Kymeta™ u7 Terminal User Manual

Includes Kymeta™ u7 Antenna

Covers u7h, u7m, and u7x versions of the u7 terminal

Document number: 700-00032-000-rev05

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1 Product description

The u7 terminal comprises three major components:

1. The weather-facing **outdoor unit** (ODU), which is rated for the environment and is designed for exposure to the elements. The ODU includes:
   - Kymeta u7 antenna, which includes a combined transmit- and receive-capable aperture, control electronics assembly, mechanical enclosure system, and software.
   - Mounting plate with RF transceiver elements (BUC, LNB, and diplexer) attached.

   Kymeta ships the u7 terminal in two different configurations:
   - Configuration 1 includes the ODU unassembled as two components: the antenna and the ODU mounting plate (with attached RF chain) uninstalled.
   - Configuration 2 includes the ODU assembled as one component: the antenna with the ODU mounting plate (with attached RF chain) installed.

2. The **indoor unit** (IDU), which is rated for use indoors. The IDU includes:
   - I/O box
   - Modem
   - Power supplies and interfaces

3. Physical connection interfaces. ODU and IDU components interface with each other through five cables:
   - ODU interface cable
   - Transmit coaxial cable (TX cable)
   - Receive coaxial cable (RX cable)
   - LNB-to-antenna cable
   - Ethernet cable

The initial release of the u7 terminal requires some installation and initialization upon commissioning it to a known satellite network. This initialization must be performed by a trained field engineer. Once the product is installed and commissioned, it will be ready to facilitate data communications through a satellite network. For information on commissioning, contact Kymeta customer support at support@kymetacorp.com or 1-855-525-6638.

This is a transmit and receive satellite terminal; the user must comply with all applicable local, national, and international laws and regulations regarding the installation and use of this product.
2 Indoor unit

2.1 I/O box

The I/O box is a vital component of the Kymeta u7 antenna. It is designed to operate indoors above the modem in the same rack.

The I/O box performs the following key tasks in the operation of the antenna:

» Connects the antenna (and the BUC in the u7 terminal) to an AC power supply via a standard IEC C13 plug connection from the I/O box to your local power supply.

» Connects the u7 antenna to a switch or router with an Ethernet interface.

» Provides a physical remote connection to the u7 antenna for recovery.

The I/O box has a user interface comprised of the following elements:

» A Power switch on the back

» A Status light on the front

» A Recovery button on the front

The I/O box is connected to the u7 antenna through a single ODU interface cable.

The I/O box contains the following ports:

» I/O interface

» Ethernet

» Power

2.1.1 I/O interface

The ODU interface cable uses an 18-pin locking connector.

2.1.2 Ethernet

The Ethernet port is the primary M&C port and is a standard 10/100/1000 Ethernet. It supports multiple protocols for a web server (GUI), ACU-Modem Interface (OpenAMIP™), and an M2M (machine-to-machine) RESTful API. Installation engineers can make multiple connections through use of an external switch.
2.1.3 Power
The power receptacle is a universal AC IEC 320-C14 on the back of the I/O box. Each I/O box ships with a US standard Type B 3-pin plug.

2.1.4 Status light
The status light has three states:
- Off, no light—no power
- Yellow—failed to start
- On, green—operational

If the status light is yellow, contact your Kymeta representative.

2.1.5 Recovery button
The Recovery button is a three-function pin-hole button. Use this button to reset the u7 antenna network and user configuration if the u7 antenna local network is not responding.

Reset
To reset the **u7 antenna network configuration** to the factory default values:
1. Make sure the u7 antenna is running.
2. Press and hold the Recovery button for four seconds.

The LED on the u7 antenna will blink and then stay on indicating the network configuration was reset. The changes take effect immediately; no restart is necessary.

Restore
To restore the u7 antenna network configuration and user configuration to the factory default values:
1. Power off the u7 antenna.
2. Press and hold the Recovery button, and then power on the u7 antenna.
3. Release the Recovery button 30 seconds after the power is turned on.

Software image restore
To restore the u7 antenna software image to the factory default:
1. Power off the u7 antenna.
2. Press and hold the Recovery button, and then power on the u7 antenna.
3. Release the Recovery button 60 seconds after the power is turned on.

⚠️ If the u7 antenna is reset or powered off within 3 minutes of the software image restore operation being requested, the operation will not be completed and the original software image will remain.

Recover
If the u7 terminal is not responding, cycle the system power to reset.
2.2 Modem

Install the IDU in a climate-controlled environment with proper temperature and humidity control.

If the modem temperature indicator light turns yellow or red during operations, it means the air temperature is too high for the modem and climate control measures are insufficient. The IDU shall not be operated in an environment which allows it to heat to more than 50° C.

Refer to the modem manufacturer’s installation and support guide for details regarding the iDirect x7. Refer to 2.1 I/O box for information regarding the I/O box.
3 Physical connection interfaces

The Kymeta u7 terminal includes the following physical connection interfaces:

» ODU interface cable
» TX cable
» RX cable
» LNB-to-antenna cable
» Ethernet cable

Refer to Appendix A: Specification for more information.

3.1 ODU interface cable

Kymeta requires using only the ODU Interface cable supplied by Kymeta. Standard lengths are available up to 15.2 m (50.0 ft.).

This cable connects the I/O box to the antenna and BUC. It provides power, Ethernet connectivity, and recovery functionality for the antenna. It also provides power and communication for the BUC.

This cable has three different connectors:

» 31-pin connector—connects to the 31-pin receptacle on the back of the antenna
» 12-pin Amphenol connector—connects to the 12-pin receptacle on the BUC
» 18-pin connector at the end of the long tail—connects to the I/O box

3.2 TX cable

This N-type IF cable connects the BUC in the ODU to the TX Out of the modem within the IDU. The TX cable works in the frequency range from 1050 MHz to 1700 MHz and passes a 10 MHz reference signal to the BUC. This protocol and the cabling is dependent on the specific modem and BUC used for each solution. Kymeta provides an N-type to F-type adapter to connect this cable to the modem.

3.3 RX cable

This N-type IF cable sends the L-Band (950 MHz to 2150 MHz) signal from the antenna to the modem and provides DC power for the LNB. It connects the antenna RX OUT port to the modem primary RX IN port (Rx 1). The RX cable works in the frequency range from 950 MHz to 2150 MHz and provides power for the LNB. Kymeta provides an N-type to F-type adapter to connect this cable to the modem.

3.4 LNB-to-antenna cable

This cable connects the LNB to the antenna RX IN port. By default Kymeta provides a 0.3 m (12.0 in.) LMR-195 cable, with a right-angle N-type connector. The connector is hex and knurl at each end. This cable comes attached to the ODU mechanical assembly.
3.5 Ethernet cable

This cable connects the modem to the I/O box. The Ethernet port is the primary M&C port and is a standard 10/100/1000 Ethernet. It supports multiple protocols for a web server (GUI), ACU-Modem Interface (OpenAMIP™), and an M2M (machine-to-machine) RESTful API. Installation engineers can make multiple connections with an external switch.
## 4 Package contents

### 4.1 u7 terminal packaging (configuration 1)

<table>
<thead>
<tr>
<th>Box</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box 1: u7 antenna</td>
<td>(1) antenna</td>
</tr>
<tr>
<td>Box 2: ODU assembly</td>
<td>(1) ODU mounting plate with attached RF chain - BUC, diplexer, LNB</td>
</tr>
<tr>
<td></td>
<td>(4) Screws</td>
</tr>
<tr>
<td></td>
<td>(4) Short stand-off posts</td>
</tr>
<tr>
<td></td>
<td>(8) Washers</td>
</tr>
<tr>
<td></td>
<td>(1) Loctite</td>
</tr>
<tr>
<td></td>
<td>(6) Cable ties</td>
</tr>
<tr>
<td></td>
<td>(1) O-ring</td>
</tr>
<tr>
<td></td>
<td>(1) 700-00009-001 Kymeta™ u7 terminal quick start guide</td>
</tr>
<tr>
<td></td>
<td>(1) 700-00011-000 Kymeta™ u7 terminal limited warranty</td>
</tr>
<tr>
<td></td>
<td>(1) 700-00008-001 Kymeta safety and handling guide</td>
</tr>
<tr>
<td>Box 3: I/O box</td>
<td>(1) I/O box</td>
</tr>
<tr>
<td></td>
<td>(1) power cable</td>
</tr>
<tr>
<td></td>
<td>(8) screws and nuts</td>
</tr>
<tr>
<td>Box 4: ODU interface cable</td>
<td>(1) ODU interface cable (three lengths available: 3.66 m, 7.62 m, 15.24 m)</td>
</tr>
<tr>
<td>Box 5: Modem</td>
<td>(1) Modem</td>
</tr>
<tr>
<td></td>
<td>(1) Power cable</td>
</tr>
<tr>
<td></td>
<td>(8) Screws and nuts</td>
</tr>
<tr>
<td></td>
<td>(1) Ethernet cable</td>
</tr>
<tr>
<td></td>
<td>(2) N-type to F-type adapter</td>
</tr>
<tr>
<td>RF cables (accessory)</td>
<td>(1) RX cable (three lengths available: 3.66 m, 7.62 m, 15.24 m)</td>
</tr>
<tr>
<td></td>
<td>(1) TX cable (three lengths available: 3.66 m, 7.62 m, 15.24 m)</td>
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</tbody>
</table>
## 4.2 u7 terminal packaging (configuration 2)

<table>
<thead>
<tr>
<th>Box</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box 1: u7 terminal ODU</td>
<td>(1) Pre-assembled ODU (ODU mounting plate (attached RF chain - BUC,</td>
</tr>
<tr>
<td></td>
<td>diplexer, LNB) installed on antenna)</td>
</tr>
<tr>
<td></td>
<td>(6) Cable ties</td>
</tr>
<tr>
<td></td>
<td>(1) 700-00009-001 <em>Kymeta™ u7 terminal quick start guide</em></td>
</tr>
<tr>
<td></td>
<td>(1) 700-00008-001 <em>Kymeta safety and handling guide</em></td>
</tr>
<tr>
<td></td>
<td>(1) 700-00011-000 <em>Kymeta™ u7 terminal limited warranty</em></td>
</tr>
<tr>
<td>Box 2: ODU interface cable</td>
<td>(1) ODU interface cable (three lengths available: 3.66 m, 7.62 m, 15.24 m)</td>
</tr>
<tr>
<td>Box 3: I/O box</td>
<td>(1) I/O box</td>
</tr>
<tr>
<td></td>
<td>(1) Power cable</td>
</tr>
<tr>
<td></td>
<td>(8) Screws and nuts</td>
</tr>
<tr>
<td>Box 4: Modem</td>
<td>(1) Modem</td>
</tr>
<tr>
<td></td>
<td>(1) Power cable</td>
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<tr>
<td></td>
<td>(8) Screws and nuts</td>
</tr>
<tr>
<td></td>
<td>(1) Ethernet cable</td>
</tr>
<tr>
<td></td>
<td>(2) N-type to F-type adapter</td>
</tr>
<tr>
<td>RF cables (accessory)</td>
<td>(1) RX cable (three lengths available: 3.66 m, 7.62 m, 15.24 m)</td>
</tr>
<tr>
<td></td>
<td>(1) TX cable (three lengths available: 3.66 m, 7.62 m, 15.24 m)</td>
</tr>
</tbody>
</table>
5 Package the Kymeta u7 terminal

Kymeta recommends boxing the u7 terminal in the original packaging. If you need to return a terminal, Kymeta will provide the replacement terminal first. Use the packaging from the replacement terminal to ship the original one back.

5.1 Package the u7 terminal (configuration 1)

The order of steps may vary depending upon your mounting structure. Always follow safety guidelines and refer to the 700-00008-001 Kymeta safety and handling guide for best practices.

1. Power off the terminal using the power switch on the back of the I/O box.
2. Carefully disconnect and cap all cables, being mindful of pins and connectors.
   a. Make sure cable ends do not drop into water or dirt.
   b. Dry off cables and coil them into the box, binding with cable ties.
   c. Do not leave adapters on cables.
3. Remove the terminal ODU from the mounting structure and place face-down on a non-abrasive surface for safe and easy access.
4. Dry off all equipment and remove any debris.
5. Place the terminal ODU at an angle where you can safely work on removing the mounting plate and attached RF chain.
   If the BUC is warm, cool it off before removing and packing the mounting plate with the attached RF chain.
6. Remove the four diplexer mounting screws from the antenna WR-75 flange.
7. Remove the ODU’s four connection point screws and remove the mounting plate with the attached RF chain.
8. Reattach the protective cover to the antenna WR-75 flange before packing.

If the protective cover is no longer available, cover the port with electrostatic discharge (ESD) tape.
9. Place the ODU mounting plate with the attached RF chain and the antenna back into the shipping compartments in the original cardboard boxes.
   a. Secure any loose items (e.g. screws, tools, cable ends).
   b. Close the boxes.
10. Place the ODU mounting plate with the attached RF chain and the antenna original shipping boxes inside reusable containers.
11. Close the containers and fasten the latches carefully.

5.2 Package the u7 terminal (configuration 2)

The order of steps may vary depending upon your mounting structure. Always follow safety guidelines and refer to the 700-00008-001 Kymeta safety and handling guide for best practices.

1. Power off the terminal using the power switch on the back of the I/O box.
2. Carefully disconnect and cap all cables, being mindful of pins and connectors.
   a. Make sure cable ends do not drop into water or dirt.
   b. Dry off cables and coil them into the box, binding with cable ties.
   c. Do not leave adapters on cables.
3. Remove the terminal ODU from the mounting structure and place face-down on a non-abrasive surface for safe and easy access.
4. Dry off all equipment and remove any debris.
5. Place the terminal ODU back into the shipping compartment in the original cardboard box.
   a. Secure any loose items (e.g. screws, tools, cable ends).
   b. Close the box.
6. Place the terminal ODU original shipping box inside a reusable container.
7. Close the container and fasten the latches carefully.

5.3 Package the u7 terminal IDU

1. Confirm power is off.
2. Carefully disconnect and cap all cables, being mindful of pins and connectors.
3. Coil and secure all cables with cable ties.
4. Check all fasteners to make certain they are still secure.
5. If unit is warm, cool it off.
6. Place foam inside the rack mount unit.
7. Close unit and fasten latches carefully.
6 Clean the u7 antenna

Prior to cleaning any part of the u7 antenna, ensure it is powered off.

**General cleaning**

Blow or rinse off loose debris first, and then apply a cleaning agent and use a clean, soft towel to clean the stained area. Avoid scrubbing and do not use abrasive materials when cleaning the terminal components.

Avoid exposing rubber parts (for example, gaskets) to alcohol or alcohol-based cleaners, for they can deteriorate the integrity of the rubber part.

**General cleaning agents**

Clean finger prints, smudges, salt spray, and light marks with isopropyl alcohol products: CAS Number 67-63-0. It is safe to use isopropyl alcohol on the assembly.

Clean difficult stains, such as oil, grease, soot, ink, and other soils with LPS Precision Clean Multi-Purpose Cleaner Degreaser at 10 to 1 dilution.

**Connectors**

Use a soft bristle acid brush or cotton swab with isopropyl or denatured alcohol to gently clean all connectors. Take extra care when cleaning RF air-dielectric connectors and don’t damage, bend, knick, push in, or pull out the center connector as this will change your signal. Carefully clean any surface corrosion on the exterior of the connector. Do not scrape or over scrub the connector as this will damage the connector coating and render it more susceptible to corrosion.

Ensure connectors are completely dry before reconnecting.

**Screws**

Use a soft bristle brush and isopropyl or denatured alcohol to clean lightly oxidized screws. Replace heavily corroded or oxidized screws when possible. For information on replacing parts and components, see section 9 Component replacement.
# 7 Component replacement tools

Before replacing any components on the u7 terminal, make sure you have all the required tools.

<table>
<thead>
<tr>
<th>Tool diagram</th>
<th>Tool description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="3 mm ball head Allen driver" /></td>
<td>3 mm ball head Allen driver</td>
</tr>
<tr>
<td><img src="image2.png" alt="M3 ball head Allen driver" /></td>
<td>M3 ball head Allen driver</td>
</tr>
<tr>
<td><img src="image3.png" alt="#2 Philips screwdriver" /></td>
<td>#2 Philips screwdriver</td>
</tr>
<tr>
<td><img src="image4.png" alt="US standard driver with ball head, 7/64&quot;" /></td>
<td>US standard driver with ball head, 7/64&quot;</td>
</tr>
<tr>
<td><img src="image5.png" alt="5 mm Allen wrench" /></td>
<td>5 mm Allen wrench</td>
</tr>
<tr>
<td><img src="image6.png" alt="M3 Allen wrench" /></td>
<td>M3 Allen wrench</td>
</tr>
<tr>
<td><img src="image7.png" alt="Break-over torque wrench for N-type connectors" /></td>
<td>Break-over torque wrench for N-type connectors</td>
</tr>
<tr>
<td><img src="image8.png" alt="Adjustable crescent wrench" /></td>
<td>Adjustable crescent wrench</td>
</tr>
<tr>
<td><img src="image9.png" alt="Torque screwdriver 0.2 N-m (2 in.-lb.) minimum rating" /></td>
<td>Torque screwdriver 0.2 N-m (2 in.-lb.) minimum rating</td>
</tr>
<tr>
<td>Tool Type</td>
<td>Specification</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Torque screwdriver</td>
<td>1.47 N·m (13 in.-lb.) minimum rating</td>
</tr>
<tr>
<td>Metric hex bit, 2.5 mm ball head with 3 in. (minimum) extension</td>
<td></td>
</tr>
<tr>
<td>Metric hex bit, 5 mm ball head with 3 in. (minimum) extension</td>
<td></td>
</tr>
<tr>
<td>M3 ball head with 3 in. (minimum) extension</td>
<td></td>
</tr>
<tr>
<td>Hex bit, M3 ball head with 3 in. (minimum) extension</td>
<td></td>
</tr>
<tr>
<td>7/64” bit with ball head with 3 in. (minimum) extension</td>
<td></td>
</tr>
</tbody>
</table>
8 Component replacement hardware

Before replacing any ODU components, take inventory to make sure you have all required hardware.

Kymeta provides all hardware for any replacement component to the ODU in the field replaceable units (FRU):

- 400-00004-0000 8 W Universal Series BUC FRU
- 400-00005-0000 16 W Universal Series BUC FRU
- 400-00006-0000 Universal N-type connector LNB FRU
- 400-00007-0000 Ku-band Diplexer FRU

The contents of each FRU are listed in the following tables.

8.1 BUC replacement hardware

<table>
<thead>
<tr>
<th>HW diagram</th>
<th>Hardware description</th>
<th>Part number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New Japan Radio Co. Universal Series 8 W BUC</td>
<td>160-00189-000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>New Japan Radio Co. Universal Series 16 W BUC</td>
<td>160-00168-000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O-ring (provided with the BUC)</td>
<td>455-00006-100</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>BUC side mounting flange</td>
<td>430-00495-000</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>BUC side support flange</td>
<td>430-00496-000</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>BUC rear side mounting flange</td>
<td>430-00497-000</td>
<td>1</td>
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<tr>
<td></td>
<td>Phillips head screw (PHS) with lock washer, M4 X 10</td>
<td>471-00022-000</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Phillips head screw (PHS), M4 X 20</td>
<td>471-00024-000</td>
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</tr>
<tr>
<td>HW diagram</td>
<td>Hardware description</td>
<td>Part number</td>
<td>Quantity</td>
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<tr>
<td></td>
<td>Button head cap screw (BHCS), M4 x 8</td>
<td>471-00016-000</td>
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<tr>
<td></td>
<td>Socket head cap screw (SHCS), M4 x 10</td>
<td>471-00018-000</td>
<td>4</td>
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</tbody>
</table>

### 8.2 LNB replacement hardware

<table>
<thead>
<tr>
<th>HW diagram</th>
<th>Hardware description</th>
<th>Part number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New Japan Radio Co. Universal LNB with N-type connector</td>
<td>160-00191-000</td>
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<tr>
<td></td>
<td>Socket head cap screw (SHCS), M4 x 10</td>
<td>471-00018-000</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>O-ring</td>
<td>455-00006-100</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>LNB mounting flange</td>
<td>430-00498-000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Socket head cap screw (SHCS), M4 x 8</td>
<td>471-00013-000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Belleville washer</td>
<td>495-00064-000</td>
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</tbody>
</table>
## 8.3 Diplexer replacement hardware

<table>
<thead>
<tr>
<th>HW diagram</th>
<th>Hardware description</th>
<th>Part number</th>
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<tbody>
<tr>
<td><img src="image" alt="Ku-band diplexer" /></td>
<td>Ku-band diplexer</td>
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<tr>
<td><img src="image" alt="Antenna WR-75 flange protection cover" /></td>
<td>Antenna WR-75 flange protection cover</td>
<td>430-00518-000</td>
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<tr>
<td><img src="image" alt="O-ring" /></td>
<td>O-ring</td>
<td>455-00006-100</td>
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</tbody>
</table>
9 Component replacement

Before beginning any component replacement, refer to 700-00008-001 Kymeta safety and handling guide to get familiar with the key steps to remember during the Kymeta u7 terminal installation.

**General recommendations:**

» Make sure to read these instructions carefully.

» Read text instructions. Pictures are provided for your reference and do not replace text instructions.

» Always start fasteners by hand, ensuring you do not to cross thread before tightening with a tool.

» Follow torque recommendations.

» Whenever tightening hardware, use a star or cross pattern and apply torque in steps. First attach all fasteners, then tighten partially in a star or cross pattern before tightening any hardware completely when there are multiple fasteners in an assembly.

» There are some items that should not be tightened completely until instructed to do so, follow tightening steps carefully.

9.1 Replace the antenna mounting plate with attached RF chain

Prior to replacing the antenna mounting plate, power down the u7 terminal and disconnect all power sources.

Dismount the ODU and lay it face down on a clean, flat surface.

9.1.1 Remove the antenna mounting plate with attached RF chain

1. Disconnect the LNB-to-antenna cable from the RX IN port on the antenna.
   **Tool:** Break-over torque wrench for N-type connectors
2. Unscrew and remove the four socket head cap screws connecting the diplexer to the antenna WR-75 flange.  
   **Tools:** US standard driver with ball head, 7/64"

3. Loosen and remove the four short hex stand-offs attaching the mounting plate to the antenna.  
   **Tools:** Torque wrench and M16 drive socket.

4. Lift up and remove the ODU assembly from the antenna.  
   *Never grab or lift the mounting plate with the attached RF chain (BUC, diplexer, LNB, and LNB-to-antenna cable) or the assembled ODU by the diplexer or any other part of the RF chain. Never use the diplexer or any part of the RF chain to mount the ODU. Avoid damaging the coating on the diplexer.*
9.1.2 Mount the replacement antenna mounting plate and attached RF chain

1. Remove the ODU assembly from the box by holding the mounting plate as pictured.

Never grab or lift the mounting plate with the attached RF chain (BUC, diplexer, LNB, and LNB-to-antenna cable) or the assembled ODU by the diplexer or any other part of the RF chain. Never use the diplexer or any part of the RF chain to mount the ODU. Avoid damaging the coating on the diplexer.

2. Remove the tape and protective cover from the WR-75 flange of the diplexer.
3. Place the ODU assembly directly on the antenna, so that the rectangular portion points to the bottom of the backshell. There should be a gap between the diplexer and the antenna WR-75 flange.

4. Loosen the LNB N-type connector to avoid putting stress on the diplexer.
   **Tools:** Crescent wrench, box wrench, or spanner wrench as available

5. Loosen the BUC rear-side mounting flange.
   **Tools:** #2 Philips screwdriver

6. Loosen the BUC side mounting flange.
   **Tools:** #2 Philips screwdriver
7. Adjust the ODU assembly to align the diplexer WR-75 flange holes.

8. Bolt the diplexer to the antenna WR-75 flange with four socket head cap screws. Ensure the O-ring is in place, fully aligned, and is not pinched when installing the diplexer. Poor O-ring installation can degrade RF performance. Screws should be tightened to about halfway in to align the diplexer flange holes.

**Tools:** Torque screwdriver 1.47 N·m (13 in.-lb.) minimum rating, 7/64” bit with ball head with 3 in. (minimum) extension

**Hardware:** (4) 6-32 x 1/2” socket head cap screw

9. Attach four short hex stand-offs. Apply two drops of Loctite starting at the second thread from the end of the bolt. Tighten the standoffs.

**Tools:** Torque wrench and M16 drive socket

**Hardware:** (4) short hex stand-off, 8M X 5/16” X ¾” (19 mm)

**Torque:** 20.34 N·m (180 in.-lb.)
10. Gently support the rear side of the BUC. The diplexer flange should be flush with the antenna WR-75 flange. Tighten the screw supporting the BUC rear-side mounting flange.
   **Tools:** #2 Phillips screwdriver
   **Torque:** 2.23 N·m (20 in.-lb.)

11. Tighten the BUC side mounting flanges in cross pattern.
   **Tools:** #2 Phillips screwdriver
   **Torque:** 1.52 N·m (13.5 in.-lb.)
12. Tighten the LNB N-type connector.
   **Tools:** Break-over torque wrench for N-type connectors
   **Torque:** 4.52 N·m (40 in.-lb.)

13. Connect the LNB-to-antenna cable to RX IN port on the antenna.
   » Ensure the center pin of the cabled connector is aligned to the center pin receptacle on the antenna.
   » Press the cabled connector onto the threaded antenna receptacle and hand tighten the outer ring clockwise until the threads are engaged and the outer ring no longer spins.

   **Tools:** Break-over torque wrench for N-type connectors
   **Torque:** 0.91 N·m (8.1 in.-lb.)

14. Fasten the LNB-to-antenna cable with a cable tie.

⚠ Check that all screws are tight before lifting the ODU.

⚠ Always lift the antenna by the sides. Never lift by any mounted components or cables.

### 9.2 Replace the BUC

Prior to replacing the BUC, power down the u7 terminal and disconnect all power sources.

Dismount the ODU and lay it face down on a clean, flat surface.

#### 9.2.1 Remove the BUC

⚠ Depending on which configuration of the u7 terminal you have, replacement of the BUC will require either a 3 mm, 5 mm, and M3 Allen wrench or a #2 Philips head screwdriver.
1. Disconnect the 12-pin Amphenol connector from the 12-pin receptacle on the BUC.
2. Disconnect the TX cable from the BUC.
3. Loosen the screw attaching the BUC rear-side mounting flange to the mounting plate.
   **Tool:** 3 mm ball head Allen driver or #2 Philips screwdriver

4. Remove the screw attaching the BUC rear-side mounting flange to the BUC.
   **Tool:** 5 mm Allen wrench or #2 Philips screwdriver

5. Remove the four socket head cap screws connecting the BUC to the diplexer.
   **Tool:** 3 mm ball head Allen driver

6. Remove the two BUC side mounting flanges attached to the BUC and the two BUC side support flanges.
   **Tool:** M3 Allen wrench or #2 Philips head screwdriver
7. Lift up and remove the BUC from the mounting plate.

8. Remove the O-ring from the diplexer flange.

9. Flip the BUC over and with the fan facing down, remove the BUC side mounting flanges from the bottom by removing the four button head cap screws.  
   **Tools:** Torque screwdriver 0.2 N-m (2 in.-lb.) minimum rating and metric hex bit, 2.5 mm ball head with 3 in. (minimum) extension.
9.2.2 Mount the replacement BUC

1. Flip the BUC over with the fan facing down and attach two BUC side mounting flanges to the bottom of the BUC with four button head cap screws. Check the picture to determine the orientation of the BUC side mounting flanges.
   **Tools:** Torque screwdriver 0.2 N-m (2 in.-lb.) minimum rating and metric hex bit, 2.5 mm ball head with 3 in. (minimum) extension
   **Hardware:** (1) BUC, (2) BUC side mounting flange, (4) BHCS, M4 x 8
   **Torque:** 1.47 N·m (13 in.-lb.)

   ![Image of BUC side mounting flanges]

   **⚠ Do not use the screws that come with the BUC. Always use hardware provided by Kymeta.**

2. Attach two BUC side support flanges to the mounting plate with four Phillips head screws.
   **Tools:** #2 Phillips screwdriver
   **Hardware:** (2) BUC side support flange, (4) PHS w/ lock washer, M4 X 10
   **Torque:** Loosely, you will tighten them down in a later step

   ![Image of BUC side support flanges]

3. Attach a BUC rear-side mounting flange to the mounting plate with one Phillips head screw.
   **Tools:** #2 Phillips screwdriver
   **Hardware:** (1) BUC rear side mounting flange, (1) PHS w/ lock washer, M4 X 10
   **Torque:** Loosely

   ![Image of BUC rear-side mounting flange]
4. Connect the two BUC side mounting flanges attached to the BUC to the two BUC side support flanges with four Phillips head screws and tighten the two BUC side support flanges to the mounting plate.
   **Tools:** #2 Phillips screwdriver
   **Hardware:** (4) PHS w/ lock washer, M4 X 10
   **Torque:** Tighten the screws so that the BUC slides easily back and forth up to WR-75 flange.

5. Ensure the diplexer and the BUC are aligned.

6. Slide the BUC up to the diplexer flange and check the fit of the socket head cap screws into the BUC screw holes through the diplexer flange.

7. Place the O-ring between the BUC and the diplexer flange and install four socket head cap screws into the BUC.
   **Tools:** Torque screwdriver 0.2 N·m (2 in.-lb.) minimum rating, M3 ball head with 3 in. (minimum) extension
   **Hardware:** (1) O-ring (provided with the BUC), (4) SHCS, M4 x 10
   **Torque:** 1.47 N·m (13 in.-lb.)

8. Attach the BUC rear-side mounting flange to the BUC with one Phillips head screw.
   **Tools:** #2 Phillips screwdriver
   **Hardware:** (1) PHS, M4 X 20
   **Torque:** 2.23 N·m (20 in.-lb.)
9. Tighten the screw attaching the BUC rear-side mounting flange to the mounting plate.

**Tools:** #2 Phillips screwdriver

**Hardware:** (1) PHS w/ lock washer, M4 X 10

**Torque:** 1.47 N·m (13 in.-lb.)
9.3 Replace the LNB

Prior to replacing the LNB, power down the u7 terminal and disconnect all power sources.

Dismount the ODU and lay it face down on a clean, flat surface.

9.3.1 Remove the LNB

1. Disconnect the LNB-to-antenna cable from the LNB.
   
   **Tools:** Break-over torque wrench for N-type connectors or adjustable crescent wrench

2. Remove the Belleville washer from the LNB.

3. Remove the LNB mounting flange from the mounting plate.
   
   **Tools:** M3 ball head Allen driver

4. Disconnect the LNB from the diplexer by removing the four socket head cap screws and the O-ring.
   
   **Tools:** M3 ball head Allen driver
9.3.2 Mount the replacement LNB

1. Connect the LNB to the diplexer with four socket head cap screws and an O-ring ensuring the screws are aligned.
   **Tools:** Torque screwdriver 0.2 N·m (2 in.-lb.) minimum rating, hex bit, M3 ball head with 3 in. (minimum) extension
   **Hardware:** (4) SHCS, M4 x 10, O-ring
   **Torque:** 1.47 N·m (13 in.-lb.)

   ⚠ Make sure that the LNB film stays on. The film keeps dust from entering the LNB and does not reduce gain.

   ⚠ Do not cross-thread!

2. Attach the LNB mounting flange to the mounting plate with one socket head cap screw.
   **Tools:** Torque screwdriver 0.2 N·m (2 in.-lb.) minimum rating, hex bit, M3 ball head with 3 in. (minimum) extension
   **Hardware:** (1) LNB mounting flange, (1) SHCS, M4 x 8
   **Torque:** 1.47 N·m (13 in.-lb.)

3. Attach the Belleville washer to the LNB. Ensure that the tapered portion is facing out of the LNB.
   **Hardware:** (1) Belleville washer
4. Connect the LNB-to-antenna cable to the LNB.
   **Tools:** Break-over torque wrench for N-type connectors
   **Hardware:** LNB-to-antenna cable
   **Torque:** 4.52 N·m (40 in.-lb.)

9.4 Replace the diplexer

*Never grab or lift the mounting plate with the attached RF chain (BUC, diplexer, LNB, and LNB-to-antenna cable) or the assembled ODU by the diplexer or any other part of the RF chain. Never use the diplexer or any part of the RF chain to mount the ODU. Avoid damaging the coating on the diplexer.*

Prior to replacing the diplexer, power down the u7 terminal and disconnect all power sources.

Dismount the ODU and lay it face down on a clean, flat surface.

9.4.1 Remove the diplexer

1. Remove the diplexer from the antenna WR-75 flange by unscrewing the four socket head cap screws.
   **Tools:** US standard driver with ball head, 7/64”
2. Remove the O-ring.
3. If you are not immediately replacing the diplexer, replace the antenna WR-75 flange protective cover.
   **Hardware:** Antenna WR-75 flange protective cover

9.4.2 Mount the diplexer

1. If necessary, remove the protective cover from the antenna WR-75 flange.
   **Hardware:** Antenna WR-75 flange protective cover
2. Place an O-ring at the antenna WR-75 flange.
   **Hardware:** (1) O-ring, WR-75 flange

3. Bolt the diplexer to the antenna WR-75 flange with four socket head cap screws. Ensure the O-ring is in place, fully aligned, and is not pinched when installing the diplexer. Poor O-ring installation can degrade RF performance.
   **Tools:** Torque screwdriver 1.47 N-m (13 in.-lb.) minimum rating, 7/64" bit with ball head with 3 in. (minimum) extension
   **Hardware:** (1) diplexer, (4) 6-32 x 1/2" socket head cap screw

4. Refer back to Section 9.2.2 *Mount the replacement BUC* and Section 9.3.2 *Mount the replacement LNB* for remounting the BUC and LNB.
## 10 Revision history

<table>
<thead>
<tr>
<th>Revision</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Initial document.</td>
</tr>
</tbody>
</table>
| 02       | Added new sections:  
  » Section 4 "Package content"  
  » Section 5 "Package KyWay terminal"  
  » Section 7 "Component replacement tools"  
  » Section 8 "Component replacement hardware"  
  » Section 9 "Component replacement"  
  Updated the following sections:  
  » Section 1: "Product description"  
  » Appendix A: "Specification"  
  » Appendix C: "KyWay terminal configuration diagram" |
| 03       | Added "Replace ASM mounting plate with attached RF chain" section.  
  Enhanced "Clean the mTenna\textsuperscript{u7} ASM" section. |
| 04       | Added warning to "Replace the diplexer" section.  
  Added replacement components list. See Section 8. |
| 05       | Updated product names to reflect new branding guidelines. Updated the Appendix A. Specification to support u7h terminal configuration. |
11 Legal information

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All other trademarks are the property of their respective owners.
# Appendix A: Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antenna</strong></td>
<td></td>
</tr>
<tr>
<td>Band</td>
<td>Ku</td>
</tr>
<tr>
<td>Antenna type</td>
<td>Electronically scanned array</td>
</tr>
<tr>
<td>Polarization</td>
<td>Vertical and horizontal, software defined</td>
</tr>
</tbody>
</table>
| RX frequency range\(^{(1)}\)     | u7x: 11.8 GHz to 12.7 GHz; 11.2 GHz to 12.1 GHz  
                               | u7m: 11.4 GHz to 12.3 GHz  
                               | u7h: |
| G/T (broadside)                  | 9.5 dB/K      |
| RX instantaneous bandwidth       | > 100 MHz     |
| RX scan roll-off @ 60°           | Cos^\(1.1-1.2\) |
| TX frequency range               | 14.0 GHz to 14.5 GHz |
| EIRP (broadside)                 | 8 W BUC: 41.5 dBW  
<pre><code>                           | 16 W BUC: 44.5 dBW |
</code></pre>
<p>| TX instantaneous bandwidth       | &gt; 100 MHz     |
| TX scan roll-off @ 60°           | Cos^(1.2-1.4) |
| <strong>Tracking</strong>                     |                |
| Tracking rate                    | &gt; 20°/second  |
| Scan angles                      | Theta up to 75° off broadside; Phi 360° |
| Accuracy                         | &lt; 0.2°        |
| Tracking receiver type           | Integrated DVB-S2 |
| <strong>Power and RF system</strong>          |                |
| Input power                      | 110 VAC to 240 VAC 50/60 Hz |</p>
<table>
<thead>
<tr>
<th><strong>Parameter</strong></th>
<th><strong>Specification</strong>*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power consumption</strong></td>
<td>8 W BUC: 300 W (typical)</td>
</tr>
<tr>
<td></td>
<td>16 W BUC: 400 W (typical)</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td></td>
</tr>
<tr>
<td>Network interface</td>
<td>RJ45 10/100/1000</td>
</tr>
<tr>
<td>RF cables</td>
<td>N-type connectors</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td></td>
</tr>
<tr>
<td>Interface cable 3.66 m (12 ft.)</td>
<td>Bare 0.9 kg (2 lb.)</td>
</tr>
<tr>
<td>Interface cable 7.62 m (25 ft.)</td>
<td>Bare 1.81 kg (4.0 lb.)</td>
</tr>
<tr>
<td>Interface cable 15.24 m (50 ft.)</td>
<td>Bare 3.63 kg (8.0 lb.)</td>
</tr>
<tr>
<td>RF cable 3.66 m (12 ft.)</td>
<td>Bare 0.11 kg (0.25 lb.)</td>
</tr>
<tr>
<td>RF cable 7.62 m (25 ft.)</td>
<td>Bare 0.23 kg (0.5 lb.)</td>
</tr>
<tr>
<td>RF cable 15.24 m (50 ft.)</td>
<td>Bare 0.45 kg (1.0 lb.)</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
</tr>
<tr>
<td>Outdoor unit dimensions</td>
<td>L 82.3 cm × W 82.3 cm × 16.5 cm</td>
</tr>
<tr>
<td></td>
<td>(L 32.4 in. × W 32.4 in. × D 6.4 in.)</td>
</tr>
<tr>
<td>Outdoor unit weight</td>
<td>u7x 18.14 kg (40 lb.)</td>
</tr>
<tr>
<td></td>
<td>u7m(2) 20.41 kg (45 lb.)</td>
</tr>
<tr>
<td></td>
<td>u7h 18.14 kg (40 lb.)</td>
</tr>
<tr>
<td>Outdoor unit mounting interface</td>
<td>4 × M8 × 1.25 mounting standoffs 0.95 cm (0.375 in.) deep</td>
</tr>
<tr>
<td>Indoor unit dimensions</td>
<td>W 44.5 cm × D 31.75 cm × H 9.06 cm (W 17.5 in. × D 12.5 in. × H 3.57 in.)</td>
</tr>
<tr>
<td>(maximum)</td>
<td></td>
</tr>
<tr>
<td>Indoor unit weight</td>
<td>6.35 kg (14.0 lb.)</td>
</tr>
<tr>
<td><strong>Environmental (outdoor unit)</strong></td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Specification*</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| **Operational temperature** | u7m, u7h: -25 °C to +55 °C  
                      | u7x (antenna): -25 °C to +65 °C  
                      | u7x (terminal): -25 °C to +55 °C |
| Storage temperature  | -40 °C to +75 °C |
| Ingress protection   | IP66nd storage  |
| Shock                | IEC 60068-2-27  |
| Vibration            | MIL-STD-167-1A | MIL-STD-810G | IEC 600068-2-64 | IEC 60068-2-57 |

**Environmental (indoor unit)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational temperature</strong></td>
<td>0 °C to +50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C to +75 °C</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP20</td>
</tr>
<tr>
<td>Shock</td>
<td>IEC 60068-2-27</td>
</tr>
<tr>
<td>Vibration</td>
<td>MIL-STD-810G</td>
</tr>
</tbody>
</table>
| BTU/hr               | 8 W: 1025 (typical) | 1700 (peak)  
                      | 16 W: 1375 (typical) | 2050 (peak) |

**Compliance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification*</th>
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<tbody>
<tr>
<td>Earth station License</td>
<td>FCC compliant for 25.222 and 25.226</td>
</tr>
<tr>
<td>Certifications</td>
<td>UL, FFC, CE, WEEE, and ROHS</td>
</tr>
</tbody>
</table>

**Notes:**

(1) Terminal version availability: u7x - Q3 2019; u7m - now; u7h - March 2019.

(2) A lighter version of u7m terminal will be available in Q3 2019.

*Specifications are subject to change.*
Appendix B: Accessories

Kymeta provides the following cables as accessories for the Kymeta u7 terminal:

» ODU interface cable
» RX cable
» TX cable

Available lengths:

» 3.66 m (12 ft.)
» 7.62 m (25 ft.)
» 15.24 m (50 ft.)

Custom lengths are available upon request. Contact your Kymeta representative for details.

To ensure performance of the system across the full operational range, Kymeta recommends using the following IF cable types for the RX cable and TX cable. The maximum attenuation levels of the table assumes 4 Ω of DC resistance and an RF attenuation of 10 MHz at 1.5 dB with a maximum value of 12 dB RF attenuation at 950 to 2150 MHz.

<table>
<thead>
<tr>
<th>IF cable type</th>
<th>Maximum length</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMR-195</td>
<td>19 m (65 ft.)</td>
</tr>
<tr>
<td>LMR-240</td>
<td>28 m (93 ft.)</td>
</tr>
<tr>
<td>LMR-400</td>
<td>54 m (179 ft.)</td>
</tr>
<tr>
<td>LMR-600</td>
<td>83 m (276 ft.)</td>
</tr>
</tbody>
</table>
Appendix C: Kymeta u7 terminal configuration diagram

OUTDOOR UNIT
Kymeta™ u7 antenna, mounting plate with BUC, LNB, and diplexer attached

MODEM

I/O BOX

INDOOR UNIT

- ODU interface cable
- TX cable
- RX cable
- LNB-to-antenna cable
- Power cable (Type B included with modem and I/O box)
- Ethernet cable (included with modem)
- Ethernet cable* (not included with Kymeta u7 terminal)

*If your Kymeta u7 terminal configuration includes an iDirect Evolution X7 modem, connect the Ethernet cable to any modem port in the range from 2 to 8. If your terminal configuration includes an iDirect Velocity X7 modem, connect the Ethernet cable to any modem port in the range from 5 to 8.