.1	OpenAPI Specification	42
9.2	Using the OpenAPI Specification	42
10	Troubleshooting the system	44
10.1	Troubleshooting overview	44
10.2	Following troubleshooting best practices	44
10.3	Following the troubleshooting workflow	44
10.3.1	Verifying carrier lock	45

10.3.2	Verifying signal quality	45
10.3.3	Verifying network connectivity	45
10.3.4	Verifying system controls	45
10.4	Resolving common issues	46
10.4.1	Resolving signal acquisition issues	46
10.4.2	Resolving signal quality issues	46
10.4.3	Resolving connectivity issues	47
10.4.4	Resolving transmission issues	47
10.4.5	Resolving GNSS issues	47
10.4.6	Resolving firmware and compatibility issues	48
10.5	Performing reset and recovery procedures	48
10.5.1	Understanding reset functions	48
10.5.2	Rebooting the system	49
10.5.3	Resetting router network settings	49
10.5.4	Restoring router software	49
10.5.5	Restoring router/terminal software and configuration	50
10.5.6	Resetting terminal network settings	50
10.5.7	Resetting terminal configuration	51
10.5.8	Performing terminal failsafe recovery	51
10.6	Collecting support information	51
10.6.1	System identification information	51
10.6.2	Software information	52
10.6.3	Operational status information	52
10.6.4	Diagnostic logs	52
10.6.5	Description of the issue	52
10.6.6	Supporting documentation	53
10.7	Obtaining technical support	53
10.7.1	Contacting your distribution partner	53
10.7.2	Contacting Kymeta customer support	53
10.7.3	Requesting replacement parts	54
10.7.4	Warranty information	54
11	Maintaining the system	55
11.1	Performing routine inspections	55
11.1.1	Inspecting mounting hardware	55
11.1.2	Inspecting connectors and seals	55
11.1.3	Inspecting airflow and thermal clearances	55

11.1.4	Inspecting mounting structures and brackets	56
11.1.5	Inspecting the radome surface	56
11.1.6	Verifying system operation	56
11.2	Updating software	56
11.2.1	Understanding automatic software updates	57
11.2.2	Updating a system after extended storage or inactivity	57
11.2.3	Verifying software versions	57
11.2.4	Performing manual software updates	57
11.3	Removing snow and ice	57
11.3.1	Removing accumulated snow	58
11.3.2	Removing ice accumulation	58
11.3.3	Verifying system condition after snow or ice removal	58
11.4	Cleaning the system	58
11.4.1	General cleaning precautions	59
11.4.2	Cleaning exterior surfaces	59
11.4.3	Cleaning connectors and hardware	59
11.4.4	Final inspection after cleaning	60
11.5	Reapplying the hydrophobic coating	60
11.6	Preparing the system for shipment	60
11.6.1	Packaging recommendations	61
12	Accessories and field replaceable units	62
12.1	Ordering replacement parts	63
13	Warranty	63
14	Regulatory and legal information	63
14.1	Declaration of conformity	63
14.2	Compliance	64
14.2.1	Rail standards	64
14.2.2	Non-rail standards	65
14.3	FCC regulatory information	65
14.4	Radio Standards Specifications (RSS) information	66
14.5	WEEE information	66
15	Customer support	66
16	Revision history	67
17	Copyright and trademark information	67
	Appendix A. UT configurations setup	68
	Appendix B. LED indicators	70

1.1 Burst pattern syntax	70
1.2 LED state	70
Appendix C. I/O panel interfaces and functions	71
Appendix D. Router interfaces and functions	72

1 Introduction

This manual provides information required to install, configure, operate, monitor, and maintain the Kymeta™ Kestrel™ u5 user terminal (UT).

The manual is intended to support deployment and operation of Kestrel u5 systems in fixed, mobile, rail, communications-on-the-move (COTM), communications-on-the-pause (COTP), and hybrid LEO/GEO environments.

The procedures and guidance provided in this manual are intended for trained personnel responsible for installation, operation, monitoring, and maintenance of the UT.

1.1 Intended audience

This manual is intended for:

- Installers responsible for system deployment and commissioning
- Operators responsible for routine system operation
- Network Operations Center (NOC) personnel responsible for monitoring and troubleshooting
- Service and maintenance personnel responsible for system upkeep

Users should be familiar with basic networking concepts, power systems, and applicable site safety requirements before performing procedures described in this manual.

1.2 Acronyms and definitions

Acronym	Definition
ACU	Antenna control unit
AIM	Antenna interface module
CMXC	Commercial multi-constellation RF chain
CNX	Customer network exchange
COTP	Communications-on-the-pause
COTM	Communications-on-the-move
ESA	Electronically scanned antenna
ESD	Electrostatic discharge

Acronym	Definition
GEO	Geostationary Earth orbit
GNSS	Global navigation satellite system
GUI	Graphical user interface
IP	Internet protocol
LEO	Low Earth orbit
MoCA	Multimedia over Coax Alliance
NOC	Network operations center
OpenAMIP	Open antenna-modem interface protocol
RF	Radio frequency
SD-WAN	Software-defined wide area network
SSM	Satellite subscriber module
SSMv2	OneWeb satellite subscriber module version 2
UT	User terminal
Wi-Fi	Wireless local area network technology
XCVR	Antenna subsystem including the ESA, RF chain, ACU, GNSS receiver, SSM, and enclosure

2 Product overview

The Kestrel u5 is a software-defined, full-duplex electronically steered antenna (ESA) platform that provides broadband satellite communications over Low Earth Orbit (LEO) and compatible Geostationary Earth Orbit (GEO) satellite networks.

The Kestrel u5 is designed to provide reliable connectivity in fixed, mobile, and rail environments. The electronically steered antenna enables satellite tracking without mechanical movement, allowing the system to maintain connectivity while stationary or in motion.

The Kestrel u5 supports fixed, mobile, rail, communications-on-the-move (COTM), and communications-on-the-pause (COTP) deployments. Depending on the deployment configuration, the system can operate using OneWeb LEO services, compatible GEO services through an external modem, or hybrid LEO/GEO services.

The system is managed through the Kymeta u5 Access graphical user interface (GUI), which provides monitoring, configuration, diagnostic, and service management capabilities.



Figure 1: Kestrel u5 UT overview

2.1 Key features

Key features of the Kestrel u5 include:

- Electronically steered antenna technology
- Full-duplex satellite communications
- Support for OneWeb LEO services
- Support for compatible GEO services
- Hybrid LEO/GEO operation
- Integrated GNSS receiver
- Ethernet connectivity
- Wi-Fi connectivity
- SD-WAN functionality
- IP68 and IP69K environmental protection

2.2 System components

A typical Kestrel u5 system consists of a UT, a Kymeta router, and customer network equipment. Depending on the deployment configuration, the system may also include an external GEO modem, power supply equipment (such as an AC-DC power supply or rail-certified DC-DC converter), and mounting accessories.

2.2.1 User terminal

The Kestrel u5 UT is the primary satellite communications component of the system. The UT contains the ESA, RF subsystem, integrated GNSS receiver, and embedded OneWeb satellite subscriber module (SSMv2) required to establish and maintain satellite connectivity. The GNSS receiver provides location and timing information used during satellite acquisition and operation, while the embedded SSMv2 provides connectivity to the OneWeb LEO network.

2.2.2 Router

The Kymeta router provides power, networking, and management functions for the Kestrel u5 system. The router supplies power and data connectivity to the UT and serves as the primary interface for system management. Users access the Kymeta u5 Access GUI through the router to monitor and manage the system.

The router provides:

- MoCA transport
- Ethernet switching
- SD-WAN functionality
- Wi-Fi connectivity
- Access to the Kymeta u5 Access GUI

2.2.3 External GEO modem (optional)

For GEO deployments, the Kestrel u5 can be integrated with a compatible external GEO modem.

The external modem provides access to supported GEO satellite services to support hybrid LEO/GEO deployments.

2.2.4 Customer network equipment

Customer network equipment includes computers, networking devices, and other systems connected to the Kestrel u5 network. Devices can connect through the Ethernet or Wi-Fi interfaces provided by the Kymeta router.

2.3 Supported product configurations

2.3.1 u5 LEO configuration for Rail

The table below lists available u5 LEO UT configurations for Rail (cardboard packaging):

SKU	Description
U50K-AW08TA-CBBAA01-0	KESTREL U5 TEXTURED WHITE, SSMV2, ROUTER1, RAIL 200W DC, 1 COAX, INBOARD MNT

Kestrel u5 LEO UT configurations for Rail includes:

- Kestrel u5 user terminal
- Kestrel u5 router
- Rail-certified DC-DC converter
- Coax cable kit for test setup
- Inboard mount
- Associated cables and installation hardware

The supplied coax cable kit is intended for test setup purposes only. Rail installations shall use rail-certified cabling that meets applicable installation requirements.

Refer to [*Kestrel u5 LEO UT components and setup*](#) for the content and setup diagram.

2.3.2 u5 LEO/GEO configurations

The table below lists available u5 LEO/GEO UT configurations (cardboard packaging):

SKU	Description
U50K-AG08TA-AABA0D-0	KESTREL U5 TEXTURED GREY, SSMV2, ROUTER1, 200W DC, 2 COAX, INBOARD MNT, GHOST/MORPH LIC

SKU	Description
U50K-AG08TA-BABA0D-0	KESTREL U5 TEXTURED GREY, SSMV2, ROUTER1, 240W AC, 2 COAX, INBOARD MNT, GHOST/MORPH LIC
U50K-AW08TA-BAAA01-0	KESTREL U5 TEXTURED WHITE, SSMV2, ROUTER1, 240W AC, 2 COAX, OUTBOARD MNT

The table below lists available u5 LEO/GEO UT configurations (flyaway case):

SKU	Description
U50K-AG08TA-BABB0D-0	KESTREL U5 TEXTURED GREY, SSMV2, ROUTER1, 240W AC, 2 COAX, INBOARD MNT, GHOST/MORPH LIC, FLYAWAY
U50K-AW08TA-BAAB01-0	KESTREL U5 TEXTURED WHITE, SSMV2, ROUTER1, 240W AC, 2 COAX, OUTBOARD MNT, FLYAWAY CASE
U50K-AW08TA-BABB0D-0	KESTREL U5 TEXTURED WHITE, SSMV2, ROUTER1, 240W AC, 2 COAX, INBOARD MNT, GHOST/MORPH LIC, FLYAWAY

The generic system configuration includes:

- Kestrel u5 user terminal
- Kestrel u5 router
- AC-DC power supply
- Coax cable kit
- GEO modem cable kit
- Mounting hardware
- Associated cables and installation hardware

Refer to [Kestrel u5 LEO/GEO UT components and setup](#) for the contents and setup diagram.

2.3.3 SKU descriptors definitions

The table below defines the SKU descriptors used in the product configuration descriptions.

Descriptor	Definition
SSMV2	OneWeb Satellite Subscriber Module Version 2
ROUTER1	Kymeta ruggedized router platform
240W AC	AC-powered configuration
RAIL 200W DC	Rail-certified DC power solution
1 COAX	Single RG-6 cable assembly included
2 COAX	Dual 'Siamese' RG-6 cable assemblies included
INBOARD MNT	Inboard mounting solution
OUTBOARD MNT	Outboard mounting solution
GHOST/MORPH LIC	Software-enabled licensed feature set

3 Technical specifications

This chapter provides the key technical specifications for the Kestrel u5 user terminal and Kymeta router. Additional interface, power, and installation requirements are provided in subsequent chapters.

3.1 UT specifications

The table below lists the Kestrel u5 user terminal specifications.

Parameter	Specification
Antenna type	Single aperture, full duplex, Ku-band ESA
Scan angles	Azimuth 360°, Elevation +15° to +90°
Polarization	Software-defined circular
RX band	10.70 GHz to 12.75 GHz
TX band	13.75 GHz to 14.50 GHz
G/T	9.2 dB/K
EIRP	LEO: 40.3 dBW GEO: 42.3 dBW (broadside)
Modem	Embedded OneWeb satellite subscriber module (SSMv2)
Dimensions	60 cm × 60 cm × 8 cm 23.62 in. × 23.62 in. × 3.15 in.
Weight	10.75 kg 23.70 lb.
Input power	AC via external power supply
Typical power	100 W
Operating temperature	-40 °C to +55 °C (ambient) -40 °C to +70 °C (with solar load)
Survival temperature	-40 °C to +85 °C
Ingress protection	IP68

3.2 Router specifications

The table below lists the Kestrel u5 router specifications.

Parameter	Specification
Hosted capabilities	OneWeb CNX, Kymeta u5 Access GUI
Dimensions	32.9 cm × 23.8 cm × 4.2 cm 12.95 in. × 9.37 in. × 1.65 in.
Weight	1.8 kg 3.97 lb.
Input power	AC via external power supply
Operating temperature	-40 °C to +55 °C (ambient) -40 °C to +70 °C (with solar load)
Ingress protection	IP68

4 Safety and handling

4.1 General safety information

Read and understand all safety information before installing, operating, servicing, or maintaining the UT.

Failure to follow the procedures and precautions described in this manual may result in equipment damage, degraded performance, service interruption, personal injury, or violation of applicable safety regulations.

Only trained personnel should install, configure, service, or maintain the system.

The UT contains no user-serviceable components within the sealed UT enclosure.

4.2 Handling precautions

Use care when handling the UT, router, cables, and accessories.

Observe the following precautions:

- Use appropriate lifting practices when handling the user terminal or mounted assemblies.
- Protect connectors and cable assemblies from impact, contamination, and excessive strain.
- Do not lift, carry, or support equipment using attached cables.
- Do not place objects on top of the user terminal.
- Do not apply coatings, coverings, or materials that could obstruct the radiating surface of the user terminal.
- Inspect all equipment for shipping damage before installation.

If equipment damage is observed, do not install or operate the system until the condition has been evaluated.

4.3 Electrical safety

The UT receives power through the Kymeta router. Power is distributed from the router to the UT through the TERMINAL interface. Observe the following electrical safety requirements:

- Ensure all electrical installations comply with applicable local, national, and site-specific electrical regulations.
- Install appropriate upstream over-current protection in accordance with applicable electrical codes.
- Verify that the power source meets system requirements before applying power.
- Disconnect input power before installing, relocating, or servicing system components.
- Use only approved or properly qualified power conversion equipment for the installation environment.
- When using customer-supplied power equipment, verify compatibility before operation.

4.4 Electrostatic discharge (ESD) precautions

The UT contains electrostatic discharge (ESD)-sensitive electronic components. Improper handling may result in equipment damage. Observe the following precautions:

- Follow established ESD control procedures when handling connectors and system components.
- Avoid contact with connector contacts and exposed conductive surfaces.
- Store and transport equipment using appropriate protective packaging.
- Use grounded ESD protection equipment when performing authorized service activities.

The user terminal enclosure is sealed and contains no user-serviceable components. Unauthorized disassembly or modification may damage the equipment and void the product warranty.

Do not open or remove the sealed antenna enclosure.

4.5 Information for operators and maintenance technicians

Operators and maintenance technicians working on or near the Kestrel u5 system should be trained on applicable RF exposure requirements and the time-averaging considerations specified in FCC OET Bulletin 65 or other applicable national regulations.

Before performing maintenance that requires access to the antenna or its immediate surroundings, technicians shall perform one of the following actions:

- Place the antenna in a non-transmitting state (receive-only mode).
- Remove power from the system and verify that shutdown is complete.

In installations where the Kestrel u5 is accessible to the public or installed in an unsecured area, appropriate barriers or access controls should be used to maintain a safe distance from the antenna during operation.

4.6 RF energy exposure

To avoid RF exposure when operating a UT in the 16.9 W (GEO) / 9.6 W (LEO) configuration, do not place your head or other body parts near the top and sides of the UT when the system is operational.

Maintain a distance of **3 m (118 in.) from the face of the UT** and **170 cm (66.9 in.) from any edge of the UT**.

Figure 2 identifies the keep-out region (shown in blue) and safe region (outside the blue area).

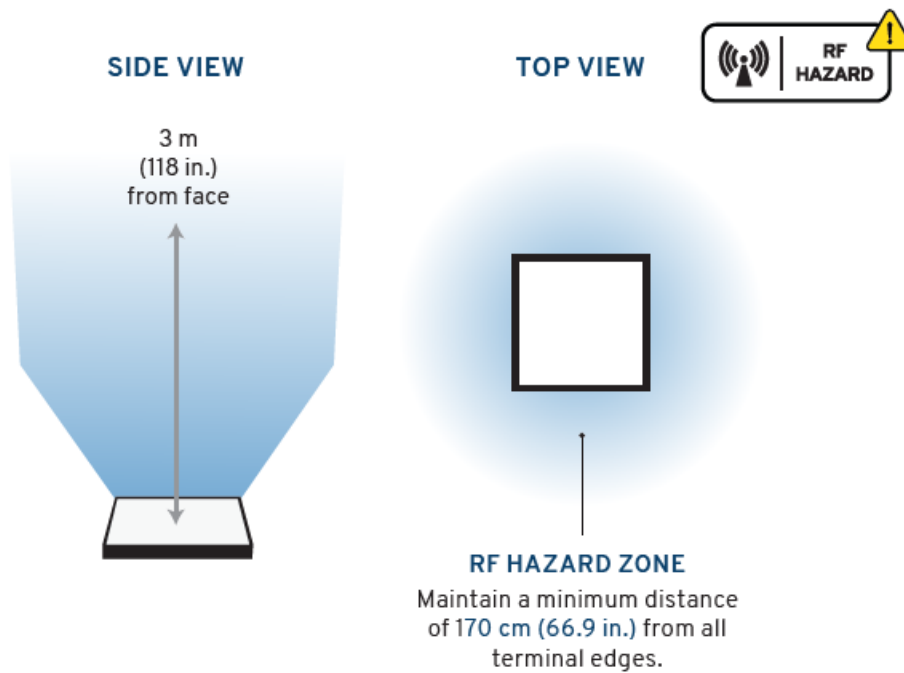


Figure 2: Keep-out region (gray cone) and safe region (outside the gray cone) for a 16.9 W (GEO) / 9.6 W (LEO) UT

In unusual cases where the UT is not in a secured area inaccessible to the public, customers should install an indicative barrier around the UT. The unlikely scenario of a member of the general public accessing the keep-out region near the UT is deemed analogous to a condition of transient exposure that would exist for only a very short duration or will mute if the receive signal is blocked by an RF-blocking obstruction.

Kymeta has received authorization to operate the UT in the 16.9 W (GEO) / 9.6 W (LEO) configuration described herein only. Any increase to input power may increase RF exposure and/or increase the size of the keep-out region described by the gray cone above.

No modifications or changes to the input power should be made without the express consent of Kymeta. Any such changes, if approved, should only be completed by trained professionals who have reviewed and understand the consequences of such changes, including, but not limited to, an understanding of FCC OET Bulletin 65.

Any such changes may require additional testing or recertification/authorization from applicable regulatory agencies. Such testing and authorizations are the responsibility of the user, and Kymeta assumes no liability where such changes are made to the UT.

Kymeta u5 terminals comply with FCC guidelines for protecting individuals from harmful levels of RF exposure.

4.7 Hazard zones

The Kymeta u5 Access GUI provides the ability to define hazard zones for both LEO and GEO operations.

When enabled, hazard zones mute UT transmission whenever the antenna pointing vector directed toward the intended satellite intersects a defined hazard zone. This functionality helps prevent unintended RF exposure to personnel and can also be used to protect nearby equipment and infrastructure.

Refer to [Section 4.6 RF energy exposure](#) for additional information regarding RF exposure considerations.

The system supports multiple hazard zone definitions. The use of hazard zones and enforcement of transmit restrictions are controlled by the user or installation operator.

Note: The UT is unable to select an alternative satellite when a hazard zone is encountered. Hazard zones do not mitigate outages caused by obstructions or blockages.

4.8 Hazard zone coordinate system

Hazard zones are defined using a local antenna coordinate system.

Figure 3 illustrates the hazard zone coordinate system.

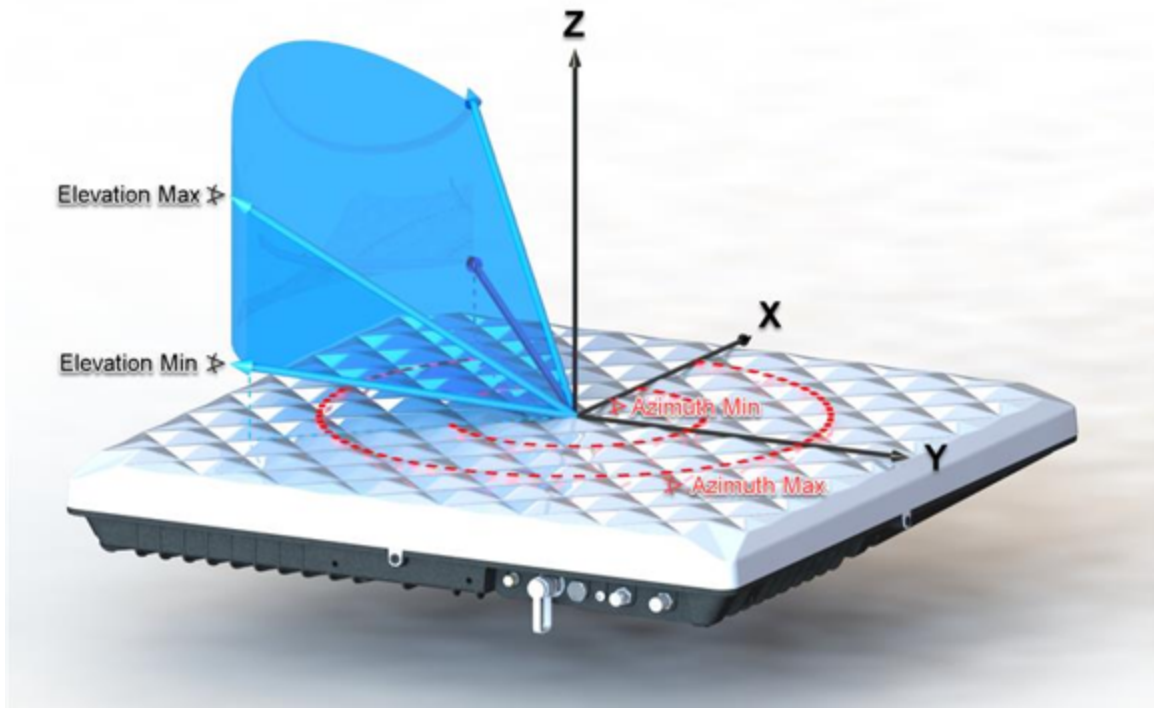


Figure 3: Hazard zone coordinate system

The x-axis points away from the interface panel.

Azimuth values are measured relative to the positive x-axis. Positive azimuth angles are measured in the clockwise direction from the perspective of an observer above the radome standing behind the interface panel.

Elevation values are measured from the surface of the radome (x-y plane). Positive elevation values are measured in the direction of the positive z-axis.

The hazard zone coordinate system is local to the antenna and, once installed, remains fixed relative to the coordinate system of the installation platform.

Hazard zones are defined using minimum and maximum azimuth and elevation values.

- Azimuth range: 0° to 360°
- Elevation range: 0° to 90°

Figure 3 illustrates a hazard zone solid angle defined by minimum and maximum azimuth and elevation values.

5 Planning the installation

Before installing the Kestrel u5 UT, verify that the required equipment, software, installation site, and supporting infrastructure are available. Completing the planning activities described in this chapter helps reduce installation time and minimizes the need for rework.

After completing these planning activities, proceed to [Section 6 Installing the Kestrel u5 UT](#).

5.1 Verifying required equipment

Verify that all equipment required for the planned deployment is available before arriving at the installation site.

Depending on the selected configuration, the installation may include:

- Kestrel u5 UT
- Kymeta router
- Power supply or power conversion equipment
- Mounting hardware
- Cable kits
- Installation hardware
- Optional external GEO modem
- Optional accessory kits

Inspect all equipment before installation and verify that no components were damaged during shipment.

Initial system setup requires a computer or mobile device equipped with:

- Ethernet, Wi-Fi, or both
- A supported web browser

The device is used to access the Kymeta u5 Access GUI during system setup and commissioning.

5.1.1 Verifying software requirements

Access to the Kymeta u5 Access GUI requires one of the following supported web browsers:

- Google Chrome
- Microsoft Edge
- Apple Safari
- Mozilla Firefox

Kymeta recommends using the latest available version of the selected browser.

5.2 Evaluating the installation site

Selecting an appropriate installation location is critical to achieving reliable satellite connectivity and optimal system performance.

Before installing the Kestrel u5, evaluate the proposed installation location for satellite visibility, nearby RF emitters, environmental conditions, and mounting suitability.

5.2.1 Verifying line-of-sight requirements

A clear line of sight is critical for proper UT operation.

Install the UT in a location that provides an unobstructed view of the sky, with no obstructions from broadside to 28° above the horizon across a full 360° field of view.

Objects such as buildings, bridges, trees, utility poles, towers, and other structures may obstruct the antenna field of view. Obstructions within the field of view may reduce performance, interrupt service, or prevent the UT from acquiring and maintaining satellite connectivity.

If a clear line of sight cannot be achieved, relocate the UT to a location with fewer obstructions.

The following figure illustrate representative installation examples.



Figure 4: Kymeta u5 UT installation example

5.2.2 Identifying nearby RF transmitters

Radar systems and other high-power transmitters may affect the performance of the UT when installed within the transmitter beam path.

To reduce the risk of interference and equipment degradation:

- Install the UT as far from radar systems and other high-power transmitters as practical.
- Install the UT outside the transmitter beam width whenever possible.
- Maintain separation from radar emissions, typically within a $\pm 15^\circ$ elevation range from the transmitter beam.

Figure 5 below illustrates a recommended installation arrangement relative to radar systems and other high-power transmitters.

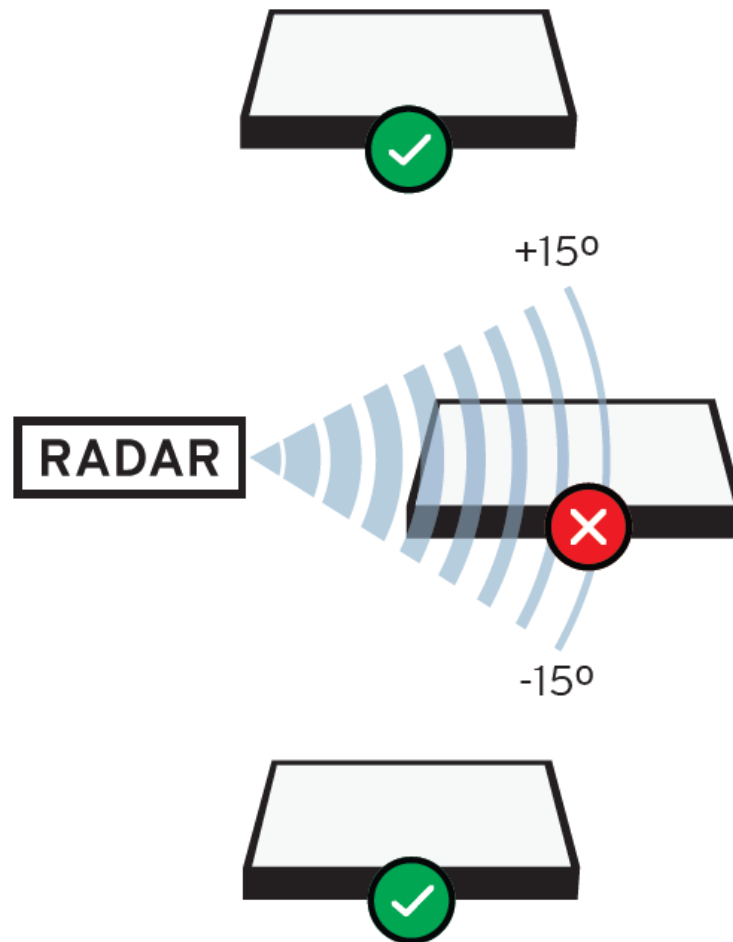


Figure 5: Install the UT outside the beam width of radar and other high-power transmitters

Before finalizing the installation, verify system performance with all nearby radar systems and transmitters operating under normal conditions.

5.3 Verifying environmental and thermal conditions

The Kestrel u5 uses a fully passive thermal design with no fans or moving parts.

Maintain unobstructed airflow beneath and around the UT during operation.

The installation shall provide:

- Minimum 19 mm (0.75 in.) clearance beneath the heatsink
- Minimum 15 mm (0.6 in.) clearance around the user terminal
- Minimum airflow of 6.5 kph (4 mph) when ambient temperatures exceed 45 °C

Failure to maintain the required clearances and airflow may affect thermal performance and system operation.

The following figure illustrates the minimum clearance requirements for passive cooling.

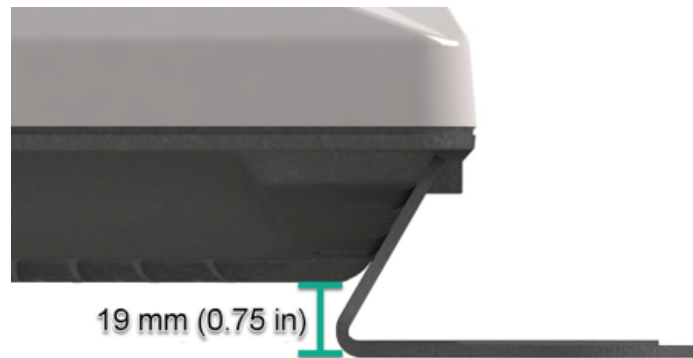


Figure 6: Minimum clearance requirements for passive cooling

The following figure illustrates the airflow path required to support passive cooling.



Figure 7: Airflow path required to support passive cooling.

5.4 Verifying electrical service

5.4.1 General electrical requirements

All electrical installations shall comply with applicable local, national, and site-specific electrical regulations.

When a non-Kymeta power supply is used, the installer is responsible for verifying electrical compatibility and ensuring proper operation and maintenance.

Appropriate upstream over-current protection shall be provided as part of the installation.

Vehicle and rail installations shall use approved power conversion equipment suitable for the intended operating environment.

5.4.2 Power requirements

The Kymeta router receives 48 VDC $\pm 10\%$ input power and distributes power and data connectivity to the UT through the TERMINAL interface.

Power consumption varies depending on operating mode and traffic levels.

Parameter	Specification
Input voltage to router	48 VDC $\pm 10\%$
Maximum power consumption	200 W
Typical LEO operation	100 W
Typical GEO operation (low network traffic)	120 W
Typical GEO operation (high network traffic)	170 W

5.4.3 Supported power solutions

The following power solutions are available for use with the Kestrel u5:

SKU	Description
U5ACC-00009-0	200 W rail-certified DC-DC converter
U5ACC-00004-0	240 W AC-DC power supply

The supported rail-certified DC-DC converter has the following characteristics:

Parameter	Specification
Manufacturer	CINCON
Model	CHB200W12-72S48-CMFD
Input voltage	14–160 VDC
Output voltage	48 VDC
Output power	200 W

5.4.4 Grounding requirements

Chassis grounding for the UT is accomplished through the six M6 mounting bolt locations.

The installer is responsible for ensuring proper grounding in accordance with applicable electrical codes, site requirements, and installation practices.

Grounding methods may vary depending on the installation platform and mounting configuration.

5.5 Selecting a mounting solution

The Kestrel u5 supports multiple mounting options depending on the installation environment and selected bundle configuration. Select the mounting solution appropriate for the deployment. Available mounting options include:

Outboard mount (U5ACC-00008-0)

- The outboard mount is a low-profile, four-point through-bolt mounting solution designed for flat-surface installations.
- The installed height is approximately 100 mm (4 in.).
- Refer to the *Kestrel u5 Outboard Mount Installation Instructions (700-00371-000)* for installation procedures.

Inboard mount (U5ACC-00010-0)

- The inboard mount is designed for protected or recessed installations.
- The mount is compatible with Seaview mounting solutions and the Kymeta u8 mounting pattern.
- The mount can be installed directly on narrow-base mounting platforms.
- Refer to the *Kestrel u5 Inboard Mount Installation Instructions (700-00370-000)* for installation procedures.

Vehicle rack mount (U5ACC-00011-0)

- The vehicle rack mount is an adjustable mounting solution for vehicle applications.
- The mount supports roof rack crossbar spans from 45 cm to 90 cm (17.72 in. to 34.45 in.), measured center-to-center.
- Refer to the *Kestrel u5 Vehicle Rack Mount Installation Instructions (700-00376-000)* for installation procedures.

Flyaway transport kit (U5ACC-00012-0)

The flyaway transport kit is a portable transport solution for mobile deployments.

The airline-checkable case accommodates the UT, router, power supply, cables, and mounting hardware and is designed to comply with most commercial airline oversize and overweight check-in requirements.

If assistance is required in selecting a mounting configuration, contact Kymeta customer support.

5.6 Planning GEO modem integration (optional)

The Kestrel u5 supports operation with compatible external GEO modem platforms. If the system will operate with a compatible external GEO modem, verify that:

- The modem is supported.
- Space is available for the modem and associated equipment.
- Required RF, Ethernet, and management interfaces are available.
- Required cable lengths are available.
- Service activation has been coordinated with the service provider or Network Operations Center (NOC).

Kymeta recommends using the **Coax Cable Kit (U5ACC-00006-0)** when integrating compatible GEO modem platforms.

For modem-specific configuration, integration, and commissioning procedures, refer to the *Modem Integration section* of the current document (under development and will be included in the future revisions).

6 Installing the Kestrel u5 UT

This chapter describes installation of the Kestrel u5 system. Detailed procedures for installing Kymeta mounting accessories are provided in the applicable mount installation instructions.

6.1 Understanding the installation process

After completing the planning activities described in [Section 5 Planning the installation](#), install the Kestrel u5 system using the approved mounting hardware and installation accessories.

A typical installation consists of the following activities:

1. Unpack and inspect the equipment.
2. Prepare the installation location.
3. Install the mounting hardware.
4. Mount the UT.
5. Install the router and power equipment.
6. Connect all required interfaces.
7. Route and secure cables.
8. Verify the installation.
9. Complete system setup and commissioning as described in [Section 7 Setting up and commissioning the system](#).

Detailed mounting procedures are provided with the applicable mounting accessories and installation instructions.

6.2 Unpacking and inspecting the equipment

Before beginning installation, unpack and inspect the equipment to verify that all required components have been received and that no damage occurred during shipment.

6.2.1 Unpacking the equipment

To unpack the UT:

1. Open the shipping box.
2. Remove the top foam insert and place it on a clean, level surface to use as a temporary work surface.
3. Carefully remove the UT from the shipping box.
4. Place the UT on the foam insert.

Handle the UT with care during unpacking and installation. Do not place heavy objects on the UT or allow the radome surface to come into contact with sharp objects or abrasive materials.

6.2.2 Inspecting the equipment

After unpacking the equipment:

1. Verify that all ordered equipment, accessories, and installation hardware have been received.
2. Inspect the shipping container and packaging for signs of damage.
3. Inspect the UT, router, power equipment, cables, and accessories for visible damage.
4. Verify that all connectors and interface panels are free from damage or contamination.

If any equipment is missing or appears damaged, do not proceed with the installation. Contact Kymeta customer support or your distribution partner for assistance.

6.3 Preparing for installation

Before beginning installation:

- Verify that all required equipment and accessories are available.
- Verify that the installation location meets the requirements described in [*Section 5.2 Evaluating the installation site*](#).
- Verify that the selected mounting solution is appropriate for the intended deployment.
- Ensure that all power sources are disconnected.

 If performing an initial deployment, Kymeta recommends completing the setup and verification procedures described in [*Section 7 Setting up and commissioning the system*](#) before permanently mounting the UT.

6.4 Installing the mounting hardware

Install the selected mounting hardware in accordance with the applicable installation instructions.

For details on the available mounting kits, refer to [*Section 1 Introduction*](#):

Ensure that the mounting hardware is securely attached and that the installation location provides the required line of sight, thermal clearances, and access for maintenance activities.

6.5 Mounting the UT

Install the UT on the selected mounting solution in accordance with the applicable installation instructions.

During installation:

- Maintain the required thermal clearances.
- Preserve the required line of sight.
- Ensure adequate airflow around the terminal.
- Verify that cable routing paths are available before securing the terminal.

After installation, verify that all mounting hardware is securely fastened.

6.6 Installing the router and power equipment

6.6.1 Installing the router

Install the router in a protected location that provides convenient access for administration, monitoring, maintenance, and troubleshooting.

Select an installation location that:

- Keeps the front-panel status indicators visible.
- Provides unobstructed access to the interface ports.
- Allows cables to be routed without excessive bending or strain.
- Maintains the router within its specified operating environment.
- Provides sufficient space for cable installation and future service activities.

The router includes a physical reset interface on the rear panel. A corresponding reset interface is also provided on the UT interface panel. For reset and recovery procedures, refer to [Section 10 Troubleshooting the system](#).

6.6.2 Installing power equipment

Install the appropriate power equipment for the selected deployment.

Supported power solutions include:

- AC-DC power supply (U5ACC-00004-0)
- Rail-certified DC-DC converter (U5ACC-00009-0)

Install all power equipment in accordance with applicable electrical codes, site requirements, and local regulations.

Before applying power, verify that:

- The power source is compatible with the selected power equipment.
- All electrical connections are complete and secure.
- Grounding requirements have been satisfied.

6.7 Connecting interfaces

After the UT, router, and power equipment have been installed, connect the required interfaces before applying power to the system.

The Kestrel u5 system uses power, RF, Ethernet, management, and optional GEO modem interfaces to support satellite communications and system management. Interface locations are described in [*Appendix C. I/O panel interfaces and functions*](#) and [*Appendix D. Router interfaces and functions*](#). Detailed connector specifications, mating connector information, and cable requirements are provided in the *Kestrel™ u5 User Terminal Interface Control Document (700-00377-000)*.

Verify that all connectors are fully seated, properly secured, and free from contamination before proceeding.

6.7.1 Connecting the UT and router

The ROUTER interface on the UT provides the primary connection between the UT and the Kymeta router.

To connect the UT and router:

1. Verify that power has been removed from the system.
2. Connect the ROUTER interface on the UT to the TERMINAL interface on the router.
3. Verify that both connectors are fully seated and secured.
4. Ensure that the cable is routed without excessive bending, twisting, or mechanical strain.

The ROUTER-to-TERMINAL connection supplies both power and data communications required for normal system operation.

6.7.2 Connecting an external GEO modem (optional)

For GEO operation, connect the external modem using the required RF, Ethernet, and management interfaces.

Verify that all required transmit, receive, Ethernet, and management connections are installed in accordance with the modem manufacturer's instructions.

Kymeta recommends using the **Coax Cable Kit (U5ACC-00006-0)** when integrating supported GEO modem platforms.

The Kestrel u5 supports operation with compatible external GEO modem platforms. Refer to [*Section 5.6 Planning GEO modem integration \(optional\)*](#) and *Modem Integration section* of the current document (under development; will be included in a future revision) for modem-specific configuration, integration, and commissioning procedures.

6.7.3 Connecting a computer or mobile device

- A computer or mobile device may be connected using either Ethernet or Wi-Fi.
- Ethernet connections are made through the DATA interface on the router.
- Wi-Fi connectivity is provided by the router and is enabled by default.

Detailed procedures for accessing the Kymeta u5 Access GUI are provided in [Section 1 Introduction](#).

6.7.4 Verifying cable installation

Before applying power, verify that:

- All connectors are fully seated and secured.
- Appropriate strain relief has been provided.
- Cables are protected from abrasion and mechanical damage.
- Cable bend radii comply with the cable manufacturer's recommendations.
- Unused connectors are protected with the supplied protective covers.

6.7.5 Routing and securing cables

Route and secure all power, Ethernet, coaxial, and optional GNSS cables in accordance with site requirements and installation best practices.

When routing cables:

- Avoid excessive bending or cable stress.
- Protect cables from vibration, abrasion, and environmental exposure.
- Provide adequate strain relief.
- Maintain access to serviceable connections.
- Secure cables to prevent movement during operation.

6.8 Verifying the installation

Before applying power, verify that:

- All mounting hardware is securely installed.
- The UT is properly secured.
- The router is securely installed.
- Power equipment has been installed and grounded.
- All required cables are connected and secured.
- Required thermal clearances are maintained.
- The installation location provides the required line of sight.

Correct any identified issues before proceeding to system setup and commissioning.

7 Setting up and commissioning the system

7.1 Preparing for system setup

Before applying power to the system:

- Verify that the installation has been completed in accordance with [Section 6 Installing the Kestrel u5 UT](#)
- Verify that all required interfaces are connected and secured.
- Verify that the router, UT, and power equipment are properly installed.
- Verify that all mounting hardware is secure and that the installation site provides the required line of sight and thermal clearances.
- Ensure that all personnel are clear of the RF exposure area described in [Section 4.6 RF energy exposure](#).

If an external GEO modem will be used, verify that all required RF, Ethernet, and management connections have been completed before applying power.

7.2 Powering on the system

The router supplies both power and data connectivity to the UT through the TERMINAL interface.

To power on the system:

1. Verify that all required cables are connected between the UT and the router.
2. Connect the router to the appropriate AC or DC power source.
3. Apply power to the router.

Allow approximately 2 to 3 minutes for the system to complete its start-up sequence.

7.3 Verifying system start-up

After power has been applied, verify that the system completes its start-up sequence successfully.

The UT status indicator should display a **pulsing green state**, indicating that **power has been applied** and the **UT is booting**.

In addition to verifying the UT status indicator, verify the router status LED. During normal operation:

- A blinking blue LED indicates that the router is operational and is awaiting a WAN connection.
- A solid blue LED indicates that the router is operational and has established a WAN connection.

After start-up completes, verify that the router and UT are operating normally.

For additional information about status indicators, refer to [Appendix B. LED indicators](#).

7.4 Activating and commissioning services

Before normal operation can begin, the UT must be activated and commissioned for the applicable satellite service.

Activation and commissioning procedures vary by service provider.

7.4.1 Activating OneWeb LEO services

For OneWeb LEO service activation:

1. Contact your service provider. Provide the UT serial number, IMEI, and IMSI as required by the service provider.
2. Activation time frames vary and may take several business days.
3. Complete the applicable activation and commissioning procedures.
4. Provide the requested UT identification and service information.

Activation time frames vary by service provider.

7.4.2 Loading an ephemeris file

During initial OneWeb commissioning, it may be necessary to load the latest ephemeris file into the embedded OneWeb modem.

To load an ephemeris file:

1. Using a system with internet connectivity, navigate to: <https://ephemeris.oneweb.net/ltef/>
2. Download the latest **ltef.csv** ephemeris file and note its save location.
3. Access the Kymeta u5 Access GUI at: <https://kymeta.lan>
4. Open the OneWeb modem interface by navigating to: **Settings > Modems > Open Modem GUI**
5. In the OneWeb modem interface, select **Install**.
6. Follow the installation workflow until the **Upload Ephemeris Data** page is displayed.
7. Select **Browse** and locate the downloaded **ltef.csv** file.
8. Select **Upload** to transfer the file to the modem.
9. Wait for the upload process to complete. The modem will reboot automatically after the file has been installed.
10. After the modem has restarted, verify that the UT successfully connects to the OneWeb network.

Following initial commissioning, leave the UT online for approximately 30 minutes to allow software updates and network synchronization activities to complete.

Verify successful commissioning from the **Dashboard** page of the Kymeta u5 Access GUI.

 **Note:** The ephemeris file contains satellite orbit information used by the OneWeb modem during network acquisition and operation. Always use the latest available ephemeris file when performing initial commissioning or as directed by your service provider.

For guidance on returning a system to service after extended storage or inactivity, refer to [Section 11.2.2 Updating a system after extended storage or inactivity](#).

7.4.3 Activating GEO services

The Kestrel u5 supports operation with compatible external GEO modem platforms.

For GEO service activation:

1. Verify that the external GEO modem has been installed and connected.
2. Coordinate activation and commissioning activities with the applicable Network Operations Center (NOC) or service provider.
3. Complete any required modem provisioning activities.

For Kymeta-managed GEO services, contact the Kymeta NOC for activation assistance.

For customer-managed GEO services, coordinate provisioning and commissioning activities with the customer NOC.

The Kestrel u5 supports operation with compatible external GEO modem platforms. If GEO or hybrid LEO/GEO services will be used, refer to the *Modem Integration* section of the current document (under development; will be included in a future revision) for modem-specific configuration, integration, and commissioning procedures.

7.5 Completing system setup

After commissioning has been completed:

1. Verify that the correct modem is active.
2. Verify that the system status indicates normal operation.
3. Verify that signal quality metrics are available.
4. Verify network connectivity.
5. Confirm that the system is communicating with the intended satellite service.

The Kestrel u5 is now ready for operation.

7.6 Verifying service operation

After activation and commissioning:

1. Verify that the desired service is active.
2. Verify that network connectivity is available.
3. Verify that the correct modem is selected.
4. Verify that system status indicators report normal operation.

Use the **Dashboard** and **Monitoring** pages of the Kymeta u5 Access GUI to verify system status.

 Following initial commissioning, leave the UT online for approximately 30 minutes to allow software updates and network synchronization activities to complete.

7.7 Powering off the system

To power off the system:

1. Remove AC or DC input power from the router.
2. Allow the system to shut down completely before disconnecting cables or moving equipment.

Do not disconnect power directly from the UT through the TERMINAL interface.

7.8 Preparing the system for operation

After setup and commissioning are complete, the system is ready for normal operation.

Refer to [Section 8 Managing the Kestrel u5](#) for information on monitoring system status, configuring settings, viewing diagnostics, and performing operational tasks.

8 Managing the Kestrel u5

The Kymeta u5 Access GUI provides diagnostic tools that can be used to monitor system operation, verify connectivity, review system events, and assist with troubleshooting activities.

Diagnostic information is available through multiple pages within the GUI and may include system status, modem information, GNSS information, antenna status, event logs, and network information.

8.1 Accessing the Kymeta u5 Access GUI

The Kymeta u5 Access GUI is the primary interface for configuring, commissioning, monitoring, and managing the Kestrel u5 system.

Before accessing the GUI, ensure that the router has completed its startup sequence and that your computer or mobile device is connected to the router using either Ethernet or Wi-Fi.

8.1.1 Accessing the GUI using Ethernet

The router provides two Ethernet interfaces for accessing the Kymeta u5 Access GUI:

- **DATA** – User access through DHCP
- **ADMIN** – Administrative access through a static IP address

Using the DATA interface

1. Configure your computer to obtain an IP address automatically using DHCP.
2. Connect your computer to the DATA port on the router.
3. Open a supported web browser.
4. Navigate to: <https://kymeta.lan>

Using the ADMIN interface

1. Configure your computer with a static IP address on the 192.168.45.0/24 subnet.
2. Connect your computer to the ADMIN port on the router.
3. Open a supported web browser.
4. Navigate to: <https://192.168.45.3>

Refer to [Appendix D. Router interfaces and functions](#) for interface locations.

8.1.2 Accessing the GUI using Wi-Fi

The router provides a Wi-Fi network for wireless access to the Kymeta u5 Access GUI.

To connect using Wi-Fi:

1. Wait approximately 1 to 3 minutes after applying power for the Wi-Fi network to become available.
2. Locate the Wi-Fi network name (SSID) printed on the router label.
3. Connect to the **U5-DATA-#####** network, where **#####** is the unique identifier assigned to the router.
4. Enter the default Wi-Fi password printed on the router label.

Alternatively, scan the QR code printed on the router label to automatically connect to the router's Wi-Fi network.

After connecting, open a supported web browser and navigate to:

<https://kymeta.lan>

8.1.3 Verifying access

After the GUI loads, verify that the Dashboard page is displayed and that the system status indicates normal operation.

If the GUI cannot be reached:

- Verify that the router has completed its startup sequence.
- Verify that the computer or mobile device is connected to the correct Ethernet port or Wi-Fi network.
- Verify the IP configuration when using the ADMIN interface.
- Refer to *Section 10 Troubleshooting the system* if the issue persists.

8.2 Viewing system status

Use the Kymeta u5 Access GUI **Dashboard** page to review the current operational status of the system. The **Dashboard** provides information such as:

- System status
- Network connectivity
- Active modem
- Signal quality
- Terminal status
- GNSS status
- System health indicators

Review the **Dashboard** regularly to verify normal operation and identify potential issues.

In addition to verifying the UT status indicator, verify the router status LED. During normal operation:

- A blinking blue LED indicates that the router is operational and is awaiting a WAN connection.
- A solid blue LED indicates that the router is operational and has established a WAN connection.

Refer to Appendix B, *LED indicators*, for additional status LED definitions.

8.3 Monitoring system performance

Use the Kymeta u5 Access GUI to monitor the operational status and performance of the Kestrel u5 system.

The monitoring features provide real-time information that can be used to verify system operation, evaluate network connectivity, and identify potential issues before they affect service.

Available performance information includes:

- Satellite connection status
- Network connectivity
- Signal quality
- System health
- Hardware status
- Software version
- Event and alarm notifications

Review system status periodically during operation, particularly after installation, configuration changes, software updates, or maintenance activities.

If the system reports alarms or abnormal operating conditions, refer to [Section 10 Troubleshooting the system](#).

8.4 Managing hazard zones

8.4.1 Understanding hazard zones

The Kymeta u5 Access GUI provides the ability to define hazard zones for both LEO and GEO operations.

Hazard zones can be used to prevent transmission when the antenna pointing vector intersects a user-defined region. Hazard zones are commonly used to reduce RF exposure risks and to prevent transmission toward nearby equipment, structures, or operational areas.

When a hazard zone is active and the antenna pointing vector enters the defined region, the UT automatically mutes transmission.

The **Hazard Zones** section of the **Antenna** page displays all configured hazard zones and their associated azimuth and elevation boundaries.

Multiple hazard zones can be configured simultaneously.

Note: The UT is unable to select an alternative satellite when a hazard zone is encountered. Hazard zones do not mitigate outages caused by obstructions or blockages.

For information about RF exposure requirements and hazard zone geometry, refer to [Section 4 Safety and handling](#).

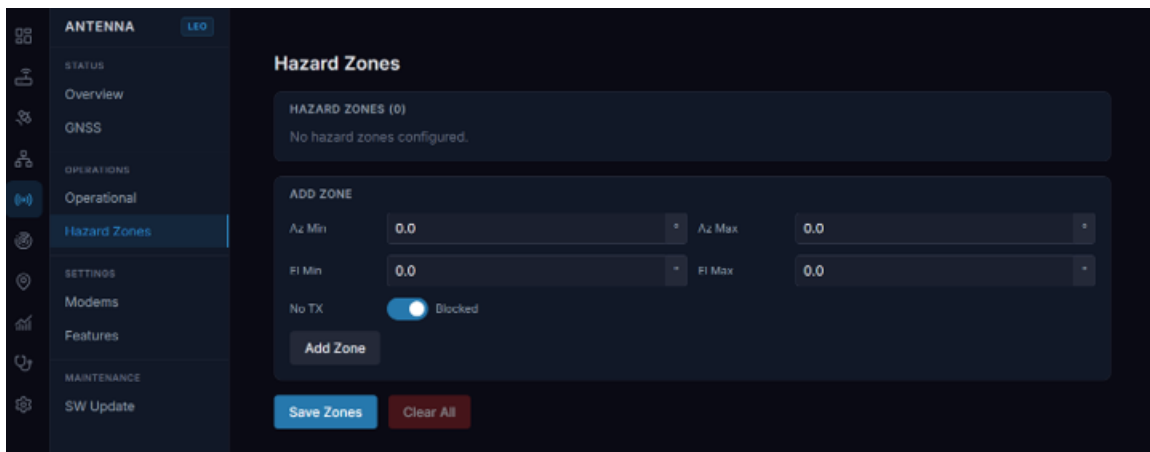
8.4.2 Defining hazard zones

Hazard zones can be configured from the **Antenna** page of the Kymeta u5 Access GUI.

To define a hazard zone:

1. Enter the desired minimum and maximum azimuth values.
2. Enter the desired minimum and maximum elevation values.
3. Verify that the **No TX** option is selected.
4. Select **Add Zone**.
5. Repeat the process as required to define additional hazard zones.

Configured hazard zones are displayed in the **Hazard Zones** section of the GUI.



Hazard zone definition

After defining hazard zones, perform operational testing to verify that the configured values accurately represent the intended restricted areas.

Incorrectly defined hazard zones may result in unintended transmission restrictions or service interruptions.

For information about hazard zone concepts and coordinate definitions, refer to Section 4.7, *Hazard zones*, and Section 4.8, *Hazard zone coordinate system*.

8.5 Managing modem selection

8.5.1 Selecting LEO modem

To select OneWeb (LEO) operation:

1. Open the Kymeta u5 Access GUI.
2. Navigate to **Modem Switching**.
3. Select **LEO**.
4. Wait for the system to complete the transition.
5. Verify that **LEO** is displayed on the Dashboard page.
6. Verify that the online status indicator is green.
7. Verify that signal quality information is displayed.

Optional: Run connectivity or throughput tests.

8.5.2 Selecting an external GEO modem

To select an external GEO modem:

1. Verify that the external GEO modem is installed and operational.
2. Open the Kymeta u5 Access GUI.
3. Navigate to **Modem Switching**.
4. Select **EXT**.
5. Complete any required external modem workflow.
6. Verify that **GEO** is displayed on the Dashboard page.
7. Verify that the online status indicator is green.
8. Verify that signal quality information is displayed.

Optional: Validate connectivity using ping, traceroute, or throughput testing.

8.6 Managing EMCON operation

The Kestrel u5 supports Emissions Control (EMCON), also referred to as Ghost Mode, for deployments that require control of RF emissions and operational visibility.

EMCON enables users to intentionally reduce or restrict RF activity while maintaining awareness of the system's operational state. This capability can be used to support regulatory requirements, operational security requirements, or mission-specific operating procedures.

EMCON provides multiple operating states that control transmission activity and radio operation.

8.6.1 Understanding EMCON states

Delta

Delta is the normal operating state.

In Delta mode:

- No transmission restrictions are applied.
- Normal LEO and GEO operation is supported.

- All configured services are available.

Charlie

Charlie mode applies transmission restrictions while maintaining limited satellite operation.

In Charlie mode:

- Transmission can be restricted within defined hazard or blockage zones.
- Operation may be restricted to a single GEO or LEO network.
- Transmit mute settings persist across system reboots.

Bravo

Bravo mode disables satellite transmission.

In Bravo mode:

- Satellite transmit functions are muted.
- Receive-only operation may be permitted.
- The EMCON state persists across reboots.

Alpha

Alpha mode disables all radio operation.

In Alpha mode:

- All radio transmit functions are disabled.
- All radio receive functions are disabled.
- The router remains powered to support local management access.
- The system may be safely powered down if required.

State	TX	RX	Persistence
Delta	Enabled	Enabled	No restriction
Charlie	Restricted	Enabled	Persists
Bravo	Disabled	Limited/Enabled	Persists
Alpha	Disabled	Disabled	N/A

8.6.2 Understanding EMCON behavior

EMCON settings affect the ability of the system to transmit, receive, acquire satellite services, and maintain network connectivity.

Depending on the selected EMCON state, the system may intentionally restrict or disable RF activity. Before troubleshooting connectivity, acquisition, or transmission issues, verify the current EMCON state.

Changes to EMCON settings should be performed in accordance with applicable operating procedures and organizational policies.

8.6.3 Verifying EMCON status

The active EMCON state can be viewed through the Kymeta u5 Access GUI.

Verify the current EMCON state before troubleshooting connectivity or transmission issues.

 Certain EMCON states may prevent transmission, satellite acquisition, or network access.

8.7 Understanding licensed features

Certain Kestrel u5 capabilities are available as optional licensed features.

Licensed features are intended for advanced operational, integration, testing, or specialized deployment scenarios and are not enabled by default in standard system configurations.

Feature availability is controlled through software entitlements and may require the purchase of additional licenses.

Examples of licensed capabilities include:

- Manual antenna configuration
- Satellite Select configuration
- OpenAMIP logging
- Manual location control (GPS-denied operation)

Availability of licensed features depends on the installed software version and the associated system entitlements.

8.7.1 Understanding feature entitlements

Feature entitlements enable access to specific advanced capabilities within the Kestrel u5 platform.

Features that require entitlements may not be visible or available unless the appropriate license has been installed.

Entitlement-based features are intended for qualified users who require advanced configuration, integration, diagnostic, or testing capabilities.

8.7.2 Obtaining licensed features

For information regarding feature availability, licensing options, or entitlement activation, contact your distribution partner or Kymeta customer support.

Additional documentation may be required for advanced licensed capabilities. Refer to the applicable product documentation for detailed feature-specific information.

8.8 Running diagnostics

8.8.1 Viewing diagnostic logs

The Kymeta u5 Access GUI maintains system logs that record operational events, status changes, warnings, and error conditions.

To review system logs:

1. Open the Kymeta u5 Access GUI.
2. Navigate to the appropriate Diagnostics page.
3. Review available system and antenna log information.

Logs can be used to investigate:

- Startup and shutdown events
- Connectivity issues
- Antenna events
- Hazard zone events
- System warnings and errors

When troubleshooting an issue, collect relevant log information while the issue is occurring whenever possible.

8.8.2 Monitoring signal quality

Signal quality information is available through the Dashboard and other diagnostic pages.

Signal quality metrics can be used to:

- Verify successful satellite acquisition
- Monitor link performance
- Identify potential obstruction issues
- Detect environmental or interference-related conditions

Unexpected changes in signal quality may indicate changes in the installation environment or service conditions.

8.8.3 Verifying GNSS operation

GNSS information is used by the system during satellite acquisition and normal operation.

Use the available diagnostic pages to verify:

- GNSS availability
- Position information
- Satellite visibility
- Timing synchronization

If GNSS information is unavailable or invalid, system performance may be affected.

8.8.4 Reviewing modem status

Diagnostic pages provide information regarding the active modem and network connection.

Review modem information to verify:

- Active modem selection
- Service status
- Network registration
- Connectivity state
- Link status

When operating in hybrid environments, verify that the intended modem is active and operating normally.

8.8.5 Monitoring hazard zone events

If hazard zones are configured, transmit mute events can be monitored through the Kymeta u5 Access GUI.

To review hazard zone activity:

1. Open the Kymeta u5 Access GUI.
2. Navigate to **Diagnostics > Antenna > Logs**.
3. Review recorded transmit mute and hazard zone events.

Active log monitoring can be used to identify instances where transmission was restricted because of configured hazard zones.

For LEO operation, additional hazard zone event information may be available through the antenna logs. Refer to the applicable product documentation for platform-specific diagnostic information.

8.8.6 Collecting diagnostic information

Before contacting your distribution partner or Kymeta customer support, collect the following information whenever possible:

- Product serial number
- Software version
- Active modem
- Current system status

- Relevant log entries
- Description of the observed issue

Providing diagnostic information can significantly reduce troubleshooting time and help expedite issue resolution.

8.8.7 Viewing hazard zone events in the SSM log (LEO)

For LEO operation, hazard zone events can also be reviewed through the SSM user interface.

To view hazard zone events:

1. Open the SSM user interface.
2. Navigate to **Diagnostics > Host Processor Logs**.
3. Open **amc.log**.

The log contains notifications indicating when the antenna entered and exited a hazard zone.

 **Note:** The **amc.log** file does not indicate whether the antenna is currently within a hazard zone. The log records historical entry and exit events and reports blockage information after the hazard zone condition has cleared.

Hazard zone event information in the SSM log can be useful when troubleshooting intermittent service interruptions caused by hazard zone definitions.

9 Accessing the REST API documentation

The Kestrel u5 provides a RESTful Application Programming Interface (API) that enables external applications to monitor and manage the user terminal (UT) through programmatic access.

The REST API is intended for software developers and system integrators who require automated interaction with the Kestrel u5. Typical applications include system monitoring, status reporting, configuration management, and integration with third-party management systems.

9.1 OpenAPI Specification

The Kestrel u5 REST API is documented using the OpenAPI Specification (OAS).

The API documentation includes:

- Available REST endpoints
- Request and response formats
- Authentication requirements
- Parameter definitions

The OpenAPI Specification (JSON) file for the UT is available from the Kymeta Access Portal as part of the Kestrel u5 software release package and product documentation.

To access the OpenAPI Specification file:

1. Sign in to the Kymeta Access Portal at <https://portal.kymeta.io>.
2. Navigate to **Documents & Software > Software > u5 Software**.
3. Download the appropriate JSON file for the installed software release.

9.2 Using the OpenAPI Specification

The OpenAPI Specification file can be imported into OpenAPI-compatible development and testing tools to explore and interact with the REST API.

Examples include:

- Postman
- Swagger UI
- Visual Studio Code with an OpenAPI-compatible extension

Refer to the documentation provided with the selected tool for instructions on importing and using OpenAPI Specification file.

 Always use the OpenAPI Specification file that corresponds to the software version installed on the Kestrel u5 system to ensure compatibility between the API documentation and the deployed software.

10 Troubleshooting the system

10.1 Troubleshooting overview

This chapter provides procedures for diagnosing and resolving common issues that may affect operation of the Kestrel u5.

The troubleshooting process begins with verification of satellite connectivity, signal quality, network connectivity, and system operating state. If an issue cannot be resolved using the procedures in this chapter, use the reset and recovery procedures provided in [Section 10.5 Performing reset and recovery procedures](#) and collect the information described in [Section 10.6 Collecting support information](#) before contacting technical support.

For information regarding system monitoring and diagnostics, refer to [Section 8.8 Running diagnostics](#).

10.2 Following troubleshooting best practices

Before performing advanced troubleshooting procedures, verify that the installation, configuration, and operating environment meet the requirements described in this manual.

Kymeta recommends the following troubleshooting practices:

- Verify RF parameters and service configuration before investigating hardware-related issues.
- Verify that the UT has a clear line of sight and that the installation location remains free of obstructions.
- Verify that all cables, connectors, and interfaces are securely connected and free of damage.
- Use multiple diagnostic tools together when troubleshooting system issues. Diagnostic information may be available through system logs, status indicators, signal quality metrics, and monitoring tools.
- Capture logs and diagnostic information while the issue is occurring whenever possible.
- Maintain a record of known-good configuration settings for comparison during troubleshooting.
- Verify that software and firmware versions are current and supported.

When troubleshooting transmission-related issues, verify that EMCON settings, hazard zones, and transmit controls are configured appropriately for the intended operation.

Diagnostic tools available through the Kymeta u5 Access GUI are described in [Section 8.8 Running diagnostics](#).

10.3 Following the troubleshooting workflow

When troubleshooting system issues, follow the sequence below to identify the source of the problem.

1. Verify carrier lock.
2. Verify signal quality.

3. Verify network connectivity.
4. Verify system controls and operating state.

Resolving issues in this order helps eliminate common causes before proceeding to more advanced troubleshooting activities.

10.3.1 Verifying carrier lock

Verify that the system has successfully acquired and locked to the intended satellite service.

If carrier lock is not present:

- Verify service availability.
- Verify antenna installation and alignment.
- Verify GNSS operation.
- Verify modem and service configuration.
- Verify that no obstructions are blocking the antenna field of view.

10.3.2 Verifying signal quality

Verify that signal quality metrics indicate normal operation.

If signal quality is low or unstable:

- Verify line-of-sight conditions.
- Check for new obstructions.
- Verify installation integrity and mounting stability.
- Verify that nearby RF sources are not causing interference.

10.3.3 Verifying network connectivity

If carrier lock and signal quality are normal, verify network connectivity.

Check:

- IP addressing
- Gateway configuration
- DNS configuration
- Local network connectivity
- Service provider connectivity

10.3.4 Verifying system controls

Verify that system operating controls are not preventing normal operation.

Check:

- EMCON status
- Hazard zone configuration
- Modem selection
- Transmission status
- User-configured operating restrictions

10.4 Resolving common issues

10.4.1 Resolving signal acquisition issues

Signal acquisition issues typically occur when the system is unable to establish or maintain carrier lock.

Common causes include:

- Obstructed line of sight
- Installation or alignment issues
- GNSS issues
- Service activation issues
- Configuration errors

Recommended actions:

1. Verify that the UT has a clear view of the sky.
2. Verify that the system has been properly commissioned and activated.
3. Verify that GNSS information is available and valid.
4. Verify that all required cables are connected.
5. Verify that the correct modem and service configuration are selected.

10.4.2 Resolving signal quality issues

Low signal quality may result in reduced throughput, intermittent connectivity, or service interruptions.

Common causes include:

- Obstructions within the antenna field of view
- Environmental conditions
- RF interference
- Installation issues

Recommended actions:

1. Inspect the installation site for obstructions.
2. Verify that nearby radar systems or high-power transmitters are not affecting operation.

3. Verify that the UT is securely mounted.
4. Review signal quality metrics in the Kymeta u5 Access GUI.
5. Verify that the radome surface is clean and free of excessive contamination.

10.4.3 Resolving connectivity issues

Connectivity issues may occur even when the system has successfully acquired the satellite network.

Common causes include:

- Incorrect IP configuration
- Gateway or DNS issues
- Local network configuration issues
- Firewall restrictions
- Service provisioning issues

Recommended actions:

1. Verify local network connectivity.
2. Verify IP addressing and gateway settings.
3. Verify DNS configuration.
4. Verify firewall and security policy settings.
5. Verify service activation status with the service provider.

10.4.4 Resolving transmission issues

Transmission issues occur when the system is unable to transmit even though other functions appear normal.

Common causes include:

- Transmission mute settings
- EMCON restrictions
- Hazard zone restrictions
- Service provider restrictions

Recommended actions:

1. Verify that transmission is enabled.
2. Verify the current EMCON state.
3. Review configured hazard zones.
4. Verify that the antenna is not operating within a restricted transmission region.
5. Confirm that service authorization permits transmission.

10.4.5 Resolving GNSS issues

GNSS information is used during satellite acquisition and normal operation.

Common symptoms include:

- Acquisition failures
- Reduced pointing accuracy
- Delayed startup
- Position or timing errors

Recommended actions:

1. Verify that the UT has an unobstructed view of the sky.
2. Verify GNSS status using the Kymeta u5 Access GUI.
3. Allow sufficient time for GNSS acquisition after startup.
4. Verify any external GNSS connections, if applicable.
5. Confirm that valid position information is being reported.

10.4.6 Resolving firmware and compatibility issues

Software or firmware incompatibilities may affect system operation, service availability, or feature functionality.

Recommended actions:

1. Verify that the installed software version is supported.
2. Verify that the router and UT are operating compatible software versions.
3. Verify compatibility with connected equipment and services.
4. Check release notes for known issues or limitations.
5. Contact your distribution partner or Kymeta customer support if compatibility concerns are suspected.

10.5 Performing reset and recovery procedures

The Kestrel u5 system provides reset and recovery functions for both the router and the UT.

Two physical reset buttons are available:

- Router Reset button
- Terminal Reset button

These functions can be used to reboot the system, restore default configurations, or recover the system from certain software-related issues.

⚠ Caution: Reset and recovery procedures may interrupt network connectivity and may temporarily prevent communication between the router and the UT.

10.5.1 Understanding reset functions

The reset and recovery functions available depend on which reset button is used and how long the button is pressed.

Router reset functions include:

- System reboot
- Router network configuration reset
- Router software recovery

UT reset functions include:

- Terminal network configuration reset
- Terminal configuration reset
- Terminal failsafe recovery

Perform only the procedure required to resolve the issue. Configuration reset operations may remove user-defined settings.

 Router reset and recovery functions may vary depending on the installed software version. Refer to the latest product documentation or contact Kymeta customer support if the expected recovery behavior does not occur.

10.5.2 Rebooting the system

A system reboot restarts the router and power cycles the UT without removing configuration settings.

To reboot the system:

1. Verify that the system is powered on.
2. Press and hold the **router Reset button** for 2 to 10 seconds.
3. Release the button.

Allow several minutes for the router and UT to restart and return to normal operation.

10.5.3 Resetting router network settings

This procedure restores the router network configuration to its default settings.

 **Caution:** Resetting the router network configuration may interrupt communication with connected devices and may sever communication with the UT.

To reset router network settings:

1. Verify that the system is powered on.
2. Press and hold the **router Reset button** for 10 to 15 seconds.
3. Release the button.

Allow the router to complete the reset process before attempting to reconnect.

10.5.4 Restoring router software

The router supports recovery using the factory software partition.

This procedure restores the router software and network configuration to the factory state.

 **Caution:** Restoring factory software may remove user-defined settings and may sever communication with the UT.

To restore router software:

1. Verify that the system is powered on.
2. Initiate the factory recovery procedure using the **router reset button**.
3. Press and hold the **router Reset button** for 15 to 25 seconds.
4. Allow the recovery process to complete.

After recovery, verify network connectivity and reapply any required configuration settings.

 **Note:** The exact recovery behavior may vary depending on the installed software version.

10.5.5 Restoring router/terminal software and configuration

The router supports recovery using the factory software partition.

This procedure restores the router software and network configuration to the factory state, as well as terminal factory states, given the network is intact.

 **Caution:** Restoring factory software may remove user-defined settings and may sever communication with the UT.

To restore router software:

1. Verify that the system is powered on.
2. Press and hold the **router Reset button** for longer than 25 seconds.
3. Allow the recovery process to complete.

After recovery, verify network connectivity and reapply any required configuration settings.

10.5.6 Resetting terminal network settings

This procedure restores the terminal network configuration to its default settings.

 **Caution:** Resetting terminal network settings may interrupt communication between the UT and the router.

To reset terminal network settings:

1. Verify that the system is powered on.
2. Press and hold the **UT Reset button** for approximately 5 seconds.
3. Release the button.

Allow the terminal to complete the reset process before verifying connectivity.

10.5.7 Resetting terminal configuration

This procedure restores the terminal configuration to its default settings, including terminal network settings.

⚠ Caution: This procedure removes user-defined terminal configuration settings.

To reset the terminal configuration:

1. Ensure that the terminal is powered off.
2. Press and hold the **UT Reset button**.
3. Apply power to the terminal while continuing to hold the button.
4. Continue holding the button for approximately 30 seconds.
5. Release the button.

Allow the UT to complete start-up before reconnecting to the system.

10.5.8 Performing terminal failsafe recovery

The terminal includes a failsafe software partition that can be used to recover a terminal that is unable to boot normally.

The failsafe partition provides a recovery environment that supports manual software installation and recovery procedures.

To enter terminal failsafe recovery mode:

1. Begin with the terminal powered off.
2. Apply power to the terminal.
3. Repeatedly press and release the **UT Reset button** for approximately 20 seconds during start-up.

The terminal boots using the failsafe partition.

After entering failsafe mode, perform the required software recovery procedures before returning the terminal to normal operation.

If recovery is unsuccessful, contact your distribution partner or Kymeta customer support for assistance.

10.6 Collecting support information

Before contacting your distribution partner or Kymeta customer support, collect as much relevant system information as possible. Providing complete diagnostic information can help reduce troubleshooting time and accelerate issue resolution. Refer to [Section 8.8 Running diagnostics](#) for information on locating logs and diagnostic information.

Kymeta recommends collecting the information specified in the sections below.

10.6.1 System identification information

Record the following information:

- UT serial number
- Router serial number
- Product configuration, if known
- Installed accessories or optional equipment

10.6.2 Software information

Record the currently installed software versions, including:

- UT software version
- Router software version
- Modem software version, if applicable

Software version information is available through the Kymeta u5 Access GUI.

10.6.3 Operational status information

Record the current system status, including:

- Active modem
- Network connectivity status
- GNSS status
- Signal quality information
- EMCON state, if applicable
- Any active warnings or alarms

10.6.4 Diagnostic logs

Collect relevant log information from the Kymeta u5 Access GUI.

When possible:

- Capture logs while the issue is occurring.
- Record the date and time of the event.
- Note any actions that immediately preceded the issue.

For systems using hazard zones, include any related transmit mute or hazard zone log entries.

10.6.5 Description of the issue

Document the observed behavior, including:

- A description of the issue
- When the issue first occurred
- Whether the issue is continuous or intermittent

- Any recent configuration, software, or installation changes
- Any troubleshooting actions already performed

10.6.6 Supporting documentation

If available, provide:

- Screenshots of relevant status or error messages
- Photographs of the installation
- Relevant log files
- Network test results
- Diagnostic reports

Providing complete and accurate information can significantly improve the efficiency of troubleshooting and support activities.

10.7 Obtaining technical support

If the troubleshooting procedures in this chapter do not resolve the issue, contact your distribution partner or Kymeta customer support for assistance.

Before requesting support, collect the information described in [Collecting diagnostic information](#).

10.7.1 Contacting your distribution partner

For most installation, commissioning, operational, and maintenance questions, contact the distribution partner from whom the system was purchased.

Distribution partners can assist with:

- Installation and configuration questions
- Service activation and commissioning
- Product operation
- Troubleshooting assistance
- Replacement parts and accessories
- Warranty support

Have the system serial number and relevant diagnostic information available when contacting support.

10.7.2 Contacting Kymeta customer support

If additional assistance is required, contact Kymeta customer support.

When contacting support, provide:

- Product serial number
- Software version information
- Description of the issue
- Relevant log files
- Any troubleshooting actions already performed

Providing complete information helps reduce resolution time and enables support personnel to diagnose issues more efficiently.

10.7.3 Requesting replacement parts

Replacement accessories and field replaceable units (FRUs) are available through Kymeta and authorized distribution partners.

Refer to *Section 12 Accessories and field replaceable units* for information regarding available replacement components.

10.7.4 Warranty information

Warranty coverage, limitations, and terms are provided separately in the Kymeta Product Warranty.

Refer to *Section 13 Warranty* for information on accessing warranty documentation.

11 Maintaining the system

11.1 Performing routine inspections

Periodic inspections help ensure reliable operation and may identify installation or environmental issues before they affect system performance.

Kymeta recommends performing routine inspections at intervals appropriate for the operating environment and installation type. Systems operating in harsh environments, including rail, mobile, marine, or industrial deployments, may require more frequent inspections.

During each inspection, verify the condition of the following components:

11.1.1 Inspecting mounting hardware

Inspect all mounting hardware for signs of:

- Loosening
- Corrosion
- Mechanical damage
- Excessive vibration wear

Verify that all mounting hardware remains secure and that the UT is firmly attached to the mounting structure.

- Abrasion
- Cuts or tears
- Pinching
- Excessive bending
- Environmental damage

Verify that cable strain relief is intact and that cables are properly supported and secured.

11.1.2 Inspecting connectors and seals

Inspect all external connectors and environmental seals for signs of:

- Corrosion
- Moisture intrusion
- Physical damage
- Loose connections

Verify that all protective covers and sealing components remain properly installed.

11.1.3 Inspecting airflow and thermal clearances

Verify that airflow beneath and around the UT remains unobstructed.

Inspect the installation area for:

- Debris accumulation
- Snow or ice buildup
- Foreign objects
- Changes to nearby structures that could affect airflow

Ensure that the required cooling clearances are maintained.

11.1.4 Inspecting mounting structures and brackets

Inspect mounting structures, brackets, racks, and support equipment for signs of:

- Structural damage
- Excessive movement
- Corrosion
- Fatigue or cracking

Verify that the mounting system continues to provide adequate support for the installed equipment.

11.1.5 Inspecting the radome surface

Inspect the radome for signs of:

- Cracks
- Impact damage
- Excessive contamination
- Coating degradation

Remove dirt, debris, snow, or other contaminants as necessary using the procedures described in [Section 11.3 Removing snow and ice](#) and [Section 11.4 Cleaning the system](#).

11.1.6 Verifying system operation

After completing the physical inspection:

1. Verify that the system powers on normally.
2. Verify that status indicators report normal operation.
3. Verify network connectivity.
4. Review the Kymeta u5 Access GUI for active alarms, warnings, or abnormal conditions.

Investigate and correct any issues identified during inspection before returning the system to normal service.

11.2 Updating software

The Kestrel u5 is designed to receive software updates automatically while connected to the network.

Under normal operating conditions, no user action is required to maintain current software versions.

11.2.1 Understanding automatic software updates

When the UT is connected to an active satellite service, software updates may be delivered automatically over the air.

To ensure successful software updates:

- Maintain network connectivity during normal operation.
- Avoid interrupting power during software update activities.
- Allow the system sufficient time to complete update and synchronization processes.

Following initial commissioning, Kymeta recommends leaving the UT online for approximately 30 minutes to allow software updates and network synchronization activities to complete.

11.2.2 Updating a system after extended storage or inactivity

If the UT has been stored or inactive for more than 90 days, reload the latest ephemeris file before returning the system to service.

After loading the ephemeris file:

1. Power on the system.
2. Verify network connectivity.
3. Leave the UT online for approximately 30 minutes to allow software updates and network synchronization activities to complete.

Refer to [*Section 7.4.2 Loading an ephemeris file*](#) for instructions on obtaining and loading the latest ephemeris file.

11.2.3 Verifying software versions

Software version information can be viewed through the Kymeta u5 Access GUI.

After software updates are completed, verify that the system is operating normally and that all required services are available.

11.2.4 Performing manual software updates

Manual software updates may be required in certain circumstances, such as recovery operations or deployments that do not have access to normal update services.

For assistance with manual software updates, contact your distribution partner or Kymeta customer support.

Additional update procedures may be provided separately for specific software releases or recovery scenarios.

11.3 Removing snow and ice

Accumulated snow and ice may affect system performance and should be removed when practical and safe to do so.

When removing snow or ice from the Kestrel u5, use methods that will not damage the radome surface or protective coatings.

11.3.1 Removing accumulated snow

Remove accumulated snow from the terminal surface using a standard soft-bristle snow brush.

Apply only light pressure while brushing and avoid excessive force that could damage the radome surface or mounting hardware.

11.3.2 Removing ice accumulation

If snow or ice is adhered to the radome surface:

1. Apply warm water to loosen the accumulation.
2. Allow the ice or snow to soften.
3. Remove the remaining material using a soft-bristle brush and light pressure.

To prevent damage to the terminal:

- Do not use hard tools, scrapers, shovels, or metal implements to remove snow or ice.
- Do not use abrasive materials on the radome surface.
- Do not use commercial de-icing chemicals or sprays.
- Do not apply excessive force when removing snow or ice.

Many commercial de-icing products contain chemicals that may damage the radome surface, protective coatings, seals, or other external components.

11.3.3 Verifying system condition after snow or ice removal

After removing snow or ice:

1. Inspect the radome surface for signs of damage.
2. Verify that all connectors and cables remain secure.
3. Verify that airflow paths and thermal clearances are unobstructed.
4. Confirm normal system operation using the Kymeta u5 Access GUI.

If excessive ice accumulation, impact damage, or environmental damage is observed, inspect the installation thoroughly before returning the system to normal service.

11.4 Cleaning the system

Periodic cleaning helps maintain the appearance and performance of the Kestrel u5 and reduces the accumulation of contaminants that may affect long-term reliability.

Before cleaning any part of the system, power off the equipment and disconnect external power sources.

Avoid scrubbing and do not use abrasive materials when cleaning any UT component. Avoid exposing rubber components, including gaskets and seals, to alcohol or alcohol-based cleaners, as these materials may deteriorate over time.

11.4.1 General cleaning precautions

Observe the following precautions when cleaning the system:

- Use only soft, lint-free cloths, sponges, or soft-bristle brushes.
- Do not use abrasive cleaning pads, brushes, or materials.
- Do not use strong solvents, acids, bases, biocides, or other aggressive cleaning chemicals.
- Avoid exposing rubber gaskets and seals to alcohol or alcohol-based cleaners.
- Prevent liquids from entering connectors, seams, vents, or other openings.
- Do not apply excessive force during cleaning.

11.4.2 Cleaning exterior surfaces

To clean the radome and external surfaces:

1. Remove loose dirt, dust, and debris using clean compressed air or a light water rinse.
2. Clean the surface using a soft cloth, sponge, or soft-bristle brush and a mild detergent solution, such as diluted soap or vehicle shampoo.
3. Remove fingerprints, smudges, salt deposits, and light contamination using gentle wiping motions.
4. Rinse any remaining cleaning solution from the surface.
5. Dry the surface using a clean, soft cloth.

For more difficult stains, isopropyl alcohol (IPA) may be used on exterior surfaces. If IPA is used on the radome surface, Kymeta recommends reapplying the hydrophobic coating after cleaning. Refer to [Section 11.5 Reapplying the hydrophobic coating](#) for details.

Apply cleaning agents sparingly and avoid oversaturating the surface.

11.4.3 Cleaning connectors and hardware

Inspect connectors and exposed hardware before cleaning.

To clean connectors and hardware:

1. Remove loose dirt and debris using a soft brush or clean compressed air.
2. Clean connector surfaces using a soft brush or cotton swab with IPA or a mild detergent solution.
3. Allow all cleaned surfaces to dry completely before reconnecting cables.

When cleaning RF connectors:

- Do not bend the center contact.
- Do not push or pull the center contact.
- Avoid introducing contaminants into the connector.

Light corrosion on external hardware may be cleaned using a soft brush and IPA.

Replace hardware that exhibits severe corrosion, excessive wear, or physical damage.

11.4.4 Final inspection after cleaning

After cleaning:

1. Verify that all surfaces are clean and dry.
2. Verify that connectors are completely dry before reconnecting cables.
3. Inspect cables, connectors, seals, and mounting hardware for signs of damage or wear.
4. Restore power to the system.
5. Verify normal system operation using the Kymeta u5 Access GUI.

If cleaning revealed damaged components, replace the affected components or contact your distribution partner or Kymeta customer support for assistance.

11.5 Reapplying the hydrophobic coating

The Kestrel u5 radome is supplied with a hydrophobic surface coating designed to improve environmental performance by promoting water shedding and reducing surface contamination.

For best performance, Kymeta recommends reapplying the hydrophobic coating every 2 to 5 years, depending on operating conditions and environmental exposure.

If cleaning is required before the recommended reapplication interval, use a neutral pH vehicle shampoo to remove dirt and debris from the radome surface.

Nasiol NL272 Nano Ceramic Coating

Before applying a new coating:

1. Clean the radome surface in accordance with the cleaning procedures described in Section 10.4.
2. Ensure the surface is clean, dry, and free of contaminants.
3. Follow the coating manufacturer's instructions for application and curing.

For detailed application procedures, refer to the **Nasiol NL272 Nano Ceramic Coating Application Kit Instructions (700-00186-000)**.

For information regarding Nasiol NL272 products, material safety data sheets (MSDS), or product availability, contact the coating manufacturer or your Kymeta representative.

 **Note:** Use only approved coating products and application methods. The use of unapproved coatings may affect radome performance or interfere with normal system operation.

11.6 Preparing the system for shipment

When transporting, returning, or storing the Kestrel u5 system, use appropriate packaging to protect the equipment from damage.

 **Note:** For returns, Kymeta recommends using the original shipping materials whenever possible.

Before preparing the system for shipment:

1. Power off the system.
2. Disconnect all external power sources.
3. Allow the system to shut down completely.

To prepare the system for shipment:

1. Carefully disconnect all power, Ethernet, coaxial, and optional GNSS cables.
2. Install protective caps on all connectors, if available.
3. Do not allow cable ends or connectors to come into contact with water, dirt, or other contaminants.
4. Remove any adapters, accessories, or temporary installation hardware.
5. Dry all cables and equipment surfaces before packaging.
6. Coil cables neatly and secure them using cable ties or equivalent restraints.
7. Remove the UT from the mounting structure in accordance with the applicable installation instructions.
8. Place the UT on a clean, non-abrasive surface with the radome protected from damage.
9. Inspect the equipment and remove any dirt, debris, moisture, or contaminants.
10. Secure any loose items, including mounting hardware, adapters, tools, and cable assemblies.
11. Place the equipment in the original shipping container or approved transport case.
12. Close and secure the shipping container.

11.6.1 Packaging recommendations

The original shipping materials provide the preferred level of protection during transportation and storage.

If the original packaging is unavailable, Kymeta offers the following transport accessories:

Part number	Description
U5ACC-00013-0	Kestrel u5 shipping box
U5ACC-00012-0	Kestrel u5 flyaway case

Before shipment, verify that all equipment is properly secured within the container and protected from movement during transport.

12 Accessories and field replaceable units

This chapter identifies accessories and field replaceable units (FRUs) that are available for the Kestrel u5 UT.

Accessories provide installation, mounting, transport, power, and cabling options for specific deployment requirements. Field replaceable units are components that may be replaced in the field if damaged or during maintenance activities.

The following accessories are available for the Kestrel u5 platform.

Part number	Description
U5ACC-00003-0	Kestrel u5 maritime mount
U5ACC-00004-0	Kestrel u5 AC-DC power supply
U5ACC-00005-0	Kestrel u5 DC-DC converter
U5ACC-00006-0	Kestrel u5 coax cable kit, LEO, 1x
U5ACC-00007-0	Kestrel u5 Ethernet cable kit
U5ACC-00008-0	Kestrel u5 low-profile surface (outboard) mount
U5ACC-00009-0	Kestrel u5 DC-DC converter (rail, 200 W)
U5ACC-00010-0	Kestrel u5 cradle (inboard) mount
U5ACC-00011-0	Kestrel u5 vehicle rack mount
U5ACC-00012-0	Kestrel u5 flyaway case
U5ACC-00013-0	Kestrel u5 shipping box
U5ACC-00014-0	Kestrel u5 coax cable kit, LEO/GEO, 2x

Accessory availability may vary deployment type and product configuration.

The following field replaceable units are available for the Kestrel u5 platform.

Part number	Description
U5ACC-00001-0	Router card kit
U5ACC-00015-0	Kestrel u5 router kit

Replacement procedures may vary depending on the component being replaced.

Refer to the applicable installation instructions or contact Kymeta customer support for assistance.

12.1 Ordering replacement parts

Replacement accessories and field replaceable units can be ordered through your distribution partner or Kymeta.

When requesting replacement parts, provide:

- Product model information
- Part number
- Serial number, if applicable
- Description of the required replacement component

For assistance identifying the correct replacement part, contact your distribution partner or Kymeta customer support.

13 Warranty

The Kestrel u5 Product Warranty provides detailed information regarding warranty coverage, limitations, exclusions, and warranty claim procedures.

To access the latest Kymeta u5 Product Warranty, visit the Kymeta website at: www.kymetacorp.com/legal/product-warranty/.

14 Regulatory and legal information

Kymeta maintains additional regulatory, legal, and compliance information on its website. To access the latest regulatory and legal documentation:

- Scan the QR code provided below.
- Visit the Kymeta website at: <https://www.kymetacorp.com/support/policies-warranties>.

14.1 Declaration of conformity

68-1:2018 (Third Edition), CB Scheme Certificate Number: NO139227.

EMC (art 3.1.b): EN 301 4 Kymeta Corp., of 12277 134th Ct NE, Suite 100, Redmond, WA 98052, USA, declares under our sole responsibility that the product Kymeta™ Kestrel u5 to which this declaration relates, is in conformity with the following standards and/or other normative documents:

Radio Equipment Directive 2014/53/EU Low Voltage Directive 2014/35/EU EMC Directive 2014/30/EU

Restriction of the use of certain hazardous substances (RoHS) Directive 2011/65/EU amended by 2015/863.

The product conforms with the essential requirements of the above Directives, based on the following standards applied:

SAFETY (art 3.1.a): IEC 62389-1

EMC (art 3.1.b) EN 301 489-1, EN 301 489-12, EN 301 489-17, EN 301 489-19, EN 55032, EN 55035.

SPECTRUM (art 3. 2): EN 302 340, EN 302 980, EN 303 413, EN 300 328, EN 303 413, EN 301 428, EN 302 977.

RF Safety (art 3. 1a): EN IEC 62311

We hereby declare under our sole responsibility that the product identified above complies with the essential requirements and other relevant provisions of Directive 2014/53/EU (Radio Equipment Directive).

Conformity has been demonstrated against the applicable requirements of:

- Article 3.1(a) – Protection of the health and safety of persons and domestic animals and the protection of property.
- Article 3.1(b) – Electromagnetic compatibility.
- Article 3.2 – Effective and efficient use of the radio spectrum.
- Article 3.3(d), (e), and (f) – Cybersecurity requirements, where applicable.

The conformity assessment procedure has been performed and the relevant technical documentation has been compiled in accordance with Directive 2014/53/EU.

The technical documentation supporting this Declaration of Conformity is maintained at:

Kymeta Corporation

12277 134th Court NE, Suite 100

Redmond, WA 98052

United States

14.2 Compliance

The Kestrel u5 platform is designed to support compliance with applicable rail, EMC, RF, and safety standards.

14.2.1 Rail standards

EN 50155 — Railway applications – Rolling stock – Electronic equipment

EN 45545-2 — Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behavior of materials and components

EN 50121 — Railway applications – Electromagnetic compatibility

EN 50163:2006 Annex A — Railway applications – Supply voltages of traction systems – Annex A

EN 50388-1:2022 Section 11.2 — Railway applications – Technical criteria for the coordination between electric traction power supply systems and rolling stock to achieve interoperability – Part 1: General

14.2.2 Non-rail standards

FCC 25.218 — Satellite earth stations and systems – Off-axis EIRP density limits for Ku-band earth stations

FCC 25.222 — Earth Stations on Vessels (ESV) operating in the Fixed-Satellite Service (FSS)

FCC 25.226 — Blanket licensing provisions for Vehicle-Mounted Earth Stations (VMES) operating in the Ku-band

CE Mark — European Conformity marking indicating compliance with applicable European Union health, safety, and environmental protection requirements

EN/IEC 62368-1 — Audio/video, information and communication technology equipment – Part 1: Safety requirements

SAE J1113-11 — Electromagnetic compatibility measurement procedures and limits for vehicle components – Part 11: Conducted transient emissions

SAE J1113-13 — Electromagnetic compatibility measurement procedures and limits for vehicle components – Part 13: Immunity to electrostatic discharge

SAE J1113-21 — Electromagnetic compatibility measurement procedures and limits for vehicle components – Part 21: Radiated electromagnetic immunity

SAE J1113-41 — Electromagnetic compatibility measurement procedures and limits for vehicle components – Part 41: Conducted transient immunity

14.3 FCC regulatory information

Compliance Statement (Part 15.19)

The enclosed hardware device (when operating with a 16.9 W or 9.6 W configuration) complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Warning (Part 15.21)

Changes or modifications not expressly approved by Kymeta could void the user's authority to operate the equipment. Manufacturer is not responsible for any radio or TV interference caused by modifications to this equipment.

Compliance Statement (Part 15.105(b))

This equipment (when operating with a 16.9 W or 9.6 W configuration) has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference.

14.4 Radio Standards Specifications (RSS) information

The following information pertains to Radio standards specifications (RSS) for Canada.

(ENG) This device incorporates license-exempt transmitter(s)/receiver(s) that adhere to the license-exempt Radio Standards Specifications (RSS) established by Innovation, Science and Economic Development Canada. Its operation is subject to the following conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

(FRA) Cet appareil intègre des émetteur(s)/récepteur(s) exempt(s) de licence qui respectent les spécifications des normes radio exemptes de licence (RSS) établies par Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux conditions suivantes:

- Cet appareil ne doit pas causer d'interférences.
- Cet appareil doit accepter toute interférence, y compris celle pouvant entraîner un fonctionnement indésirable de l'appareil.

14.5 WEEE information

Electrical and electronic equipment (EEE) contains materials, components and substances that may be hazardous and present a risk to human health and the environment when waste electrical and electronic equipment (WEEE) is not handled correctly.

Electrical and electronic equipment is marked with the crossed-out wheelie bin symbol indicating that electrical and electronic equipment should not be disposed of in the regular household waste stream but needs to be collected separately.

Users of EEE must not discard WEEE together with household waste. Users must follow local recycling regulations to reduce adverse environmental impact in connection with disposal of WEEE and to increase opportunities for reuse, recycling, and recovery of WEEE.

Please contact weee@kymetacorp.com for recycling and take-back assistance.

For more details, refer to the Kymeta website: <https://www.kymetacorp.com/legal/maintenance-and-support/weee-information-page/>.

15 Customer support

Contact Kymeta customer support at support@kymetacorp.com or call Kymeta **1-855-525-6638** for urgent issues.

16 Revision history

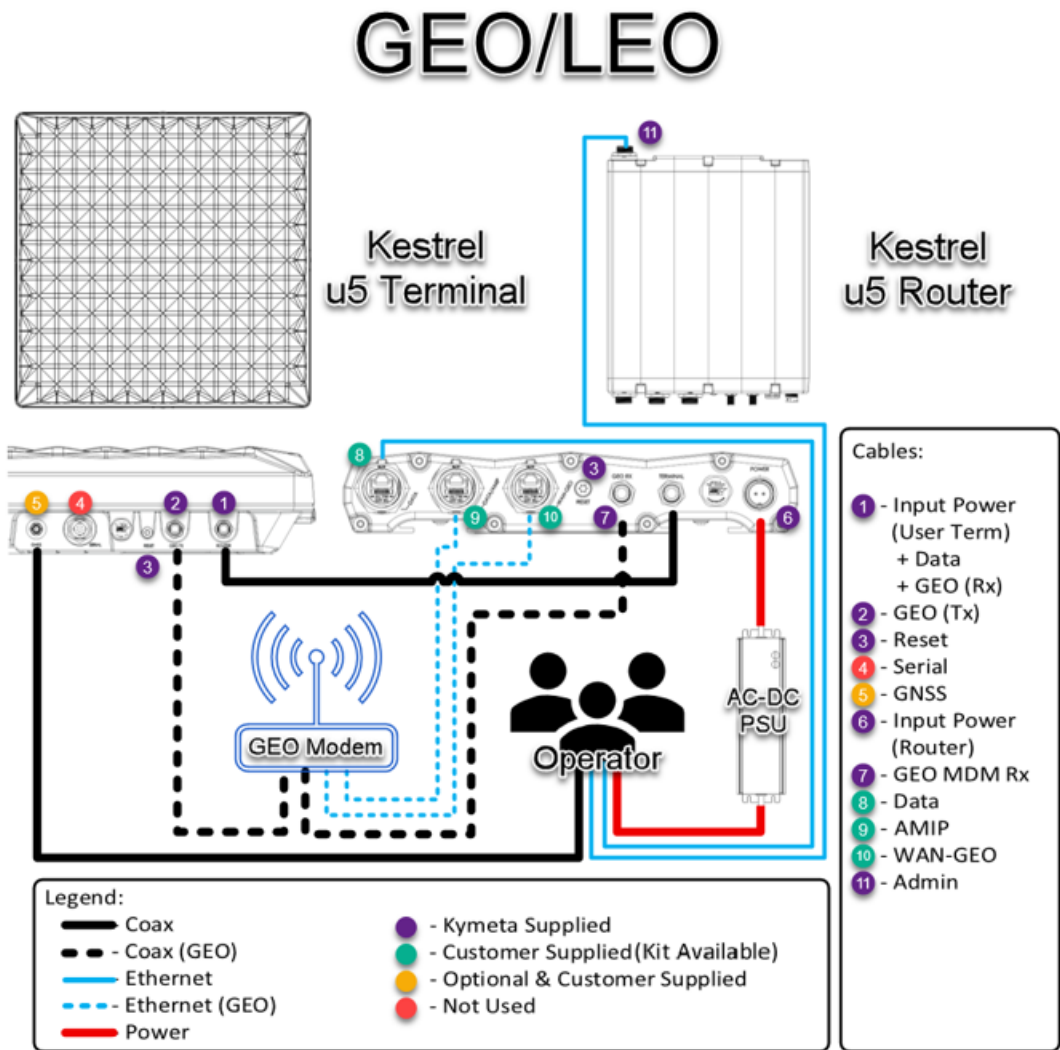
Revision	Change
01	Initial document.

17 Copyright and trademark information

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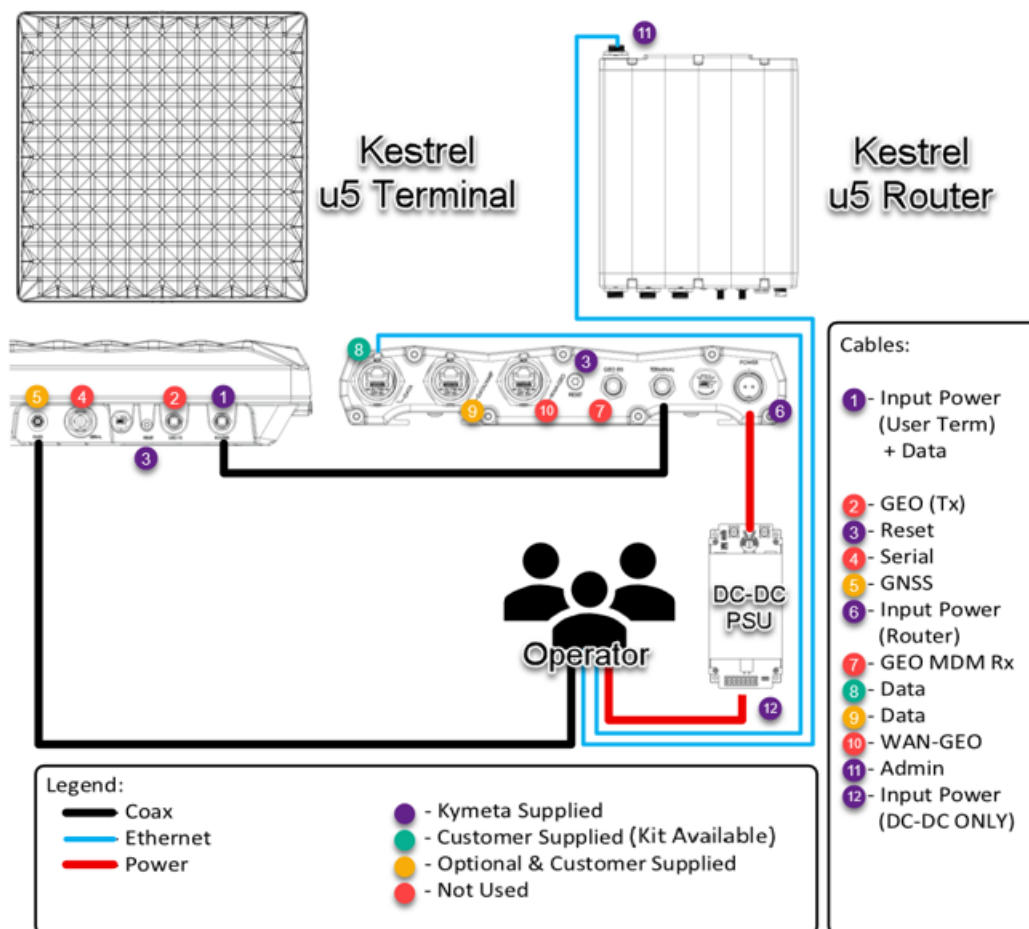
Appendix A. UT configurations setup

Kestrel u5 LEO/GEO UT components and setup



Kestrel u5 LEO UT components and setup

RAIL (LEO ONLY)



Appendix B. LED indicators

1.1 Burst pattern syntax

Pattern	Visual Representation	Description
×1	■	1 pulse, long pause, repeat
×2	■■	2 pulse, long pause, repeat
×3	■■■■ . . .	4 pulse, long pause, repeat

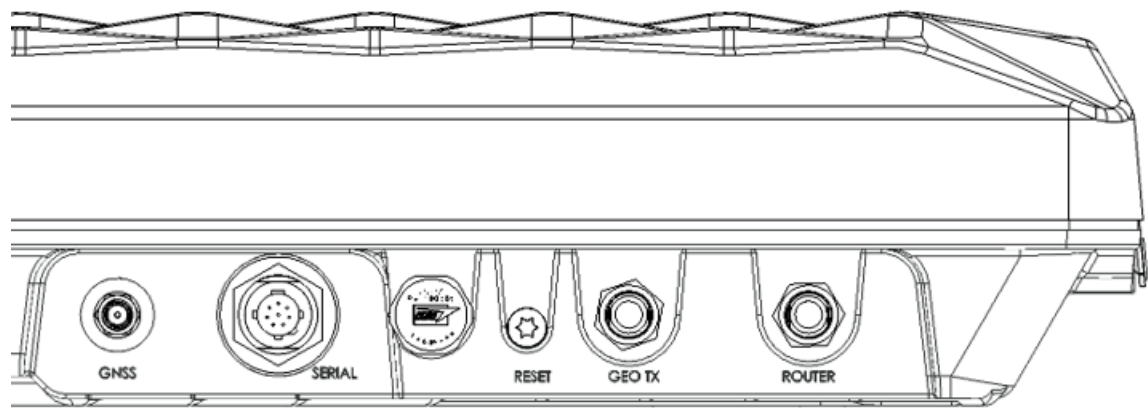
1.2 LED state

Color	Mode	Pattern	Description
Blue	Solid	—	Fully connected
Blue	Pulse	×1	WAN pending
Blue	Pulse	×2	All systems pending (boot)
Red	Solid	—	Critical / unrecoverable error
Red	Pulse	×1	Boot timeout
Red	Pulse	×4	Recovery mode
Yellow	Solid	—	Terminal link degraded
Yellow	Pulse	×1	Terminal link failure
Green	Pulse	×1	Terminal power applied (initial LED state)
Green	Pulse	×2	Firmware update in progress
Green	Pulse	×4	Soft or hard reset in progress

Note: In the case of enabled EMCON entitlement, the LED will be powered off when in ALPHA state.

Appendix C. I/O panel interfaces and functions

The diagram below identifies the external interfaces available on the Kestrel u5 UT.

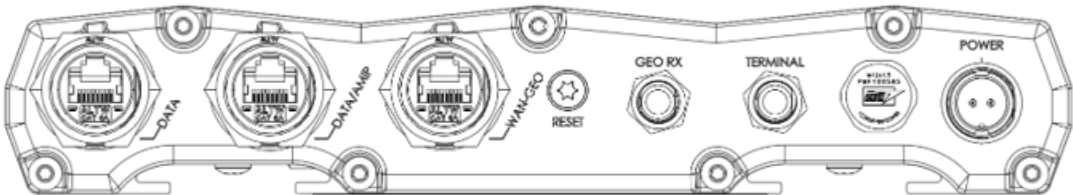


The table below provides descriptions of the UT external interfaces and their functions.

Interface	Function
GNSS	External GNSS antenna input
SERIAL	Reserved for future use
RESET	Reset and recovery for the antenna
GEO TX	GEO transmit IF interface
ROUTER	Power, data, and GEO receive interface

Appendix D. Router interfaces and functions

The figure below shows the router interfaces, including DATA, DATA/AMIP, WAN-GEO, GEO RX, TERMINAL, and POWER.



The figure below shows the ADMIN port and status LED located on the router front panel.



The table below provides descriptions of the router interfaces and their functions.

Interface	Function
DATA	User data interface
DATA/AMIP	OpenAMIP and user data interface
WAN-GEO	External GEO modem WAN interface
RESET	Reset and recovery for the router
GEO RX	GEO receive IF interface
TERMINAL	Power and data interface to the UT
POWER	Primary DC power input
ADMIN	Administrative access interface