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OneWeb HL1100W UT Installation Guide

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11717 Exploration Lane, Germantown, MD 20876
Phone (301) 428-5500 Fax (301) 428-1868/2830

Contents

Understanding safety alert messages

Safety alert messages call attention to potential safety hazards and tell you how to avoid them. These messages are identified by the signal words DANGER, WARNING, CAUTION, or NOTICE, as illustrated below. To avoid possible property damage, personal injury, or in some cases possible death, read and comply with all safety alert messages.

Messages concerning personal injury

The signal words DANGER, WARNING, and CAUTION indicate hazards that could result in personal injury or in some cases death, as explained below. Each of these signal words indicates the severity of the potential hazard.

DANGER indicates a potentially hazardous situation which, if not avoided, *will* result in death or serious injury.

DANGER indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

AVERTISSEMENT indique une situation potentiellement dangereuse qui, si elle n’est pas évitée, pourrait ntrainer la mort ou des blessures graves.

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

ATTENTION indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.

Messages concerning property damage

A NOTICE concerns property damage only.

NOTICE

NOTICE is used for advisory messages concerning possible property damage, product damage or malfunction, data loss, or other unwanted results—but *not* personal injury.

AVIS est utilisé pour les messages d'avertissement concernant d'éventuels dommages matériels, dommages ou dysfonctionnements du produit, perte de données ou autres résultats indésirables, mais pas de blessures corporelles.

Safety symbols

The generic safety alert symbol  calls attention to a potential personal injury hazard. It appears next to the DANGER, WARNING, and CAUTION signal words as part of the signal word label. Other symbols may appear next to DANGER, WARNING, or CAUTION to indicate a specific type of hazard (for example, fire or electric shock). If other hazard symbols are used in this document they are identified in this section.

Additional symbols

This document uses the following hazard symbols:

Indicates a safety message that concerns digging.

Indicates a safety message that concerns a potential electric shock hazard.

Indicates a safety message that concerns handling of an electrostatic-sensitive device or component.

Indicates a safety message that concerns the possibility of an explosion.

Indicates a safety message that concerns a potentially hazardous situation in which you could fall.

Indicates a safety message that concerns a possible fire hazard.

Indicates a safety message that concerns lifting a heavy object.

Indicates a safety message that concerns a hot surface.

Indicates a safety message that concerns laser radiation.

Indicates a safety message that concerns radio frequency (RF) energy.

Indicates a safety message that concerns ionizing radiation.

Indicates a safety message that concerns a heavy object that could crush you if it fell.

Indicates a safety message that concerns protective eyewear.

Indicates a safety message that concerns wearing a hard hat.

User terminal installation safety

Observe the following precautions when installing the satellite user terminal. This manual also includes other safety alerts where appropriate concerning specific installation procedures.

Observez les précautions suivantes lors de l'installation du terminal utilisateur satellite. Ce manuel comprend également d'autres alertes de sécurité concernant des procédures d'installation spécifiques.

- To avoid electric shock, stay at least 6 m away from power lines when there is a chance that you or the equipment you are using could come into contact with the power lines. Always look up and check for overhead lines before moving a ladder.
- If any part of the user terminal or mount assembly comes in contact with a power line, call the local power company to remove it. Do not try to remove it yourself. If the user terminal reflector contacts electric power lines, you may be killed or seriously injured.
- For pole mount installations, be sure to obtain information on underground utilities in the proposed location before digging.
- Call a company that marks underground utility lines before digging to avoid striking underground cables, pipes, or electric lines.
- Striking or cutting underground cables, pipes, or electric lines can cause personal injury or property damage.

- Pour éviter les chocs électriques, restez à au moins 6 m des lignes électriques lorsqu'il y a un risque que vous ou l'équipement que vous utilisez entrez en contact avec les lignes électriques. Regardez toujours vers le haut et vérifiez les lignes aériennes avant de déplacer une echelle.
- Si toute partie du terminal utilisateur ou de l'ensemble de montage entre en contact avec une ligne électrique, appelez la compagnie d'électricité locale pour la retirer. N'essayez pas de la supprimer vous-même. Si le réflecteur du terminal utilisateur entre en contact avec des lignes électriques, vous series en danger d'être tué ou grièvement blesse.
- Pour les installations sur poteaux, assurez-vous d'obtenir des informations sur les services publics souterrains à l'emplacement proposé avant de creuser.
- Avant de creuser et afin d'éviter de frapper des câbles, des tuyaux ou des lignes électriques souterrains, appelez une entreprise qui démarque les lignes électriques souterraines.
- Le fait de frapper ou de couper des câbles, des tuyaux ou des lignes électriques souterrains peut provoquer des blessures ou des dommages matériels.

WARNING

If you work on a roof, tower, or other high structure or use a ladder or scaffold to access the work site, follow these precautions to prevent personal injury or death:

- Walk only on sound roof structures.
- Ensure that the user terminal assembly and installation surface are structurally sound so that they can support all loads (equipment weight, ice, and wind).
- Use safety equipment (e.g., a lifeline) appropriate for the work location.
- Follow all manufacturer safety precautions for all safety and other equipment used.
- Perform as many procedures as possible on the ground.

Si vous travaillez sur un toit, une tour ou toute autre structure élevée ou si vous utilisez une échelle ou un échafaudage pour accéder au chantier, suivez ces précautions pour éviter des blessures ou la mort :

- Marchez uniquement sur des structures de toit solides.
- Assurez-vous que l'assemblage du terminal utilisateur et la surface d'installation sont structurellement solides afin qu'ils puissent supporter toutes les charges (poids de l'équipement, glace et vent).
- Utilisez un équipement de sécurité (par exemple, une ligne de sécurité) approprié au lieu de travail.

- Suivez toutes les précautions de sécurité du fabricant pour tous les équipements de sécurité et autres utilisés.
- Effectuer autant de procédures que possible au ras du sol.

WARNING 

- Do not work in high wind or rain; or if a storm, lightning, or other adverse weather conditions are either present or approaching.
- Do not attempt to assemble, move, or mount the user terminal on a windy day. Even a slight wind can unexpectedly create sudden strong forces on the user terminal surface.
- Ne travaillez pas par vent fort ou sous la pluie ; ou si une tempête, des éclairs ou d'autres conditions météorologiques défavorables sont présentes ou imminentes.
- N'essayez pas d'assembler, de déplacer, ou de monter le terminal utilisateur par temps venteux. Même un vent léger peut créer de manière inattendue des forces soudaines et fortes sur la surface du terminal utilisateur.

WARNING 

Properly ground the user terminal assembly in accordance with all local and national electrical codes.

Faites correctement la prise à terre de l’ensemble du terminal utilisateur conformément à tous les codes électriques locaux et nationaux.

WARNING

User terminals that have been improperly installed or attached to an unstable structure are susceptible to wind damage, which can be very serious or even life threatening to you and the customer. The installer and the dealer assume full responsibility that the installation is structurally sound to support all loads (weight, wind, and ice) and is properly sealed against leaks.

Les terminaux utilisateur mal installés ou fixés à une structure instable sont susceptibles d'être endommagés par le vent, ce qui peut être très grave, voire mettre votre vie en danger, ainsi que celle du client. L'installateur et le revendeur assument l'entière responsabilité du fait que l'installation est structurellement solide pour supporter toutes les charges (poids, vent et glace) et qu'elle est correctement scellée contre les fuites.

CAUTION 

Observe these precautions to avoid exposure to RF radiation, a potential safety hazard:

- All user terminals must carry an industry-standard and government-approved Radiation Hazard Caution label.
- The user terminal must be installed in a location not readily accessible to children and in a manner that prevents human exposure to potentially harmful levels of radiation.
- The user terminal must be mounted such that no object that could reasonably be expected to support a person is within 2 meters of the edges of a cylindrical space that projects outward from the user terminal. For example, the user terminal may not be installed in a place where the path of the cylindrical space passes immediately above a deck on a nearby property. This reduces the likelihood of a person being exposed to RF radiation because they stood inside of or next to that cylindrical space.
- If the above distance requirements cannot be met, the user terminal must be mounted in a controlled area inaccessible to the general public, such as a fenced enclosure or on a roof.
- Fenced installations must have a locked entry, and the fenced area must be large enough to protect the general public from exposure to potentially harmful levels of radiation.
- Access to a roof installation in a commercial, industrial, or institutional environment must be limited by a door or a permanently fastened ladder that is locked to deny access to the general public.
- Fenced or roof installations in commercial, industrial, or institutional environments must carry a Radiation Hazard Caution sign on the access door, gate, or permanently mounted access ladder within plain sight of anyone approaching the user terminal from the front or sides of the reflector.
- Once the transmitter becomes operational, maintain a safe distance; at least 1 m.

Failure to observe these cautions could result in injury to the eyes or other personal injury.

Observez ces précautions pour éviter toute exposition aux rayonnements RF, qui sont un risque potentiel pour la sécurité :

- Tous les terminaux utilisateur doivent porter une étiquette de mise en garde relative aux risques de rayonnement, conforme aux normes de l'industrie et approuvée par le gouvernement.
- Le terminal utilisateur doit être installé dans un endroit difficilement accessible aux enfants et d'une manière qui empêche l'exposition humaine à des niveaux de rayonnement potentiellement nocifs.

- Le terminal utilisateur doit être monté de telle sorte qu'aucun objet susceptible de soutenir une personne ne se trouve à moins de 2 mètres des bords d'un espace cylindrique faisant saillie vers l'extérieur du terminal utilisateur. Par exemple, le terminal utilisateur ne peut pas être installé dans un endroit où le chemin de l'espace cylindrique passe immédiatement au-dessus d'une terrasse sur une propriété voisine. Cela réduit la probabilité qu'une personne soit exposée aux rayonnements RF parce qu'elle se trouve à l'intérieur ou à côté de cet espace cylindrique.
- Si les exigences de distance ci-dessus ne peuvent pas être respectées, le terminal utilisateur doit être monté dans une zone contrôlée inaccessible au grand public, comme une enceinte clôturée ou sur un toit.
- Les installations clôturées doivent avoir une entrée verrouillée et la zone clôturée doit être suffisamment grande pour protéger le grand public de l'exposition à des niveaux de rayonnement potentiellement nocifs.
- L'accès à une installation sur toiture dans un environnement commercial, industriel ou institutionnel doit être limité par une porte ou une échelle fixée en permanence et verrouillée pour interdire l'accès au grand public.
- Les installations clôturées ou sur le toit dans des environnements commerciaux, industriels ou institutionnels doivent porter un panneau d'avertissement concernant les risques de rayonnement sur la porte d'accès, le portail ou l'échelle d'accès montée en permanence, à la vue de toute personne s'approchant du terminal utilisateur par l'avant ou les côtés du réflecteur.
- Une fois l'émetteur opérationnel, maintenez une distance de sécurité ; au moins 1 m.

Le non-respect de ces précautions pourrait entraîner des blessures aux yeux ou d’autres blessures corporelles.

⚠ CAUTION 

Observe these precautions to avoid exposure to RF radiation, a potential safety hazard:

- Do not remove the yellow caution label on the user terminal system. All user terminals of any type or size must carry an industry standard and government approved Radiation Hazard Caution label on the stanchion or ODU mount.
- A fenced or roof installation in a commercial, industrial, or institutional environment must carry a Radiation Hazard Caution sign on the access door, gate, or permanently mounted access ladder within plain sight of anyone approaching the user terminal.

Failure to observe these cautions could result in injury to eyes or other personal injury.

Observez ces précautions pour éviter toute exposition aux rayonnements RF, un risque potentiel pour la sécurité:

- Ne retirez pas l'étiquette d'avertissement jaune apposée sur le système du terminal utilisateur. Tous les terminaux utilisateur, quel que soit leur type ou leur taille, doivent porter une étiquette de mise en garde contre les risques de rayonnement conforme aux normes de l'industrie et approuvée par le gouvernement sur le bras de support du reflecteur.
- Une installation clôturée ou sur le toit dans un environnement commercial, industriel ou institutionnel doit porter un panneau d'avertissement concernant les risques de rayonnement sur la porte d'accès, le portail ou l'échelle d'accès montée en permanence, à la vue de toute personne s'approchant du terminal utilisateur.

Le non-respect de ces précautions pourrait entraîner des blessures aux yeux ou d'autres blessures corporelles.

⚠ CAUTION

If the user terminal or mount assembly begins to fall during the installation, *do not attempt to catch it*. Move away and let it fall.

Si le terminal utilisateur ou l'ensemble de montage commence à tomber pendant l'installation, n'essayez pas de l'attraper. Éloignez-vous et laissez-le tomber.

Note: Some installations may require additional precautions. See the appropriate site preparation and mount installation guide for more information.

⚠ CAUTION

Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)

Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV is, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV is isa llers en galvanisk isolator mellom apparatet og kabel-TV nettet.

Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan I isa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet..

Chapter 1
Overview

This installation guide explains how to assemble and install the OneWeb HL1100W user terminal. It is written for qualified installers who are familiar with satellite user terminal installation practices and are capable of properly applying the information presented.

This chapter presents an overview of the HL1100W user terminal, a summary of the steps used to assemble and install the user terminal, and supplemental information on tasks related to user terminal installation and commissioning.

User terminal description

The HL1100W is a user terminal (UT) with Wi-Fi support for fixed installations. The user equipment connects to the UT via Gigabit Ethernet (GigE) or Wi-Fi connections through the indoor equipment. The HL1100W UT connects to the OneWeb LEO satellites using a tracking antenna and provides a user gateway to the OneWeb Ground Network (GN). The user traffic is routed from there to the Core Network (CN) to provide Internet access to the user. The UT interfaces with the OneWeb Device Hub which provides certain UT management functions.

The HL1100W UT consists of three field replaceable units – outdoor unit (ODU), indoor unit (IDU) and power supply unit (PSU). The ODU is installed outdoors on a mount, while the IDU and PSU are installed indoors.

Figure 1 below shows the HL1100W user terminal fully assembled.

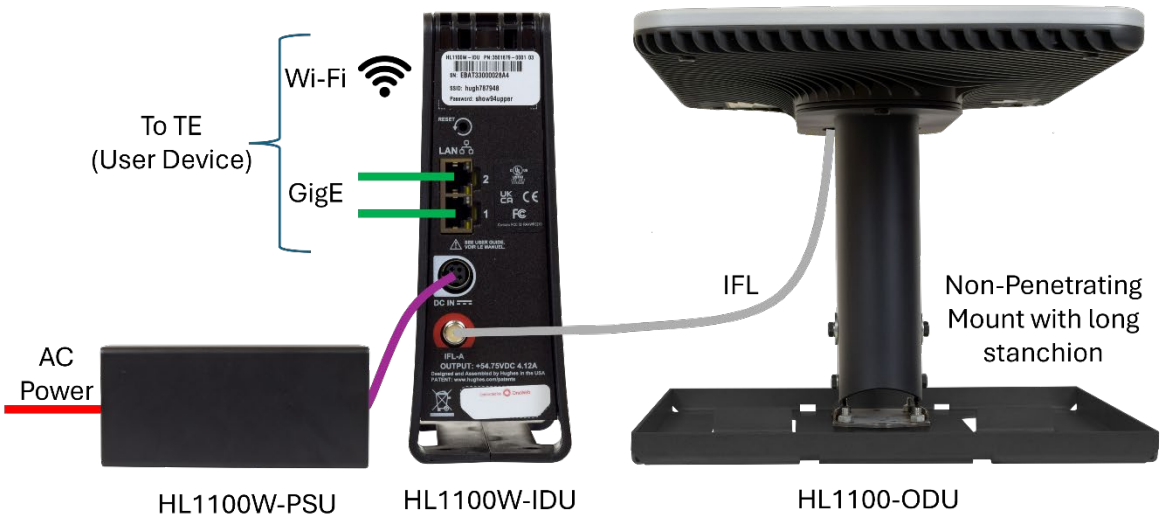


Figure 1: HL1100W satellite user terminal

Outdoor equipment

The HL1100-ODU is described in the subsection below.

HL1100-ODU

The HL1100-ODU (Outdoor Unit) consists of one electronically steered antenna panel for receive (Rx) path and transmit (Tx) path. The antenna panel has a Common Control Module (CCM), an RF Conversion Module (RCM) and a Beam Former Array (BFA). The CCM has a host processor that runs the UT software for control, management and network services, and it also houses a satellite modem that communicates with OneWeb ground network through the OneWeb LEO satellites using the Rx & Tx tracking antenna.

Indoor equipment

The HL1100W-IDU, HL1100W-PSU and IFL cables are described in the subsections below.

HL1100W-IDU

The HL1100W-IDU (Indoor Unit) hosts a Wi-Fi Router which provides two GigE ethernet ports and Wi-Fi access to the user data network. The Wi-Fi Router also provides access to the local management interface of the UT.

HL1100W-PSU

The HL1100W-PSU (Power Supply Unit) is an AC-DC power supply assembly that provides DC power to both IDU and ODU.

Intra-facility link (IFL) cables

The HL1100W-IDU is connected to the ODU via a single intra-facility link (IFL) cable. The cable connects the IDU to the IFL panel on the ODU. It carries both DC power & data. The data is transferred over a Multimedia over Coax Alliance (MoCA) link between the Wi-Fi Router on the IDU and the host processor on CCM in the ODU.

The PSU has a load sensing circuit which prevents powering on the ODU until the IDU and ODU are connected via the IFL cables.

Companion installer app

The HL1100W UT has a companion installer app (named Hughes LEO app) that can be used on smart phones to aid the commissioning and status check of the UT.

User terminal installation prerequisites checklist

The installer needs to consider a checklist of material required for installing an HL1100W user terminal before visiting the installation site. Refer to *Appendix A* on page 105 for details.

User terminal installation summary

Table 1 lists the basic steps and related tasks for assembling and installing the user terminal. Perform the procedures in the order listed. For detailed information on each task, refer to the sections listed.

Table 1: Satellite user terminal installation summary

Step	Task	Related Document
1	Explain the installation process to the customer	
2	Conduct a site survey with the customer to identify a suitable location for the outdoor and indoor equipment	Refer to *Select the ODU installation site and ODU mount* on page 31
3	Determine the most suitable mount for the ODU	Refer to *Select the ODU installation site and ODU mount* on page 31
4	Locate an installation location with clear view of the entire sky before installing the ODU. Blockage/Obstructions must be **no more than 10%** on Hughes LEO App. Use the Hughes LEO app on your smart phone to confirm the chosen site is acceptable	Refer to *Site survey using the user terminal Hughes LEO app* on page 74
5	Install the outdoor equipment (ODU)	Refer to *General instructions for assembling the ODU* on page 29
6	Install the IFL cable between the ODU and IDU	Refer to *IFL cable installation procedure* on page 53
7	Ground the user terminal assembly	Refer to *Establishing the grounding position* on page 54
8	Install the indoor equipment (IDU and PSU)	Refer to *Installing the IDU* on page 63 Refer to *Installing the PSU* on page 63
9	Power on the user terminal and connect the user equipment	Refer to *Powering up the user terminal* on page 64 Refer to *Establishing a data connection to the IDU* on page 65
10	Commission the user terminal	Refer to *Commissioning your user terminal* on page 79
11	Fill up the installation checklist	Refer to *Appendix A* on page 111

Blockage/obstruction note

Please note that the **outdoor unit (ODU) must have a ±54° conical view of the satellites** (see Figure 2). Ideally, no obstructions to this field of view must exist. At most, there must be no more than 10% blockage, as shown on Hughes LEO App. It is important to use the LEO app as a guide, holding the mobile phone as close as possible where the ODU will be located.

Note: If obstructions at the preferred installation location do not allow for the required view of the sky or an otherwise reliable compliant installation, Hughes will work with the customer to identify another suitable, obstruction-free location.

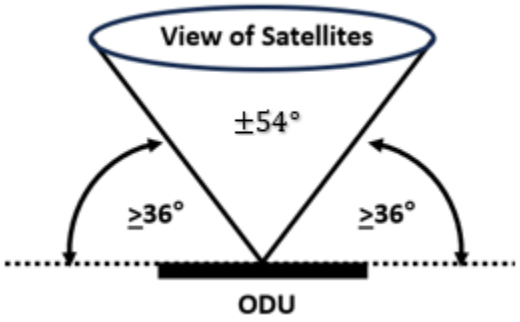


Figure 2: ODU operational conical view of Satellites

For a given obstacle height, the electronically steered antenna (ESA) must be placed at least a specific distance from the obstacle to prevent obstruction. This relationship is depicted in Figure 3.

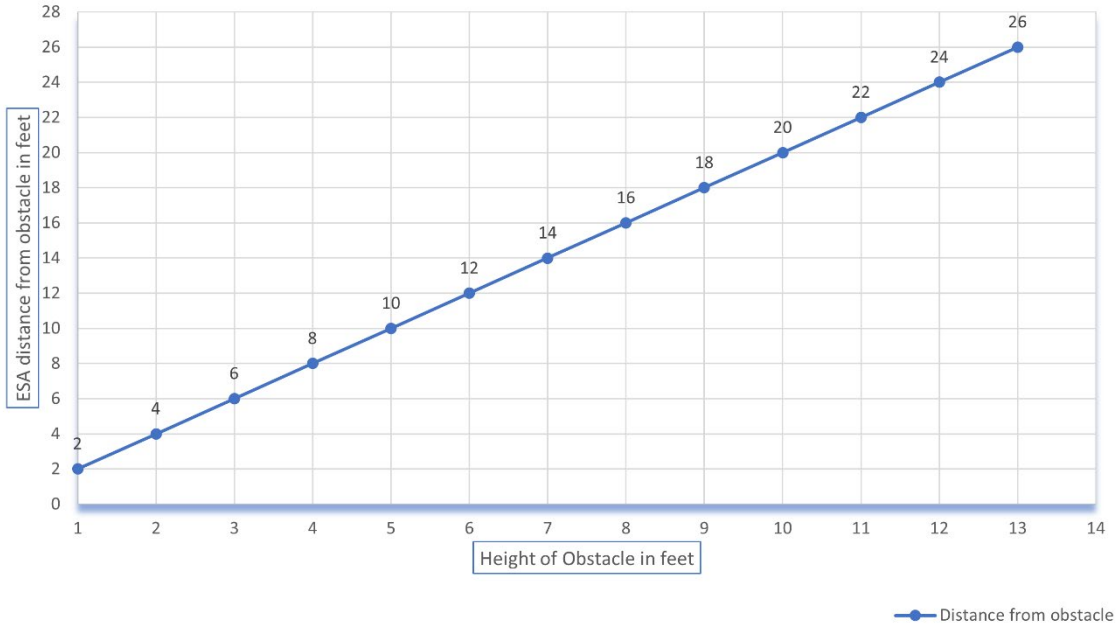


Figure 3: Distance of ESA from obstacle

Figure 4 shows an incorrect placement of an ESA, and Figure 5 shows when to proceed with an install during obstruction.

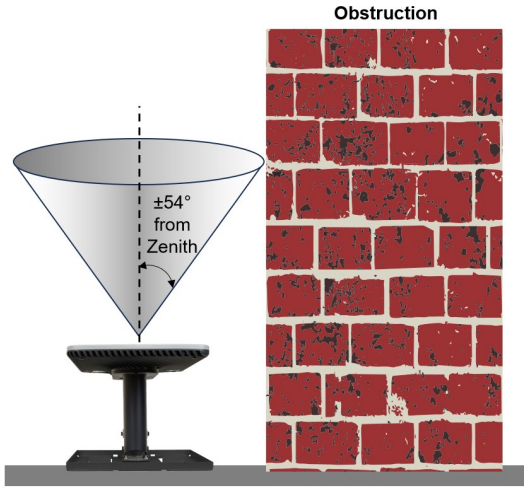


Figure 4: Incorrect placement of ESA, with clear blockage of the conical view

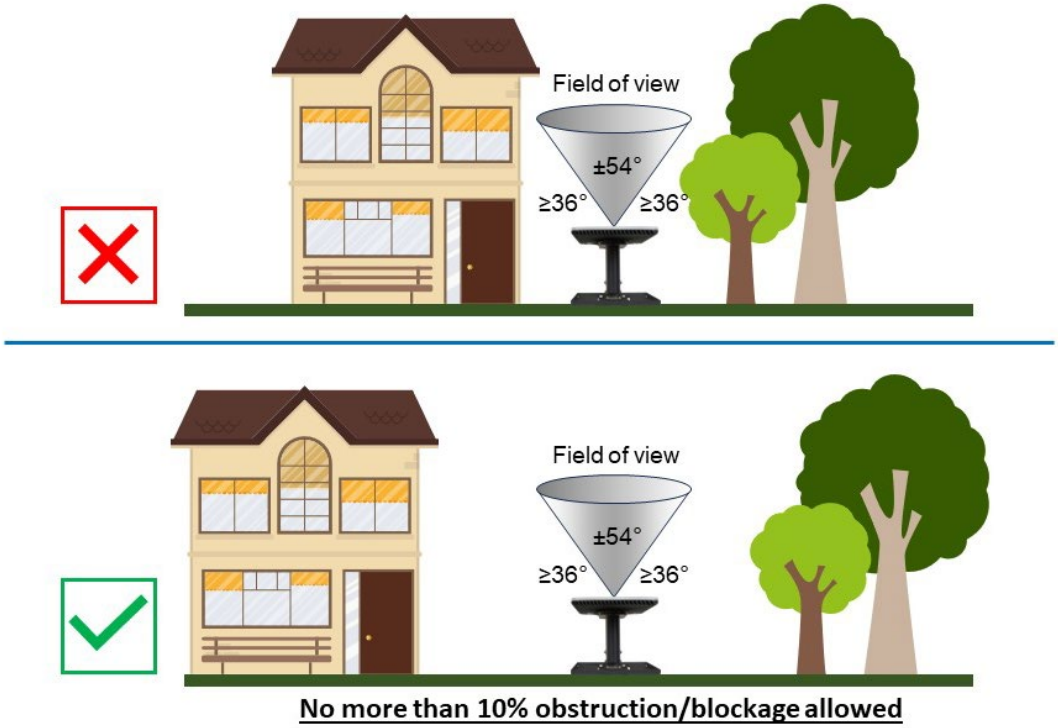


Figure 5: Obstruction cases

Any obstruction can cause unforeseen performance and service-related issues that are not linear but can manifest in varying ways.

Chapter 2

User terminal parts and recommended tools

This chapter identifies the main components and parts provided with the HL1100W user terminal kit. It also provides a list of required tools you will need to successfully perform the installation.

User terminal kit components

There are two different user terminal kits – ODU/IDU kit and mounting kit. These kits are packaged separately. When you receive the user terminal equipment, unpack and inspect the components and hardware to ensure that all parts were received in good condition.

⚠ CAUTION

Metal components may contain sharp edges. Use care when unpacking and handling user terminal parts.

Les composants métalliques peuvent contenir des arêtes vives. Soyez prudent lors du déballage et de la manipulation des pièces du terminal utilisateur.

If any parts appear to have been damaged in transit, immediately contact the freight carrier. If any parts appear to be missing or damaged, but not as a result of handling in transit, contact your dealer or distributor.

Note: To avoid potential damage, leave all components in their protective packages until required.

ODU/IDU kit

The ODU/IDU kit has the following items in it:

1. HL1100-ODU (shown in Figure 6 on page 24)
2. HL1100W-IDU (shown in Figure 7 on page 24)
3. HL1100W-PSU (shown in Figure 8 on page 25)
4. AC power cord for the HL1100W-PSU
5. RG-6 IFL cable connectors
6. IFL cable grounding block
7. A 5ml tube of dielectric grease
8. Radiation hazard caution label (shown in Figure 9 on page 25)

Note: The ODU attaches to the mounting stanchion which is part of the mounting kit.

Note: The UT Serial Number and IMEI are required for provisioning the user terminal in the OneWeb network. This information can be found on the carton label and the ODU hardware label.

Note: Country specific AC power cords for international installations must be arranged by the dealer or distributer.

Figure 6: HL1100-ODU

NOTICE

The outdoor unit (ODU) should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements.

Special care should be taken to protect the top surface of the ODU.

Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

Figure 7: HL1100W-IDU

Figure 8: HL1100W-PSU

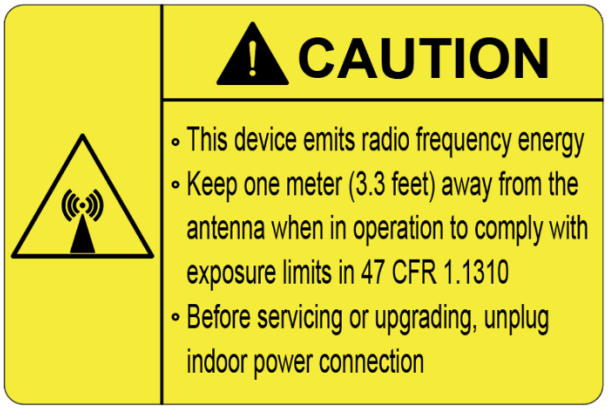


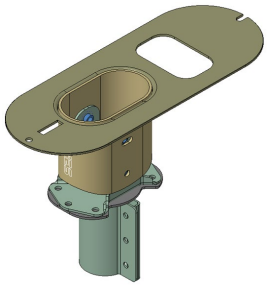
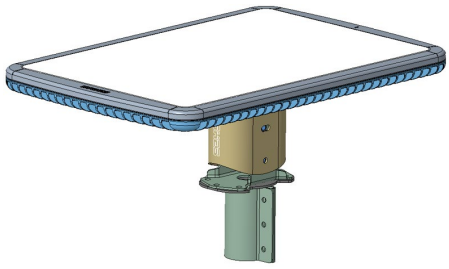
Figure 9: Radiation hazard caution label

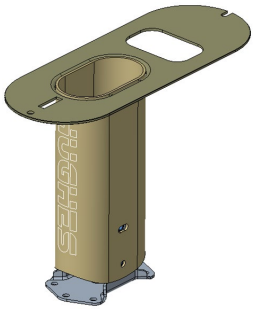
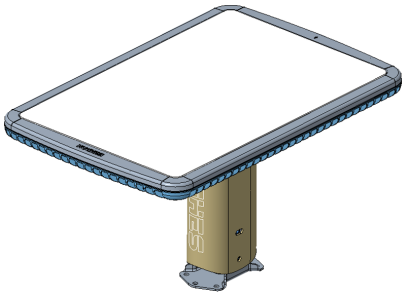
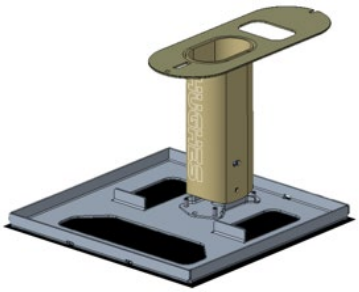
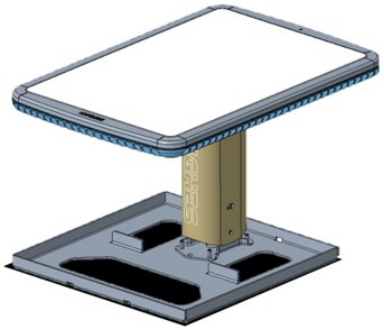
Mounting kit

The HNS ODU must be paired with one of the four approved mounting kits. Factors like the specific antenna installation location —flat or pitched roof, wall, or pole, determine which type should be used. Each kit is outlined in Table 2.

- Mast adapter
- Mast adapter with trimast
- Penetrating mount
- Non-penetrating mount

Table 2: Mounting kit components

Mount Kit Option	Mount Image	Mount Image with Antenna
Mast adapter mount with short stanchion (P/N: 1508440-0001) • Short stanchion • Mast adapter • Hardware kit		

Mount Kit Option	Mount Image	Mount Image with Antenna
Mast adapter mount with trimast and short stanchion (P/N: 1508445-0001) • Short stanchion • Mast adapter • Trimast mount • Hardware kit		
Penetrating mount with tall stanchion (P/N: 1508443-0001) • Tall stanchion • Penetrating mount • Hardware kit		
Non-penetrating mount with tall stanchion (P/N: 1508441-0001) • Tall stanchion • Rubber mat • Penetrating mount • Non-penetrating mount • Hardware kit		
Note: The hardware kit for each mount option includes all required bolts, washers and spring locks to assemble the mount to the ODU.		

The following sections provide additional information about the mounting kits.

Mounting stanchions

The mounting kit comes with one of two mounting stanchions (Figure 10), a short (1.54 lbs, 120mm) stanchion or a tall (2.54 lbs, 270mm) stanchion.

Figure 10: Tall and short mounting stanchions

Small hardware parts list for mounting

Table 3 lists the small hardware parts included with each mounting kit.

Table 3: Small hardware parts for mounting

Hardware type	Qty	Torque spec.
Hardware in kit 1508440-0001 for Mast Adapter Mount		
5/16-18 Nylon Nuts (1506365-0002)	3	-
RHSN 5/16-18 (1.25in L) Carriage Bolts (1504903-0105)	3	18 lbf-ft
M8x1.25 (20mm L) Hex Bolts (1508577-0048)	4	18 lbf-ft
M8 Flat Washer (1508595-0008)	2	-
M8 Fender Washer (9511315-0001)	2	-
M8 Lock Washer (1504088-0006)	4	-
M8x1.25 (25mm L) Hex Bolts (9511427-0001)	2	18 lbf-ft
Hardware in kit 1508445-0001 for Mast Adapter with Trimast Mount		
5/16-18 Nylon Nuts (1506365-0002)	3	-
RHSN 5/16-18 (1.25in L) Carriage Bolts (1504903-0105)	3	18 lbf-ft
M8x1.25 (20mm L) Hex Bolts (1508577-0048)	4	18 lbf-ft
M8 Flat Washer (1508595-0008)	2	-
M8 Fender Washer (9511315-0001)	2	-
M8 Lock Washer (1504088-0006)	4	-
M8x1.25 (25mm L) Hex Bolts (9511427-0001)	2	18 lbf-ft
All nuts on Trimast	9	18 lbf-ft
Hardware in kit 1508443-0001 for Penetrating Mount with Tall Stanchion		
M8 x 1.25 (20mm L) Hex Bolts (1508577-0048)	4	18 lbf-ft
M8 Flat Washer (1508595-0008)	6	-
M8 Fender Washer (9511315-0001)	2	-
M8 Lock Washer (1504088-0006)	8	-
5/16 (3in L) Lag Screw (9511338-0001)	4	18 lbf-ft (wood) 10 lbf-ft (concrete with sleeve anchors)
M8 x 1.25 (100mm L) Hex Bolts (1508577-0056)	4	18 lbf-ft
M8 x 1.25 Hex Nuts (1500457-0006)	4	18 lbf-ft
M8x1.25 (25mm L) Hex Bolts (9511427-0001)	2	18 lbf-ft
Hardware in kit 1508441-0001 for NPM with Tall Stanchion		
M8 x 1.25 (20mm L) Hex Bolts (1508577-0048)	4	18 lbf-ft
M8 Flat Washer (1508595-0008)	2	-
M8 Fender Washer (9511315-0001)	2	-
M8 Lock Washer (1504088-0006)	4	-
M8x1.25 (25mm L) Hex Bolts (9511427-0001)	2	18 lbf-ft
M8 x 1.25 Hex Nuts (1500457-0006)	4	18 lbf-ft

Mount assembly tools

Table 4 lists the recommended tools for mount installation. These tools are not included as part of the mounting kit.

Table 4: Mount assembly tools

Tool	Where used	Mounts
13mm (or ½") Socket Wrench	M8 Bolts (Stanchion – Mount Interface)	All Mounts
13mm (or ½") Torque Wrench (Capable of torque to 18 ft-lb)	M8 Bolts (Stanchion – Mount Interface)	All Mounts
Electric Drill with 13mm (or ½") socket	Required for Tri-mast / Penetrating Mount Wood or Concrete installations	Mast Adapter with Trimast mount / Penetrating Mount
Drill Bits for Wood / Masonry	Required for Tri-mast / Penetrating Mount Wood or Concrete installations	Mast Adapter with Trimast mount / Penetrating Mount
Inclinometer	Ensure Mount is at proper angle	All Mounts

Approved IFL cables

Note: An IFL cable is not included as part of the user terminal kit supplied by Hughes.

Refer to *Appendix B* on page 109 for IFL cables recommended by Hughes for use with HL1100W user terminal. You need to arrange IFL cable of required length from the recommended list to install the HL1100W user terminal.

Chapter 3

Installing the ODU

This chapter explains how to assemble and mount the ODU.

⚠ CAUTION

Before you install the ODU, read all safety information in *User terminal installation safety* on page 9.

Avant d'installer le terminal utilisateur, lisez toutes les informations de sécurité dans la section en page 9 intitulée: Sécurité de l'installation du terminal utilisateur.

General instructions for assembling the ODU

⚠ DANGER

If you work on a roof, tower, or other high structure, or use a ladder or scaffold to access the work site, follow these precautions to prevent personal injury or death:

- Walk only on sound roof structures.
- Ensure that the ODU assembly and installation surface are structurally sound so they can support all loads (equipment weight, ice, and wind).
- Use safety equipment (e.g., a lifeline) appropriate for the work location.
- Follow all manufacturer safety precautions for all safety and other equipment used.
- Perform as many procedures as possible on the ground.

Si vous travaillez sur un toit, une tour ou toute autre structure élevée, ou si vous utilisez une échelle ou un échafaudage pour accéder au chantier, suivez ces précautions pour éviter des blessures ou la mort :

- Marchez uniquement sur des structures de toit solides.
- Assurez-vous que l'assemblage du terminal utilisateur et la surface d'installation sont structurellement solides afin qu'ils puissent supporter toutes les charges (poids de l'équipement, glace et vent).
- Utilisez un équipement de sécurité (par exemple, une ligne de sécurité) approprié au lieu de travail.
- Suivez toutes les précautions de sécurité du fabricant pour tous les équipements de sécurité et autres utilisés.
- Effectuer autant de procédures que possible à raz de sol.

⚠ CAUTION

To avoid potential injury or damage to the equipment, use two installers to lift the antenna whenever possible.

Pour éviter d'éventuelles blessures ou dommages à l'équipement, faites appel à deux installateurs pour soulever l'antenne autant que possible.

⚠ DANGER 

To avoid electric shock, stay at least 20 ft away from power lines when there is a chance that you or the equipment you are using could accidentally come into contact with the power lines. Always look up and check for overhead lines before moving a ladder.

If any part of the ODU or mount assembly comes in contact with a power line, call the local power company to remove it. Do not try to remove it yourself. If the ODU contacts electric power lines, you may be killed or seriously injured.

For pole mount installations, be sure to obtain information regarding underground utilities in the proposed location before digging.

Call a local company that marks underground utility lines before digging to avoid striking underground cables, pipes, or electric lines. Call 811 from anywhere in the United States to contact a local company that does this. You can also visit http://call811.com/

Pour éviter les chocs électriques, restez à au moins 20 pieds des lignes électriques lorsqu'il y a un risque que vous ou l'équipement que vous utilisez entriez accidentellement en contact avec les lignes électriques. Regardez toujours vers le haut et faites attentions au lignes aériennes avant de déplacer une échelle.

Si une partie du terminal utilisateur ou de l'ensemble de montage entre en contact avec une ligne électrique, appelez la compagnie d'électricité locale pour la retirer. N'essayez pas de le supprimer vous-même. Si le réflecteur du terminal utilisateur entre en contact avec des lignes électriques, vous risquerez d'être tué ou grièvement blessé.

Pour les installations sur poteaux, assurez-vous d’obtenir des informations sur les services publics souterrains à l’emplacement ropose avant de creuser.

Appelez une entreprise locale en charge du marquage des lignes électriques souterraines avant de creuser pour éviter de frapper des câbles, des tuyaux ou des lignes électriques souterraines. Appelez le 811 depuis n'importe où aux États-Unis pour contacter une entreprise locale qui s’en occupe. Vous pouvez également visiter le site: http://call811.com/

Before you assemble the ODU, read these important instructions:

- **Sequence of steps** – When you assemble the ODU, be sure to follow the instructions in this chapter in the order they are presented.

  ⚠ WARNING

  For rooftop installations, assemble the ODU on the ground and then carry the fully assembled ODU up to the roof.

  Pour les installations sur le toit, assemblez le terminal utilisateur au sol, puis transportez le terminal utilisateur entièrement assemblé au toit.

- **Tightening hardware** – Do not tighten any nuts or other hardware until instructed to do so. See Table 5 for torque specifications.
- **Torque** – To ensure successful installation of the ODU, it is critical that you tighten all nuts and socket-head screws to the torque values shown in Table 5.

Table 5: Torque specifications

Hardware type	Where used	Quantity	Torque specification
RHSN 5/16-18 (1.25in L) Carriage Bolts (1504903-0105)	Mast Adapter (Canister clamp force onto mast)	3	18 lbf-ft
M8 x 1.25 (20mm L) Hex Bolts (1508577-0048)	All Mounts (Stanchion – Mount Interface)	4	18 lbf-ft
M8 x 1.25 (25mm L) Hex Bolts (9511427-0001)	All Mounts (Stanchion Adapter Plate to ODU)	2	18 lbf-ft
M8 x 1.25 (100mm L) Hex Bolts (1508577-0056)	Stanchion Mount Only (Bolt Mount onto Railing)	4	18 lbf-ft
5/16 (3in L) Lag Screw (9511338-0001)	Stanchion Mount Only (Screw Mount into Surface)	4	18 lbf-ft (into wood) 10 lbf-ft (into concrete with sleeve anchors)
All nuts on Trimast	Trimast Mount	9	18 lbf-ft (See 1035678-0001 Trimast Site Prep Guide)

Select the ODU installation site and ODU mount

Before selecting an ODU installation site, check with the customer to determine if there is a preferred location. Establish whether a clear view of the whole sky at an angle between 36° and 90° is available at the preferred installation site. If obstructions prevent reliable installation at the preferred site, work with the customer to identify a suitable obstruction-free location.

Consider IFL cable routing and potential grounding sources when choosing a location. Refer to *Establishing the grounding position* on page 54 for more information.

An appropriate ODU mount should be selected based upon the physical constraints of the installation site. The installer will need to rely on their own expertise and choose a mount that ensures a clear view of the sky and satisfies the customer's preferences.

The Hughes LEO app is to be used during site selection to capture a 360° view at the ODU position. The app will evaluate if the location is suitable for use. Instructions are provided in *Site survey using the user terminal Hughes LEO app* on page 74.

A local building permit may be required before installing the ODU. It is the property owner's responsibility to obtain necessary permits and comply with local building codes.

Mounting the ODU

There are three classes of HNS ODU mounts: non-penetrating mounts, penetrating mount, and mast adapter. Refer to *Mounting kit* on page 25 for additional information on the mounting options. This section outlines the steps required to assemble the three classes of HNS ODU mounts.

Non-penetrating mount installation

Follow the steps below to install the ODU on a non-penetrating mount (NPM).

1. Place the rubber mat, flat in the desired location.
2. Position the NPM tray atop the rubber mat (see Figure 11).

Figure 11: NPM tray

3. Align the four threaded studs from the NPM tray to fit the corresponding holes on the penetrating mount. Fully torque four M8 nuts into the studs in each corner of the penetrating mount.
4. Take the radiation hazard caution label from the IDU kit (shown in Figure 9) and affix to the stanchion as described below.
   - Peel off the label backing.
   - Orient and align the label as shown in Figure 12 on page 33, centered and below the Hughes logo and in the same reading direction. Make sure not to block the Hughes logo.
   - Place on the stanchion and apply pressure.

Figure 12: Tall stanchion with radiation hazard caution label

5. Slide the stanchion onto the goalpost feature. Secure the stanchion to the mount with two M8x1.25 (20mm L) bolts on both sides of the stanchion (four total).

   Note: The top bolts require a lock washer and M8 fender washer. The bottom bolts require a lock washer and a M8 standard washer.

   Note: The bolts should be tightened enough to allow the installer to tilt the antenna by 3 degrees. Do not tighten these bolts to torque specification until step 9.

Figure 13: NPM tray with tall stanchion

6. Use ballast to hold the mount in place. The mount is designed to work with one 4” x 8” x 16” concrete block as ballast, but sandbags or other heavy objects can be substituted. This mount requires a minimum of 20 lbs of ballast.

7. Install one M8x1.25 (25mm L) bolt on the antenna's rear mounting hole (see Figure 14), leave ½" of clearance between the bolt's head and the antenna surface.

Figure 14: Antenna with rear mounting bolt

NOTICE

The ODU should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements. Special care should be taken to protect the top surface of the ODU. Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

8. Carefully lift the antenna, align the rear mounting bolt to the open slot located on the stanchion's adapter plate and slide it in. Guide the antenna using the alignment boss and rest it on the stanchion's adapter plate. The body of the antenna must extend over the NPM tray as shown on Figure 15. Install one M8x1.25 (25mm L) bolt on the antenna's front mounting hole and tighten to torque requirements, then tighten the previously installed rear mounting bolt.

   Note: Note the orientation of the washers on the stanchion, with the larger of the two washers against the side of the stanchion.

Figure 15: ODU mounted to NPM with tall stanchion

9. The stanchion is adjustable and allows for pivoting around the lower bolts. These bolts were installed first in step 5 when connecting to the mount and left loose enough to allow pivoting. The curved slot in the center of the stanchion on either side controls the angle of the stanchion, which can be locked in place using the proper bolts. The ODU requires 3-degrees of forward tilt where forward is the direction away from the stanchion along the short side of the antenna (shown in Figure 16). An inclinometer must be used to ensure the ODU is at the desired 3-degrees forward tilt, after which all four bolts may be tightened to their required torque values.

   Note: The installation procedure is the same for the tall and short stanchions.

   NOTICE

   3-degrees of forward tilt is required to promote water drainage away from the top surface of the antenna.

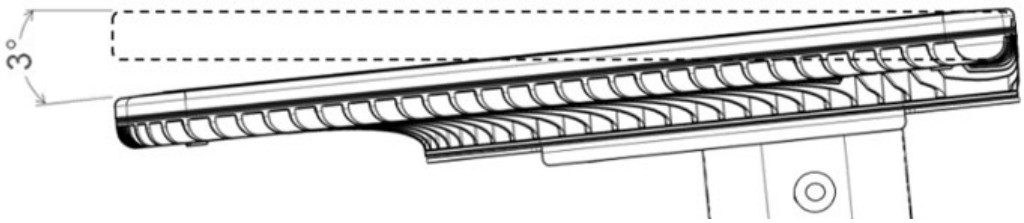


Figure 16: Tilting the ODU forward to 3-degrees

Penetrating mount installation

Follow the steps below to install the ODU on a penetrating mount.

1. Hold the penetrating mount flat against the roof or another appropriate surface.

Figure 17: Penetrating mount

2. Affix the mount to the surface using either, four 5/16” (3in L) lag screws or four M8x1.25 (100mm L) hex bolts, provided in the hardware kit. Tighten to torque requirements. (Nuts are required if using bolts)

3. Take the radiation hazard caution label from the IDU kit (shown in Figure 9) and affix to the stanchion as described below.
   - Peel off the label backing.
   - Orient and align the label as shown in Figure 18, centered and below the Hughes logo and in the same reading direction. Make sure not to block the Hughes logo.
   - Place on the stanchion and apply pressure.

Figure 18: Tall stanchion with radiation hazard caution label

4. Slide the stanchion onto the goalpost feature. Secure the stanchion to the mount with two M8x1.25 (20mm L) bolts on both sides of the stanchion (four total) (see Figure 19).

   Note: The top bolts require a lock washer and M8 fender washer. The bottom bolts require a lock washer and a M8 standard washer.

   Note: The bolts should be tightened enough to allow the installer to tilt the antenna by 3 degrees. Do not tighten these bolts to torque specification until step 7.

Figure 19: Penetrating mount with tall stanchion

5. Install one M8x1.25 (25mm L) bolt on the antenna's rear mounting hole, leave ½" of clearance between the bolt's head and the antenna surface (see Figure 20).

Figure 20: Antenna with rear mounting bolt

NOTICE

The ODU should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements. Special care should be taken to protect the top surface of the ODU. Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

6. Carefully lift the antenna, align the rear mounting bolt to the open slot located on the stanchion's adapter plate and slide it in. Guide the antenna using the alignment boss and rest it on the stanchion's adapter plate. Install one M8x1.25 (25mm L) bolt on the antenna's front mounting hole and tighten to torque requirements, then tighten the previously installed rear mounting bolt (see Figure 21).

   Note: Note the orientation of the washers on the stanchion, with the larger of the two washers against the side of the stanchion.

Figure 21: ODU mounted to penetrating mount with tall stanchion

7. The stanchion is adjustable and allows for pivoting around the lower bolts. These bolts were installed first in step 4 when connecting to the mount and left loose enough to allow pivoting. The curved slot in the center of the stanchion on either side controls the angle of the stanchion, which can be locked in place using the proper bolts. The ODU requires 3-degrees of forward tilt where forward is the direction away from the bridge along the short side of the panels (shown in Figure 22). An inclinometer must be used to ensure the ODU is at the desired 3-degree forward tilt, after which all four bolts may be tightened to their required torque values.

Note: Penetrating mounts only use short stanchions.

NOTICE

3-degrees of forward tilt is required to promote water drainage away from the top surface of the antenna.

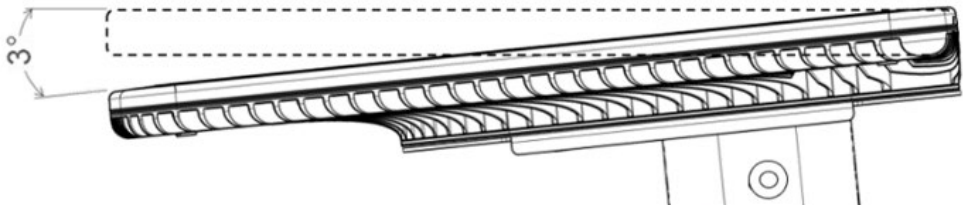


Figure 22: Tilting the ODU forward to 3-degrees

Mast adapter mount installation

Follow the steps below to install the ODU on a mast adapter.

1. Place the mast adapter onto a suitable (2.375” / 60mm) pole. Insert three RHSN 5/16-18 (1.2 in L) carriage bolts into the holes on the mast adapter canister and tighten down the three 5/16-18 nylon nuts to secure the canister onto the pole (see Figure 23).

Figure 23: Mast adapter with pole

2. Take the radiation hazard caution label from the IDU kit (shown in Figure 9) and affix to the stanchion as described below.
   - Peel off the label backing.
   - Orient and align the label as shown in Figure 24, centered and below the Hughes logo and in the same reading direction. Make sure not to block the Hughes logo.
   - Place on the stanchion and apply pressure.

Figure 24: Short stanchion with radiation hazard caution label

3. Slide the stanchion onto the goalpost feature. Secure the stanchion to the mount with two M8x1.25 (20mm L) bolts on both sides of the stanchion (four total) (see Figure 25).

   Note: The top bolts require a lock washer and M8 fender washer. The bottom bolts require a lock washer and a M8 standard washer.

   Note: The bolts should be tightened enough to allow the installer to tilt the antenna by 3 degrees. Do not tighten these bolts to torque specification until step 6.

Figure 25: Mast adapter with short stanchion

4. Install one M8x1.25 (25mm L) bolt on the antenna's rear mounting hole, leave ½" of clearance between the bolt's head and the antenna surface (see Figure 26).

Figure 26: Antenna with rear mounting bolt

NOTICE

The ODU should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements. Special care should be taken to protect the top surface of the ODU. Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

5. Carefully lift the antenna, align the rear mounting bolt to the open slot located on the stanchion's adapter plate and slide it in. Guide the antenna using the alignment boss and rest it on the stanchion's adapter plate. Install one M8x1.25 (25mm L) bolt on the antenna's front mounting hole and tighten to torque requirements, then tighten the previously installed rear mounting bolt.

   Note: Note the orientation of the washers on the stanchion in Figure 27, with the larger of the two washers against the side of the stanchion.

Figure 27: ODU mounted to mast adapter with short stanchion

6. The stanchion is adjustable and allows for pivoting around the lower bolts. These bolts were installed first in step 3 when connecting to the mount and left loose enough to allow pivoting. The curved slot in the center of the stanchion on either side controls the angle of the stanchion, which can be locked in place using the proper bolts. The ODU requires 3-degrees of forward tilt where forward is the direction away from the bridge along the short side of the panels (shown in Figure 28). An inclinometer must be used to ensure the ODU is at the desired 3-degrees of forward tilt, after which all four bolts may be tightened to their respective torques.

   Note: The mast adapter will only use the short stanchion. Do not use the tall stanchion for any mount configuration that incorporates the mast adapter.

   Note: The mast adapter can be affixed to any pole with a 2.375” / 60mm outer diameter.

   NOTICE

   3-degrees of forward tilt is required to promote water drainage away from the top surface of the antenna.

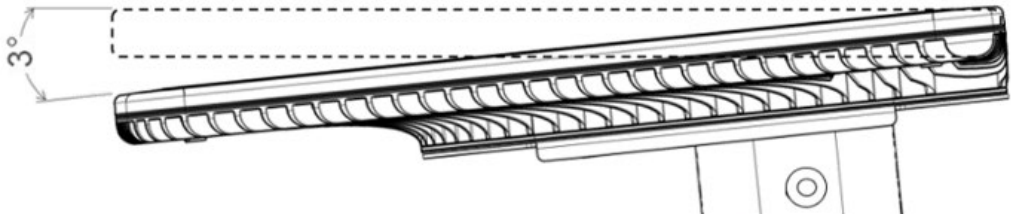


Figure 28: Tilting the ODU forward to 3-degrees

Mast adapter mount with Trimast installation

Follow the steps below to install the ODU on a mast adapter.

1. Assemble and install the Trimast mount as per these instructions:
   a. Determine the desired location for mounting the Trimast. Ensure that there will be an unobstructed view of the sky at an angle between 36° and 90° above the installed unit and that there are properly spaced studs if installing onto a building.
   b. If necessary, reconfigure the Trimast so the short end of the Trimast is at the bottom.
   c. Place the mast in a vertical position. The mast needs to be oriented so that when the antenna is installed, the radiating surface is parallel with the ground. Mark where to drill mounting holes into the surface.
   d. Secure the Trimast to the mounting surface and adjust it if necessary.

2. Place the mast adapter onto the Trimast mount pole as shown in Figure 29. Insert three RHSN 5/16-18 (1.25in L) carriage bolts into holes on mast adapter canister and tighten down the three 5/16-18 nylon nuts to secure canister onto pole.

Figure 29: Mast adapter with trimast

3. Take the radiation hazard caution label from the IDU kit (shown in Figure 9) and affix to the stanchion as described below.
   - Peel off the label backing.
   - Orient and align the label as shown in Figure 30, centered and below the Hughes logo and in the same reading direction. Make sure not to block the Hughes logo.
   - Place on the stanchion and apply pressure.

Figure 30: Short stanchion with radiation hazard caution label

4. Slide the stanchion onto the goalpost feature. Secure the stanchion to the mount with two M8x1.25 (20mm L) bolts on both sides of the stanchion (four total) (see Figure 31).

   Note: The top bolts require a lock washer and M8 fender washer. The bottom bolts require a lock washer and a M8 standard washer.

   Note: Do not tighten these bolts to torque specification until step 7.

Figure 31: Mast adapter with trimast and short stanchion

5. Install one M8x1.25 (25mm L) bolt on the antenna's rear mounting hole, leave ½" of clearance between the bolt's head and the antenna surface (see Figure 32).

Figure 32: Antenna with rear mounting bolt

NOTICE

The ODU should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements. Special care should be taken to protect the top surface of the ODU. Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

6. Carefully lift the antenna, align the rear mounting bolt to the open slot located on the stanchion's adapter plate and slide it in. Guide the antenna using the alignment boss and rest it on the stanchion's adapter plate. The body of the antenna must extend over the mast as shown in Figure 33. Install one M8x1.25 (25mm L) bolt on the antenna's front mounting hole and tighten to torque requirements, then tighten the previously installed rear mounting bolt.

   Note: Note the orientation of the washers on the stanchion, with the larger of the two washers against the side of the stanchion.

Figure 33: ODU Mounted to trimast mount with short stanchion

7. The stanchion is adjustable and allows for pivoting around the lower bolts. These bolts were installed first in step 4 when connecting to the mount and left loose enough to allow pivoting. The curved slot in the center of the stanchion on either side controls the angle of the stanchion, which can be locked in place using the proper bolts. The ODU requires 3-degrees of forward tilt where forward is the direction away from the bridge along the short side of the panels (shown in Figure 34). An inclinometer must be used to ensure the ODU is at the desired 3-degrees of forward tilt, after which all four bolts may be tightened to their respective torques.

   Note: The mast adapter will only use the short stanchion. Do not use the tall stanchion for any mount configuration that incorporates the mast adapter.

   NOTICE

   3-degrees of forward tilt is required to promote water drainage away from the top surface of the antenna.

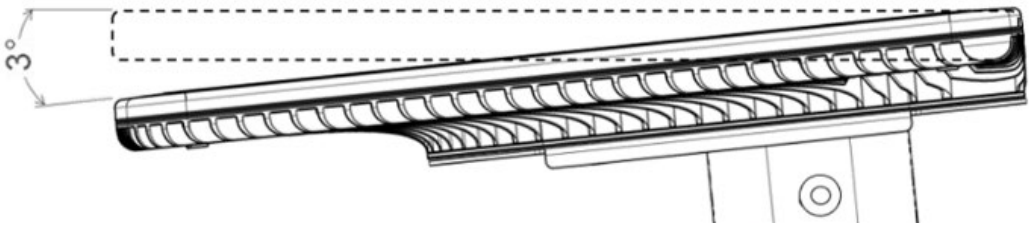


Figure 34: Tilting the ODU forward to 3-degrees

Mounting the Jonsa-OW mount

The sections below describe how to install the UT on the Jonsa-OW mount, which includes a single panel NPM and its corresponding mount adapter, model A60060036D-01 and FP6013DA6D-01, respectively.

Jonsa-OW single panel NPM components

Figure 6 below lists the components in the Jonsa-OW single panel NPM kit.

Table 6: Jonsa-OW single panel NPM components

Ref	Item	Size	Quantity
1	Hex-head cap screw	5/16”-18*3-1/8”	4
2	Round flat head square screw	5/16”-18*5/8”	2
3	Washer	5/16”-18	10
4	Nylon nut	5/16”-18	6
5	Bush	8.5/12.5*L60	1
6	Hex flange screw	5/16”-18x1-1/3”	1
7	Keps k-lock nut	5/16”-18	2
-	Wrench	13 mm	1
A	Ground mounting base	-	1
B	Mast Pole	-	1
C	Side supporting rods	-	4

Jonsa-OW mount adapter components

Table 7 below lists the components in the Jonsa-OW mount adapter kit.

Table 7: Jonsa-OW mount adapter components

Ref	Item	Size	Quantity
1	Socket head screw	M8x25mm	2
2	Spring washer	M8	2
3	Washer	M8	2
-	Wrench	12 mm	1
-	Allen wrench	6mm	1
A	AZEL/Pole clamp assy	-	1

Installing the Jonsa-OW single panel NPM and mount adapter

Follow the steps below to install the Jonsa-OW single panel NPM and mount adapter.

1. Determine the desired location for mounting the single panel NPM. Ensure that there will be an unobstructed view of the sky at an angle between 36° and 90° above the installed unit and that there are properly spaced studs if installing onto a building.

2. Loosen the eight ground mounting screws shown in Figure 35 below. Loosening these screws will allow you to adjust the base (A) to fit snugly around each component that you secure to it in the steps below.

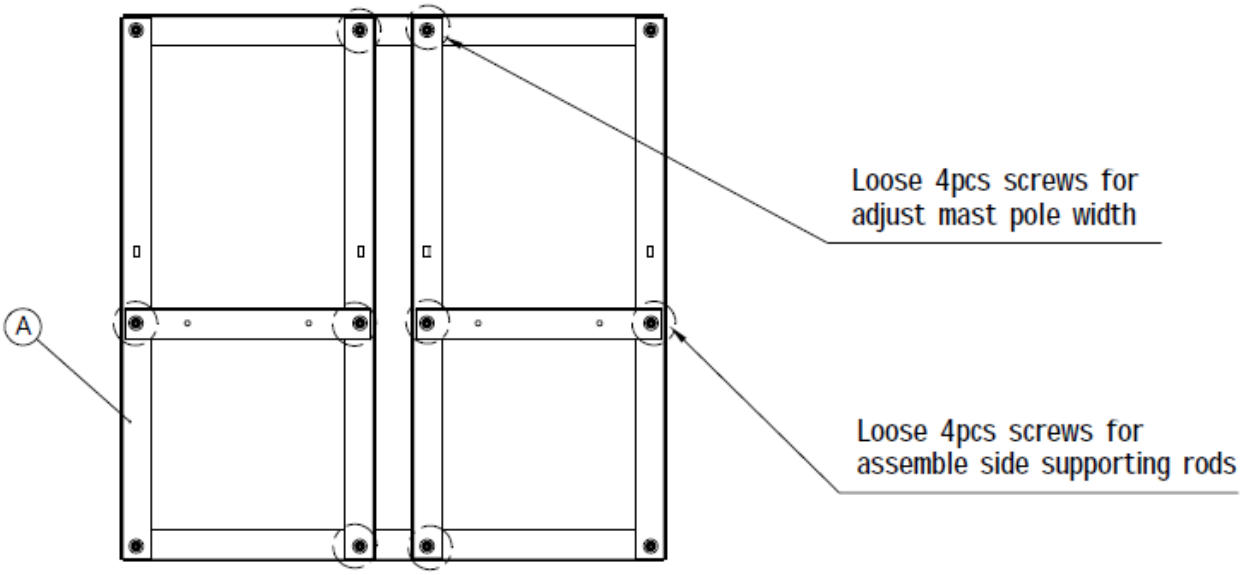


Figure 35: Loosening the ground mounting screws

3. Place the mast pole (B) upright in the center of the base, as shown in Figure 36, and connect it to the base using a hex-head cap screw (1). Secure the screw using two washers (3) and a nylon nut (4) as indicated in Figure 36.

   Note: The mast needs to be oriented so that when the antenna is installed, the radiating surface is parallel with the ground.

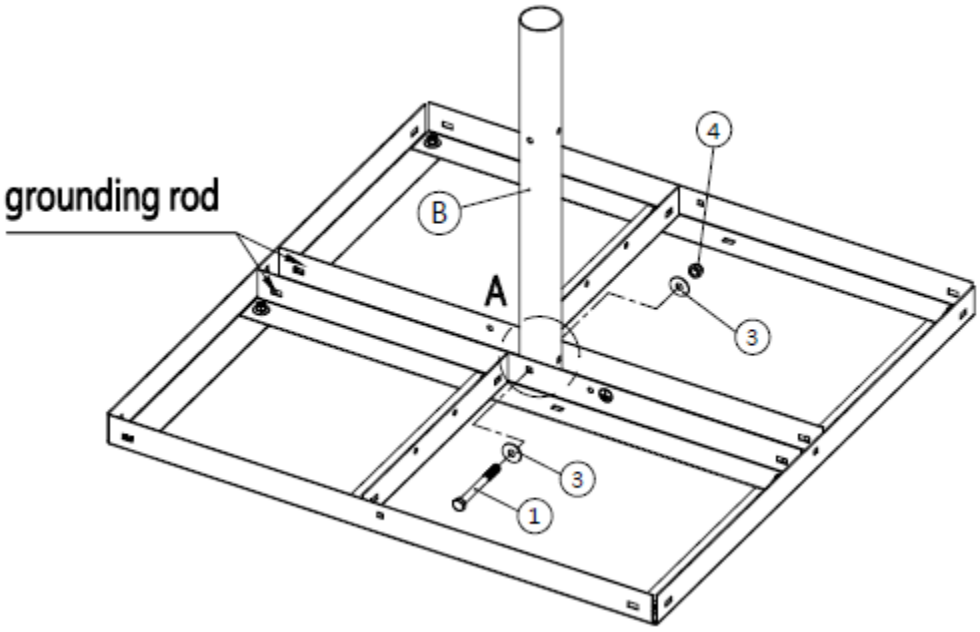


Figure 36: Installing the mast pole

Note: Make sure the screw is inserted through the lower square hole on the mast pole, as shown in Figure 37 below.

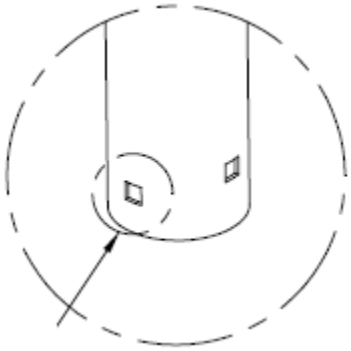


Figure 37: Lower square hole on the mast pole

4. Assemble the first set of two side supporting rods (C) to secure the mast pole to the base. The supporting rods are secured to the mast pole using a hex-head cap screw (1), two washers (3) and a nylon nut (4), as shown in Figure 38.

   For the base, remember to insert the bush (5) between the two side support rods, and then thread the hex-head cap screw (1) through the bush and secure it using two washers (3) and a nylon nut (4) as indicated in Figure 38.

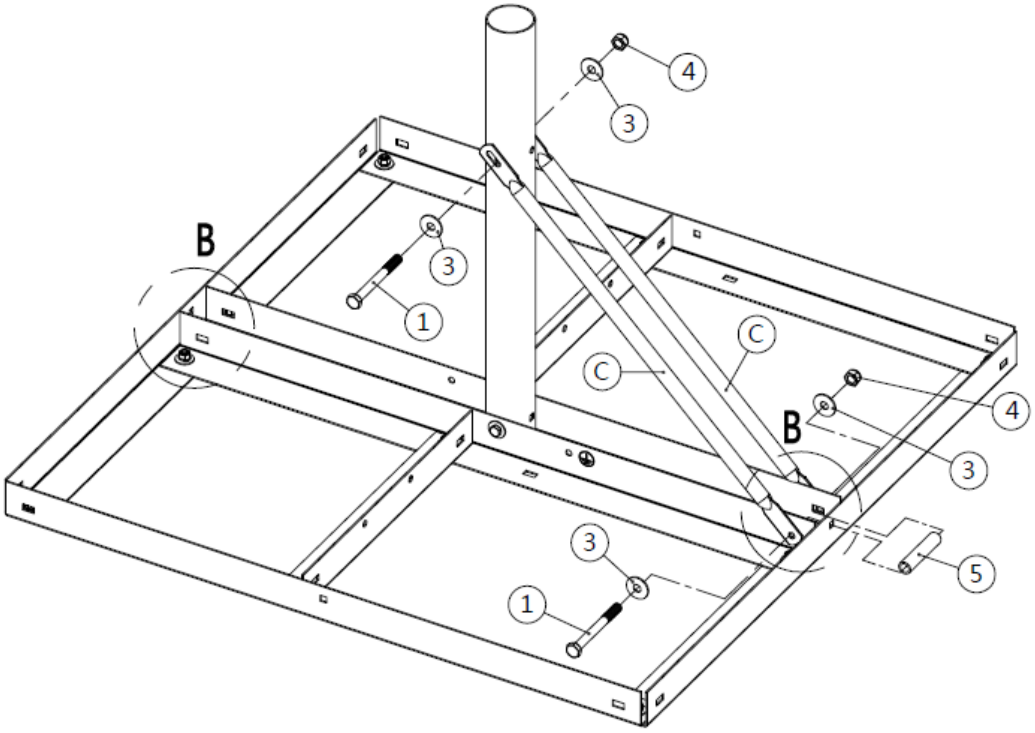


Figure 38: Installing the first two side supporting rods

5. Assemble the second set of two supporting rods (C) as shown in Figure 39 below. Each supporting rod is secured to the base using a round flat head square screw (2), one washer (3) and one nut (4).

   Note that when securing the supporting rods to the mast pole, the supporting rod sockets are meant to overlap, allowing both rods to be secured using a single hex-head cap screw (1), two washers (3) and a nylon nut (4).

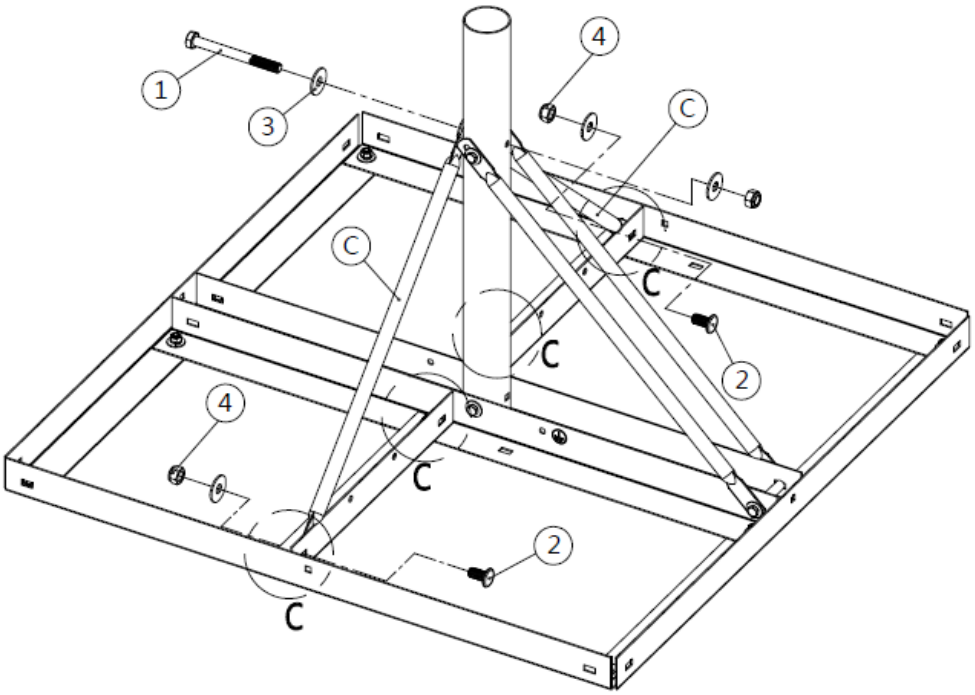


Figure 39: Installing the second two side supporting rods

6. Tear off the two grounding hole stickers on either side of the mast pole, as shown in Figure 40.

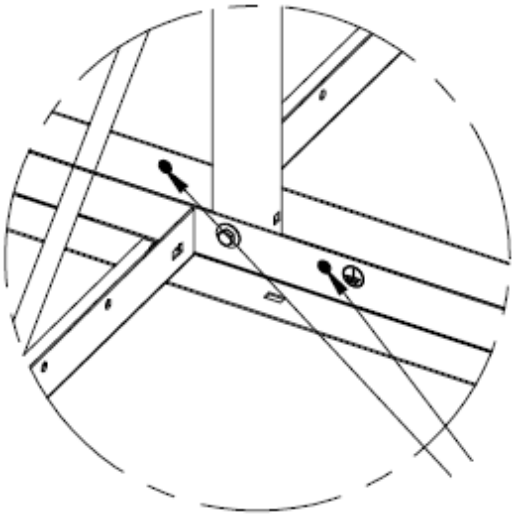


Figure 40: Tearing off the grounding stickers

7. Assemble the grounding cable as shown in Figure 41. Secure the cable in place using a hex flange screw (6) and two keps k-lock nuts (7).

   Note: Ensure the grounding cable is fully clamped and secured between the two keps k-lock nuts to provide proper grounding.

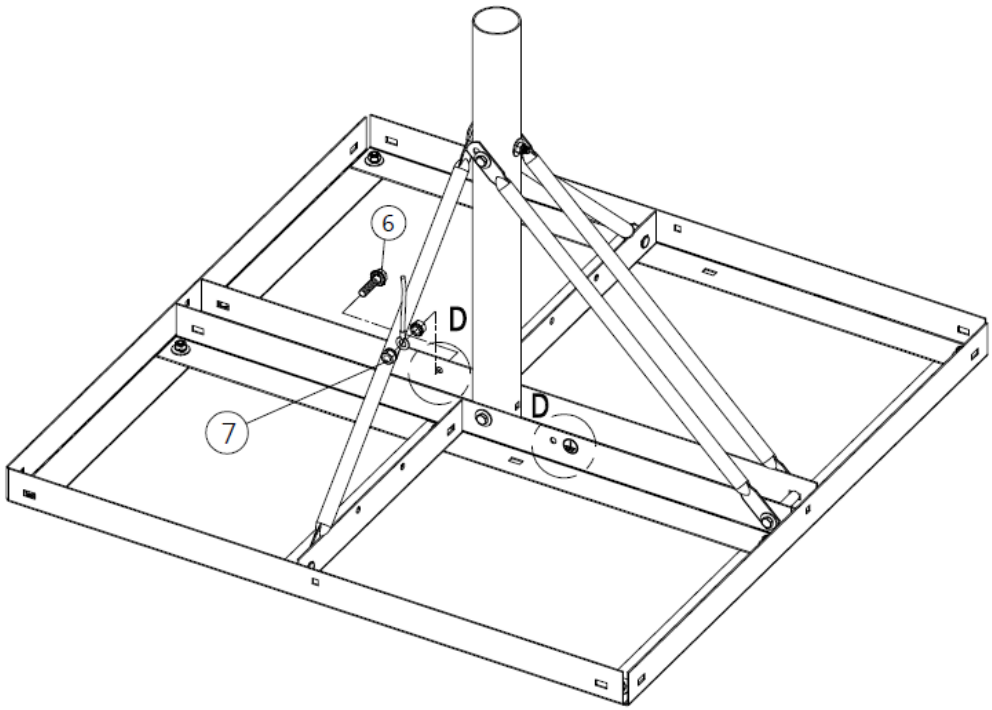


Figure 41: Installing the grounding cable

8. Optionally, if you are using a penetrating fastener, mount the base using appropriately rated fasteners connected to the four locations shown in Figure 42 below.

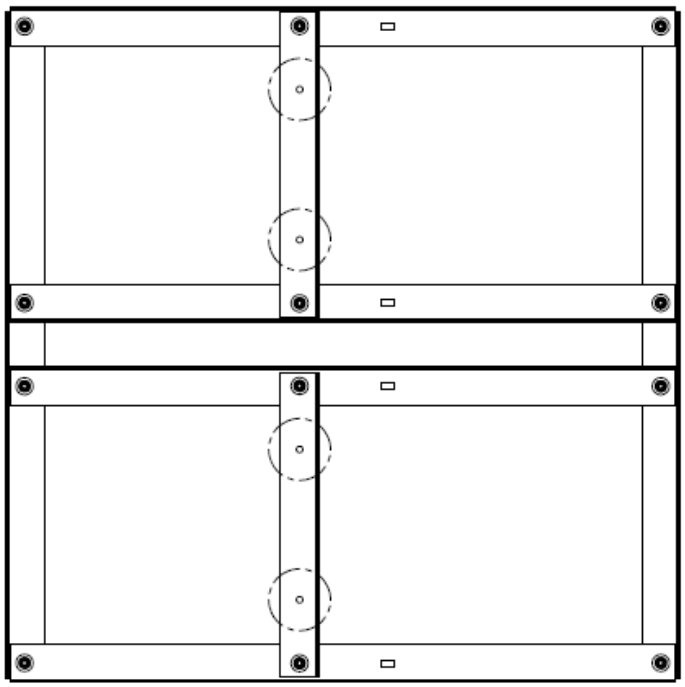


Figure 42: Penetrating fastener mount locations

9. Take the radiation hazard caution label from the IDU kit (shown in Figure 9) and affix to the pole clamp on the Jonsa-OW mount adapter as described below.
   - Peel off the label backing.
   - Orient and align the label as shown in Figure 43.
   - Place on the pole clamp and apply pressure.

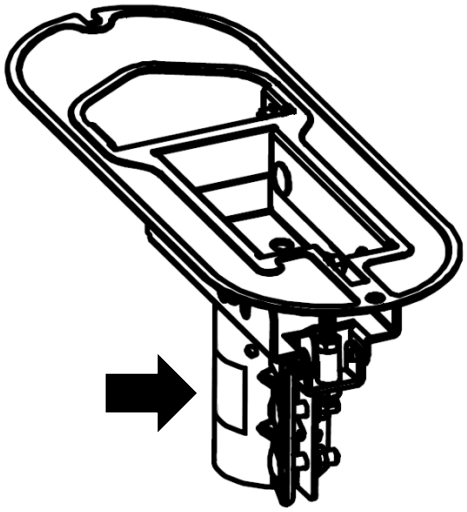


Figure 43: Installing the radiation hazard caution label

10. Install the Jonsa-OW mount adapter (A) by carefully resting the ODU antenna on the packaging foam insert to protect the hydrophobic coating on the top surface of the ODU. Align the front and rear mounting holes from the mount adapter plate, as shown in Figure 44, and secure it using two M8x25 socket head screws (1), two lock washers (2) and two flat washers (3). Tighten to 18 lbf-ft using the Allen wrench.

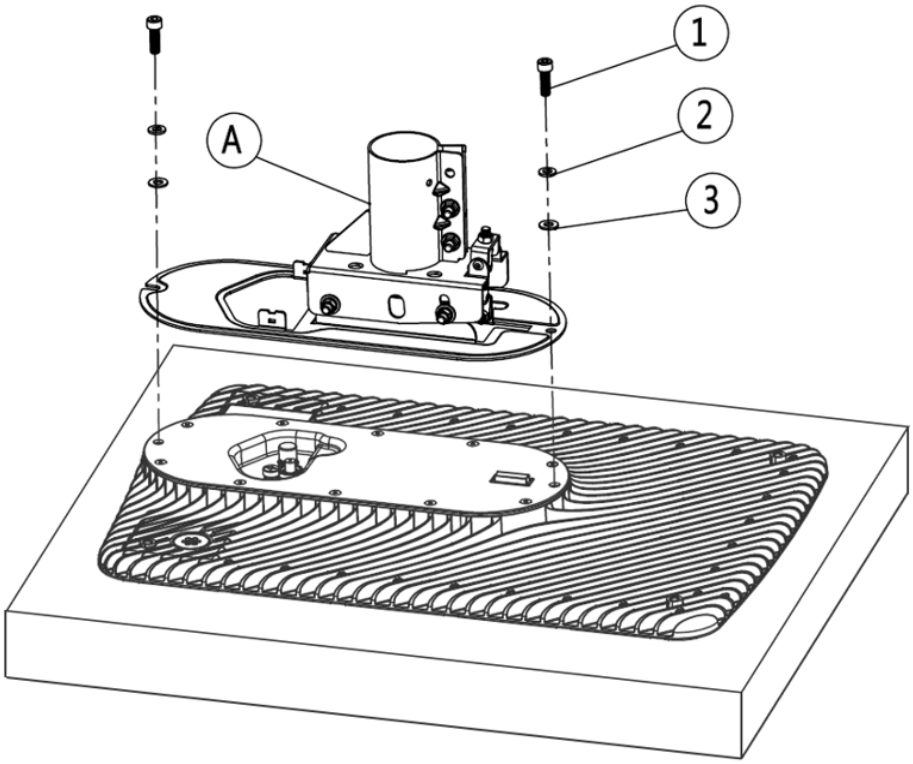


Figure 44: Installing the mount adapter to the ODU

NOTICE

The ODU should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements. Special care should be taken to protect the top surface of the ODU. Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

11. Carefully lift the ODU by the pole clamp to avoid contact with the hydrophobic coating and slide it onto the mast pole from the single panel NPM as shown in Figure 45.

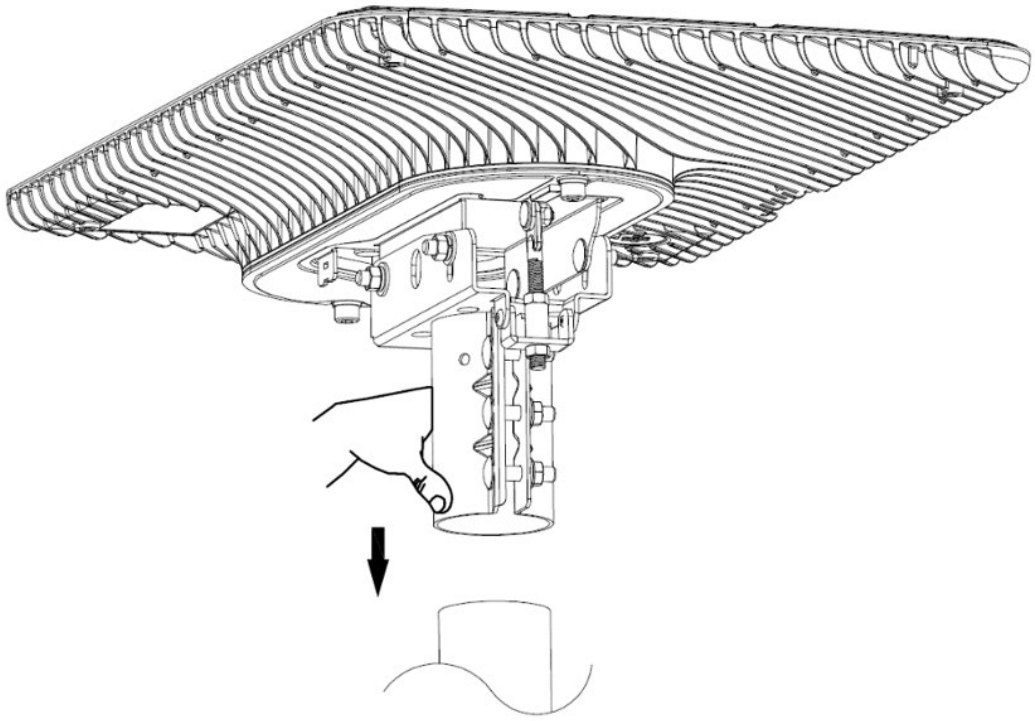


Figure 45: Mounting the ODU onto the mast pole

NOTICE

The ODU should be handled with care to avoid damage to the radiating surface, connectors, and mounting elements. Special care should be taken to protect the top surface of the ODU. Avoid handling/touching the top surface and protect it from scratching, especially during pre-installation when the unit may be upside down.

If needed, use the foam insert from the packaging to keep anything from touching the top surface of the ODU.

12. The Jonsa-OW mount adapter is adjustable and allows for azimuth and tilt adjustment.

    To adjust the azimuth, rotate the antenna around the mast pole as needed. The azimuth has an adjustment range of 0-to-360-degrees.

    To adjust the tilt, loosen the M8 nuts #1-4. Adjust M8 nuts #5-6 to set the tilt angle. The ODU requires 3-degrees of forward tilt, where forward is the direction away from the bridge along the short side of the panels (shown in Figure 46). An inclinometer must be used to ensure the ODU is at the desired 3-degrees of forward tilt.

    After the adjustment is completed, tighten the screw in sequence, first the M8 nuts #5-6, second the three M8 flange nuts #7, and last the M8 nuts #1-4 (shown in Figure 47).

    Optionally, use the #10x3/4" metal set screw (3) on the designated hole on the side of the clamp.

    NOTICE

    3-degrees of forward tilt is required to promote water drainage away from the top surface of the antenna.

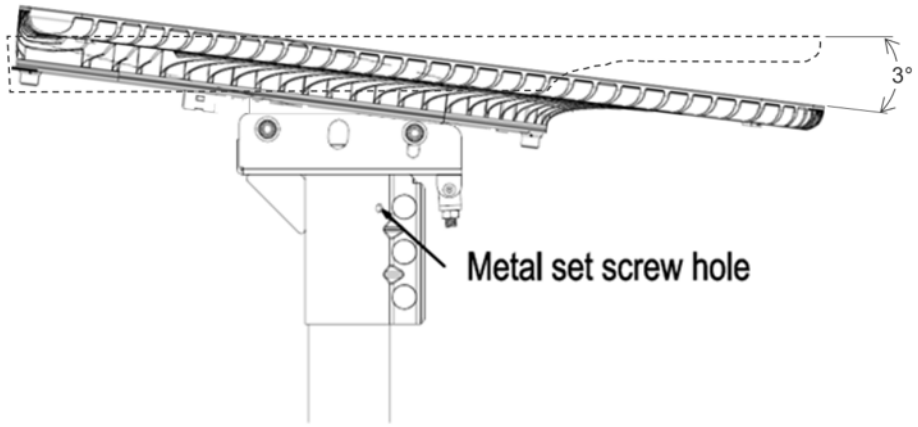


Figure 46: Tilting the ODU forward to 3-degrees

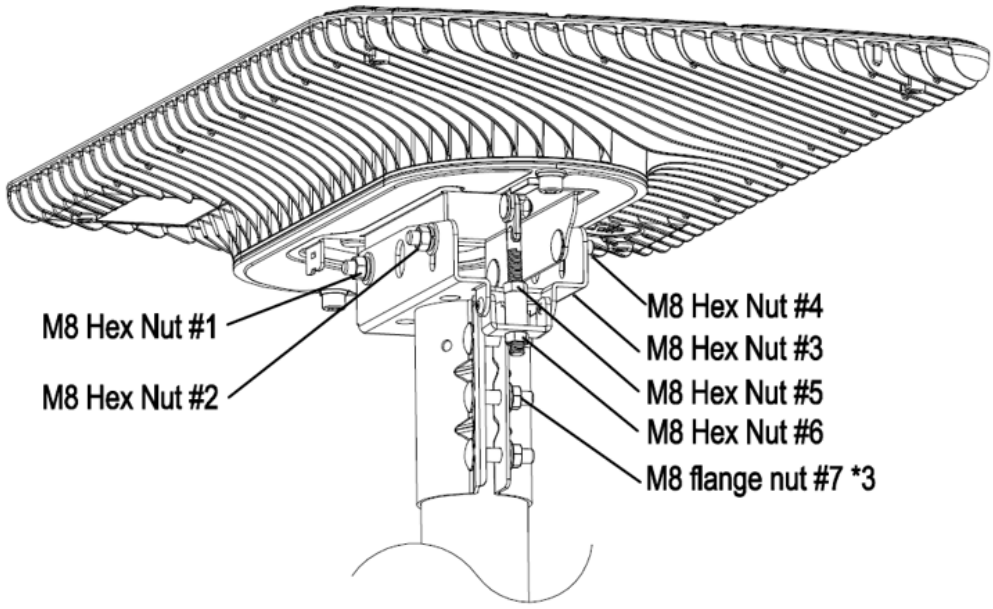


Figure 47: Tightening azimuth and tilt screws

Chapter 4

IFL cable installation

This chapter describes where the user terminal IFL connectors are located and describes how to route the IFL cables between the ODU and IDU assemblies. The IFL connection is required to power the antenna and establish a connection with the OneWeb satellite network.

IFL cabling requirements

For a list of approved coaxial cable types and maximum cable length for each approved cable type for IFL runs within the OneWeb HL1100W user terminal and electrical requirements for the IFL, refer to Choosing the right IFL cable on page 109.

IFL cable installation procedure

This section explains how to mount the IFL cable to the user terminal.

Follow the steps below to connect the IFL cable to the user terminal. These steps are described in detail in the subsections below.

1. Establish the grounding position.
2. Create the individual coaxial cable that comprises the IFL.
3. Mount the IFL connector.
4. Route the IFL cable and mate to the appropriate connector.

Figure 48 provides a graphic representation of a typical IFL cable run for the HL1100W user terminal.

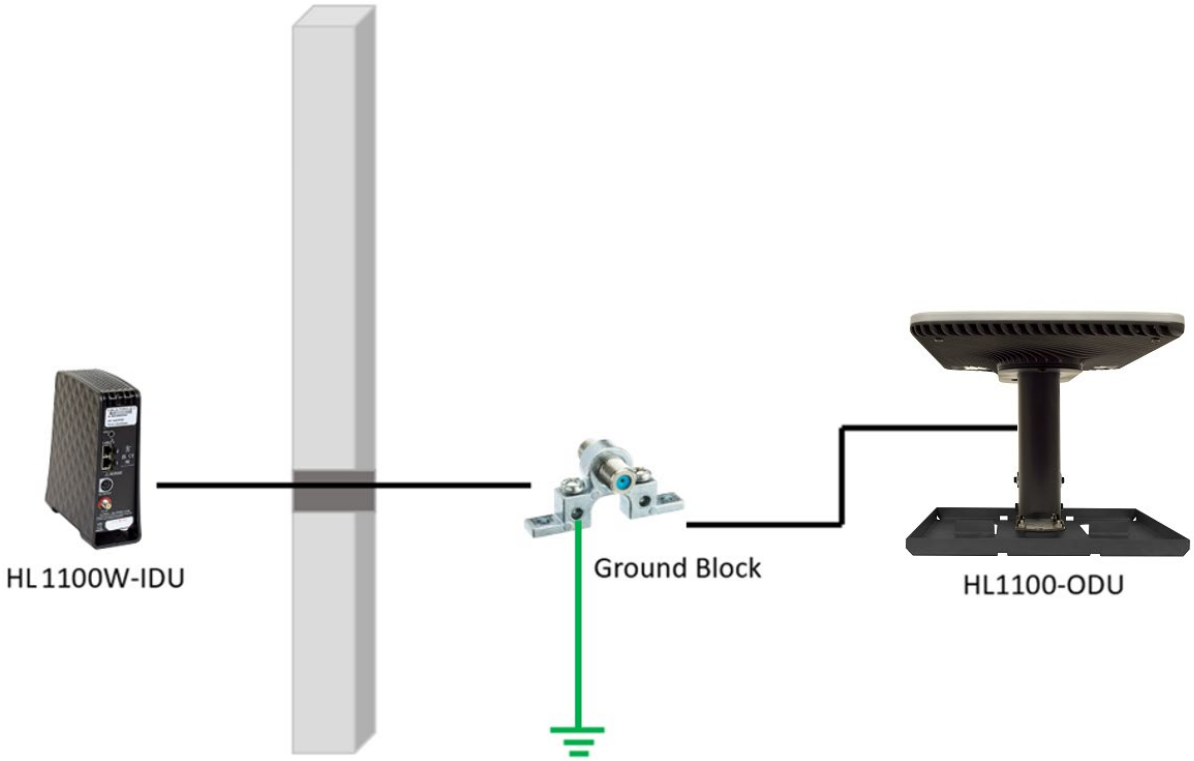


Figure 48: OneWeb HL1100W user terminal – IFL routing

Establishing the grounding position

The HL1100-ODU ground path is the IFL cable jacket to a ground block with an earthed ground connection. An approved ground block is included in every HL1100W-IDU kit. The following should be considered when establishing ground block position.

- OneWeb HL1100W user terminal grounding must comply with NEC articles 90.3, 210, 250, 810, and 820.
- Ground electrode selection must comply with NEC articles 250, 810.21 (F) and 820.100 (B).
- Ground wire minimum requirement: 14 AWG green insulated copper.
- The ground block must be installed as close as possible to the IFL point of entry (POE) – the point within a building at which the cable emerges from an external wall, concrete floor slab, a rigid metal conduit or an intermediate metal conduit that is grounded to an electrode.
- The ground block barrels must be installed in a horizontal position. The bridge connecting them is installed in a vertical position.
- For residential dwellings, the grounding conductor from the ground block to the building ground shall not exceed 6m (20ft) in length.

Figure 49 shows acceptable ground block installations.

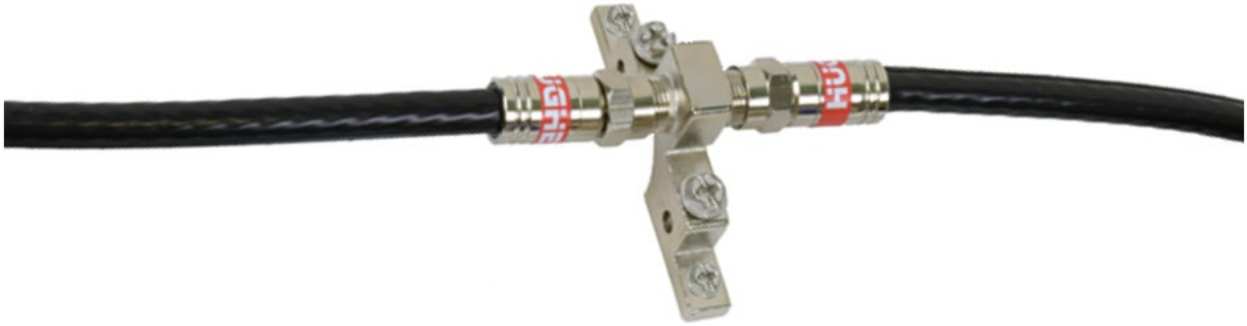


Figure 49: Acceptable ground block installations

Create the coaxial cable that comprises the IFL

Each IFL will require two sections of coaxial cable. The two cable runs are listed below.

- IDU IFL connector to the ground block
- ODU IFL connector to the ground block

The length for each cable section is to be measured and the coaxial cable segments should be cut to size. Length consideration should be made for drip loops at ground block termination points if needed to ensure water flows away from connectors.

Mount the IFL connectors

Hughes approved RG-6 connectors are supplied with every HL1100W-IDU kit, they may or may not be color coded and can be used interchangeably. These connectors are required to be used for all HL1100W installs. The IFL cable ends are all male while the IDU and ODU cable connectors are all female.

A continuity check for each cable segment should be performed prior to installing the IFL connectors to both ends. The IFL connector is to be secured on each end of a cable segment using a compression tool.

Tools required for IFL cable termination

The following tools will be needed for terminating the IFL cables (see Figure 50):

- Cable cutter
- Strip tool (for RG-6 cables)
- Compression tool (for RG-6 cable and compression connectors)

Figure 50: IFL cable termination tools

Procedure for IFL cable termination

Follow the steps below to prepare the IFL cables and mount the corresponding RG-6 compression connectors.

First, cut the cable to the desired length using proper cable cutters. This will ensure you get a straight cut with no burrs on the center conductor and will allow you to avoid cutting at an angle (see Figure 51).

Figure 51: Cutting the IFL cable to length

To terminate the IFL cable:

1. Insert the cable into the cable strip tool until it is fully seated inside the tool (see Figure 52).

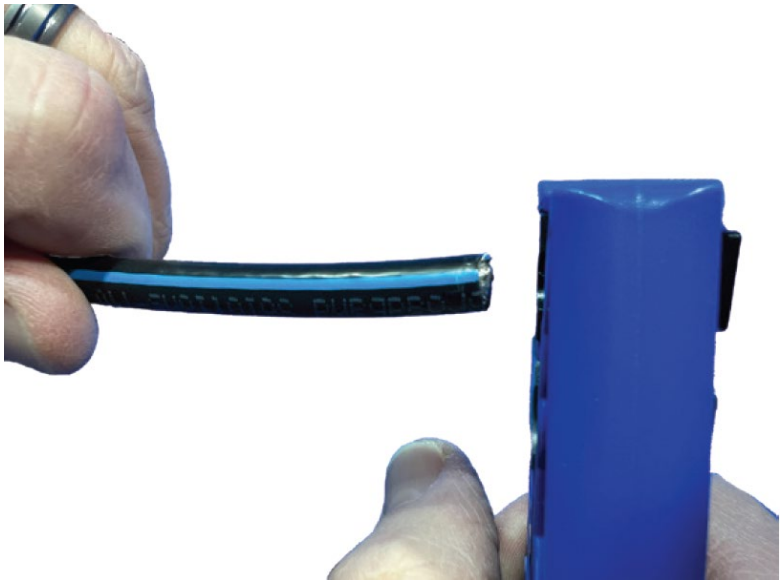


Figure 52: Inserting the IFL cable into the strip tool

2. Rotate the stripper 3-4 times clockwise and then counter-clockwise (see Figure 52).

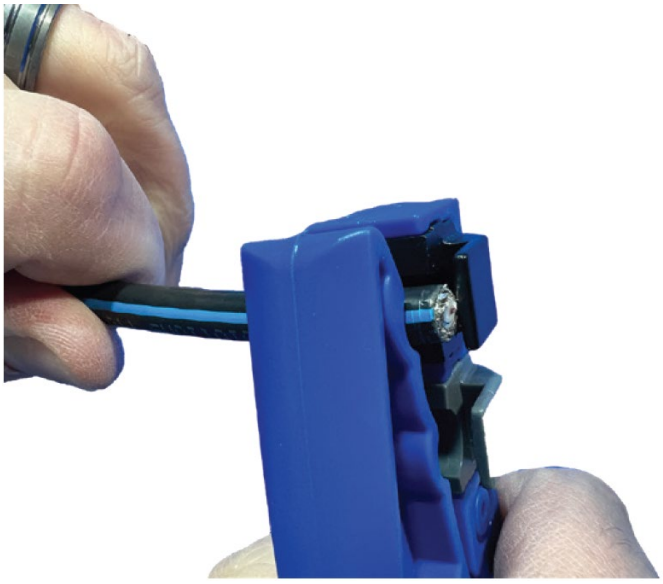


Figure 53: Rotating the cable strip tool

3. Pull the cable out of the strip tool (see Figure 54).

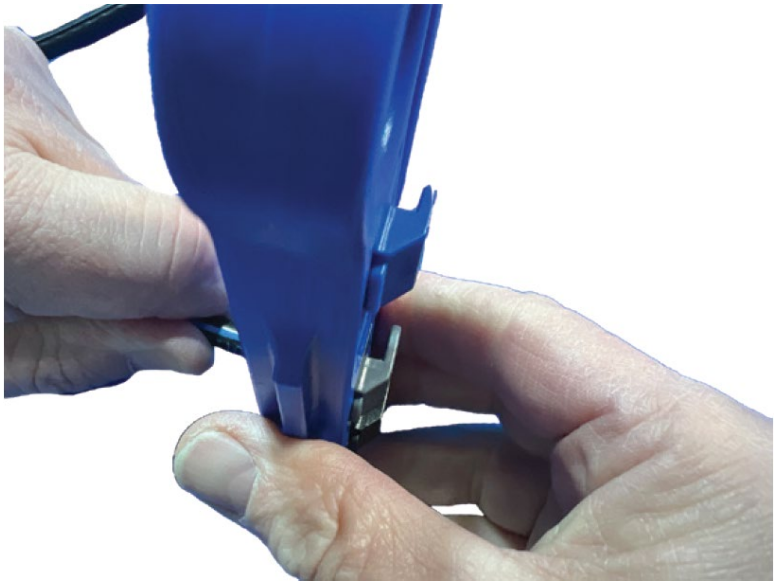


Figure 54: Pulling the cable from the strip tool

4. You should have a ¼”x¼” strip preparation, that is, ¼” for the center conductor, and a ¼” for the braid and foil (see Figure 55).

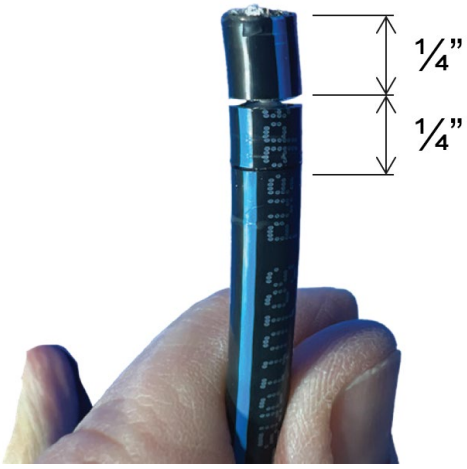


Figure 55: Strip preparation of ¼”x¼”

5. Make sure the first section is removed exposing the ¼” center conductor (see Figure 56).

Figure 56: Exposing the center conductor

6. Remove the jacket from the second ¼” section of the cable (see Figure 57).

Figure 57: Exposing the braid and foil

7. Fold the braid back against the jacket. We recommend using a piece of the hook side of Velcro on your tool to “brush” the braid evenly back around the jacket (see Figure 58).

Figure 58: Folding the outer braid against the jacket

8. Cut off the inner foil. Use a razor knife to score the foil and then peel off as shown in Figure 59.

Figure 59: Cutting the inner foil

9. Repeat step 7 with the inner braid folding it back on top of the existing folded outer braid as shown in Figure 60.

Figure 60: Folding the inner braid against the folded outer braid

10. Repeat steps 1-9 for additional IFL cables.

To mount the RG-6 compression connectors:

1. Insert the cable into the connector until the dielectric is flush with the underside of the connector head (all the braid should be inside the rear shell at this point) (see Figure 61).

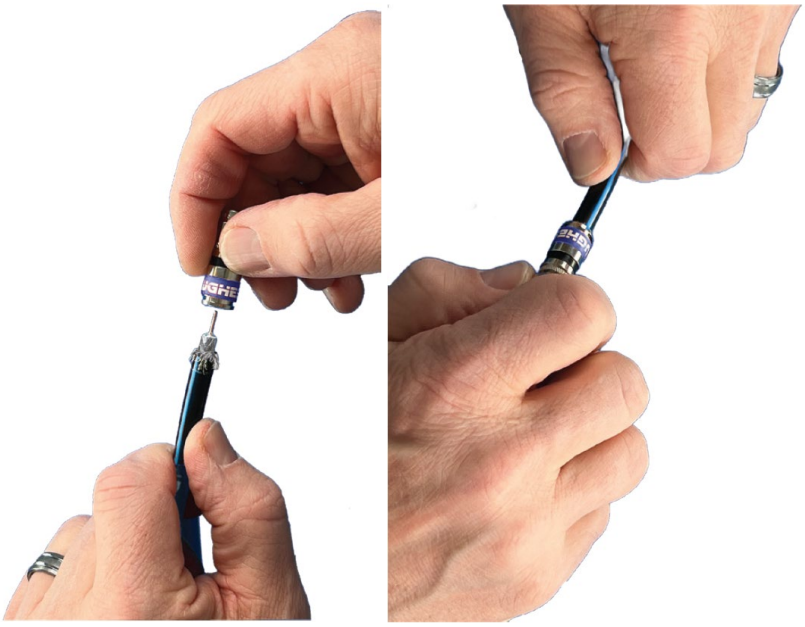


Figure 61: Inserting the IFL cable into the connector

2. Insert the cable and connector into the compression tool and press down on the toll handle until it has fully compressed the connector on the cable (you should see the rear shell flush against the body stop) (see Figure 62).

Figure 62: Inserting the IFL cable and connector into the compression tool

3. Repeat steps 1-2 to mount connectors to any additional IFL cables. Finished IFL cables are shown in Figure 63.

Figure 63: Finished IFL cables

Route each IFL cable and mate to the appropriate connectors

Route each IFL cable between the appropriate connection points shown in Figure 64.

- IFL Cable – IDU IFL connector to the ground block
- IFL Cable – ODU IFL connector

A 5ml tube of dielectric grease is supplied with each HL1100W-IDU kit. A small amount of dielectric grease is to be applied to the inside of each IFL cable connector prior to installation.

Tighten antenna and ground block connectors to 20 in/lb with a torque wrench.

Finger tighten IDU connectors. Ensure they are snug with no play.

Figure 64: OneWeb HL1100W user terminal – Hardware IFL connectors

Weatherproofing considerations

In areas with a corrosive environment, such as salt air, animal stock yards, and chemical plants, additional protection may be needed. Consider the following:

- Option 1 – Add a full length weatherboot on the IFL cable in addition to the standard installation procedure.
- Option 2 – Cover the IFL connections with weatherproof tape after completion of the standard installation procedure.

Chapter 5

Installing the IDU and PSU

This chapter provides instructions for installing the indoor components; the HL1100W-IDU and HL1100W-PSU, powering up the user terminal and connecting user devices to the IDU up until user terminal pointing.

Installing the IDU

To install the HL1100W-IDU:

1. Remove the HL1100W-IDU from the IDU kit carton.
2. Position the IDU indoors at a location that provides optimal Wi-Fi access and wired connectivity to user devices.
3. Connect the IFL cable to the IFL connector on the IDU respectively.

Installing the PSU

To install the HL1100W-PSU:

1. Remove the HL1100W-PSU from the IDU kit carton.
2. Position the PSU indoors within range of the HL1100W-IDU and a wall outlet.

   Note: The chassis of the PSU is designed to dissipate heat. It will warm up during operation and should be installed with at least 1” clearance on all sides for optimal heat dissipation.

3. Connect the DC power cord from the PSU to the IDU’s DC IN connector, as shown in Figure 65.

Figure 65: Proper power cord orientation

The HL1100W-IDU power cord connector uses a locking mechanism to ensure the cord stays snugly connected to the IDUs. Make sure the connector is oriented with **the flat side of the plug facing the IDU’s side panel nearest to the LAN ports** (see Figure 65).

Note: Sufficient pressure must be applied to the plug to initiate the connector latch. Push the plug until you feel the locking mechanism snap into placer.

4. Connect the AC power cord to the connector on the PSU's power supply.

   Note: Do not connect the AC power cord to the AC main yet.

Powering up the user terminal

To power up the HL1100W user terminal:

1. Ensure the installation of ODU, IFL cable, IDU, and PSU is complete.
2. Connect the surge protector (recommended) to the tested outlet.

   NOTICE

   A suitable surge protector is recommended to protect the IDU from possible damage due to power surges.

3. Apply power by connecting the AC power cord to the surge protector. All front panel light-emitting diodes (LEDs) on the IDU turn on once power is applied. Following that, the power LED remains on while the other LEDs turn on and off as the IDU performs a self-test and transitions to the boot phase. Once the IDU is fully booted, the Wi-Fi LED will remain lit and the user should see the SSID of the IDU being broadcast.

   Figure 66 depicts all the connections necessary to power up the user terminal.

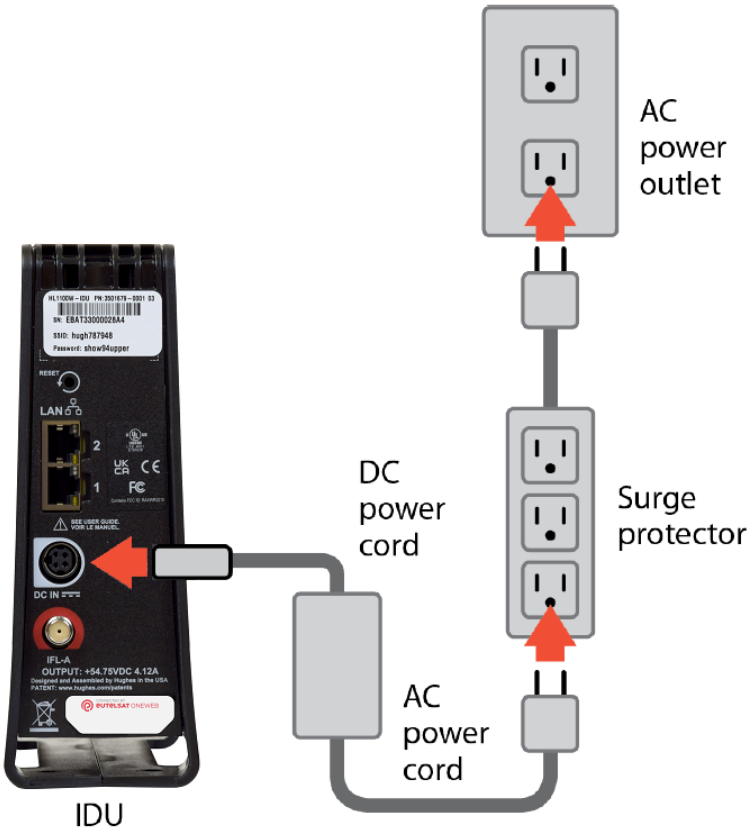


Figure 66: IDU power diagram

4. After power is applied, the ODU will receive power via the IFL cables. The ODU will perform self-test and transition to the boot phase.

   Note: HL1100W-PSU has a load-sensing circuit. The user terminal will not power on until the IFL path is connected between IDU and ODU.

Establishing a data connection to the IDU

This section describes how to establish a data connection to the IDU. This section requires a smart device or laptop to interface with the IDU.

Using your smart device to establish a connection to the HL1100W-IDU

Follow the steps below to connect your smart device to the HL1100W-IDU.

1. Note down the factory default SSID and associated password supported by the HL1100W-IDU from the label on the back of the IDU as shown in Figure 67 below.
2. The IDU's admin password on the Local User Interface (LUI) is limited to 10 characters. If only one password is printed on the label, only the first 10 characters of this password serve as the default admin password. All other characters after the tenth character will be ignored. If two passwords are printed, use them as indicated. Refer to Figure 67.

Figure 67: HL1100W-IDU Wi-Fi SSID and Passwords

3. In the wireless network settings of your smart device, select the SSID of the HL1100W-IDU.
4. Enter the password for the IDU's wireless network when prompted.

Your smart device will then be connected to the HL1100W-IDU.

Note: On your smart device, you can use the Hughes LEO app for commissioning and status check.

Note: Ensure the Hughes LEO app is installed on your smart device prior to a site visit (refer to Installing the user terminal Hughes LEO app on a smartphone on page 67). Connecting a laptop to the HL1100W-IDU.

Use an Ethernet cable to connect your laptop computer directly to either of the two LAN ports on the IDU. Figure 68 illustrates a connection between a laptop and a powered-up IDU.

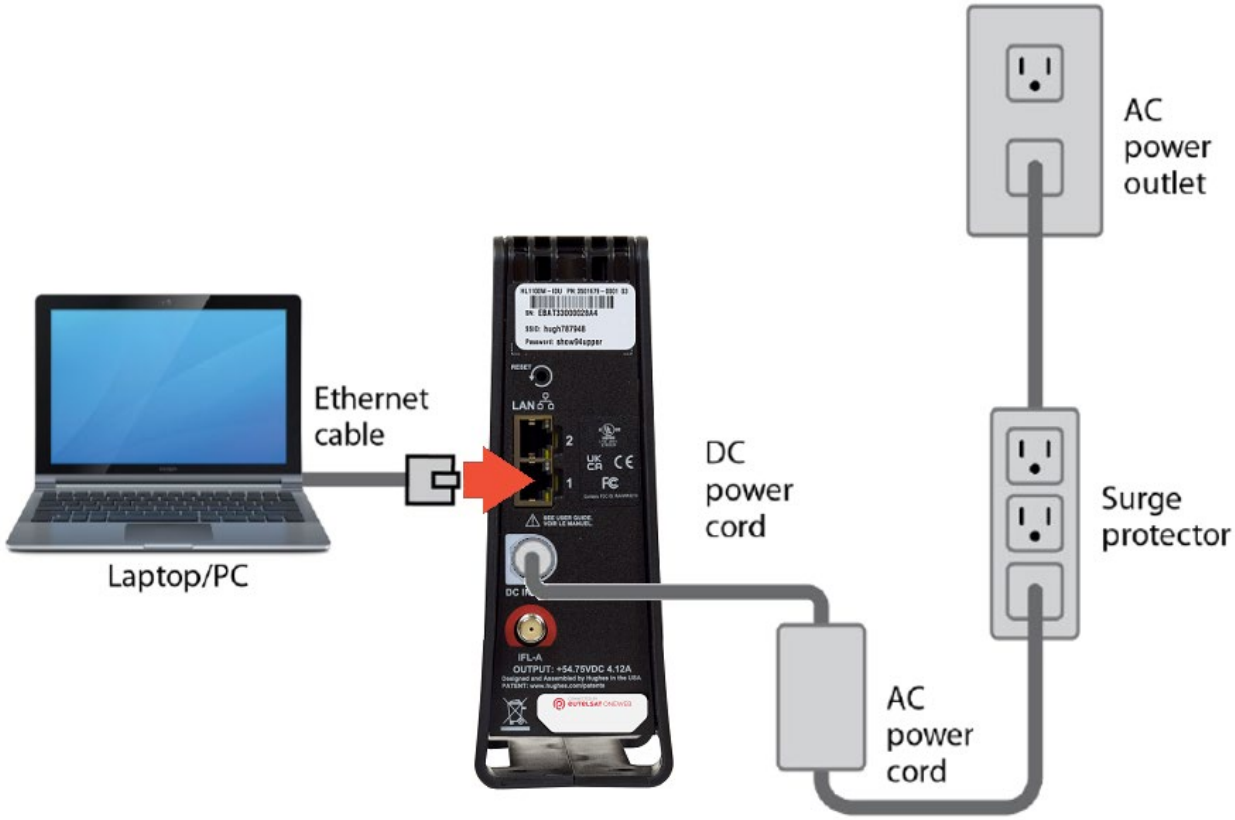


Figure 68: Connecting your laptop to the IDU

You can connect your laptop to the IDU over Wi-Fi also.

Note: A laptop can be used to access the local management user interface of the user terminal for commissioning and status check.

Chapter 6

Using user terminal Hughes LEO app

The user terminal companion smartphone app (named Hughes LEO) allows the installer to perform a site survey and commission the user terminal after UT is physically installed. The sections below describe each of these procedures.

NOTICE

Before proceeding to the site for installation, the smartphone hosting the app must be connected to internet over Wi-Fi so that the app can download requisite updates from the cloud. This ensures that the requisite updates are available with the app prior to installation at the user site. Note that the cloud syncs up with OneWeb portal (https://ephemeris.oneweb.net/ltef/ltef.csv) to download new ephemeris files when those become available.

Note that using a laptop connected to the IDU for commissioning the user terminal is an alternative.

Installing the user terminal Hughes LEO app on a smartphone

The user terminal Hughes LEO app is supported on smartphones using either iOS or Android platforms.

Hughes LEO app distribution is in progress for both Apple & Google public app stores. Once its available, here are the steps to download & install the app from the app stores:

Note: Refer to the user terminal release bulletin for the latest app release available for use.

Steps to install the app on an iOS phone

Follow these steps to download and install the Hughes LEO app on an iOS phone:

Use the QR code shown in Figure 69 to find the Hughes LEO app in the Appstore:

Figure 69: iOS QR code

If the QR code does not work:

1. Open the *App Store* app on your device.
2. Search for the *Hughes LEO* app.
3. Click on **GET** to download and install the app (see Figure 70).

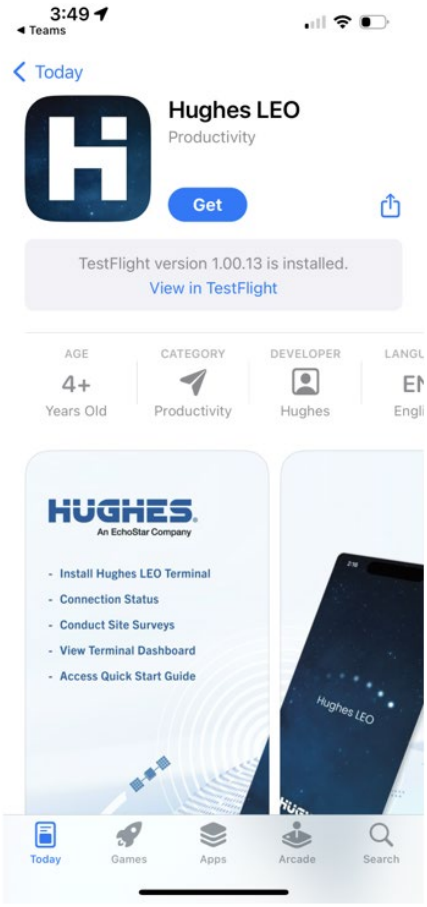


Figure 70: Hughes LEO app – iOS Appstore

Steps to install the app on Android phone

Follow these steps to download and install the Hughes LEO app on an Android phone:

Use the QR code shown in Figure 71 to find the Hughes LEO app in the Google Playstore:

Figure 71: Android QR code

1. Open the *Google Play Store* app on your device.
2. Search for the *Hughes LEO* app.
3. Click on **Install** to download and install the app (see Figure 72).

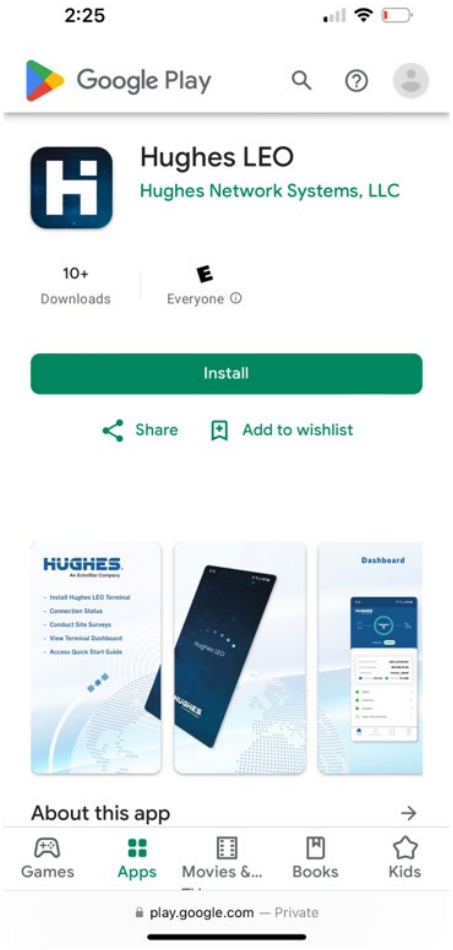


Figure 72: Hughes LEO app – Google Playstore

Launching user terminal Hughes LEO app on a smart phone

Once the Hughes LEO app is installed on your smartphone (iOS or Android platform), click the Hughes LEO app icon to launch the app (see Figure 73).

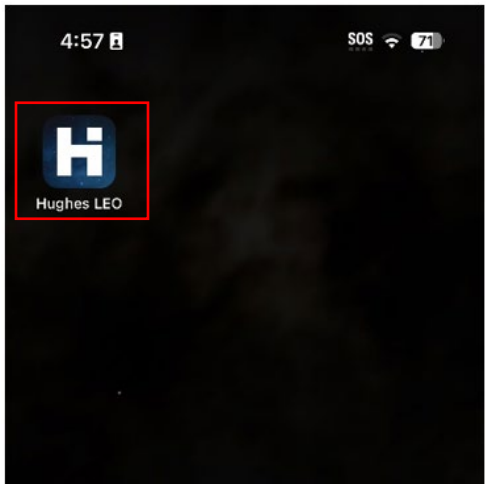


Figure 73: App icon on smartphone

When the app is launched, it briefly displays the screen shown in Figure 74.

Note: When launching the app for the first time, the smartphone must be connected to an existing network to allow the app to download updates and additional files used in the commissioning of a terminal.

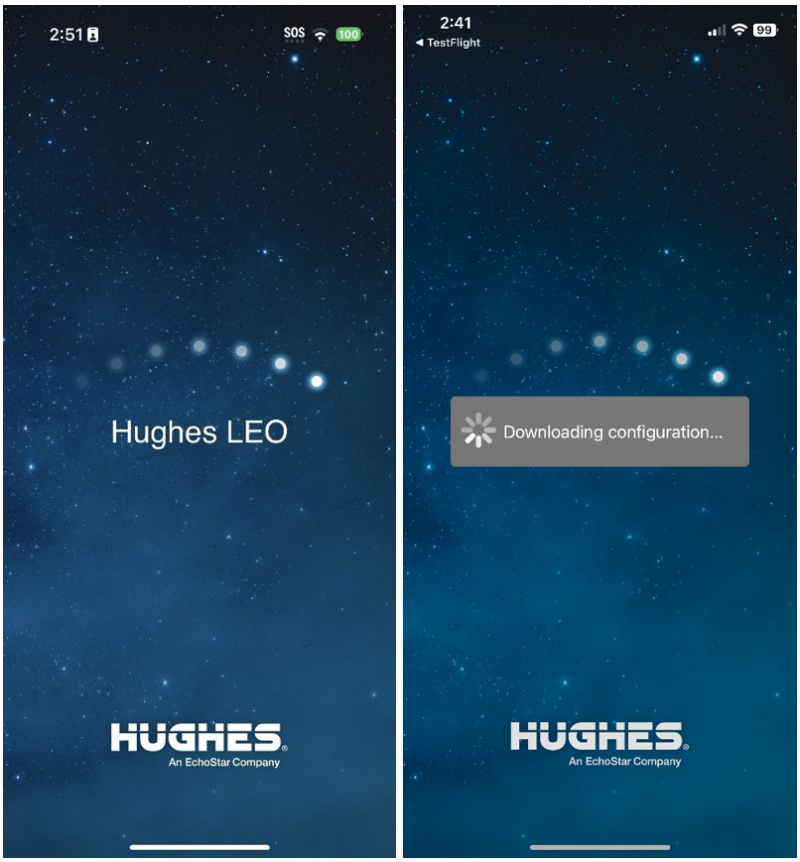


Figure 74: App launch screen

The app will automatically move to the screen shown in Figure 75.

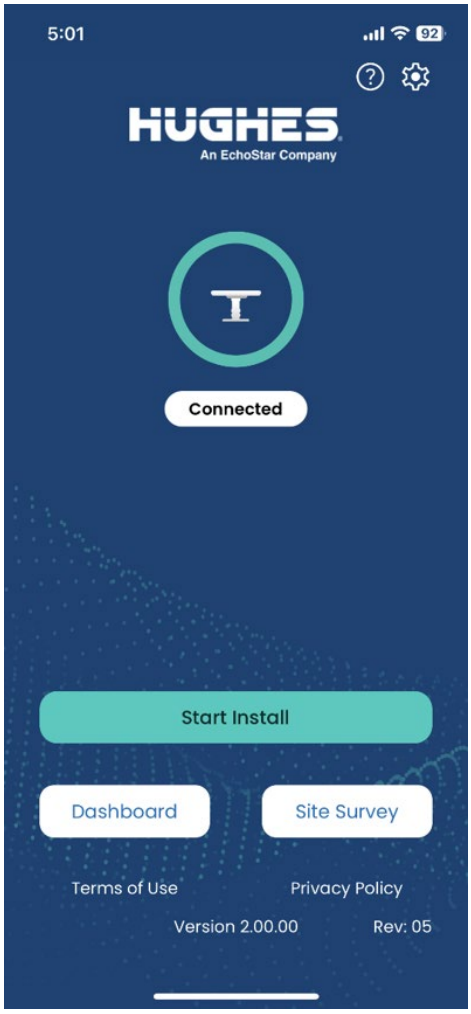


Figure 75: App login screen

The following actions can be performed using the buttons on the login screen:

- Click on the *Gear* icon in the top right corner of the screen to view the status of the app sync up with the cloud to download ephemeris, software bundle and other required configuration before the installer leaves for the site as described in *Check Hughes LEO app configuration sync from cloud* on page 72.
- Click **Start Survey** to start the site survey procedure as described in *Site survey using the user terminal Hughes LEO app* on page 74.
- Click **Start Install** to commission the user terminal and establish a connection to the OneWeb network for user service. See *Commissioning the user terminal using the Hughes LEO app* on page 80.

  Note: The password for the local user interface (LUI) and the app login will not be set in factory. So, for a first time install of a user terminal, you will be prompted to set the password when you click **Start Install**.

- Click **Dashboard** to launch the app dashboard screen from where you can check the status of the user terminal, view software and hardware version information, relaunch commissioning of the user terminal, change Wi-Fi configuration, view user help documents and customer support details, etc. See *Checking user terminal status* on page 98.

Check Hughes LEO app configuration sync from cloud

Before proceeding to the site for installation, the smartphone hosting the app must be connected to internet over Wi-Fi so that the app can download updates from the cloud. This ensures that the requisite updates are available with the app prior to installation at the user site. Note that the cloud syncs up with OneWeb portal (https://ephemeris.oneweb.net/ltef/ltef.csv) to download new ephemeris files when those become available.

To view the status of the app configuration sync with the cloud, click the **Gear** icon in the top right corner of the Login page, as shown in Figure 76.

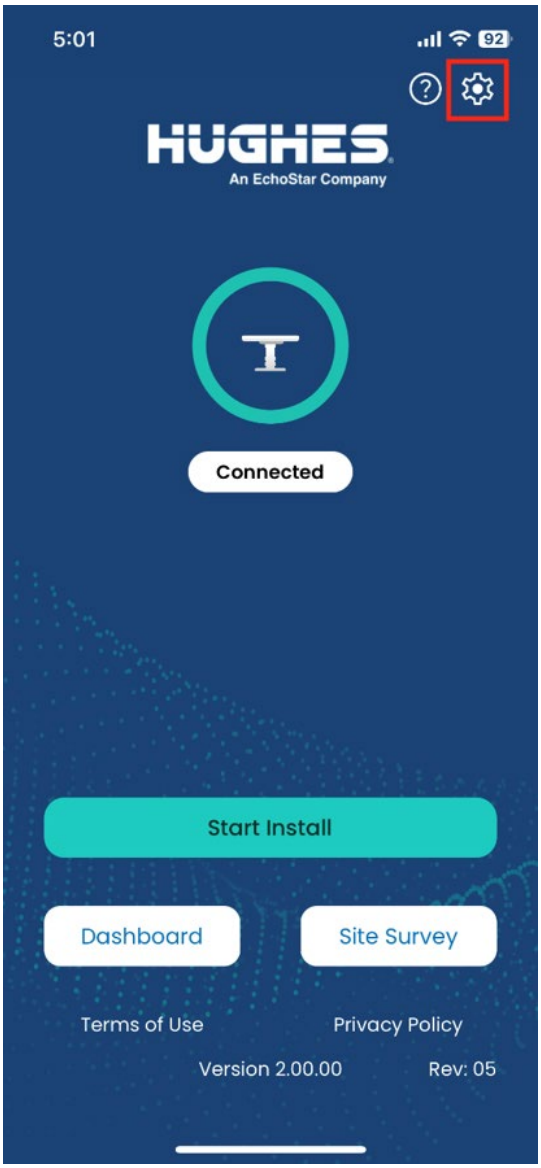


Figure 76: Icon to click for app configuration download sync status check

Figure 77 shows the status of app configuration sync from cloud for general configuration, ephemeris file, software bundle and installation guide. If any item is not synced up, select the item and click on the **Download Updates** button.

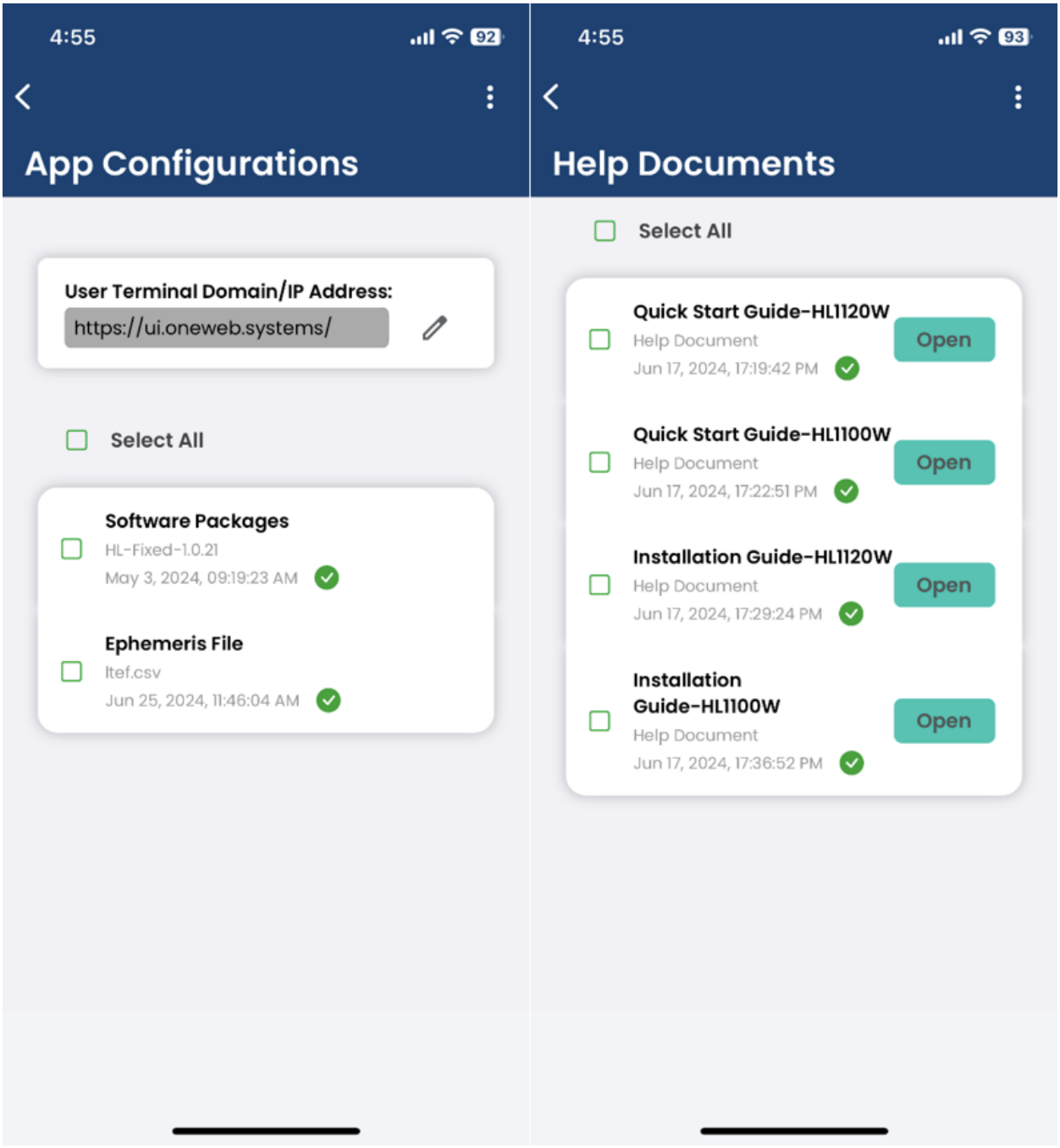


Figure 77: App configuration sync and help documents configuration sync from cloud

Site survey using the user terminal Hughes LEO app

The HL1100W user terminal requires a clear view of the sky for the best possible reception. Performing a site survey helps ensure the installation site is acceptable.

To perform a site survey:

1. Launch the app on the smartphone and click **Start Survey**, as shown in Figure 78.

   Note: The app does not need to be connected to the user terminal to perform a site survey.

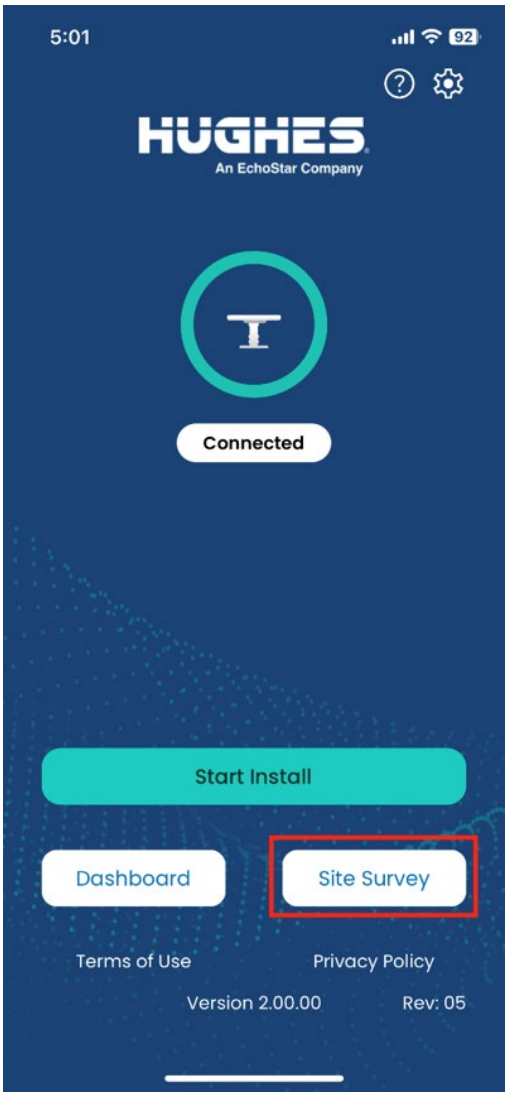


Figure 78: Start Survey button

2. Navigate to the site survey screen of the app (shown in Figure 79), read the instructions by scrolling through the pages, and then click **Site Survey**.

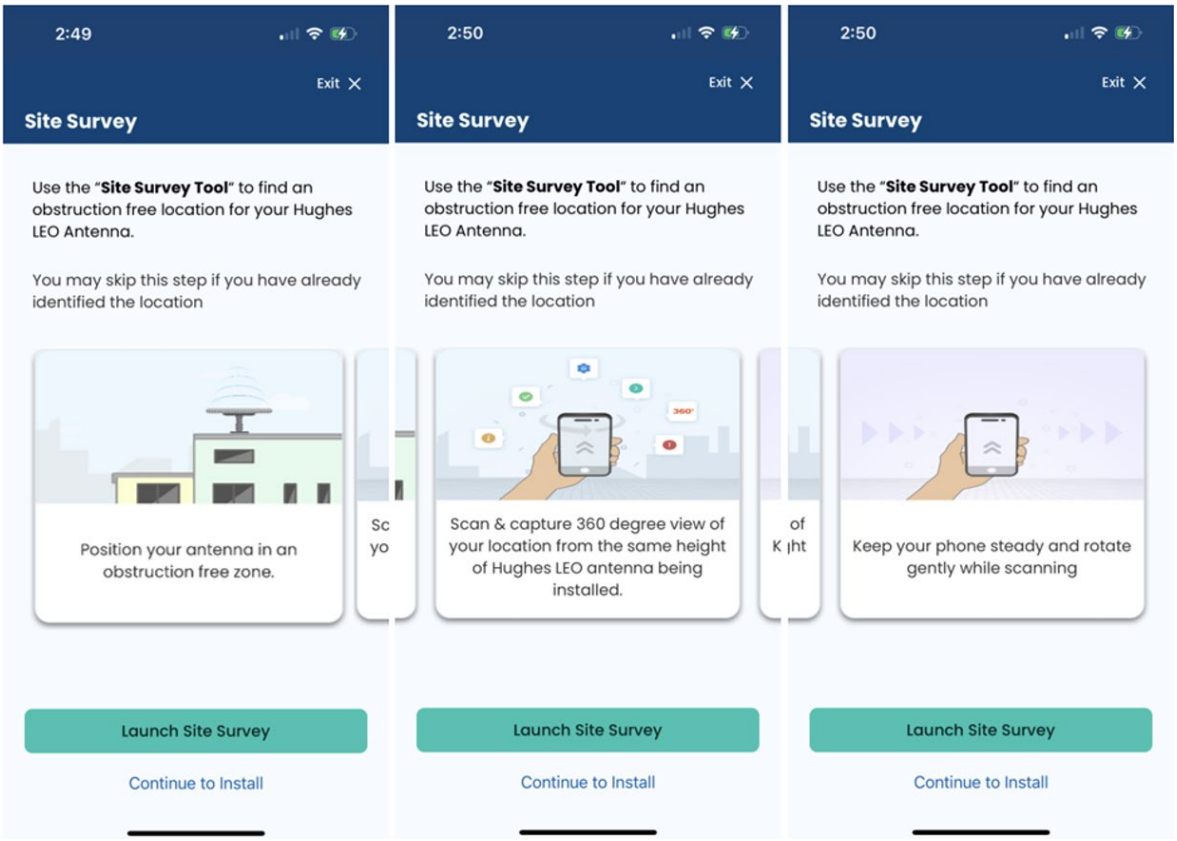


Figure 79: Launching a site survey

3. The app will ask you to give your permission for using your location information, as shown in Figure 80. If you do not give location permission, the site survey procedure will abort.

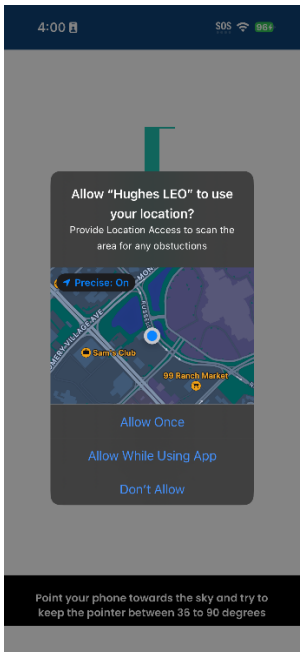


Figure 80: Allowing the app to use your location

4. The app displays the screen shown in Figure 81 asking you to give your permission for using the camera on your phone for the site survey. If you do not give camera use permission, then the site survey procedure will abort.

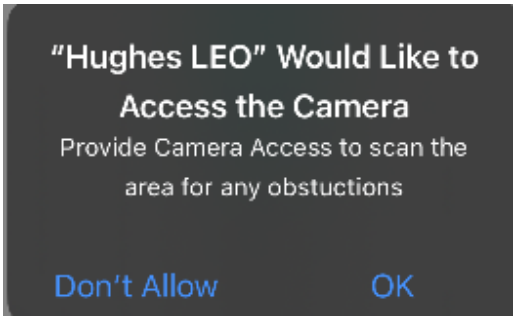


Figure 81: Allowing the app to use the camera on your phone

5. Hold your phone at the same height as the HL1100-ODU antenna being installed. Point your phone toward the sky at an angle between 36° and 90°. The arrow indicator on the screen (Figure 82) shows the current angle of your phone. Attempt to keep that arrow within the green line.

Figure 82: Pointing the phone

6. Once your phone is held at the correct angle, a circular grey capture button will appear at the bottom of the screen, as shown in Figure 83. Tap the button to begin capturing data.

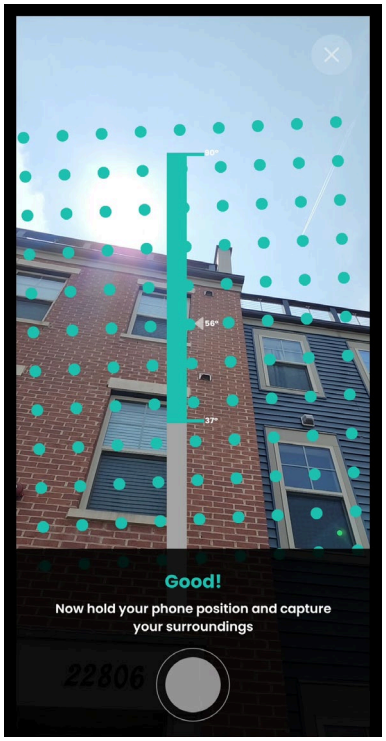


Figure 83: Site survey capture button

7. Keep your phone steady and rotate gently. Slowly pan your phone to the right until you have made a full 360° circle around the location and all on-screen dots have disappeared (see Figure 84). This will allow the app to check clear sky visibility all around the chosen install site.

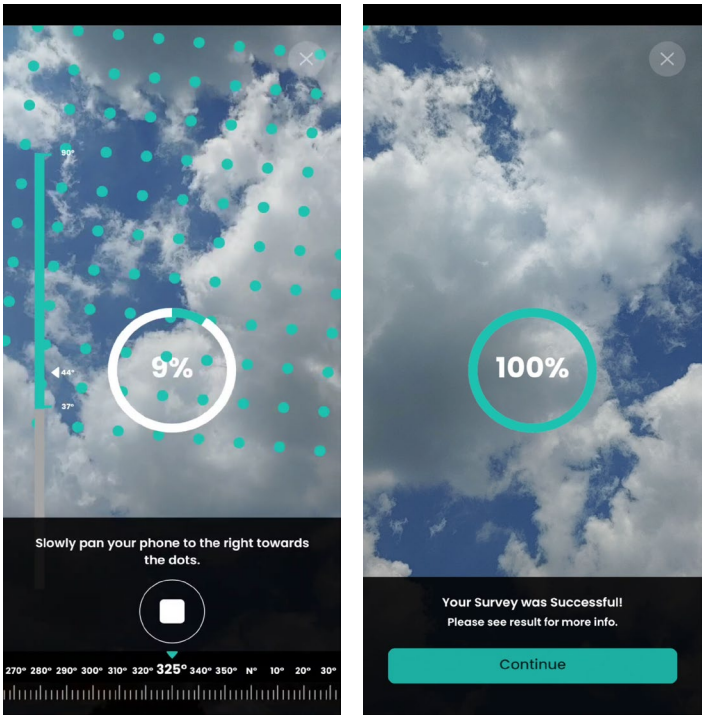


Figure 84: Panning your phone

Once you have completed the site survey, a recommendation will be generated along with an obstruction map, as shown in Figure 85. If there are any obstructions shown, find a different site. Any site that you use should have no obstructions anywhere.

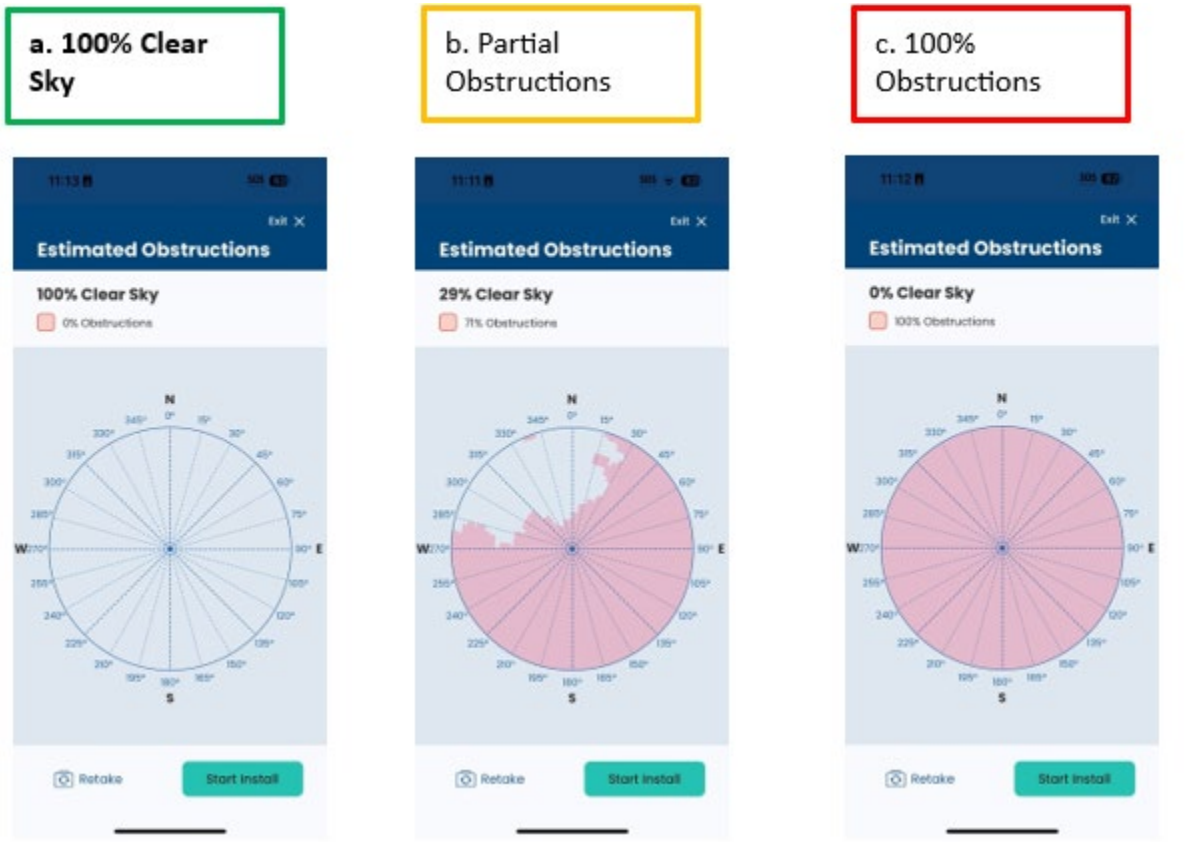


Figure 85: Site survey recommendations

Note that the pink colored section of the map indicates obstructed areas, and the light blue section indicates unobstructed areas. Any amount of obstruction above the 36-degree elevation mark can result in some degree of service interruption and impact service availability. To choose a site that is obstruction-free, a simple rule of thumb is that the distance of the UT location from an obstruction (wall, tree, pole, fence, building, etc.) should be twice the height of obstruction above the level of the antenna. For example: If the UT is being installed on a mount such that the antenna is 3’ above ground, and there is a building 24’ high that could potentially obstruct the field of view, then the UT should be located at least 2 x (24’ – 3’) = 42’ away from the building. This rule of thumb ensures a clear field of view down to 30 degrees elevation.

Installs with Partial Obstructions/blockages of more than 10% should be re-evaluated for alternate installation methods (UT relocation, or multi-transport options) to mitigate.

Note: If the site survey was initiated as part of the commissioning procedure, click **Start Install** to continue with the commissioning process. Refer to *Commissioning the user terminal using the Hughes LEO app* on page 80.

Commissioning your user terminal

NOTICE

You must complete the physical installation process before moving on to the commissioning steps.

Once you have completed the site survey and completed the physical installation process, you can move on to the commissioning process.

The user terminal can be commissioned using:

- UT Hughes LEO app on a smartphone connected to IDU over Wi-Fi. See *Commissioning the user terminal using the Hughes LEO app* on page 80.
- Laptop connected to the IDU over Wi-Fi. See Appendix C - *Commissioning the user terminal using LUI on a laptop* on page 112.

Power on the user terminal (refer to *Powering up the user terminal* on page 64) before proceeding with commissioning.

After power on, the user terminal should automatically commission itself. If you are not able to access the internet through the user terminal within 5 minutes, then follow the manual commissioning procedure as given in the following sections.

Note: If it has been more than 3 months or so since the UT was tested at a Hughes factory, self-commissioning may not succeed as an up-to-date OneWeb satellite ephemeris file is needed. The manual commissioning procedure will allow you to update the UTs ephemeris file and for the satellite modem to work normally.

Commissioning the user terminal using the Hughes LEO app

Follow the steps below to commission the user terminal using the Hughes LEO app.

Start install without login

Follow the steps below to connect the Hughes LEO app with HL1100W user terminal.

Note: Currently, authentication with the HL1100W user terminal is disabled by default.

1. Connect the smartphone to the IDU via Wi-Fi (refer to *Using your smart device to establish a connection to the HL1100W-IDU* on page 65).
2. Launch the app on the smartphone (see *Launching user terminal Hughes LEO app on a smart phone* on page 70).
3. Once the landing screen is displayed, click **Start Install**, as shown in Figure 86.

NOTICE

Avoid moving out of the IDU's Wi-Fi range during the commissioning process. Disconnecting from the IDU Wi-Fi could disrupt the commissioning process.

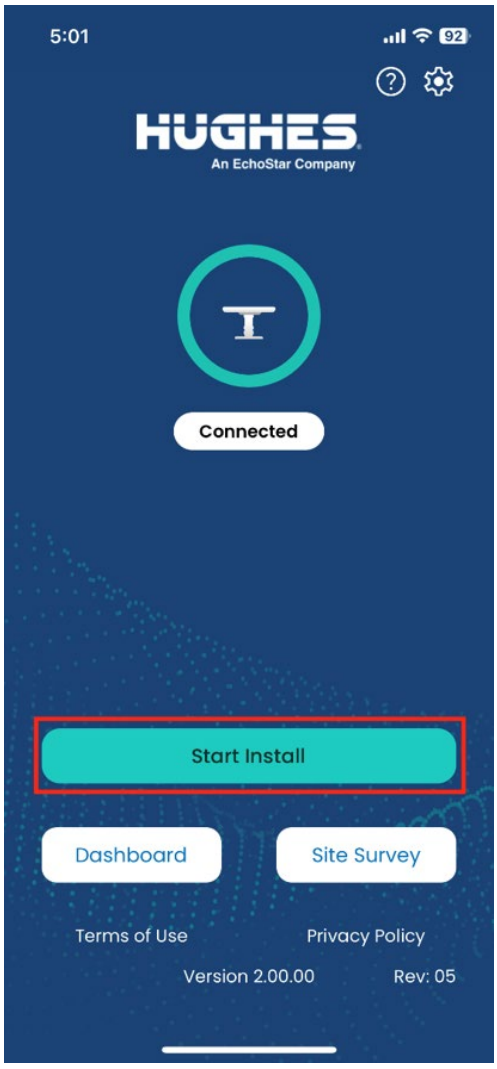


Figure 86: Start Install button to start fresh commissioning

Login into the Hughes LEO app

Follow the steps below to login to the Hughes LEO app.

Note: This step is applicable only if *login configuration* is enabled in the user terminal. By default, this feature is disabled.

1. Connect the smartphone to the IDU via Wi-Fi (refer to *Using your smart device to establish a connection to the HL1100W-IDU* on page 65).
2. Launch the app on the smartphone (see *Launching user terminal Hughes LEO app on a smart phone* on page 70).
3. Once the landing screen is displayed, click **Start Install**, as shown in Figure 86.
4. The username is fixed (`ssm-admin`) and cannot be changed. The password for the user terminal's Local User Interface (LUI) and Hughes LEO app login are the same. This password will not be set in the Hughes factory. For a first time install of a user terminal, you will be prompted to set the password when you click **Start Install**. When the screen shown in Figure 87 is displayed, enter the password and confirm the password for the user terminal local management and click **Save** to commit the password to be stored on the user terminal.

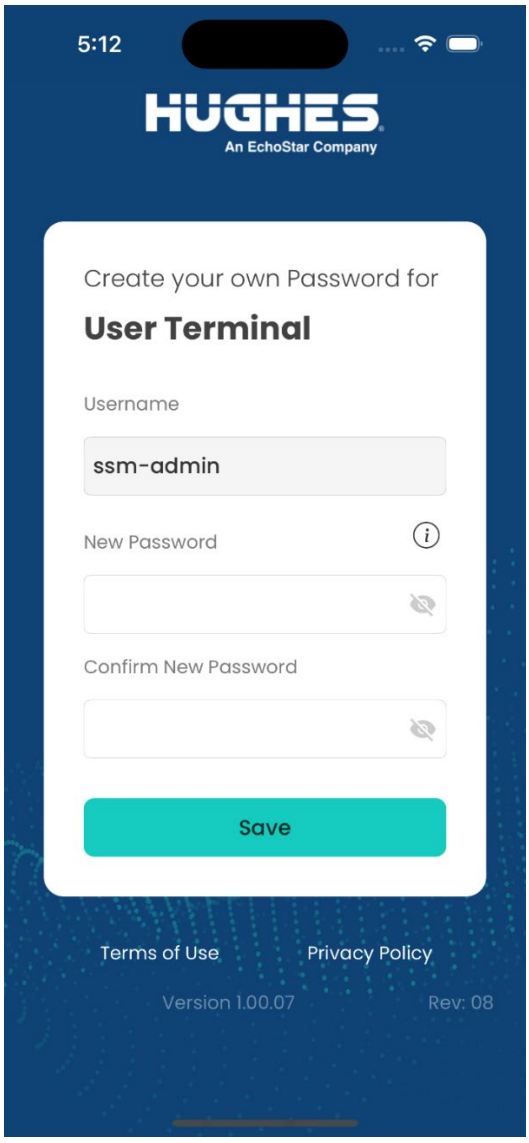


Figure 87: Create user terminal local management password

5. After the password is saved successfully, click **Continue** (depicted in Figure 88) to move back to the login screen (see Figure 89).

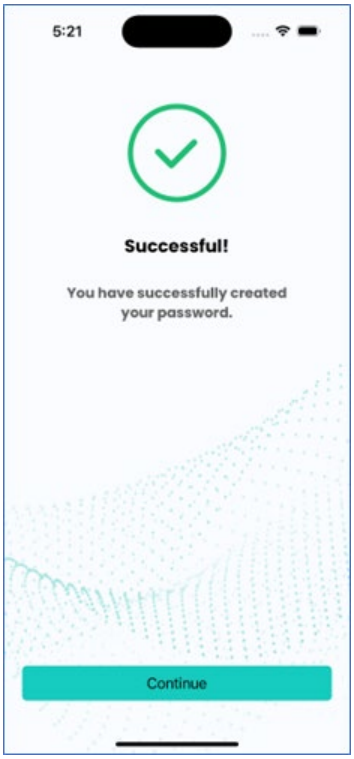


Figure 88: Successful password saved screen

6. On the Login screen (see Figure 89) enter the password and click **Login** to start the commissioning process.

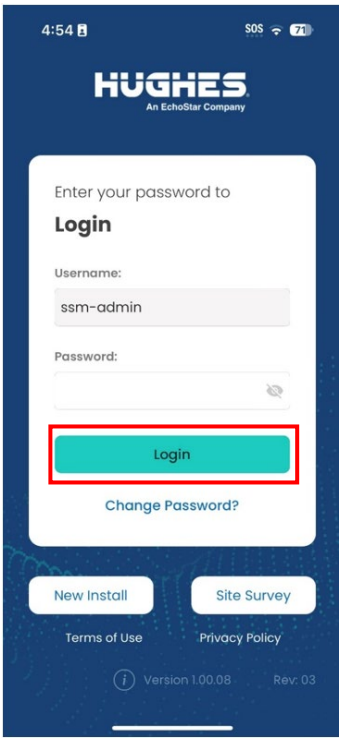


Figure 89: Login for commissioning

7. The app will ask you to give your permission for using your location information (as shown in Figure 90) if you have not done this earlier at this installation site. If you do not give location permission the commissioning procedure will abort.

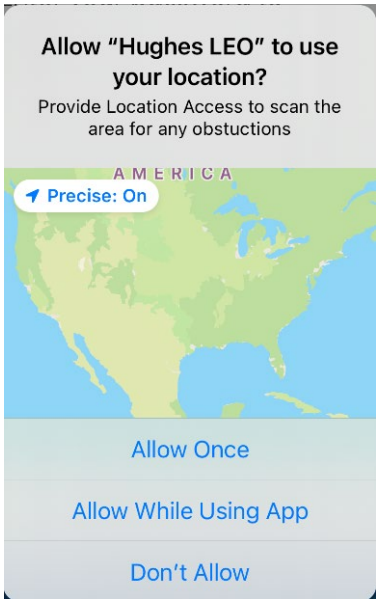


Figure 90: Allowing the app to use your location for commissioning the user terminal

Perform site survey

Once you have logged into the app, you will be given the option to perform a site survey.

1. You will see the screen (see Figure 91) to choose to do a site survey or skip if already done.

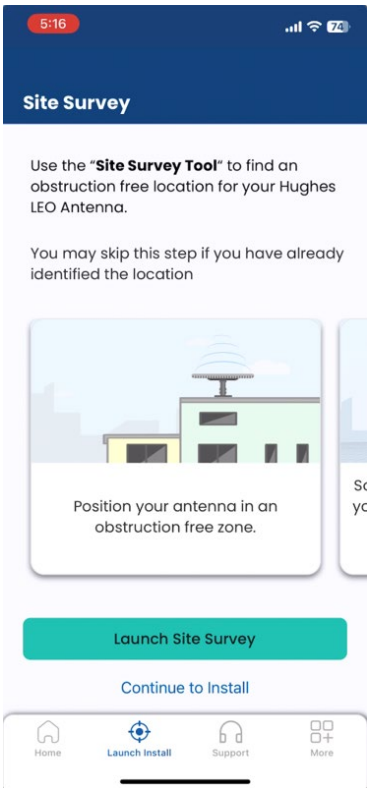


Figure 91: Skip or start site survey

2. If the site survey was not done earlier at this installation site or you want to repeat the site survey, then click **Launch Site Survey** and the app will guide you through the site survey procedure, as described in *Site survey using the user terminal Hughes LEO app* on page 74.

Starting the commissioning process

After the site survey is completed or you chose to skip the site survey by clicking **Skip to Installation**, you will be shown the installation guide (this document) for reference. When you click **Next** on the screen, then the commissioning steps start.

Note: The commissioning steps are configured on the user terminal as:

- *required* (you need to take some action on the screen before clicking **Next** to move to next step)
- *optional* (you can click **Next** to move to the next step without taking any action on this screen)
- *autonomous* (the app will automatically move to the next step when the current step completes)

Note: If the commissioning process was initiated earlier but not completed, then the user terminal remembers the last completed step. So, when you start the commissioning process again, it will start from the last saved step.

Note: All the commissioning steps are described below. If in future some steps become redundant, or the sequence of the steps change, you will see the steps as per the configuration loaded on your user terminal.

Note: The app screens allow you to go **Back** to the previous step, to go to the **Next** step, or **Start Over** the commissioning steps using the links at the top of the screen. The app screen also shows the progress of the overall commissioning process, what the next step is, and the sequence of steps with completed steps highlighted.

Upload ephemeris data

The steps below describe the process to upload ephemeris data.

1. The first step is to upload the latest OneWeb satellite ephemeris data. To do this, click **Update Ephemeris** as indicated in Figure 92. When this is finished you will see a success message.

   Note: As mentioned at the beginning of this chapter, the app would have downloaded the latest ephemeris file from the cloud to the smartphone. The name of the file downloaded to the smartphone (Itef.csv) and the download timestamp are shown on the screen in Figure 92. This screen also shows the current ephemeris file in use on the UT and when this ephemeris file was last updated on the UT.

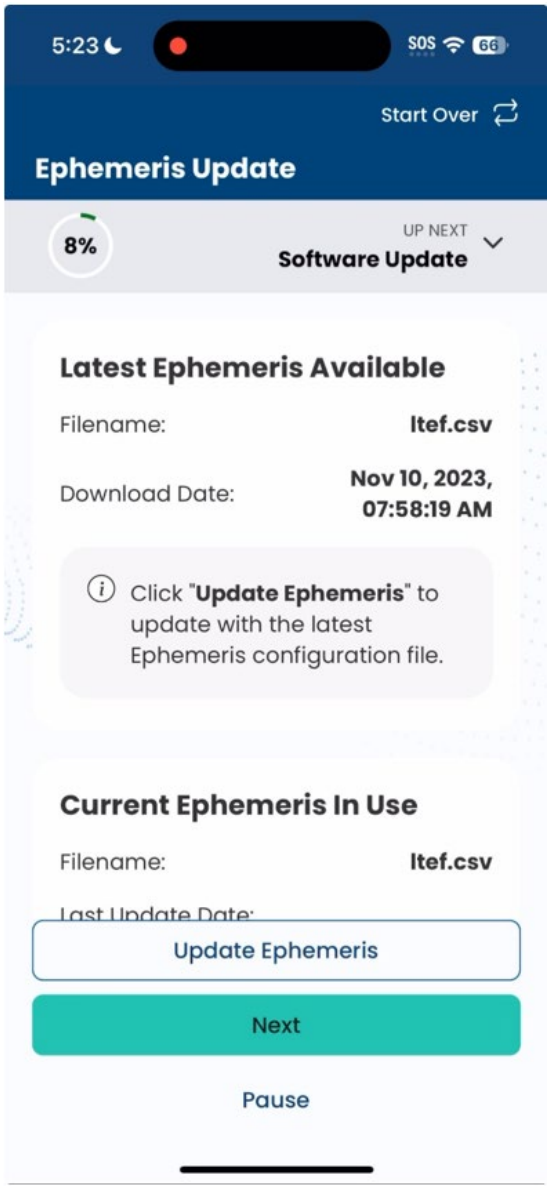


Figure 92: Uploading the ephemeris file to the user terminal

Upload software bundle (optional)

The steps below describe the process to upload the software bundle (which should only be undertaken when expressly requested by Hughes, OneWeb or your distribution partner).

1. You can skip this step, which is optional. Otherwise, in this step you can upload a software bundle to the user terminal, as shown in Figure 93. Wait for this process to complete, and then click **Next** when it's finished to move on to the next step.

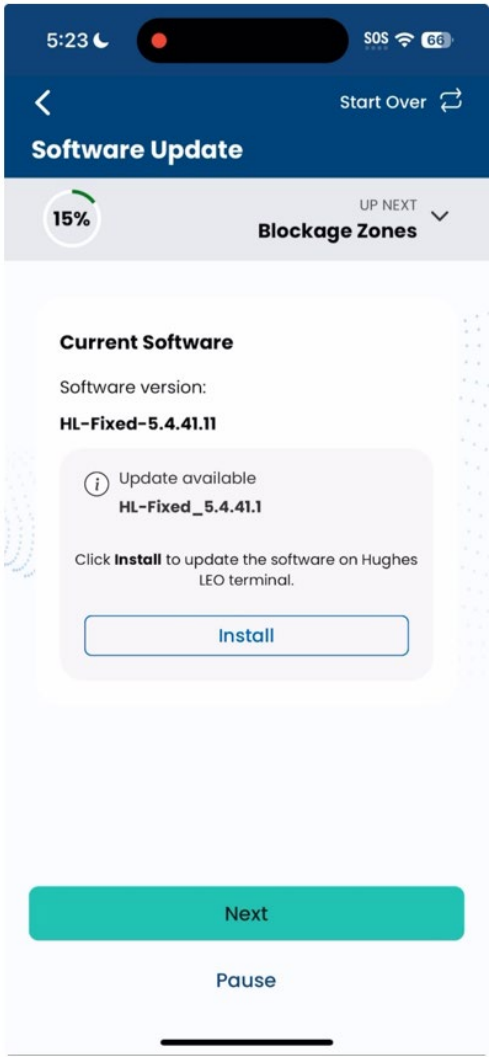


Figure 93: Software upload

Note: Ordinarily, you will skip this step because when the user terminal establishes communication with the Device Hub, it will download the required software bundle over the air and upgrade itself.

Configure blockage (no transmission) zones

The steps below describe how to specify azimuths and elevations that the user terminal should avoid transmitting into.

1. The app will then move on to the blockage screen (see Figure 94). This screen allows you to set "blockage" zones, or specified azimuths and elevations in which the user terminal should not transmit. For example, the user terminal can be configured to avoid transmitting in the direction of a hospital. You have the option to define one or more blockage zones and configure whether each zone will block transmissions or not using this screen.

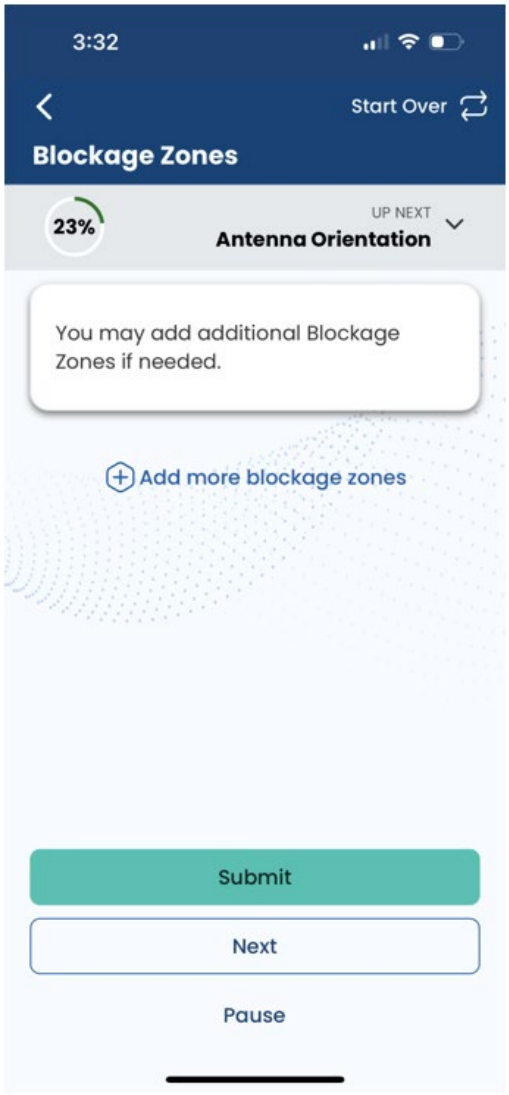


Figure 94: Adding a blockage zone

2. After you have identified any blockage zones (or if no blockage zones are needed), click **Next** to proceed (see Figure 95).

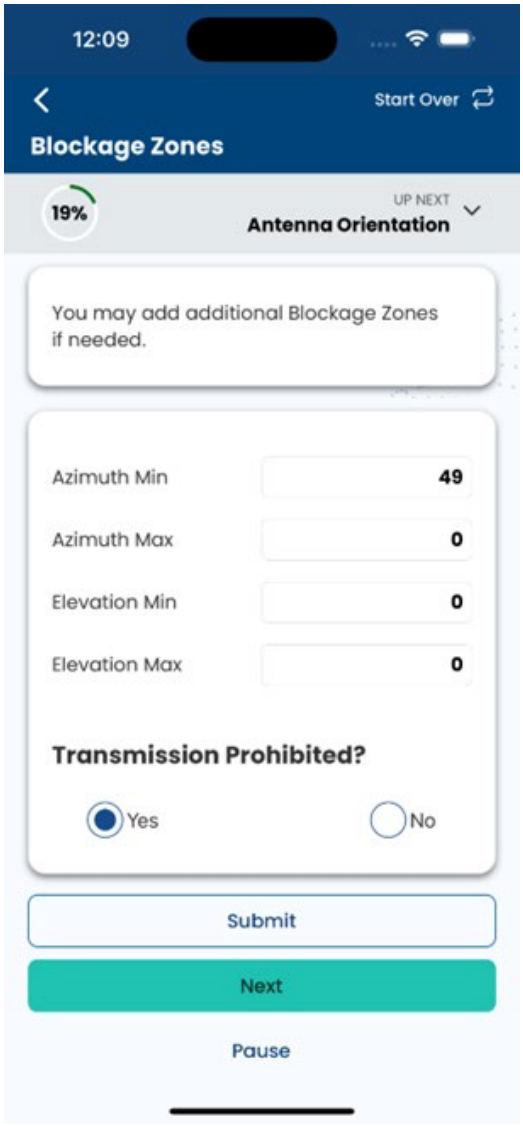


Figure 95: Blockage screen

Note: The blockage screen allows you to add new blockage entries, delete existing blockage entry or all entries, and update an existing block entry.

Check antenna orientation and start calibration

The antenna orientation screen appears (see Figure 96). Click **Start Auto Calibration** to initiate antenna calibration, wherein the user terminal estimates the pitch, roll, and true north offset.

Note: Once started, the calibration process occurs in the background and the subsequent installation steps can continue. The calibration process can take 20 minutes or more.

Once the auto-calibration process has started, click **Next** to proceed.

Figure 96: Antenna orientation screen

Note: Alternatively, you can use your tools to measure and manually enter the antenna orientation information (pitch, roll, heading, heading search range), and specify the compensation source (auto calibration, manual, tracking) values by clicking **Advanced Configuration** then clicking **Save** for the user terminal to act accordingly. The angles measured by your tool must be accurate to within +/-0.1 degree.

Configure customer support information

At this point while the antenna is going through the calibration process, you will be shown the screen depicted in Figure 97 where you will enter the customer support details. Input the required information in the app as provided to you by the distributor or dealer and click **Save**. Then click **Next** to proceed.

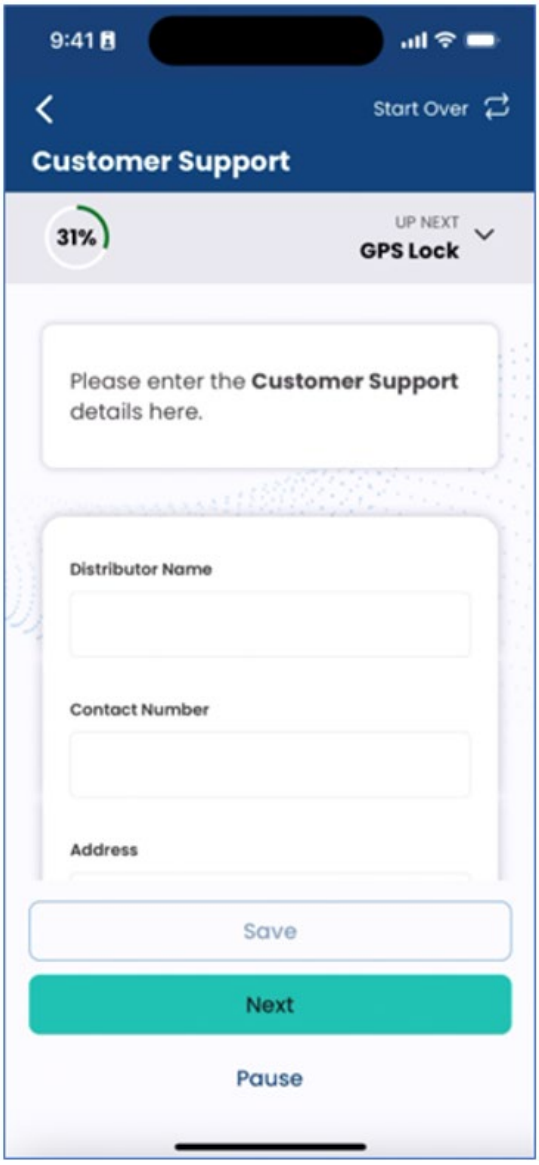


Figure 97: Customer support screen

Autonomous commissioning steps

The following sections detail the individual steps that the terminal executes autonomously during the commissioning process. At the end of each step, the user is required to click **Next** to advance the process. Autonomous steps all display a progress bar of the step's progress.

Acquire GPS lock

In the background, the user terminal is attempting to lock to the GPS signal, and the status will be displayed on the app screen depicted in Figure 98. Wait for this process to complete, and then it will move to the next step automatically when it has finished.

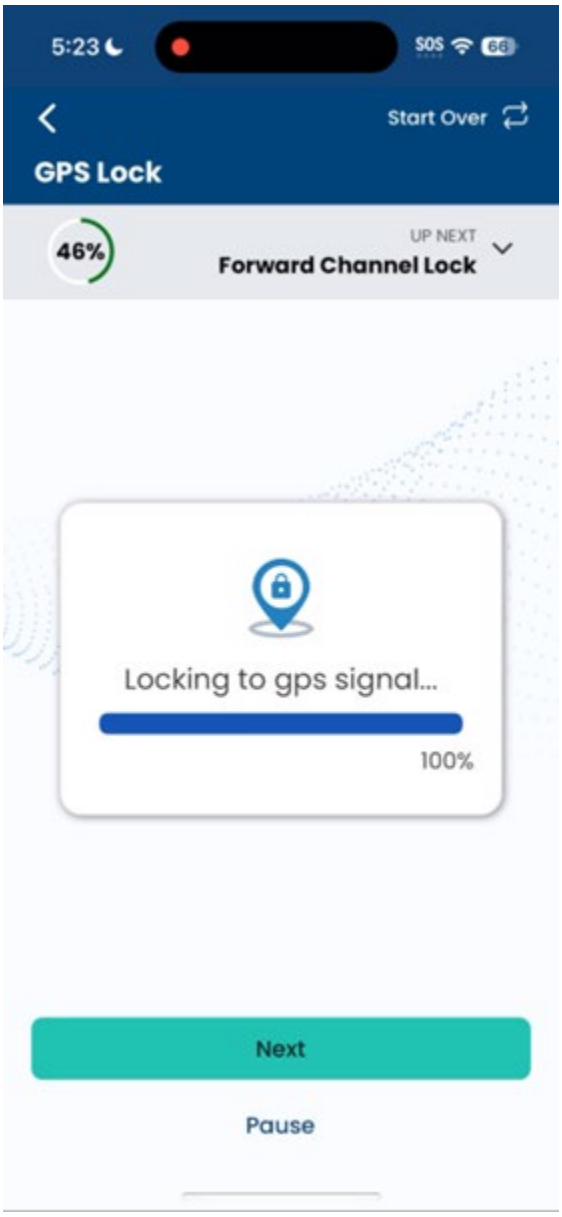


Figure 98: GPS lock screen

Acquire forward channel lock

Now the user terminal will attempt to lock to the OneWeb satellite's transmitted forward channel, and the status will be displayed on the app screen as depicted in Figure 99. Wait for this process to complete, and then it will move to the next step automatically when it has finished.

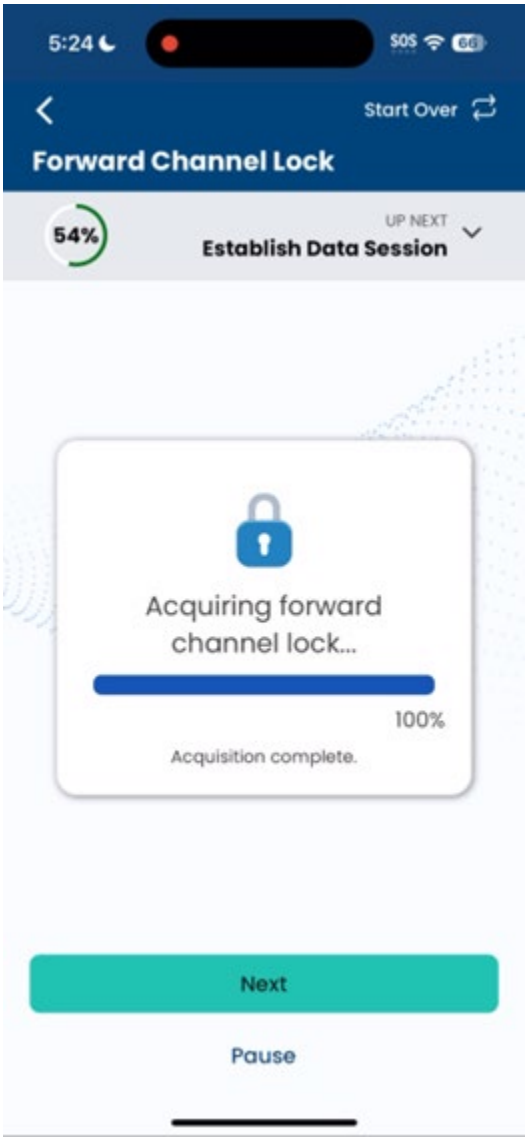


Figure 99: Acquiring the forward channel lock screen

Establish data session

The user terminal will next attempt to establish a data session with the OneWeb network and the status will be displayed on the app screen as depicted in Figure 100. Wait for this process to complete, and then it will move to next step automatically when it has finished.

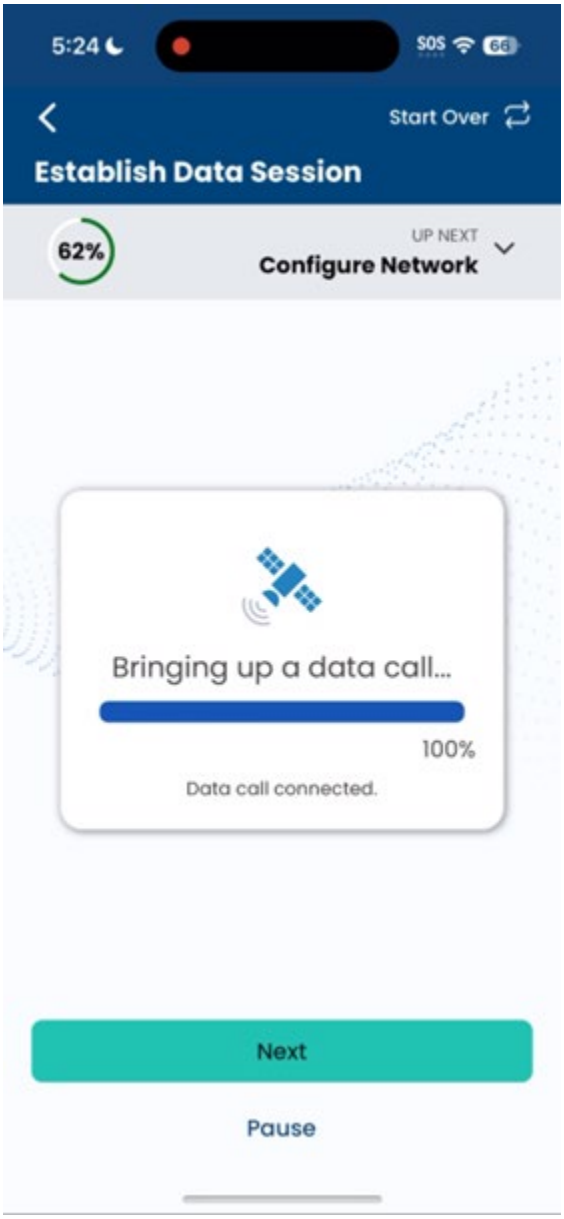


Figure 100: Data session establishment screen

Note: If the user terminal has not been provisioned in the OneWeb network yet, then this step and subsequent steps will not be successful. If this happens, check with the customer, distributor, or dealer and OneWeb about the customer's service agreement and user terminal provisioning status.

Local network configuration

The next screen (depicted in Figure 101) shows the user terminal performing the local network configuration. Wait for this process to complete, and then it will move to the next step automatically when it has finished.

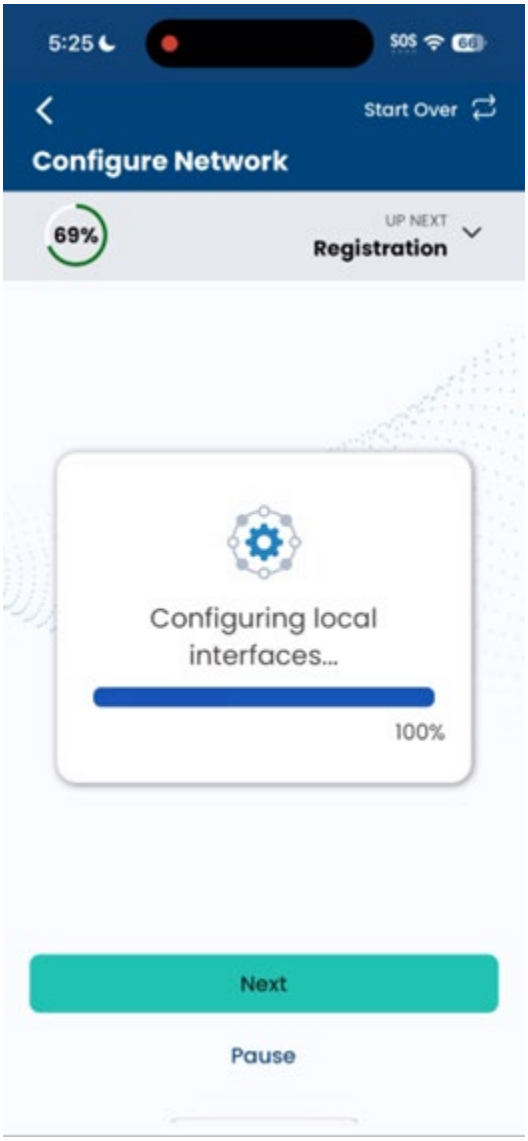


Figure 101: Local network screen

Device Hub registration

On the next screen (depicted in Figure 102), the user terminal registers with the Device Hub (CES). Wait for this process to complete, and then it will move to the next step automatically when it has finished.

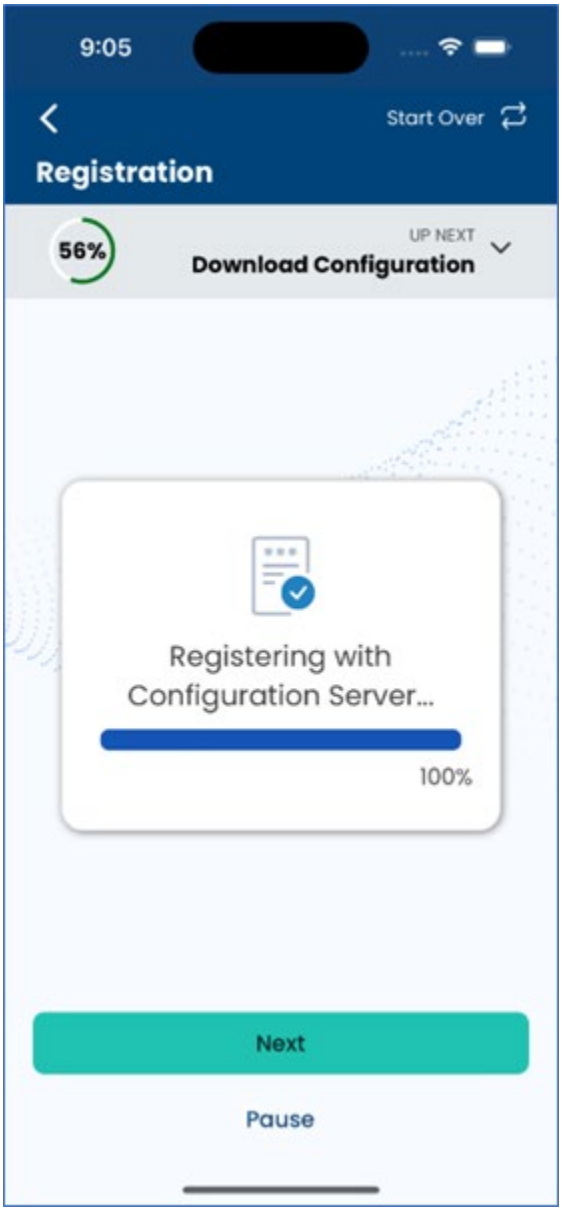


Figure 102: Register Device Hub (CES) screen

Download configuration and software from Device Hub

On the next screen (depicted in Figure 103), the user terminal downloads configuration and software files from the Device Hub (CES) as needed and upgrades the user terminal components accordingly. The user terminal may restart, in which case you may lose Wi-Fi connection and/or the login session to the user terminal will close. If that happens, wait for the session to reestablish automatically or login again. Wait for this process to complete, and then it will move to the next step automatically when it has finished.

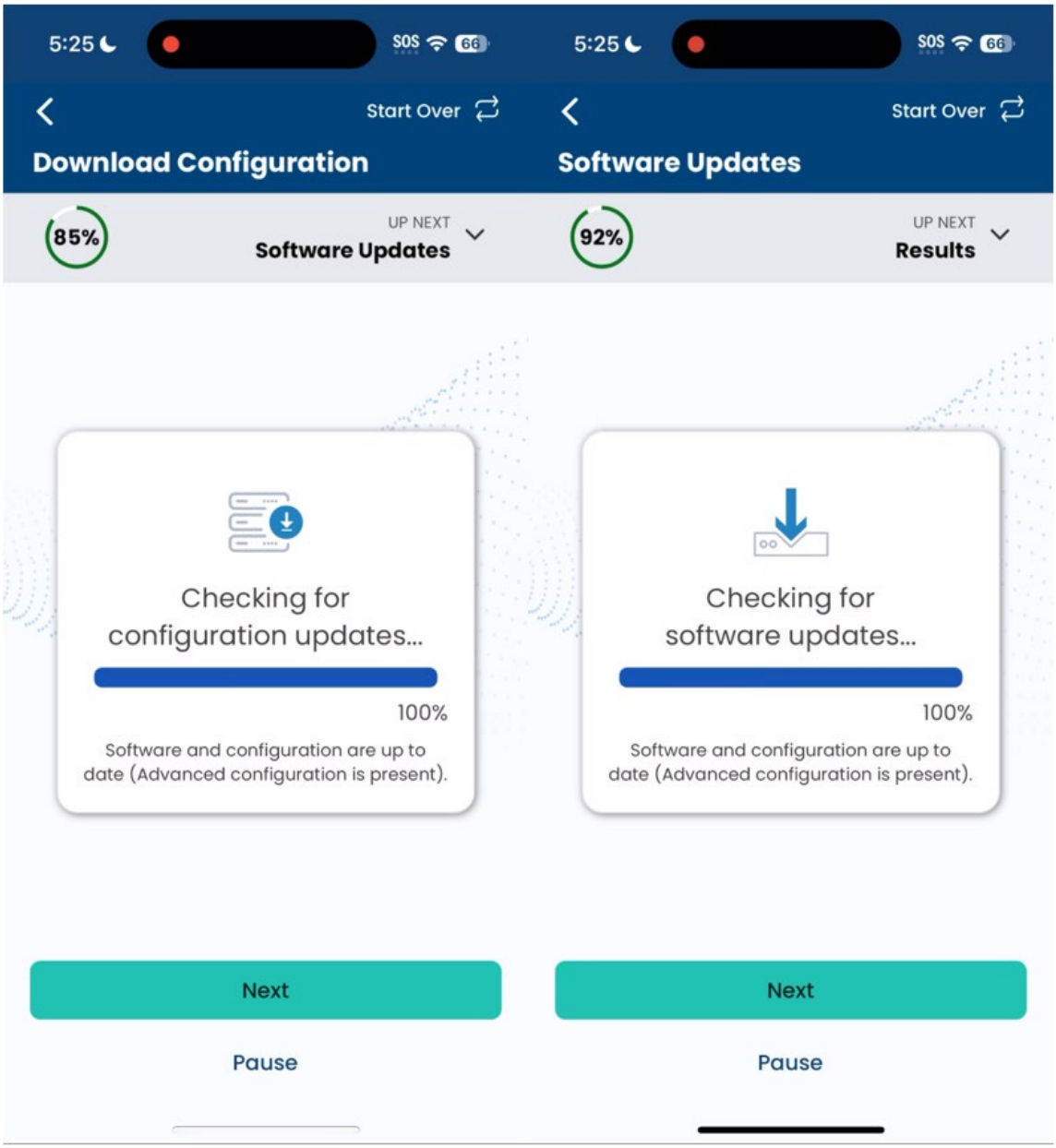


Figure 103: Download configuration and software from the Device Hub (CES) screen

Note: At this point, you can access the internet from your smartphone. Also, the user can access the internet from their devices connected to the IDU.

Results screen

Finally, after all the tests have concluded, the results screen will appear in the app (shown in Figure 104). This screen allows you to review the outcome of all the steps and all the settings that you have entered before finishing the installation.

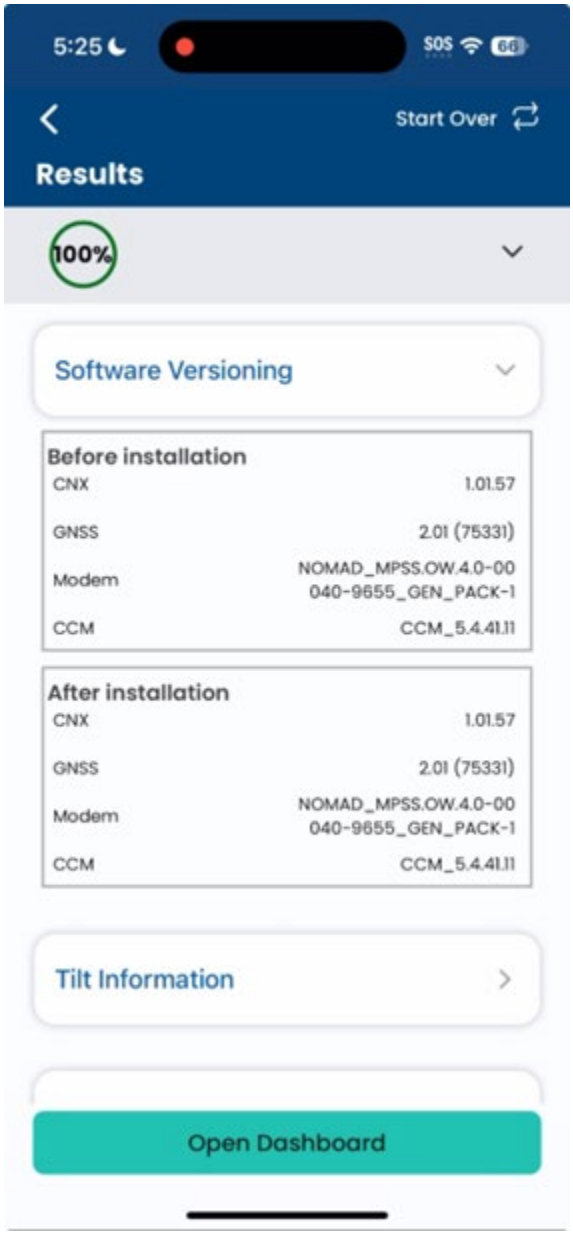


Figure 104: Results screen

3. Click **Continue** to finish commissioning the user terminal. Now you will be taken to the dashboard screen.

Checking user terminal status

To check the status of the user terminal, follow the steps below to login to the user terminal using the Hughes LEO app and check the status.

1. First, connect the smart phone to the IDU via Wi-Fi (refer to *Using your smart device to establish a connection to the HL1100W-IDU* on page 65).
2. Launch the app on the smart phone (see *Launching user terminal Hughes LEO app on a smart phone* on page 70).
3. Once the login screen appears, enter the password for the local user interface and click on the **Login** button shown in Figure 105.

NOTICE

Avoid moving out of the IDU's Wi-Fi range during this process.

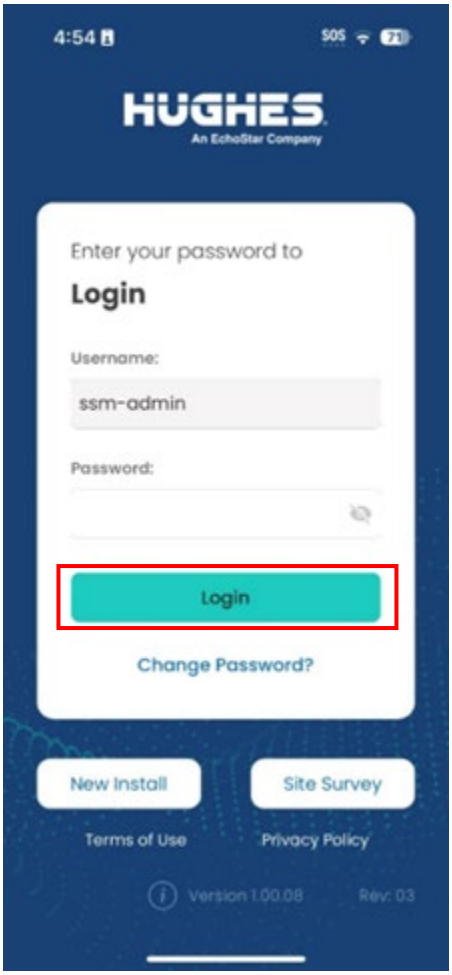


Figure 105: Login screen for status check

The dashboard screen appears, as shown in Figure 106. The **Status** field will show *Online* when the UT is connected to the OneWeb network and user devices can access the internet.

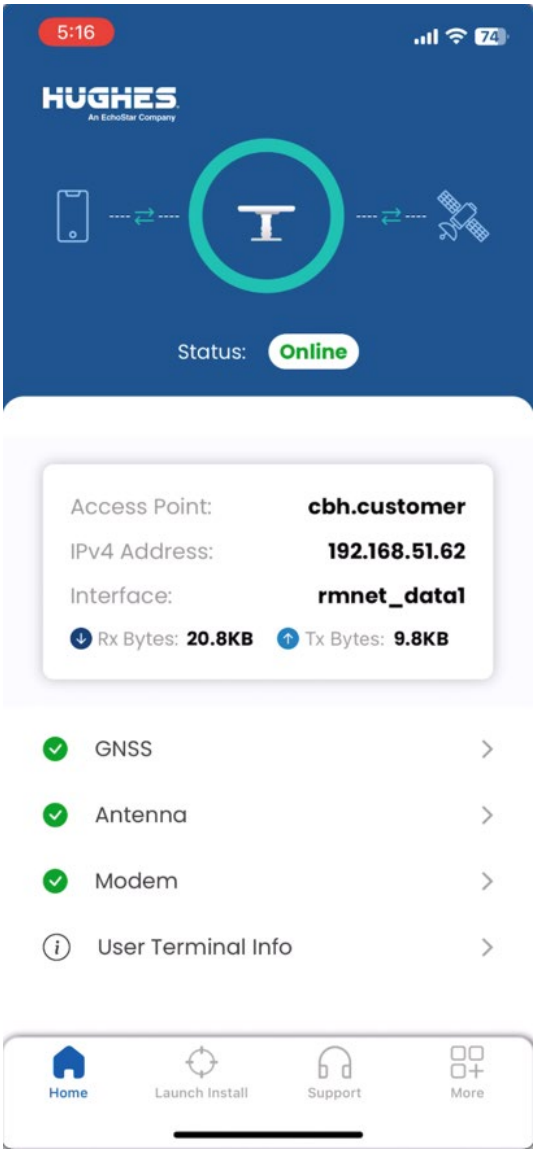


Figure 106: User terminal status screen

If the **Status** shows *Online* and you want to view more information about the UT components click on **GNSS**, **Antenna and Modem** links to view additional status information shown in Figure 107.

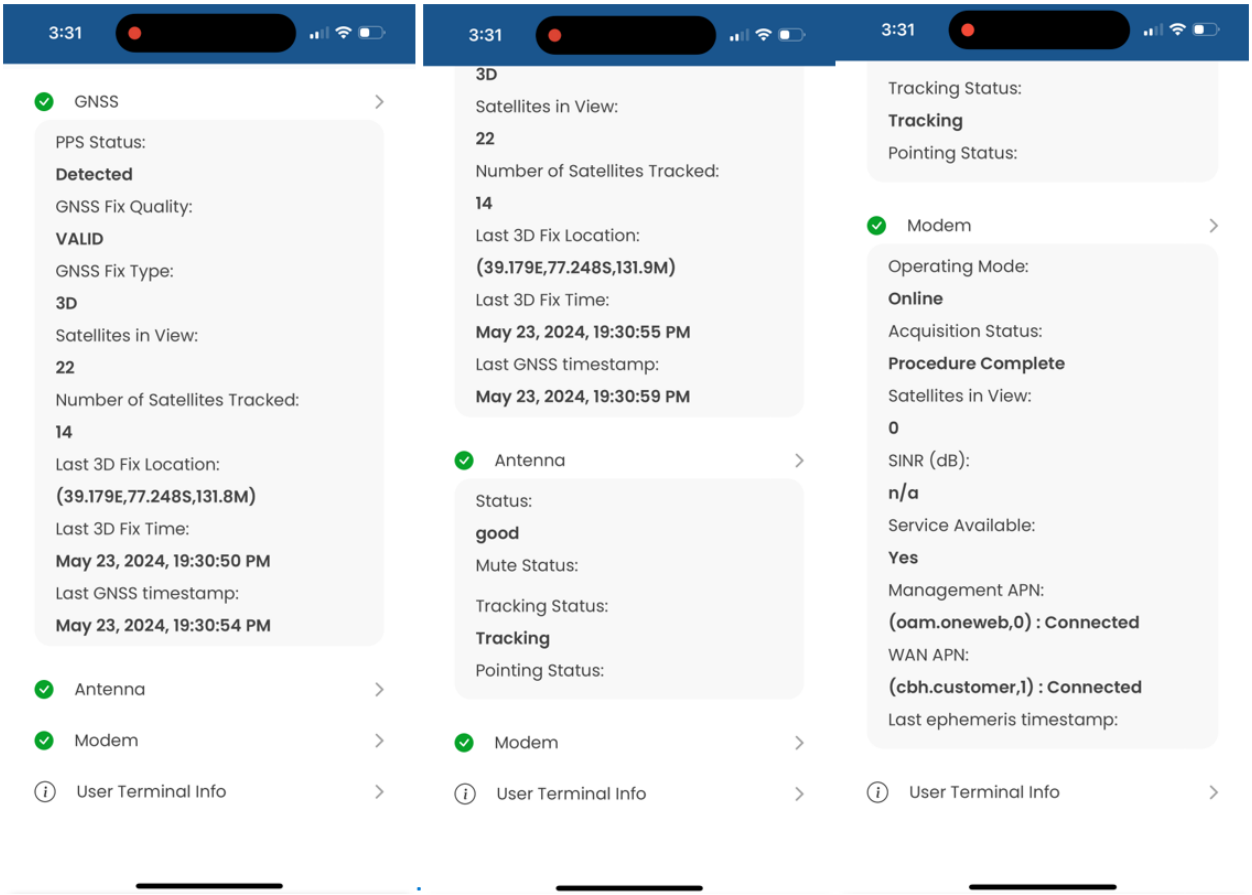


Figure 107: GNSS, Antenna, Modem status screens for UT in online state

If the **Status** shows *Offline*, click on **GNSS, Antenna and Modem** links to view additional status information shown in Figure 108.

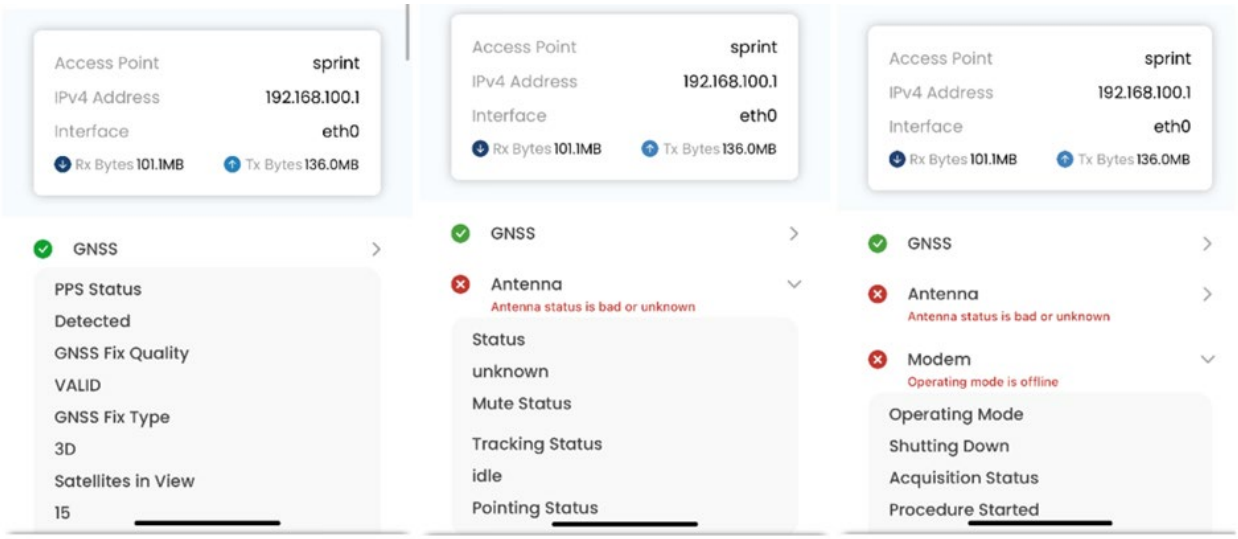


Figure 108: GNSS, Antenna, Modem status screens for UT in offline state

Recommissioning your user terminal

You may need to recommission the user terminal in certain circumstances, for example:

- If you moved the ODU to a different location.
- The ODU mounting was disturbed.
- Customer support recommended that you recommission the user terminal to address service issues.

Note: When the user terminal is power cycled after the UT was moved to a new location or the ODU mounting was disturbed, the antenna may fail to establish radio link using the previously saved calibration parameters. In such cases if the radio link is not established within 2 minutes or so, the antenna will start auto calibration and so you will not have to initiate recommissioning.

To recommission the user terminal, refer to *Checking user terminal status* on page 98 to launch the app and login to view the dashboard screen. From this screen (see Figure 109) click on **Launch Install** button to initiate recommissioning. Then follow the procedure given in *Commissioning the user terminal using the Hughes LEO app* on page 80 to complete the commissioning.

If you continue to encounter problems, contact your distribution partner's customer service for support. Refer to *Viewing customer support information* on page 141. Follow these steps to find out customer support information saved on the user terminal.

Refer to *Launching user terminal Hughes LEO app on a smart phone* on page 70 to launch the app and login to view the dashboard. From the dashboard click on the **Support** button to view customer support information.

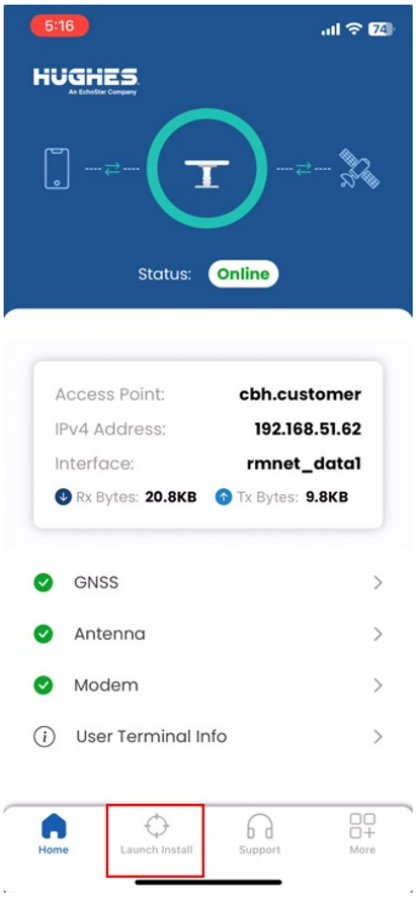


Figure 109: Launch Install from dashboard screen

Viewing user terminal hardware information

When you contact customer support, you may be asked to share user terminal hardware information (UT S/N, IMEI, IMSI) for identification purposes. UT S/N, IMEI are printed on the label of the ODU package. Also, P/N, S/N and other information are printed on the label of the ODU (located on the FDX antenna bridge), and the back side of IDU and PSU.

Additionally, ODU and IDU hardware and software information is displayed on the app dashboard.

User Terminal information in the LEO app

Launch the Hughes LEO app and login to view the dashboard as shown in Figure 110. From the dashboard click on the **User Terminal Info** link to view the user terminal hardware and software information.

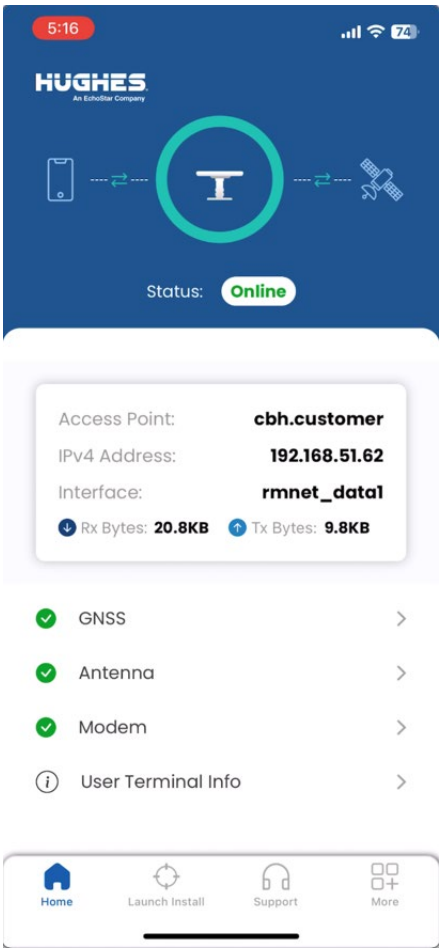


Figure 110: User terminal info link

The **User Terminal Info** screen as shown in Figure 111 details the user terminal hardware and software details.

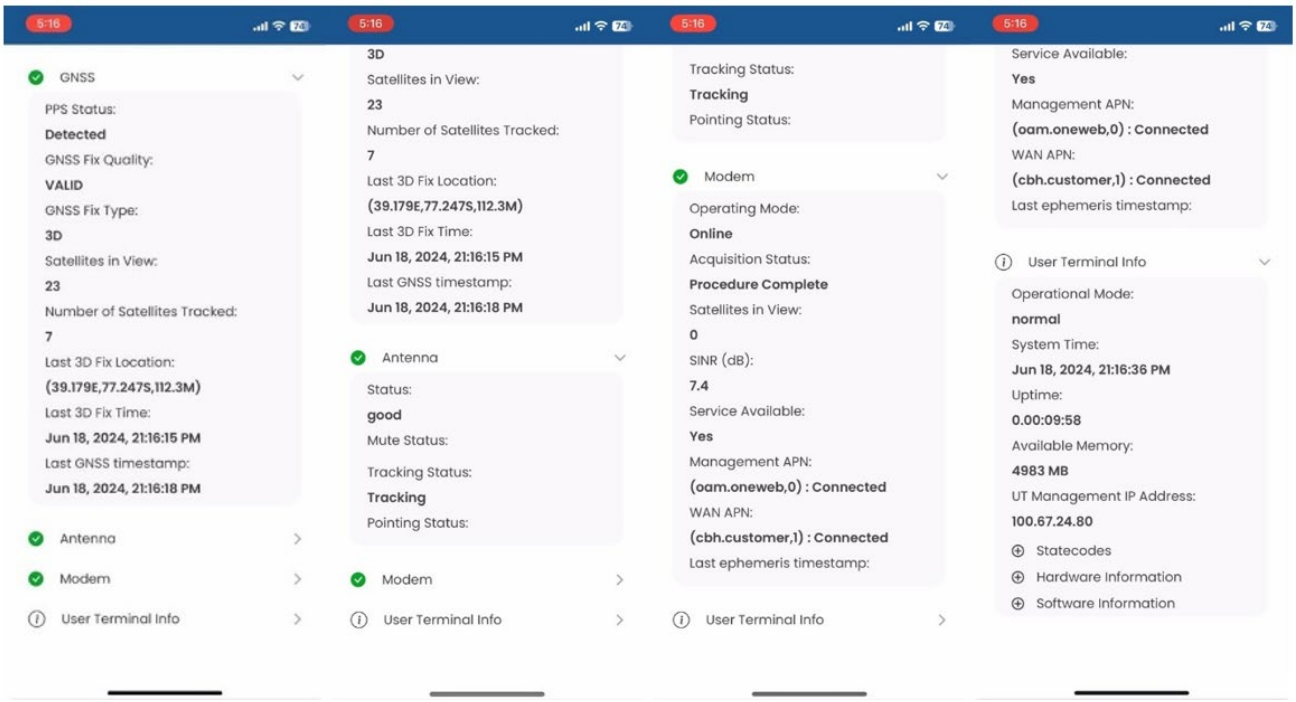


Figure 111: User terminal info screen

Appendix A

Installation checklist

This chapter provides a checklist of material to consider prior to visiting a site and installing an HL1100W user terminal.

General requirements

This section contains the general requirements and prerequisites that must be considered and planned for before installing the user terminal. To avoid delays, ensure that you have the tools and materials required for the installation before going to the installation site. Prior to installation, plan to obtain any tools or materials that you do not have.

Before site visit checklist

Table 8 lists the items that should be collected ahead of any installation site visit. A data connection and other resources may not be available on-site.

Table 8: Site prerequisite checklist

Category	No.	Checklist Item	Result
Prerequisites	1	Smart phone with Hughes LEO App installed (refer to *Installing the user terminal Hughes LEO app on a smartphone* on page 67)	Yes / No
	2	Smartphone hosting the app must be connected to internet over Wi-Fi so that the app can download requisite updates (e.g. latest ephemeris file, configurations, installation guide) from the cloud (refer to *Check Hughes LEO app configuration sync from cloud* on page 72)	Yes / No
	3	Ensure that you have the tools required to assemble an HL1100W user terminal and install (refer to *Mount assembly tools* on page 28)	Yes / No
	4	Ensure all HL1100W kit materials and hardware necessary to complete the installation are on hand in advance (refer to *User terminal kit components* on page 23)	Yes / No
	5	Ensure that you have approved IFL cable of required length required for installation (refer to *Approved IFL cables* on page 28)	Yes / No
	6	Note down Distribution Partner customer services contact number and email to complete commissioning.	Yes / No

Permits, inspections, and approvals

The customer is responsible for obtaining all required permits, inspections, and approvals before equipment installation begins to avoid any delay in installation and subsequent operation. This includes building penetration plans and approvals.

Each installation must conform to the local standards and codes. For United States-based installations, this may include:

- Applicable local building codes and uniform building codes
- National Fire Protection Association (NFPA) 70; NEC
- Electronic Industries Association (EIA) standards
- Any other applicable codes, standards, or regulations. For example, local regulations may require utility marking service prior to digging for pole mount installations.

The information in this chapter does not replace any applicable local building codes, standards, or regulations. If you are uncertain of the regulations that apply in your country, consult your local supplier or HUGHES® offices.

Construction work or site modifications must be performed by qualified electrical, mechanical, and structural contractors. All work should be performed in accordance with the recommendations provided in this chapter and any applicable codes.

Personnel requirements

Installers must be qualified to perform antenna installation tasks. Installers must understand:

- Electronics fundamentals
- Cabling and connection practices
- Electrical circuits and grounding practices
- The importance of safety precautions

Installers must also be familiar with:

- Satellite communication fundamentals
- Applicable electrical, building, fire, and safety codes and regulations
- General home construction

Safety precautions

All the requirements in this section must be met prior to initiating the installation of an HL1100W user terminal. Failure to observe these cautions could result in personal injury.

- All HL1100W user terminal installers shall be Training-certified and shall have expressly acknowledged the HUGHES requirements for the installation of an HL1100W user terminal.
- Unless explicitly authorized in writing, HUGHES antenna installations may only be completed using Training-certified indoor and outdoor units in approved HUGHES configurations.
- Installers shall ensure that HUGHES antennas are installed only in locations that are not readily accessible to children and in a manner that prevents human and animal exposure to potential harmful levels of radiation.
- Once the user terminal is operational, maintain a safe distance from the antenna; at least 1 meter.
- The antenna carries an industry-standard and government-approved Radiation Hazard Caution label. The installer shall inspect the label to verify that it is present, legible, and visible to persons approaching the antenna.

- When installers are required to work on high structures or use a ladder to access a work site, follow these precautions to prevent personal injury or death:
  - Walk only on sound roof structures.
  - Ensure the antenna assembly and installation surface are structurally sound so that they can support all loads (equipment weight, ice, and wind).
  - Use safety equipment (e.g., a lifeline) appropriate for the work location.
  - Follow all manufacturer safety precautions for all safety and other equipment used.
  - Perform as many procedures as possible on the ground.
- To avoid electric shock, stay at least 20 feet away from power lines when there is a chance that you or the equipment you are using could accidentally come into contact with the power lines. Always look up and check for overhead lines before moving a ladder.
- If any part of the antenna or mount assembly comes in contact with a power line, call the local power company to remove it. Do not try to remove it yourself as you could be killed or seriously injured.
- For pole mount installations, be sure to obtain information regarding underground utilities in the proposed location before digging. Striking or cutting underground cables, pipes, or lines can cause personal injury or property damage.
- Do not work in high wind or rain. Do not attempt an installation if storm, lightning, or other adverse weather conditions are either present or approaching.
- If the antenna or mount assembly begins to fall during the installation, do not attempt to catch it. Move away and let it fall.
- Antennas that have been improperly installed or attached to an unstable structure are susceptible to wind damage, which can be very serious and potentially life threatening. The product owner and installer assume full responsibility that the installation is structurally sound to support all loads (weight, wind, and ice) and is properly sealed against leaks.

Installation checklist

For installing the HL1100W user terminal, consider the items listed in Table 9.

Table 9: Site installation checklist

Category	No.	Checklist Item	Result
General	1	Observe all local and regulatory standards, codes, and ordinances.	Yes / No
	2	Ensure the installer is certified to install an HL1100W user terminal.	Yes / No
	3	Unpack the HL1100W kit and check that all materials and hardware necessary to complete the installation are there.	Yes / No
ODU	1	The antenna installation location provides a clear view of the sky with 360° clearance around the antenna	Yes / No
	2	The antenna installation site shall provide an unobstructed view of the horizon in all directions, free from neighboring buildings, trees, poles, power lines, and any other structures. Ensure the antenna has an unobstructed field of view, with no obstacles within 60 degrees of the zenith.	Yes / No

Category	No.	Checklist Item	Result
	3	The antenna installation location will not be subject to seasonal interference from tree leaves and hanging icicles.	Yes / No
	4	The antenna installation location is appropriately selected to minimize human and animal RF exposure.	Yes / No
	5	The installer has validated the presence of the Hazard Radiation label and ensured that it is visible to persons approaching the antenna from a minimum of 1m distance.	Yes / No
	6	The mount and antenna installation was performed per the procedures outlined in Chapter 2 on page 23.	Yes / No
	7	If installing the user terminal on a flat roof with a nonpenetrating mount, the minimum load bearing weight of the roof should be at least 20 lbs/9.1 kg.	Yes / No
	8	When installing the user terminal on a flat roof with a nonpenetrating mount, two concrete blocks should be spread equally across the tray to hold the weight of the antenna. (Total weight of the concrete blocks should be at least 20 lb/9.1 kg.)	Yes / No
IFL	1	The distance between the outdoor unit and the indoor unit is less than the maximum allowable distance for the selected IFL cable – as defined in *Appendix B* on page 109.	Yes / No
	2	The user terminal is appropriately grounded via the HUGHES-provided IFL ground block – as described in *Establishing the grounding position* on page 54.	Yes / No
	3	The connectors are used to identify IFL runs for the user terminal, as outlined in *Mount the IFL connectors* on page 54.	Yes / No
IDU	1	The IDU is placed in a dry, cool, and ventilated area.	Yes / No
	2	The IDU is located within 1.5 m of the power source.	Yes / No
	3	The IDU is properly mounted so that the vents are free of blockage, allowing for proper heat dissipation.	Yes / No

Appendix B

IFL (Coaxial) cable specifications and recommendations

This chapter provides the specifications for the IFL cable and the list of IFL cables recommended by Hughes for installing an HL1100W user terminals.

NOTICE

Thoroughly review the guidelines before installing any IFL cables. Using a cable longer than the maximum allowed length may cause User Terminal (UT) malfunction.

Choosing the right IFL cable

If a cable is available from a recommended vendor…

If possible, always choose a cable from a recommended vendor outlined in Table 11, based on the cable length needed.

If a cable is not available from a recommended vendor…

If you cannot find a cable from a recommended vendor that meets your installation needs, follow these steps to choose a suitable cable from another vendor:

- Check the manufacturer's datasheet for the cable you plan to use. Find the DC loop resistance (ohms/1000 ft). DC loop resistance determines the maximum cable length.
- Use the following formulas to calculate maximum cable length:
  - OneWeb HL1100W UT: cable length (ft) = 2530/(DC loop resistance (ohms/1000 ft))
- Alternatively, you can calculate DC loop resistance using the inner and outer conductor resistances:
  - DC loop resistance = inner conductor resistance + outer conductor resistance
- If the datasheet specifies the DC loop resistance in ohms/km, use the following formula to convert the unit into ohms/1000 ft and then use above formula to calculate the cable length:
  - (ohms/km) × 0.3048 = (ohms/1000 ft)

IFL cable specifications summary

Table 10 summarizes the requirements for the cable assembly. The ratings, cable loss and maximum resistance apply to the entire cable assembly including the connector, cable, and ground block.

Table 10: Cable assembly specifications

Terminal type	Impedance	Insertion Loss (450-650MHz)	Maximum Voltage	Maximum Current	Maximum DC loop resistance per coaxial connection
HL1100W	75Ω	30dB	59V	4.3A	2.530Ω

IFL cable recommendations for HL1100W use

There will be one cable per installation for HL1100W terminals. Table 11 shows the cables that meet the requirements for the IFL and their maximum length.

Table 11: Coaxial cable recommendations for HL1100W

MFR Name and Kit P/N	Description	Installation Length	Qty Required	Hughes Kit P/N	Connector Information
HDF Logistics ONEWEBRG6100	100’ RG6 cable, tape kit	100 FT	1	1509141-1001	Use RG6 connectors provided in HL1100W kit
HDF Logistics ONEWEBRG6100	150’ RG11 cable, 5 connector, tape kit	150 FT	1	1509141-1501	Use RG11 connectors provided with this cable kit
HDF Logistics ONEWEBRG6100	200’ RG11 cable, 5 connector, tape kit	200 FT	1	1509141-2001	Use RG11 connectors provided with this cable kit

Appendix C

User terminal local user interface

This chapter describes the Local User Interface (LUI) of the user terminal which can be used for commissioning the user terminal and check status of the user terminal as an alternative to the Hughes LEO app.

NOTICE

Before proceeding to the site for installation, the laptop to be used for commissioning must be connected to internet over Wi-Fi and you download latest ephemeris file from OneWeb website (https://ephemeris.oneweb.net/ltef/ltef.csv) to the laptop. Optionally, you can also download the latest UT software bundle (if required for installation on the user terminal during commissioning process) from distributer, OneWeb or Hughes website to the laptop. This ensures that the requisite files are available on the laptop prior to installation at the user site.

Launching user terminal LUI on a laptop

First, connect the laptop to the IDU via Wi-Fi or ethernet port (refer to *Connecting a laptop to the HL1100W-IDU* on page 65).

The LUI, the UT's home page, is a Single Page Application (SPA) that can be accessed through the web browser on a host which has LAN access to ODU via the IDU & the MoCA link between IDU & ODU or via Management APN over the air interface from Device Hub. The LUI (WebUI) can be accessed through the browser by navigating to http://192.168.100.1 (default) or http://www.myut.com which will display the terminal LUI. Note that both http and https are supported.

The LUI Home screen (see Figure 112) is loaded on the browser. From the **Home** screen, you can now navigate to different screens.

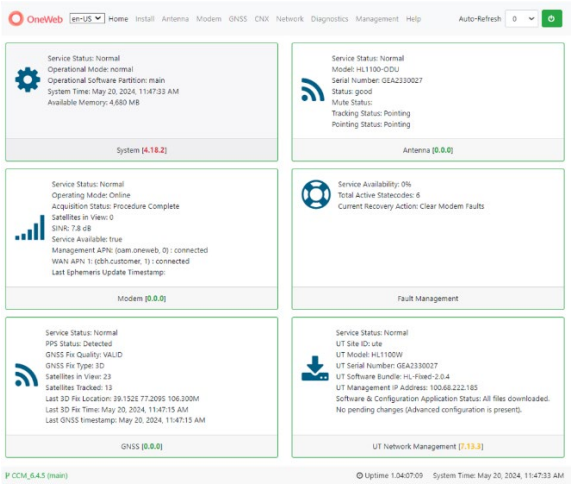


Figure 112: LUI - home screen

Commissioning the user terminal using LUI on a laptop

Follow the steps below to commission the user terminal using UT's LUI on a laptop connected to IDU over Wi-Fi.

Launch commissioning screen

From the LUI homepage click on the **Install** link on the navigation bar as shown in Figure 113.

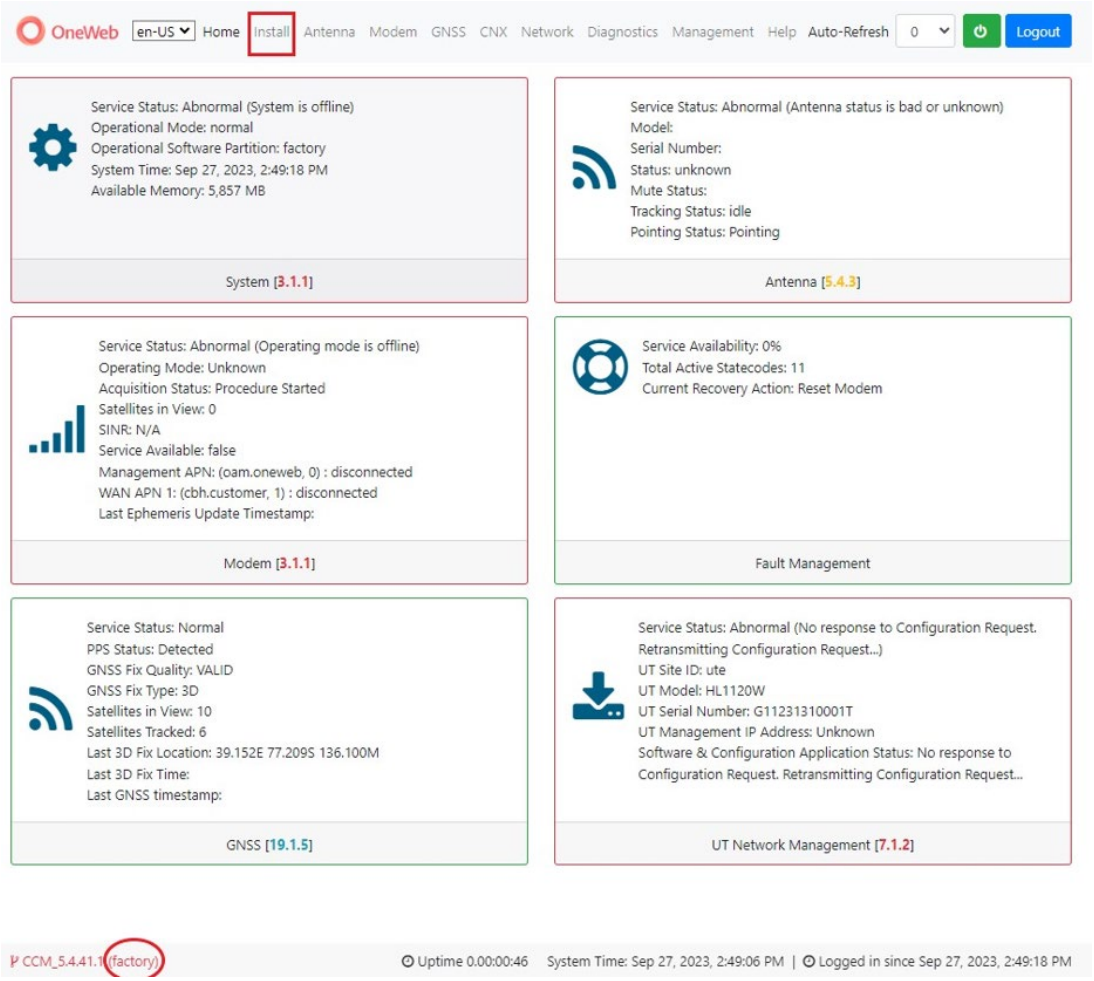


Figure 113: LUI – home screen: install link

The LUI install page serves as the front end for commissioning the user terminal.

Commissioning steps navigation

At the top of the commissioning page is the commissioning navigation. At the top is a progress bar that displays what percentage of the commissioning process is complete (see Figure 114). An auto advance button on the left that, when enabled, advances the commissioning to the next step once the current step has either finished or is not required.

On the right are three buttons: a **Start Over** button, which brings you back to the first step of the commissioning sequence, a **Back** button, which steps one step back in the commissioning sequence, and a **Next** button that will advance the commissioning sequence. If a given state is required, the **Next** button is disabled, and the commissioning cannot proceed until the current step has been completed.

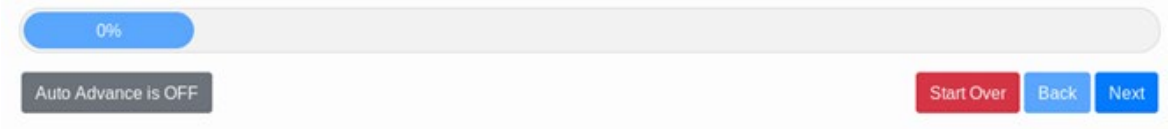


Figure 114: LUI – Commissioning steps navigation

Initial commissioning screen

The first screen of the commissioning process is a splash screen that states that the UT has not yet been commissioned. To proceed with the commissioning and advance to the next step, click on **Start Installation** or **Next** as shown in Figure 115.

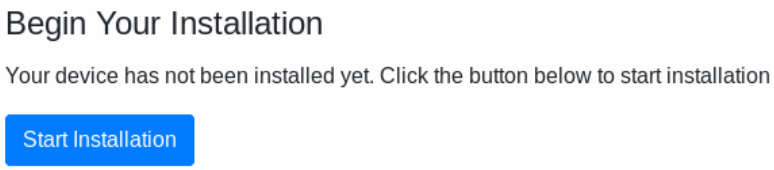


Figure 115: LUI – Initial commissioning screen

Upload ephemeris data

The Upload Ephemeris Data screen is a simple file upload page (see Figure 116). Simply click on the empty text box or the **Browse** button to select an ephemeris file locally saved on the laptop and then click on **Upload** button to upload the selected Ephemeris file to the ODU for satellite modem to use. Until a file has been uploaded, the upload button is greyed out. Upon a successful upload, a success status message will be displayed, and the state can be advanced.

Note: You must have downloaded latest ephemeris file from OneWeb portal https://ephemeris.oneweb.net/ltef/ltef.csv to your laptop before coming to the installation site.

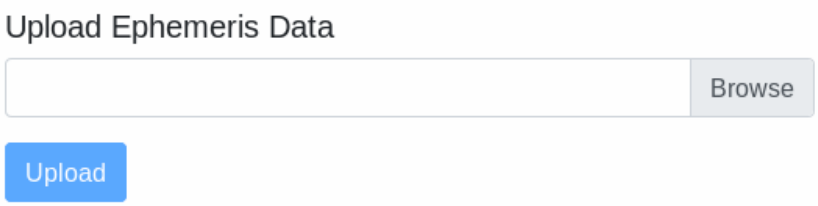


Figure 116: LUI – Upload ephemeris data

Upload software bundle (optional)

Note: This step is normally skipped. Later, when the user terminal established communication with Device Hub, it will download the required software bundle over the air and upgrade itself. Only attempt this step when Hughes, OneWeb or your distribution partner has explicitly asked you to install user terminal software.

The Upload Software Bundle screen displays the current software versions running on each component of the user terminal (see Figure 117). Simply click on the empty text box or the **Browse** button to select a software bundle file locally saved on the laptop and then click on **Upload** button to upload the selected file to the ODU for user terminal components to use. Until a bundle has been uploaded, the **Upload** button is greyed out. If the upload is not successful, a status error message is displayed.

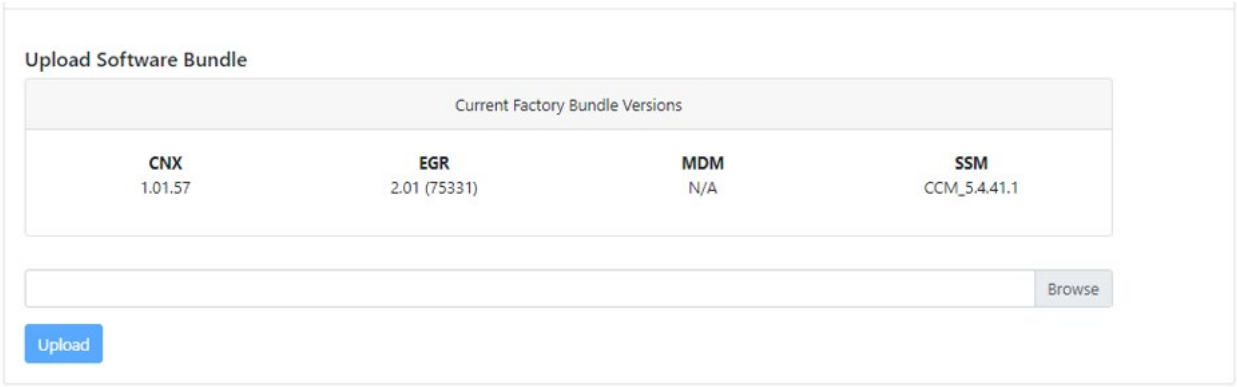


Figure 117: LUI - Upload software bundle

Upon a successful upload, the New Software version is displayed beneath the current software along with a prompt (see Figure 118). Clicking **No** deletes the bundle file that was uploaded and returns you back to the beginning of the state in which you must upload another bundle file. Clicking **Yes** then triggers the next step of this state which is performing the updates. If an update fails for any given component, an error message is displayed and the user terminal stops attempting to update the rest of the components. Upon a successful update, the user terminal resets itself and the LUI refreshes the page once the user terminal has finished rebooting. After this, you can click **Next** to advance to the next state.

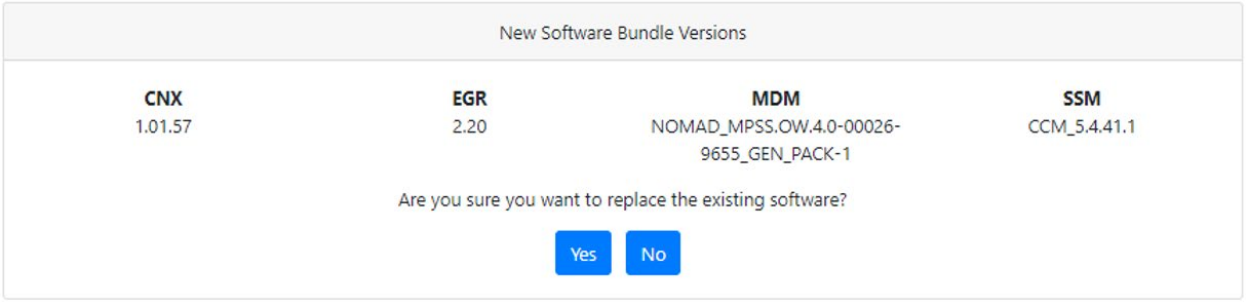


Figure 118: LUI - New software bundle listing

Configure blockage (no transmission) zones

Figure 119 screen allows you to configure blockage zones for the antenna based on the installation site requirements.

This screen allows you to set “blockage” zones, or specified azimuths and elevations in which the user terminal should not transmit. For example, the user terminal can be configured to avoid transmitting in the direction of a hospital. You have option to define one or more blockage zones and configure for each zone to block transmission or not using this screen.

Clicking on **Add more blockage zones** will add another blockage zone to configure.

Azimuth values must be between 0 and 360. Elevation values must be between 0 and 90.

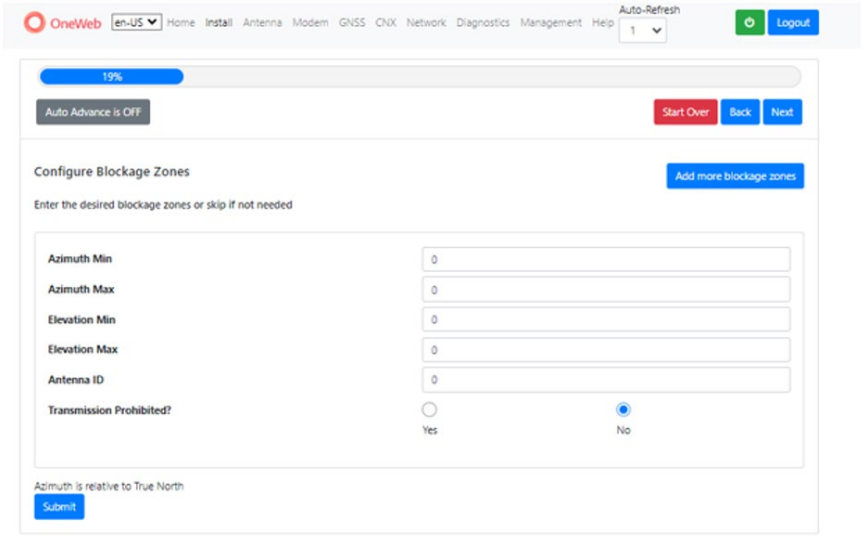


Figure 119: LUI - Configure Blockage Zones

Check antenna orientation and start calibration

This step allows you to view/configure the antenna orientation of the UT.

Click on **Start Auto Calibration** on Figure 120 screen for antenna calibration to be done automatically. You can view the antenna orientation information automatically determined by the antenna calibration application.

Note: Once started, the calibration process occurs in the background and the subsequent installation steps can continue. The calibration process can take 20 minutes or more.

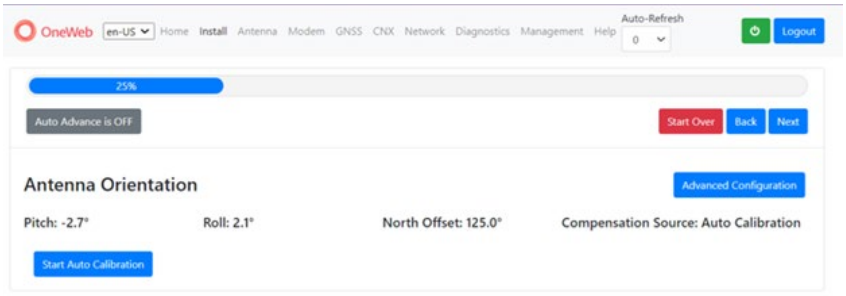


Figure 120: LUI – Antenna Orientation - Auto Calibration

Alternatively, you can click on **Advanced Configuration** on the advanced configuration screen (Figure 121) and use your tools to measure and configure antenna orientation (pitch, roll, heading and heading search range) and specify choice of the compensation source from the drop-down box in the screen for the antenna calibration application to use. Note that the angles measured by your tool must be accurate to within +/-0.1 degree. You need to click **Apply** button before proceeding to the next commissioning screen. You also have the choice to click **Cancel** button to cancel the advanced configuration and click **Start Auto Calibration** button before proceeding to the next commissioning screen.

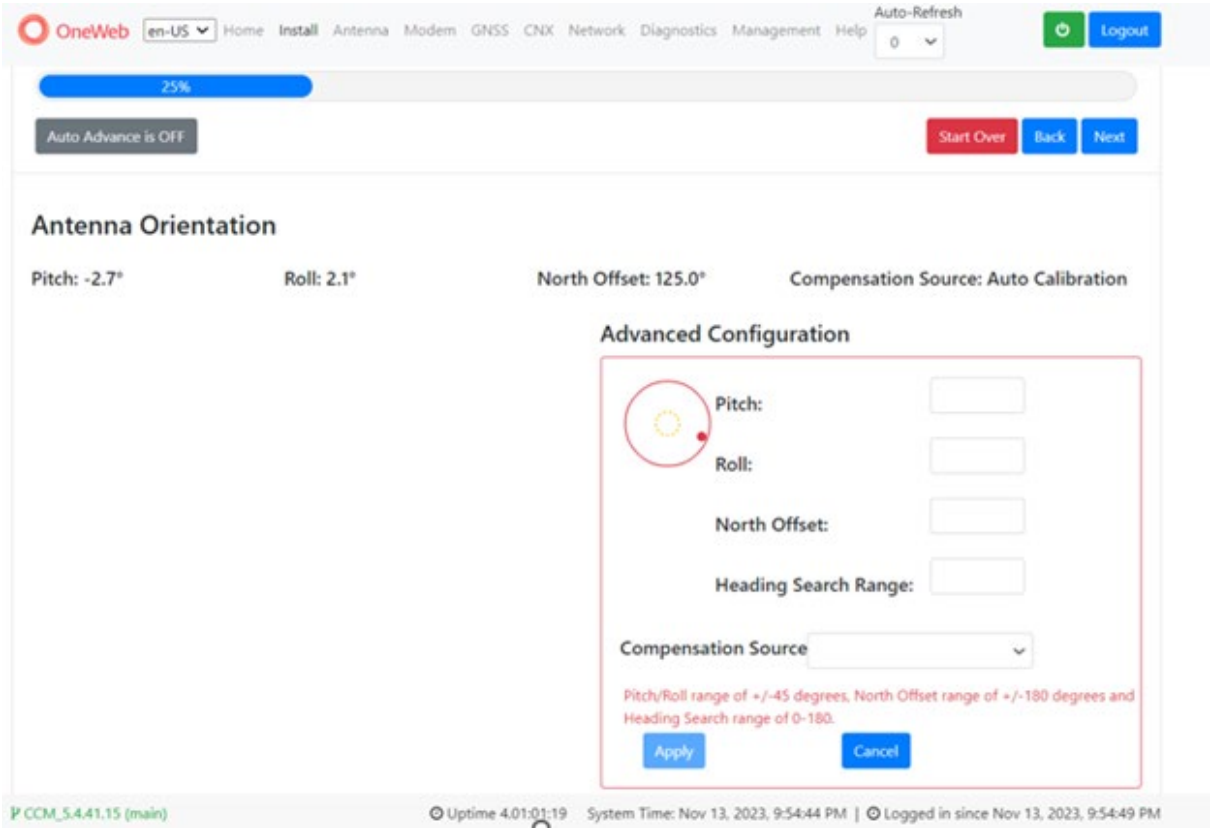


Figure 121: LUI – Antenna Orientation – Advanced Configuration

Configure customer support information

At this point while the antenna is going through calibration process, you will be shown the customer support information screen (Figure 122) to enter the customer support details. Input the required information as provided to you by the distributor or dealer in the screen and click **Submit**. Then click **Next** to proceed.

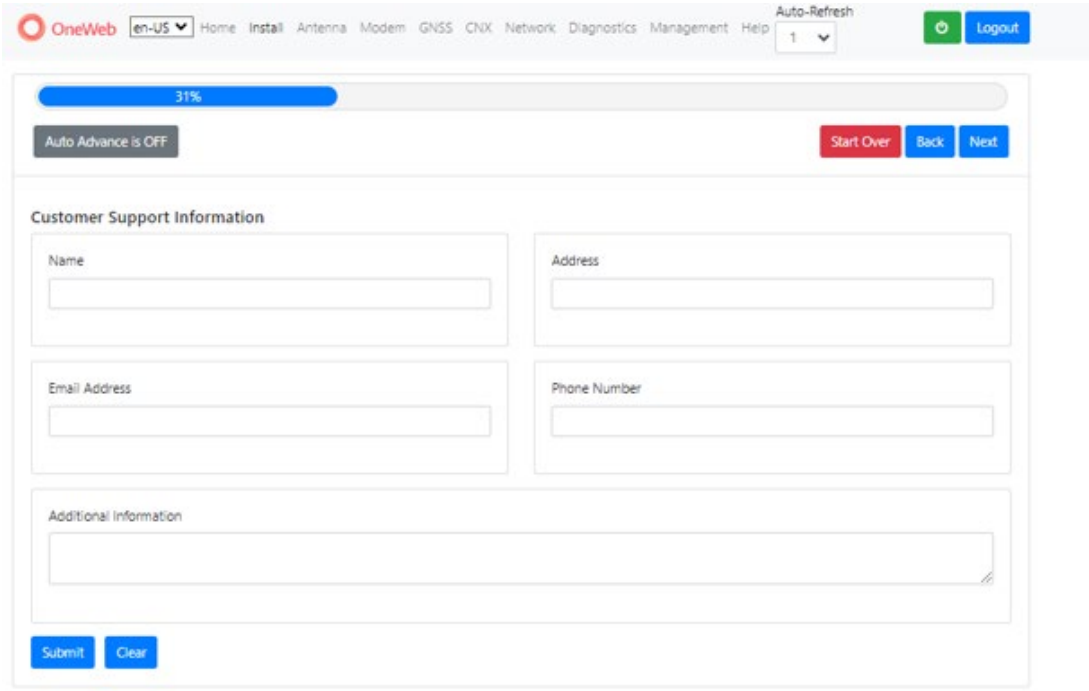


Figure 122: LUI – Customer Support Information

Autonomous commissioning states

The following states require no action from the user aside from proceeding to the next state. Autonomous states all display a progress bar of its progress.

Acquire GPS lock

Verify that the GNSS is locked as shown in Figure 123.

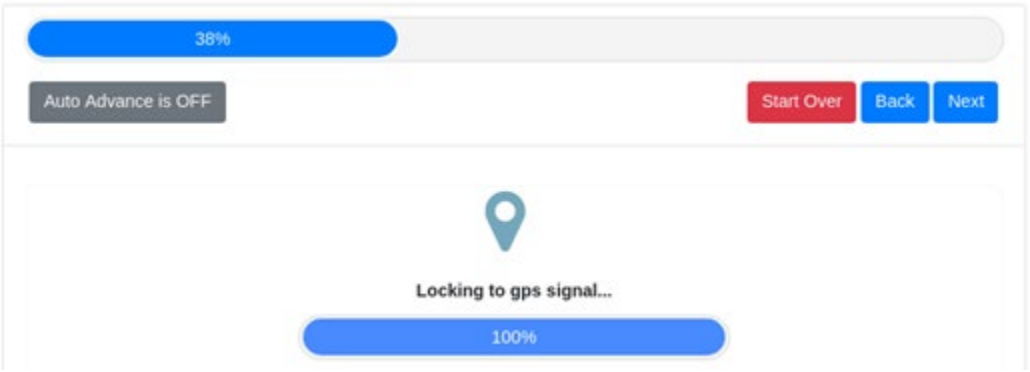


Figure 123: LUI – GNSS lock screen

Acquire forward channel lock

Verify that the UT locks to satellite forward channel as shown in Figure 124.

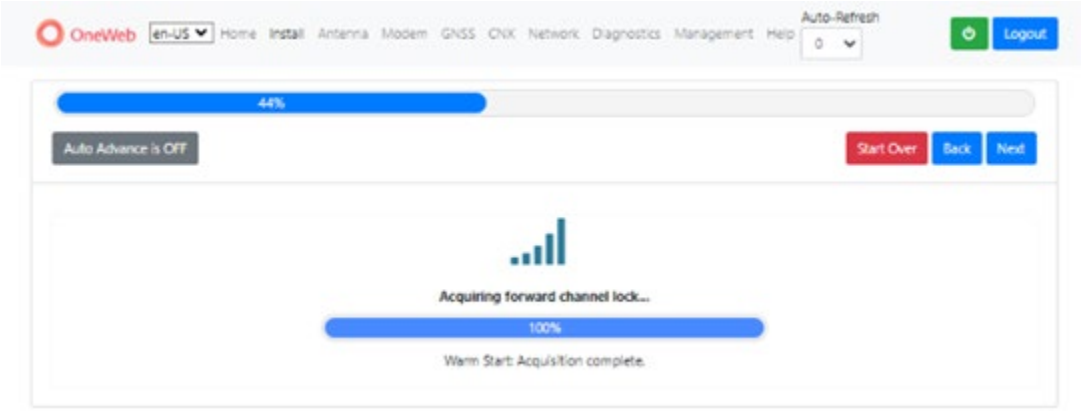


Figure 124: LUI – Forward channel lock screen

Establish data session

Verify that the UT brings the modem online and establishes the data session as shown in Figure 125.

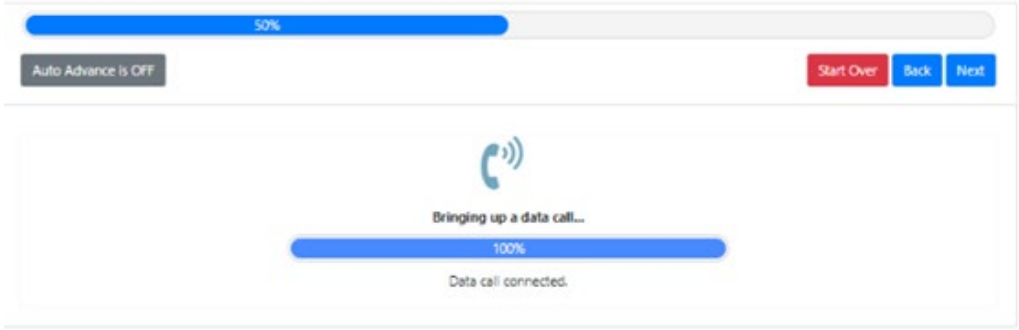


Figure 125: LUI – Establish data session screen

Configure local network

Verify that the UT's modem attaches to the network and acquires the IP addresses on the APNs as shown in Figure 126.

Figure 126: LUI – Configuring local interfaces screen

Register with Device Hub (CES)

Verify that the UT contacts the Device Hub (also known as CES) and confirms that all software and configuration files have been downloaded as shown in Figure 127.

Figure 127: LUI – Register with Device Hub (CES) screen

Download configuration from Device Hub (CES)

On the next screen, the user terminal downloads configuration files from Device Hub (CES) as needed and upgrades the user terminal components accordingly (see Figure 128). The user terminal may restart because of which you may lose Wi-Fi connection and/or the login session to the user terminal will close. If that happens wait for the session to reestablish automatically or you login again. Please wait for this process to complete, and then it will move to next step automatically when it has finished.

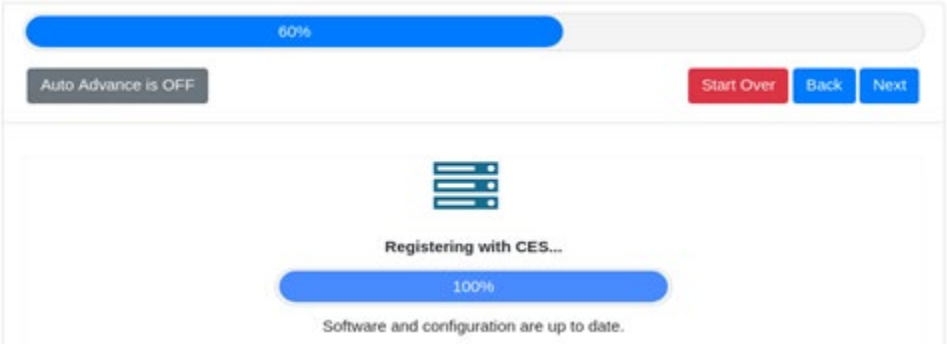


Figure 128: LUI – Download configuration from Device Hub (CES) screen

Download software from Device Hub (CES)

On the next screen, the user terminal downloads SW bundle file from Device Hub (CES) as needed and upgrades the user terminal components accordingly (see Figure 129). The user terminal may restart because of which you may lose Wi-Fi connection and/or the login session to the user terminal will close. If that happens wait for the session to reestablish automatically or you login again. Please wait for this process to complete, and then it will move to next step automatically when it has finished.

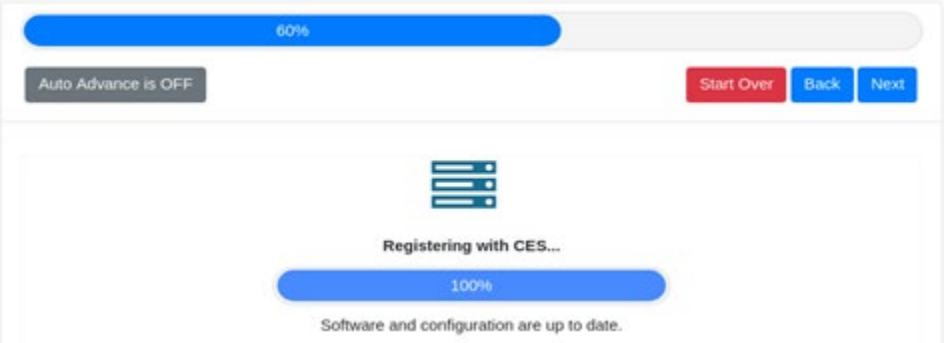


Figure 129: LUI – Download SW bundle from Device Hub (CES) screen

Installation Complete

Verify that the UT indicates that the installation is complete as shown in Figure 130.

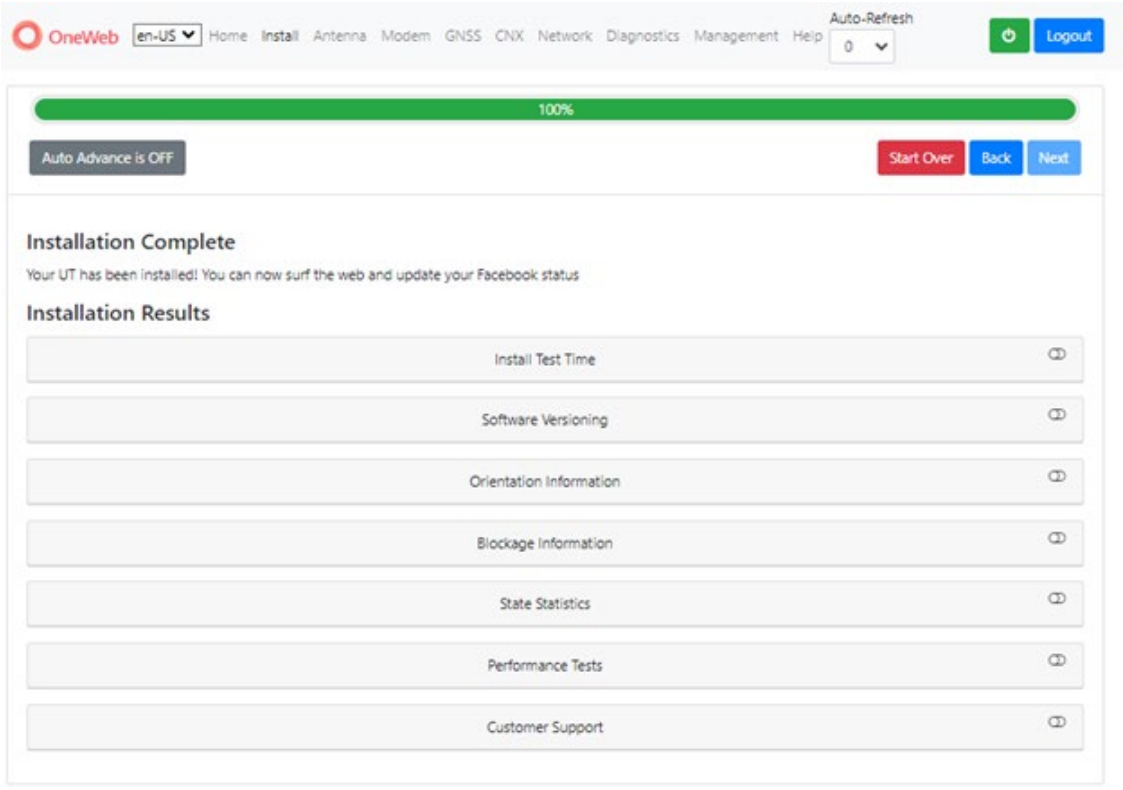


Figure 130: LUI – Commissioning completion screen

Click **Next** to go to LUI Home screen.

Verify UT commissioned with Device Hub (CES)

On the LUI Home screen, click on **Management** → **Management Stats** and verify that the **UT Service Status** indicates *Commissioned* with *All files downloaded* as shown in Figure 131. No pending changes.

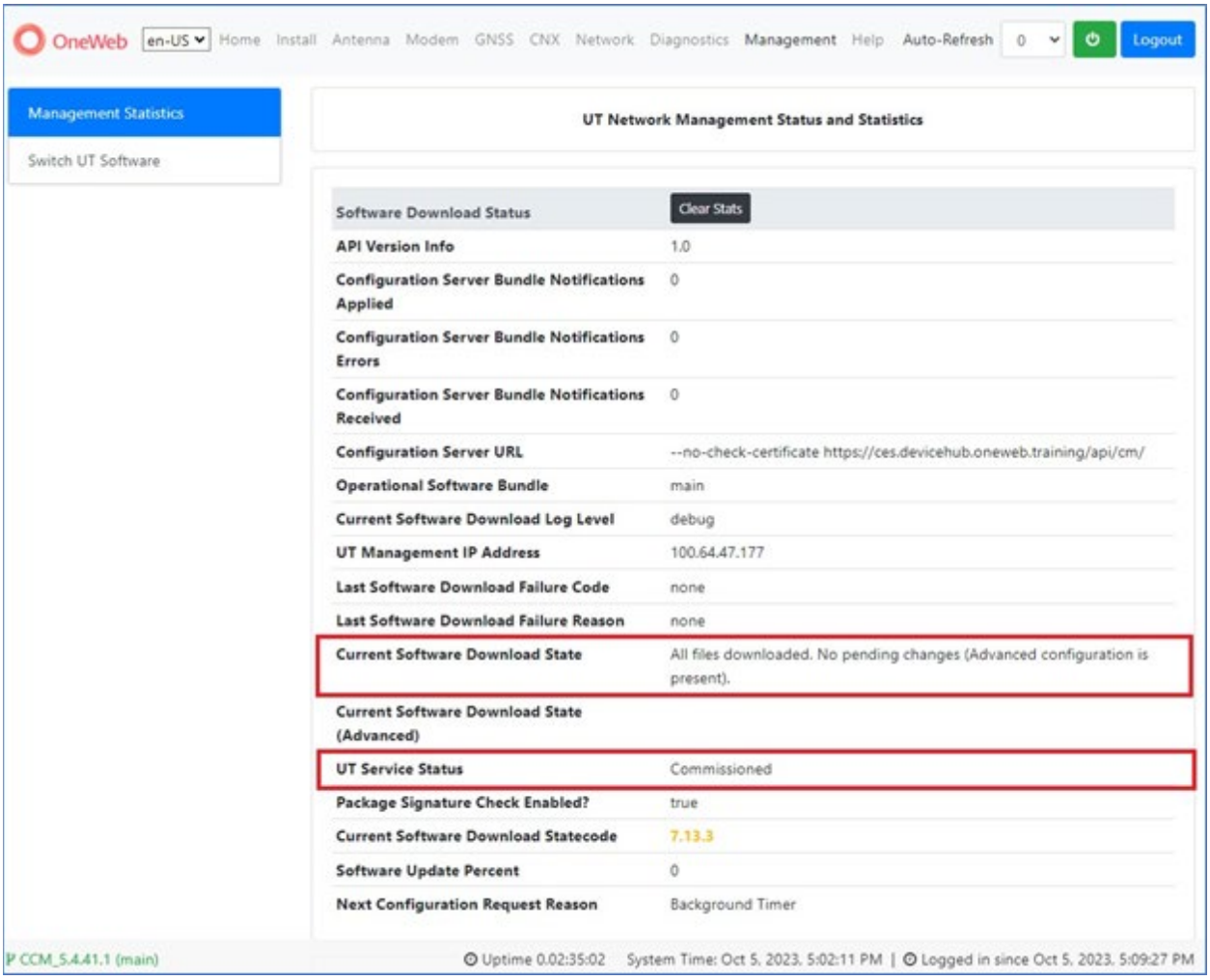


Figure 131: SDL state and UT service status

This completes the UT commissioning process. The UT is now ready for operation.

Metrics upload

On LUI Home screen, click on **Diagnostics** → **Statistics** and click on **Upload Metrics** to upload the metrics related to commissioning to the Device Hub server (see Figure 132).

Note: This step is optional.

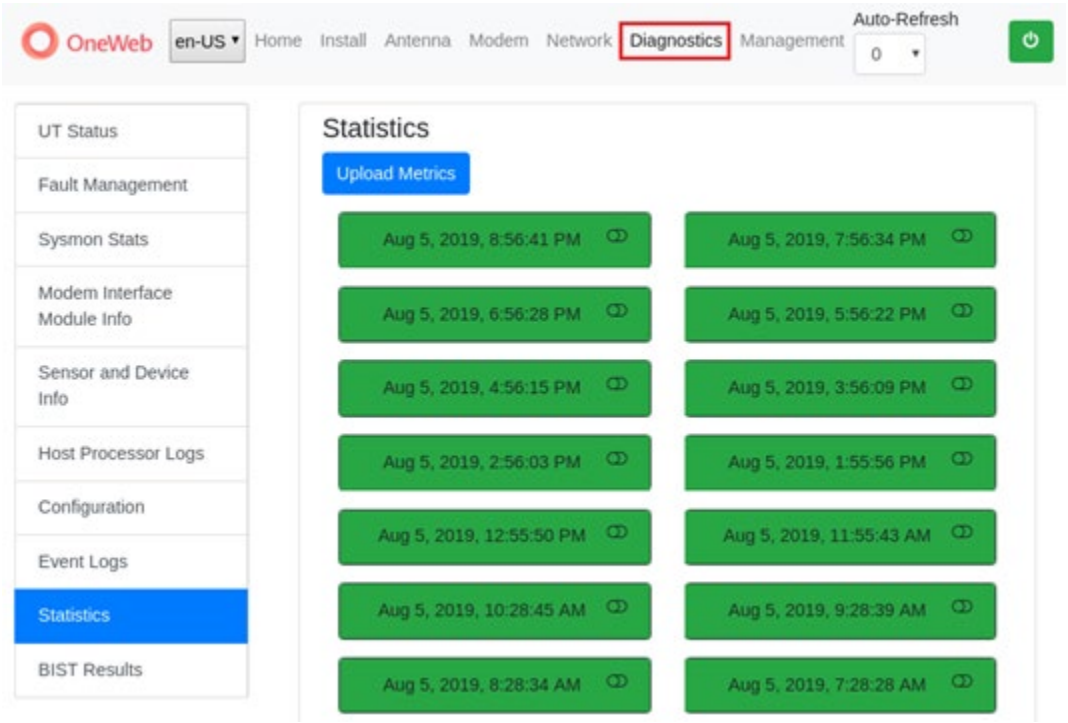


Figure 132: LUI – Commissioning metric upload screen

Appendix D

Wi-fi configuration

This chapter describes the features for Wi-Fi configuration on the IDU which can be performed after the UT is commissioned.

Changing password for SSIDs

The Wi-Fi Router on the IDU is provisioned at Hughes factory to have the following SSIDs for installer support and maintenance access:

- SSID for 2.4G
- SSID for 5G

A common default SSID Name and password are set for these two SSIDs at Hughes factory. The SSID name and password are printed on the label at the back of the IDU. These two SSIDs are enabled and SSID name broadcast is also enabled by default at Hughes factory.

Additionally, the Wi-Fi Router on the IDU is also provisioned at Hughes factory to have following SSIDs for guest Wi-Fi access, but these are disabled at Hughes factory:

- Guest SSID for 2.4G
- Guest SSID for 5G

No default password has been set for these two guest SSIDs and SSID name broadcast for these two is also disabled by default at Hughes factory.

Note that the UT will create an additional two or four SSIDs when it is operational based on service provisioning in OneWeb network for this customer.

The user terminal Hughes LEO App provides a screen for the user to view the SSIDs for 2.4G and 5G, and change the configuration associated with a selected SSID such as SSID name, password, enable/disable the SSID, enable/disable SSID broadcast. Follow the steps below to use this screen to change configuration for SSIDs.

1. First, connect the smart phone to the IDU via Wi-Fi (refer to *Using your smart device to establish a connection to the HL1100W-IDU* on page 65).

   NOTICE

   Avoid moving out of the IDU's Wi-Fi range during this process.
   Disconnecting from the IDU Wi-Fi could disrupt this process.

2. Once this is completed, launch the app on the smart phone, enter password and click on the **Login** button shown in Figure 133.

   Note: Only applicable if *Login configuration* is enabled in the user terminal. By default, the terminal has no authentication.

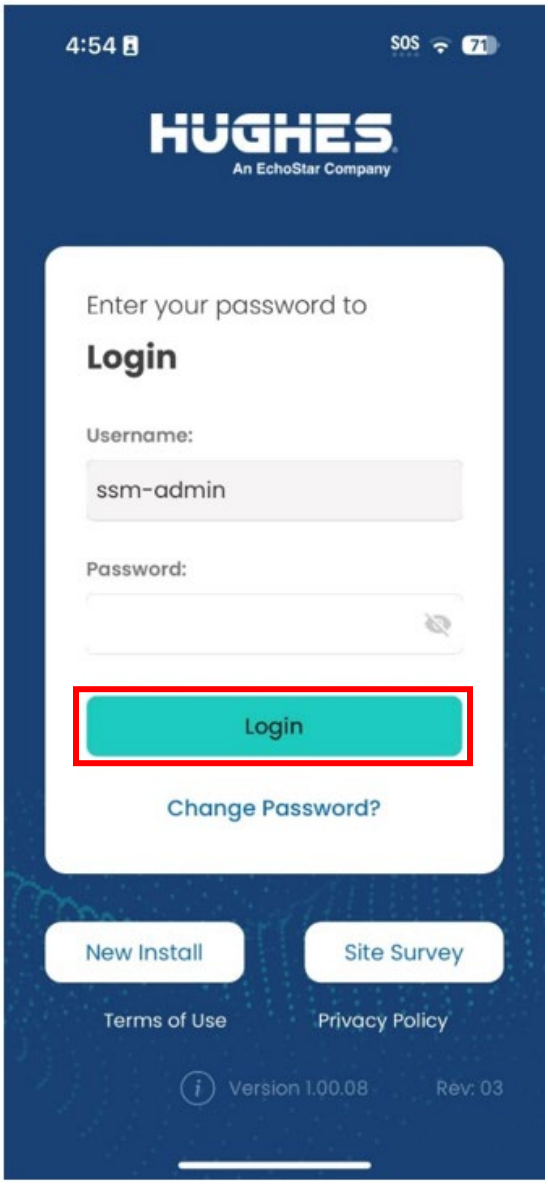


Figure 133: Login screen

3. The dashboard screen appears, as shown in Figure 134. From the dashboard, click the **More** button, highlighted in Figure 134, to launch the More screen shown in Figure 135.

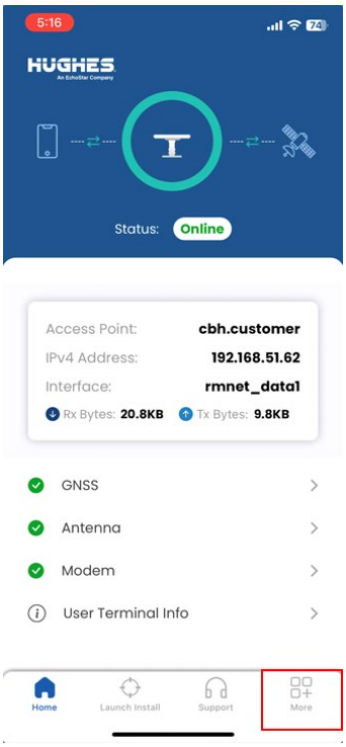


Figure 134: More button on dashboard

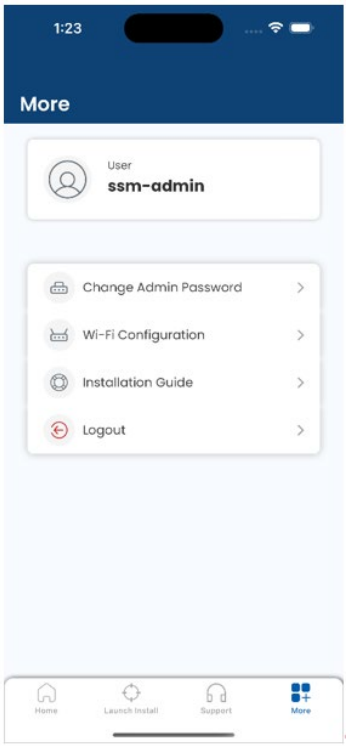


Figure 135: More screen

4. Click on the **Change Wi-Fi Configuration** link to launch the screen shown in Figure 136.

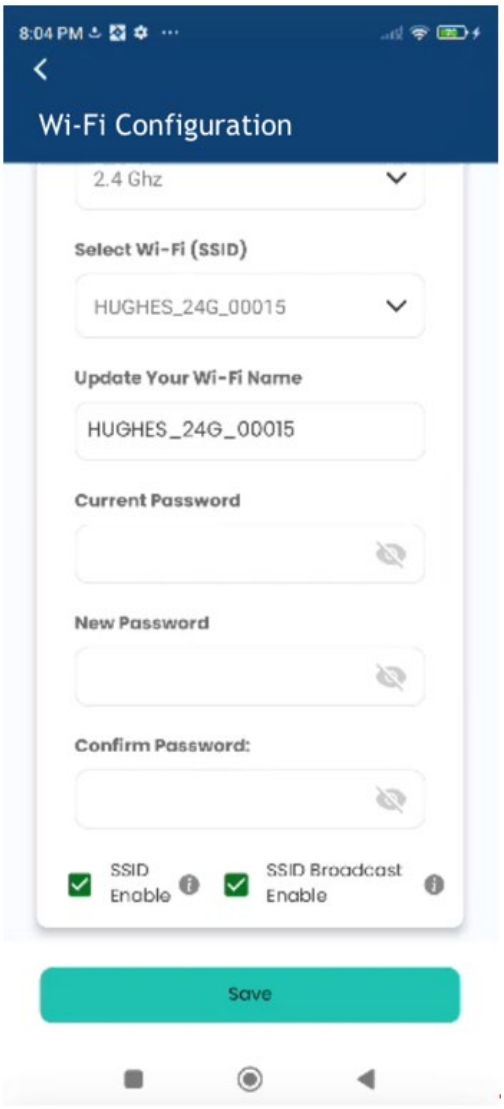


Figure 136: Change Wi-Fi configuration screen

5. Select the Bandwidth (**2.4G** or **5G**) from the pulldown, select the Wi-Fi SSID from the pulldown, and make the following updates as needed:
    - Enter a new name for SSID if you want to change it.
    - If you want to change password for the SSID then enter the current password for the SSID, the new password for the SSID you want to change & confirm the new password.
    - Select/deselect “SSID Enable” option as needed.
    - Select/deselect “SSID Broadcast Enable” option as needed.
6. Click the **Save** button to commit the Wi-Fi configuration change on the IDU.

Enable/disable the Wi-Fi

The steps to Enable/Disable the Wi-Fi from ODU LUI with the snapshots are outlined below.

1. Launch web browser and open the ODU LUI as shown in Figure 137 using its default IP: **192.168.100.1**

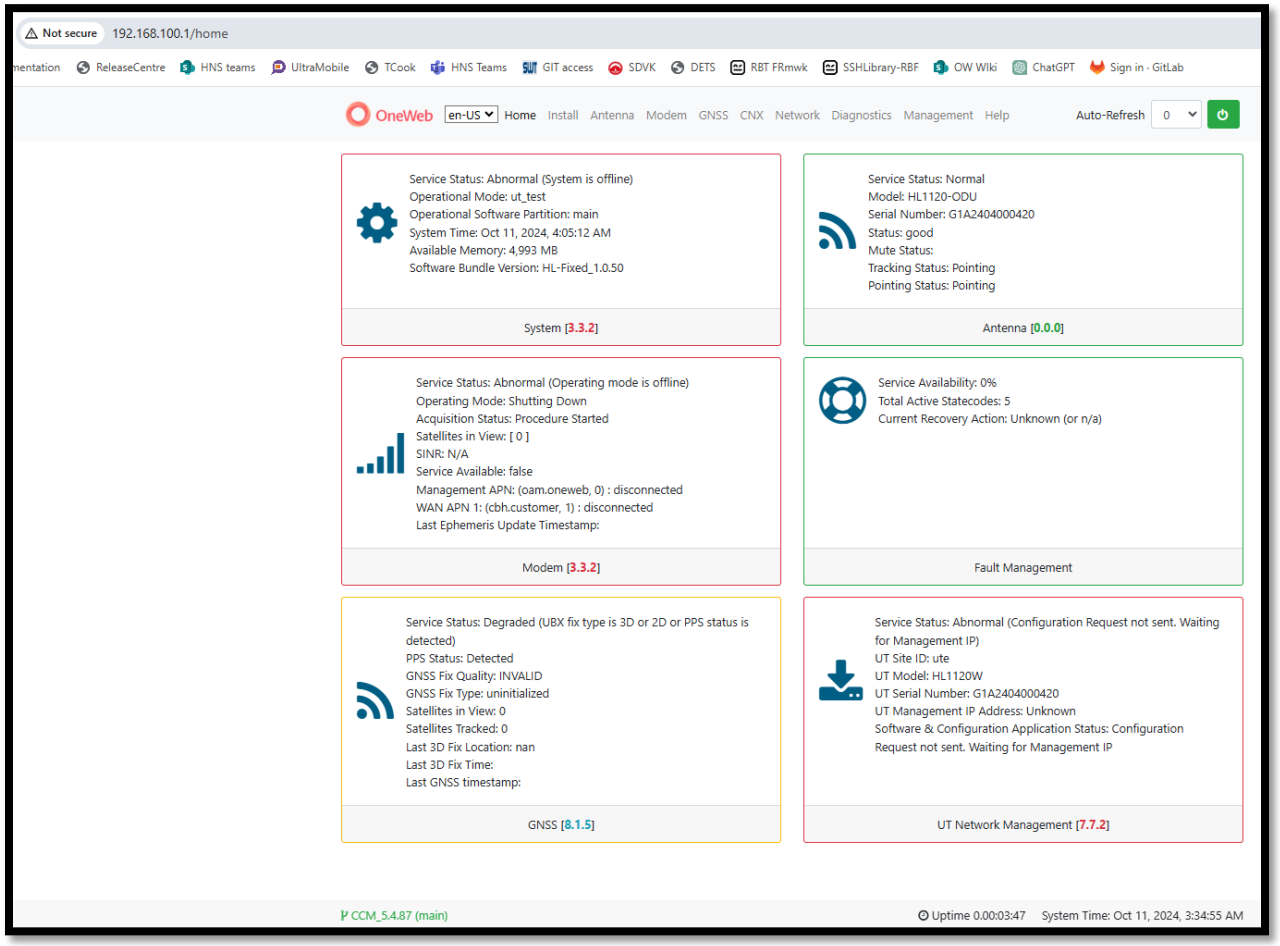


Figure 137: The ODU LUI home screen

2. On ODU LUI, navigate to CNX→ Wi-Fi Configuration screen as shown in Figure 138.

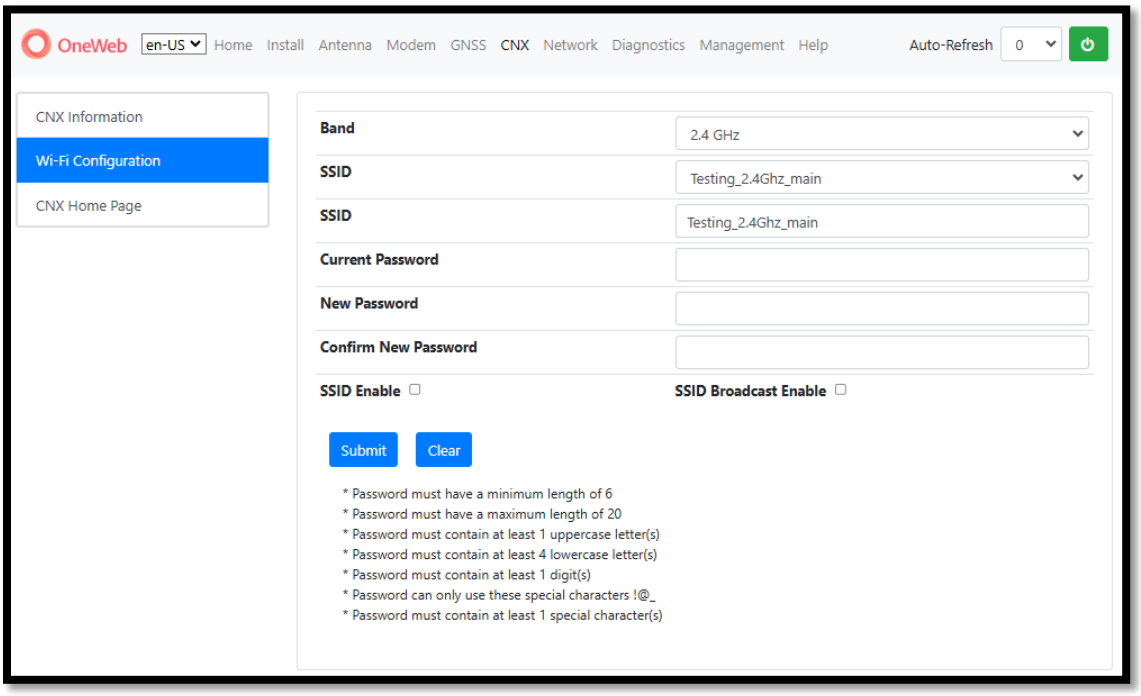


Figure 138: ODU LUI Wi-Fi Configuration screen

3. Click on the Band drop down list, you will see the two Wi-Fi bands for 2.4 GHz and 5 GHz as shown in Figure 139. Select the appropriate band.

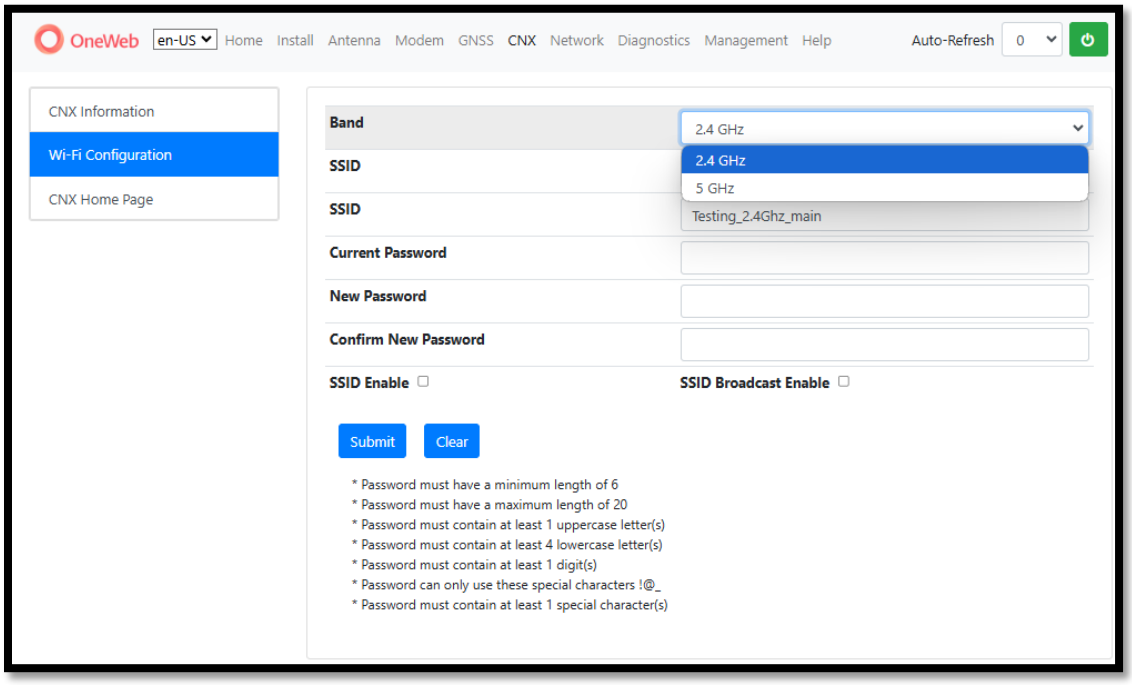


Figure 139: ODU LUI Wi-Fi band selection

4. Click on the SSID drop down list, you will see the two Wi-Fi SSIDs for each selected band, i.e. XX_XXGHz_main and XX_XXGHz_Guest, as shown in Figure 140. Select either **main** or **Guest**.

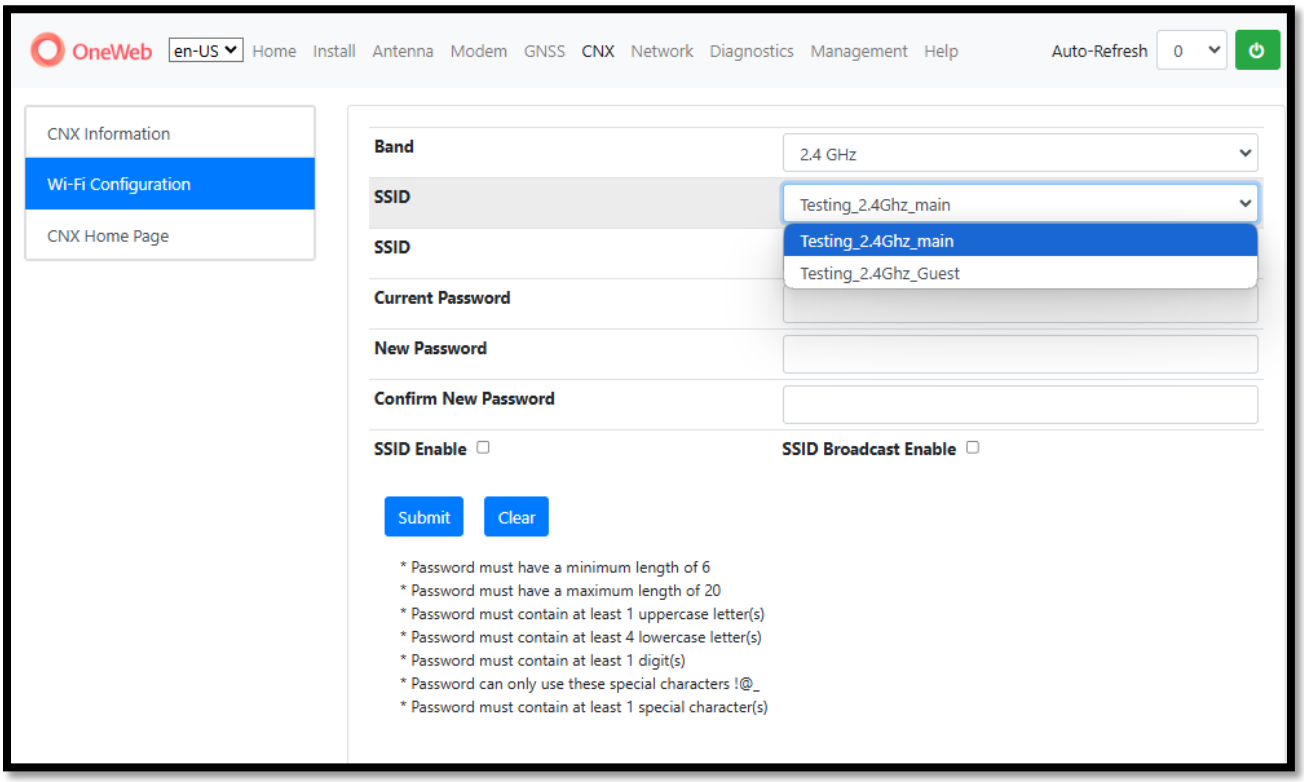


Figure 140: ODU LUI Wi-Fi SSID selection

5. Enter the "Current Password" of the CNX.
6. Uncheck the "**SSID Enable**" flag to DISABLE the SSID and check the "**SSID Enable**" flag to ENABLE the SSID.

   Note: One can choose to enable/disable the SSID. Once enabled the SSID is available for the users to setup a Wi-Fi connection even if the broadcast is disabled. If it is disabled, then the SSID will not be available anymore.

7. Click on **Submit** to save the configuration.

8. Once done Successfully, “The Wi-Fi configuration has been successfully updated” message will be displayed as shown in Figure 141 and Figure 142.

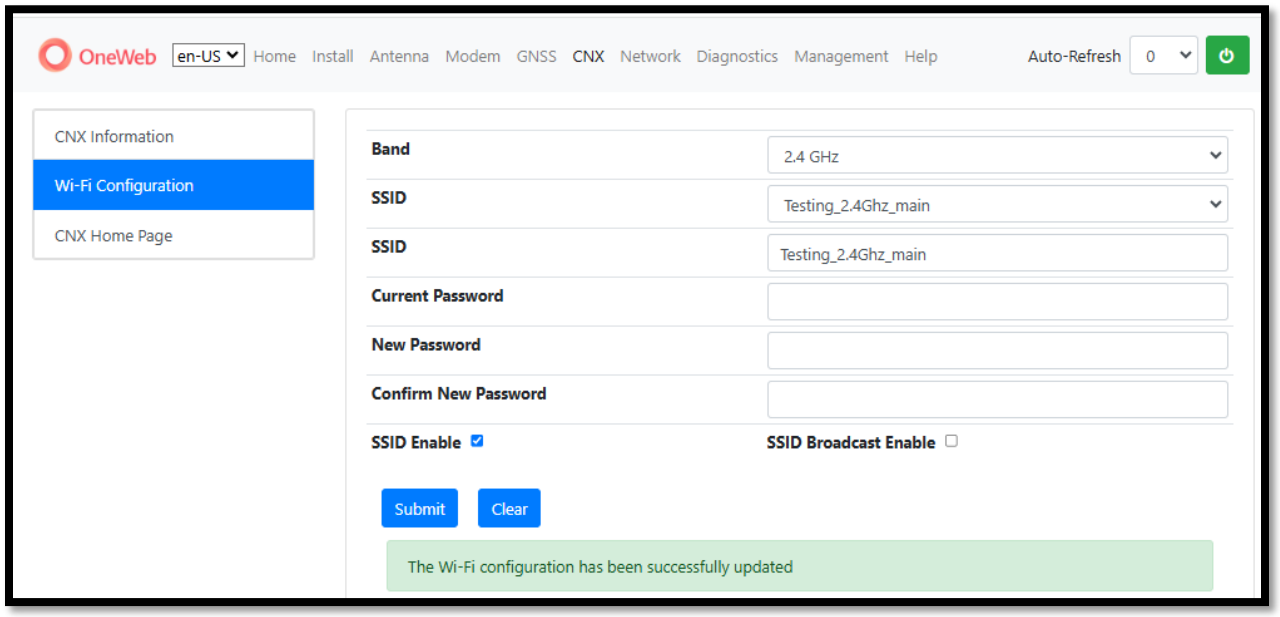


Figure 141: ODU LUI Wi-Fi Configuration success message with SSID enabled

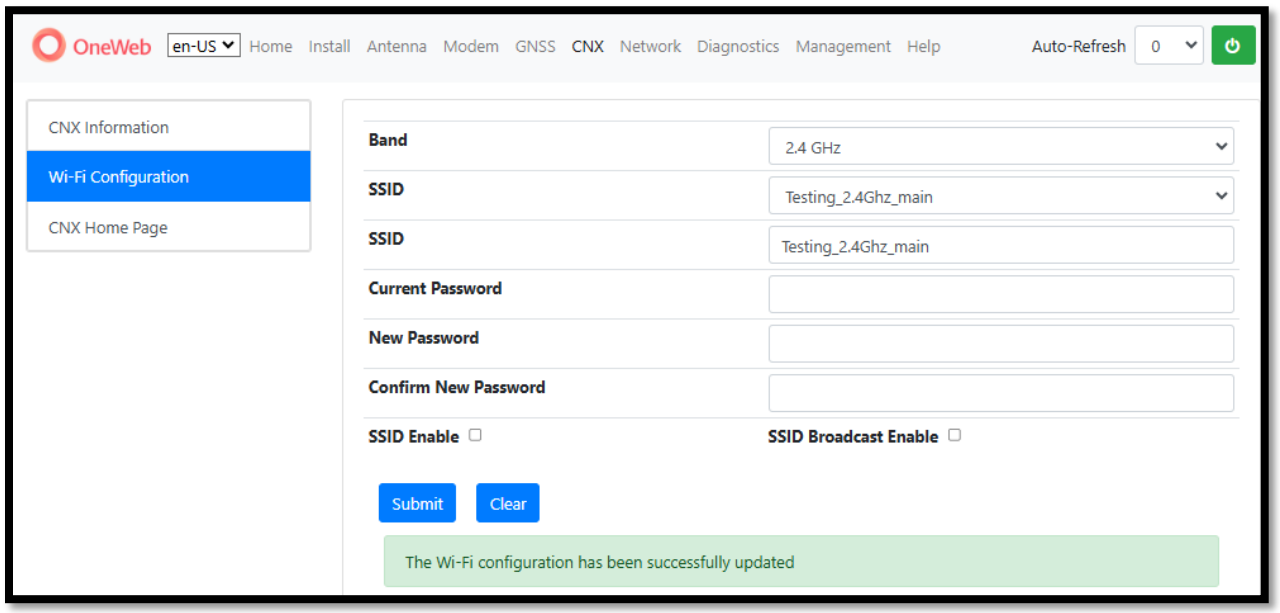


Figure 142: ODU LUI Wi-Fi Configuration success message with SSID disabled

Enable/disable the SSID Broadcast:

1. Complete step 1 through 5 in Enable/disable the Wi-Fi including, selecting the Band (**2.4 GHz** or **5GHz**) and SSID (**main** or **Guest**) as well as entering the "Current Password" of the CNX.
2. Uncheck the **SSID Broadcast Enable** flag to DISABLE the SSID broadcast and check the **SSID Broadcast Enable** flag to ENABLE the SSID broadcast.

   Note: One can choose to enable or disable SSID broadcasting. Enabling SSID broadcasting will allow other devices to easily see and connect to your network. Disabling SSID broadcasting will hide the SSID, which is not recommended.

3. Click the **Submit** button to save the configuration.
4. Once done Successfully, "The Wi-Fi configuration has been successfully updated" message will be displayed as shown in Figure 143 and Figure 144.

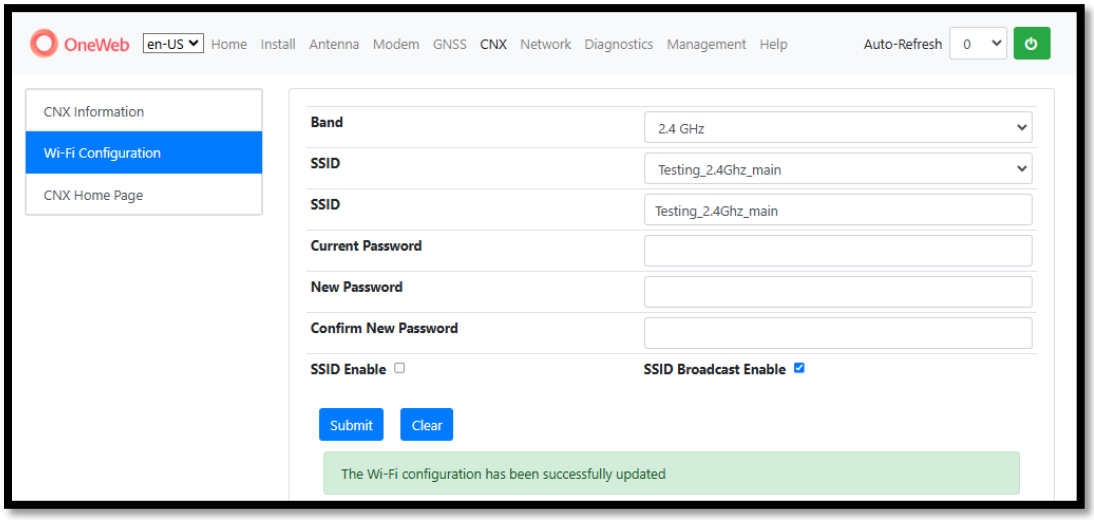


Figure 143: ODU LUI Wi-Fi Configuration success message with SSID Broadcast enabled

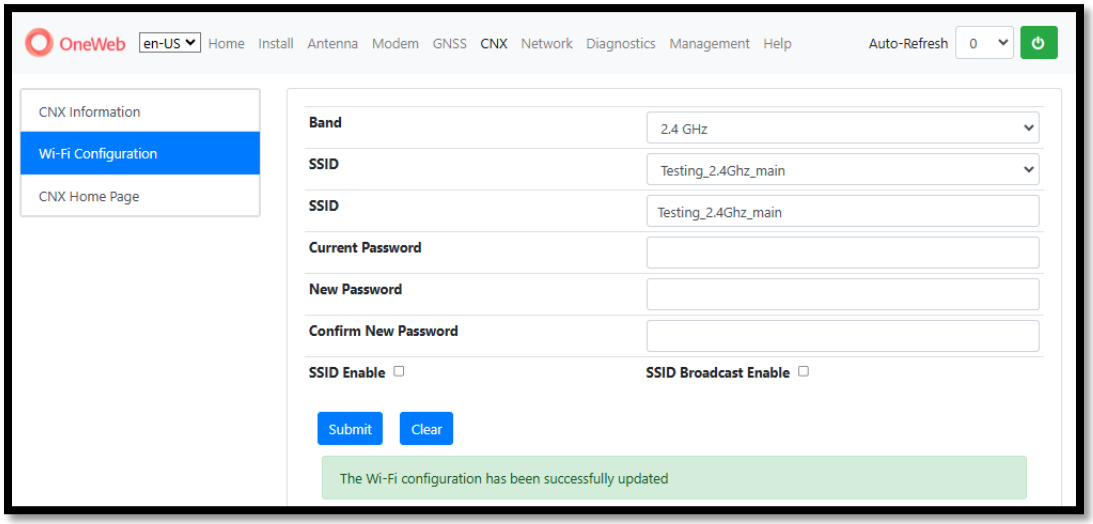


Figure 144: ODU LUI Wi-Fi Configuration success message with SSID Broadcast disabled

Based on the SSID and SSID Broadcast configuration, you will use the SSIDs on your end devices.

Front panel LEDs

The IDU has six LEDs on the front panel as shown in Figure 145. By their appearance (on, off, or blinking), the LEDs indicate the IDU's operating status. The front panel LEDs are white when lit.

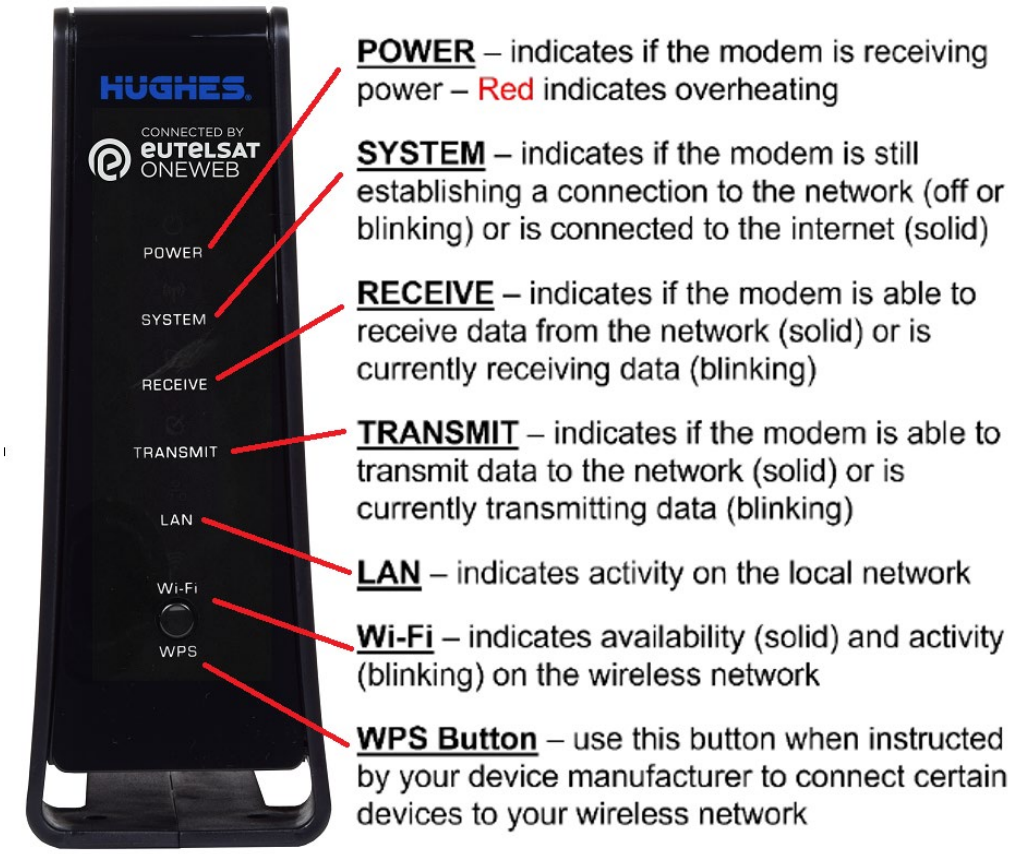


Figure 145: Front panel LEDs

Table 12 explains what the IDU status is when the LEDs are on, off, or blinking.

Table 12: Front panel LEDs

LED	Appearance	Status
Power	On, white color	Power is on and the IDU is functioning normally
	On, red color**	Indicates alarm condition
	Blinking	Power is on and the IDU is operating with fallback-bin (backup) version of software
	Off*	No power
System	On	Indicates the local IFL/MoCA link to the modem is up
	Off*	Indicates the local IFL/MoCA link to the modem is down
Receive	On	Indicates the network service is available and the modem is able to receive data from the network
	Blinking	Receiving data
	Off*	Indicates the network service is not available and the modem is not able to receive data from the network
Transmit	On	Indicates the network service is available and modem is able to transmit data to the network
	Blinking	Transmitting data
	Off*	Indicates the network service is not available and modem is not able to transmit data to the network
LAN	On	The IDU is connected to a computer network card or Ethernet device
	Blinking	Transmitting and/or receiving data
	Off*	No device is connected to the LAN port, or the device connected to the LAN port is not working properly
Wi-Fi	Blinking	One or both of the Wi-Fi bands are on and broadcasting. The LED will blink faster when a user is connected to and using one or both of the Wi-Fi bands
	Off*	Both the 2.4 GHz and 5 GHz Wi-Fi bands are disabled

Bold type indicates LED appearance during normal operation when the IDU is transmitting or receiving data.

*Indicates an operational problem.

**Indicates an alarm condition.

If the LEDs are not functioning properly, make sure you have the correct power supply. Refer to *Powering up the user terminal* on page 64 for detailed power supply information.

LAN port LEDs

The LEDs on the LAN (Ethernet) port on the IDU's rear panel indicate link status and speed, as shown in Figure 146.

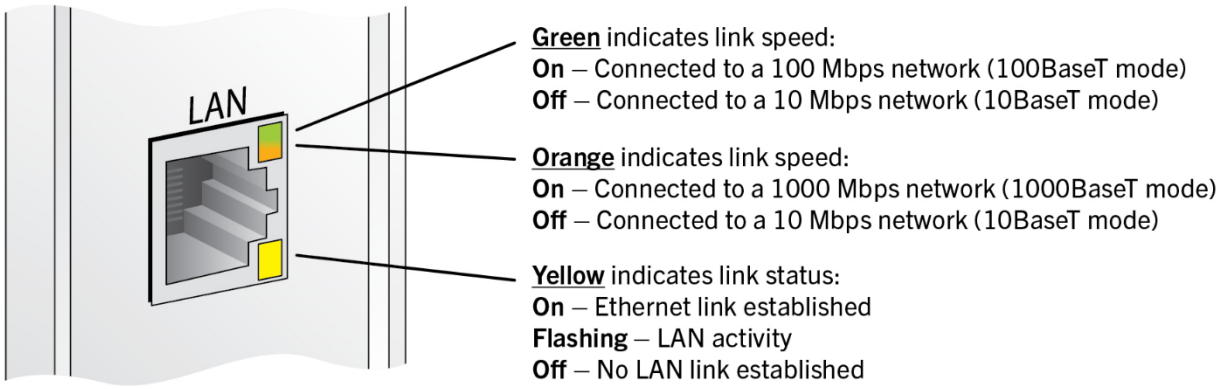


Figure 146: LAN port LEDs

Table 13 shows the IDU LAN LED scheme.

Table 13: LAN port LED descriptions

LED	Color	Description
Top LED	Orange, static	The port speed is 1000 Mbps
	Green, static	The port speed is 100 Mbps
	Off	The port speed is 10 Mbps
Bottom LED	Yellow, static	The port has a link
	Yellow, flashing	The port is transmitting or receiving data at 10/100/1000 Mbps
All LEDs	Off	No link

Appendix F

Resetting the user terminal

Turn off the user terminal

As shown in Figure 66 on page 64, to turn off the UT disconnect the AC power cord of the power supply unit from the surge protector.

Turn on the user terminal

As shown in Figure 66 on page 64, to turn on the UT connect the AC power cord of the power supply unit to the surge protector and then monitor the LEDs on the IDU front panel as described in *Front panel LEDs* on page 133. Refer to *Powering up the user terminal* on page 64 for details.

Reset the user terminal

It is recommended that to reset the UT, you should power cycle it. As shown in Figure 66 on page 64, to turn off the UT disconnect the AC power cord of the power supply unit from the surge protector and after pause to turn on the UT connect the AC power cord of the power supply unit to the surge protector.

Reset the IDU

It is recommended to reset the user terminal instead of resetting the IDU alone. If you want to reset the IDU only, you can press the RESET button on the back of the IDU. The IDU will restart and the MoCA link to the ODU will reset. Note that this will not restart the ODU.

The HL1100W UT has been certified to comply with the standards listed in Table 14 and Table 15.

Regulatory compliance

Table 14: Regulatory compliance information for the ODU

Item	Specification
Safety	UL 62368-1, UL60950-1, and UL 60950-22 for the United States CSA/CAN No. 62368-1, CSA/CAN No. 60950-1, and CSA/CAN No. 60950-22 for Canada EN 62368-1, EN 60950-1, and EN 60950-22 for the European Union and the United Kingdom IEC 62368-1, IEC 60950-1, and IEC 60950-22 for the CB Scheme
EMI/EMC	FCC Part 15 for the United States ICES-003 Issue 7 for Canada EN55032, EN 61000-3-2, EN 61000-3-3, EN 301 489-1 V2.2.3, EN 301 489-12 V3.2.1, and EN 301 489-17 V3.2.4 for the European Union and the United Kingdom
RF Spectrum	FCC Part 25 for the United States SRSP-101 Issue 3 for Canada EN 303 980 V1.3.1 for the European Union and the United Kingdom
RF Health Exposure	FCC OET Bulletin 65 for the United States SAFETY CODE 6 for Canada EN 62311 for the European Union and the United Kingdom
RoHS	EN/IEC 63000 for the European Union and the United Kingdom

Table 15: Regulatory compliance information for the IDU

Item	Specification
Safety	UL 62368-1 and UL60950-1 for the United States CSA/CAN No. 62368-1 and CSA/CAN No. 60950-1 for Canada EN 62368-1 and EN 60950-1 for the European Union and the United Kingdom IEC 62368-1 and IEC 60950-1 for the CB Scheme
EMI/EMC	FCC Part 15 for the United States ICES-003 Issue 7 for Canada EN55032, EN55035, EN 61000-3-2, EN 61000-3-3, EN 301 489-1 V2.2.3, EN 301 489-12 V3.2.1, and EN 301 489-17 V3.2.4 for the European Union and the United Kingdom
RF Spectrum	EN 303 980 V1.3.1, EN 301 893 V2.1.1, EN300 328 V2.2.2 for the European Union and the United Kingdom FCC Part 15.407 and FCC Part 15.247 for the United States
RF Health Exposure	FCC Part 2.1091 for the United States SAFETY CODE 6 for Canada EN 62311 for the European Union and the United Kingdom
RoHS	EN/IEC 63000 for the European Union and the United Kingdom

Repairs in Canada

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment or equipment malfunctions may give the telecommunications company cause to request the user to disconnect the equipment.

Users should not attempt to make electrical ground connections themselves but should contact the appropriate electrical inspection authority or electrician, as appropriate.

EMI

This product conforms to electromagnetic interference (EMI) standards of the U.S. FCC and the Canadian Standards Association (CSA), as detailed in the following sections. The installation and maintenance procedures in the installation guide must be followed to ensure compliance with these regulations.

NOTICE

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC Part 15

This section applies to the HL1100W. Standards to which conformity is declared: FCC Part 15

The VSAT 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.

Responsible party's name: Hughes Network Systems, LLC

Address: 11717 Exploration Lane, Germantown, MD 20876

Telephone: 1 (866) 347-3292

Trade name: HUGHES

Type of equipment: Two-way Hughes system

Model number: HL1100W

Canada Class B warning

The product has been tested, evaluated, and found to be compliant in accordance with the Supplier's Declaration of Conformity (SDoC) procedures.

This product meets the applicable Innovation, Science and Economic Development (ISED) Canada technical specifications, namely ICES-003 and SRSP-101.

Le produit a été testé, évalué et jugé conforme conformément aux procédures de Déclaration de Conformité (DDCF) du fournisseur.

Le présent produit est conforme aux spécifications techniques applicables d'Innovation, Sciences et Développement Économique (ISDE) Canada, specifiquement NMB-003 et PNRH-101.

CAN ICES-003(B) / NMB-003(B)

Customer support

Customer support information can be found in the Hughes LEO app.

Viewing customer support information

If you need to contact the customer support, follow these steps to find out customer support information saved on the user terminal.

Refer to *Checking user terminal status* on page 98 to launch the app and login to view the dashboard. From the dashboard (see Figure 147) click on the **Support** button to view customer support information.

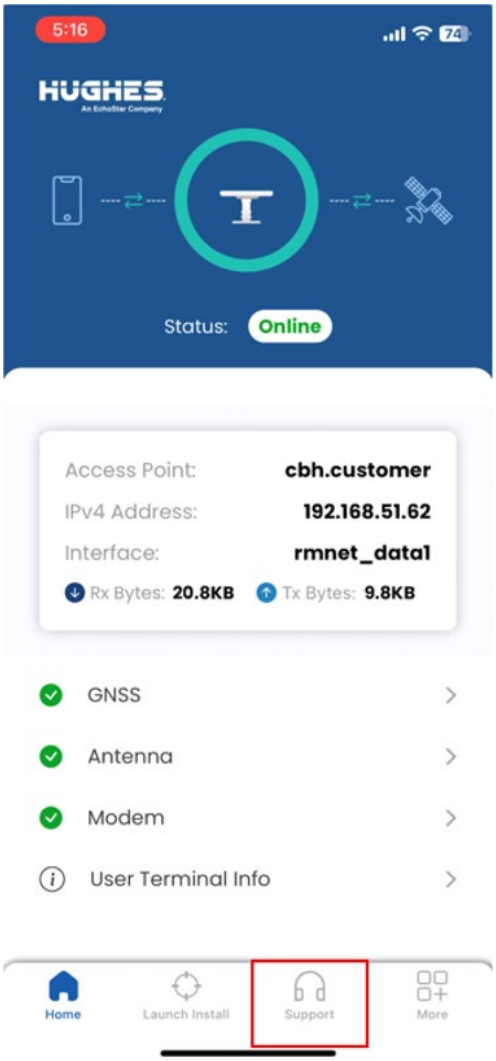


Figure 147: Support button on dashboard

Viewing user terminal hardware information

When you contact customer support, you may be asked to share user terminal hardware information (UT S/N, IMEI, IMSI) for identification purposes. UT S/N, IMEI are printed on the label of the ODU package. Also, P/N, S/N and other information are printed on the label of the ODU (located on the FDX antenna bridge), and the back side of IDU and PSU.

Additionally, ODU and IDU hardware and software information is displayed on the app dashboard.

User Terminal information in the LEO app

Launch the Hughes LEO app and login to view the dashboard. From the dashboard (Figure 148) click on the **User Terminal Info** link to view the user terminal hardware and software information.

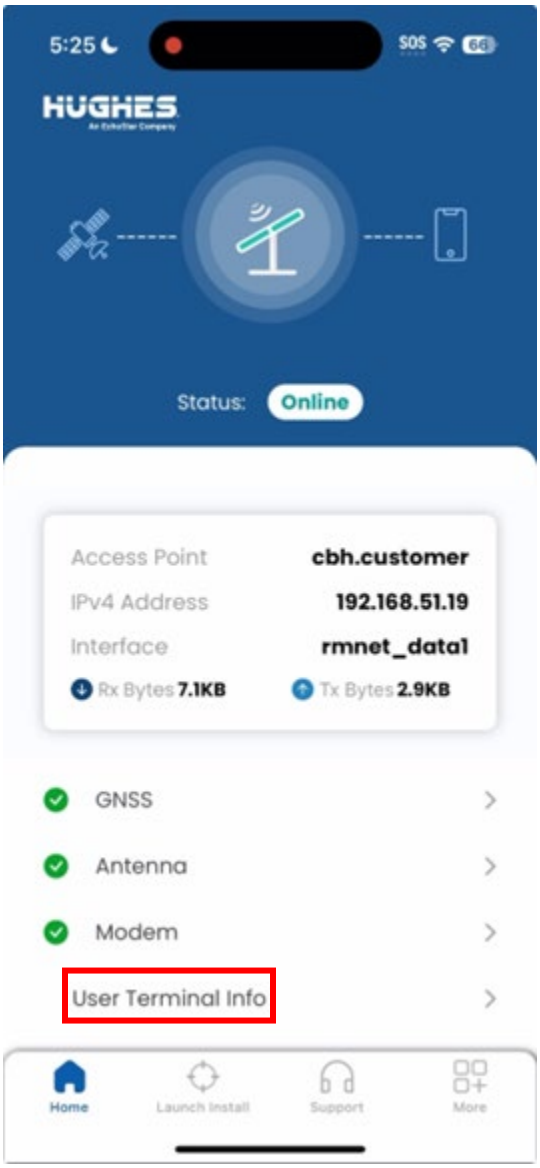


Figure 148: User Terminal Info link

The **User Terminal Info** screen details the user terminal hardware and software details (Figure 149).

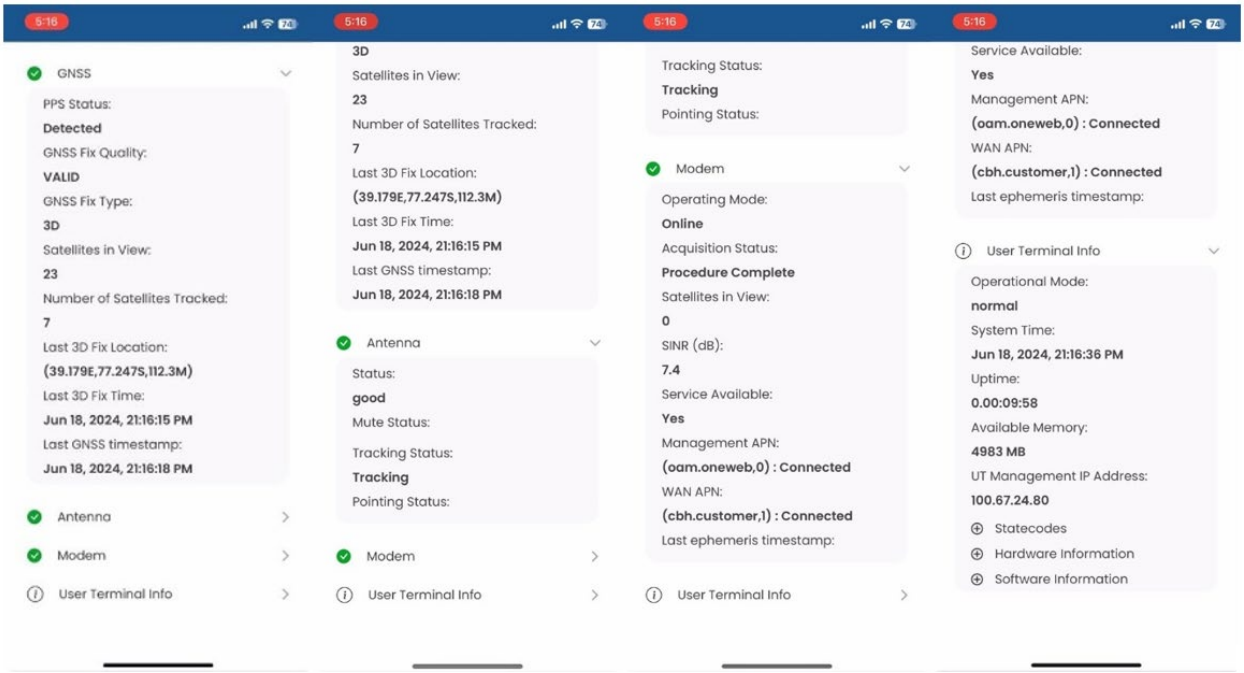


Figure 149: User Terminal Info screen

Warranty repair

Please, contact customer support if any warranty repairs are needed. Follow the instructions received from customer support to initiate the RMA process for the repair(s).

Acronyms

A

A – Amp
AC – Alternating Current
APN – Access Point Name
AWG – American Wire Gauge

B

BFA – Beam Former Array

C

CES – Device Hub
CCM – Common Control Module
CFR – Code of Federal Regulations
CN – Core Network
CSA – Canadian Standards Association

D

dB – Decibel
DC – Direct Current

E

EIA – Electronic Industries Association
EMI – Electromagnetic Interference

F

FCC – US Federal Communications Commission
FDX – Full Duplex
ft – Feet
ft-lb – Pound-Foot

G

GHz – Gigahertz
GigE – Gigabit Ethernet
GN – Ground Network
GNSS – Global Navigation Satellite System
GPS – Global Positioning System

H

HNS – Hughes Network Systems

I

IFL – Intra-facility Link
IMEI – International Mobile Equipment Identity
IMSI – International Mobile Subscriber Identity
in – Inch
in/lb – Inch-Pounds

K

kg – Kilogram

L

LAN – Local Area Network
lbs – Pounds
LED – Light Emitting Diode
LEO – Low Earth Orbit
LUI – Local User Interface

M

m – Meter
Mbps – Megabits Per Second
ml – Millilitre
mm – Millimeter
MoCA – Multimedia over Coax Alliance

N

NEC – National Electrical Code
NFPA – National Fire Protection Association
NPM – Non-Penetrating Mount

O

ODU – Outdoor Unit
OW – Oneweb

P

P/N – Part Number
PoE – Point of Entry
PSU – Power Supply Unit

R

RCM – RF Conversion Module
RG – Radio Gateway
RHSN – Round Head with Square Nut
RMA – Return Materials Authorization
Rx – Receive

S

SDoC – Supplier's Declaration of Conformity
SPA – Single Page Application
SSID – Service Set Identifier
SW – Software

T

Tx – Transmit

U

UT – User Terminal

V

V – Volt
VSAT – Very Small Aperture Terminal

W

WAN – Wide Area Network
WPS – Wi-Fi Protected Setup