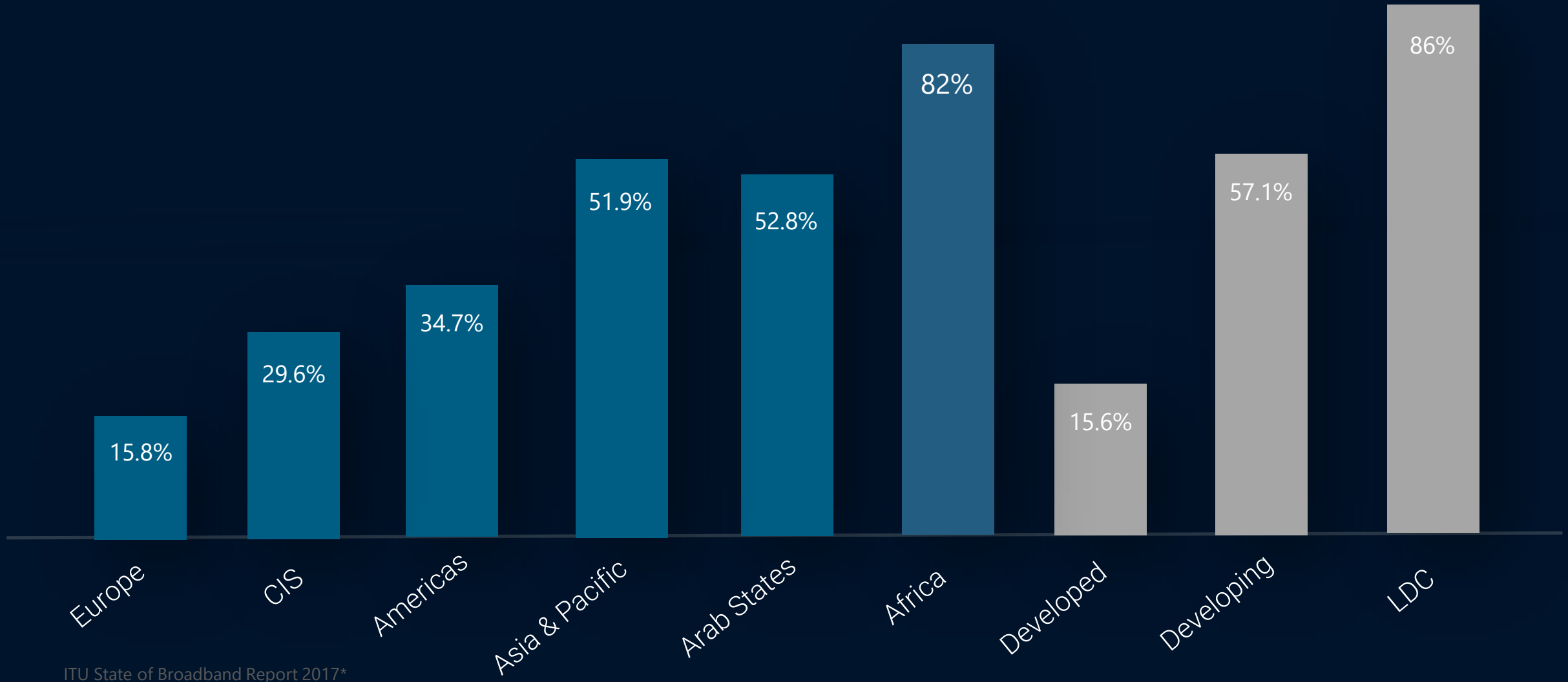
ITU Satellite Symposium 2019

S.C. Bariloche, Argentina

25 - 27 September

PERCENT OF UNCONNECTED HOUSEHOLDS

Percent of the world's population without access to Internet 52%



ITU State of Broadband Report 2017*

WHAT IS ONEWEB?

A Global Communications Company

Building a new communications network to bring unparalleled high-quality broadband access, low latency, redundancy, security, ubiquity, and opportunity to everyone

VALUE PROPOSITION

Low Latency

OneWeb's network is 30x closer to Earth than traditional satellite systems, providing services **on par or faster than fiber or cable.**

Global Coverage

Our polar orbiting satellites are designed to logically interlock, creating a coverage footprint over the entire planet. Global coverage means connectivity everywhere: land, sea, or air and even over the poles.

OneWeb brings fiber-like internet for the Arctic in 2020

Applications

Machines don't care about latency, but people do. Our combination of high speed and low latency enables you to use all the interactive applications you love while unlocking totally new applications.

OUR VISION

To connect all the unconnected schools of the world and to bridge the digital divide by 2027.

There are over 2 Million schools without access to quality broadband and more than 4 Billion people unconnected and underserved globally

OUR MISSION

To provide affordable, high speed, low latency, global broadband access for all through the world's largest constellation of satellites.

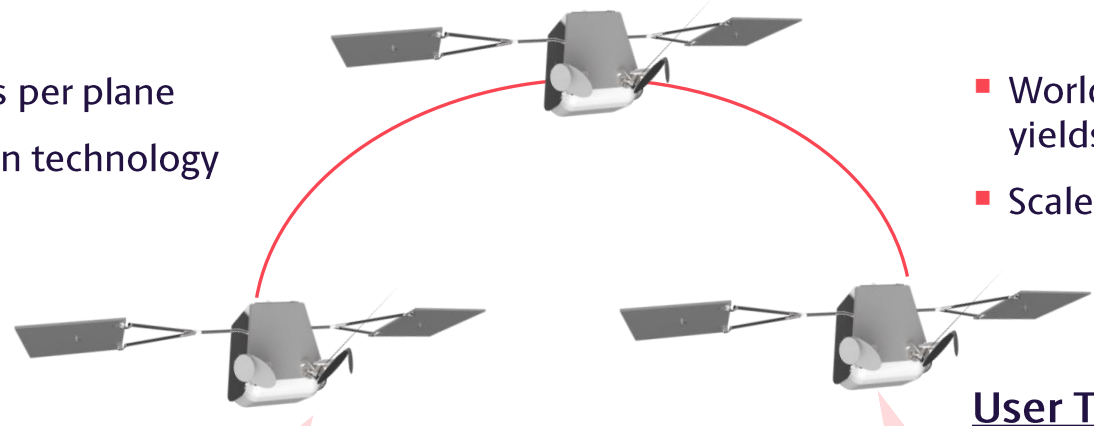
By transparently extending existing operator networks to serve new coverage areas, over a neutral 3G/LTE/5G/Wi-Fi ready network

OneWeb System Design – Innovating from the Sky to the Ground

OneWeb LEO Constellation

- 12 orbital planes; 49 satellites per plane
- Satellites are built with proven technology

- World's only high-volume satellite production yields lowest cost per satellite
- Scales to higher capacity in the future

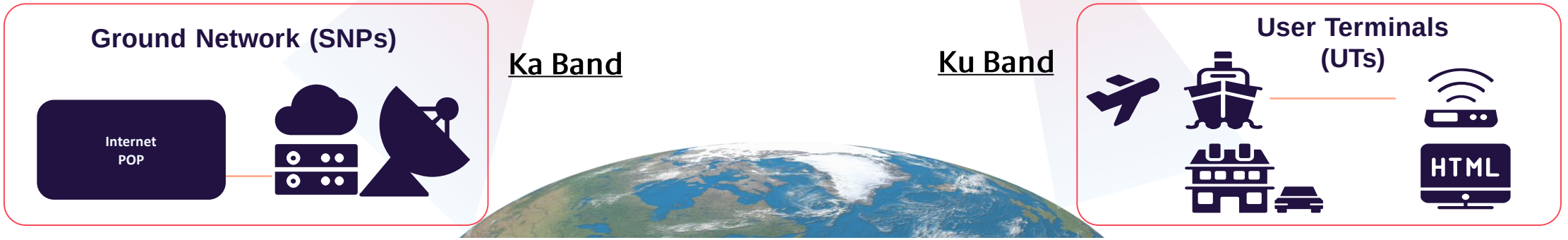


Ground Network (SNPs)

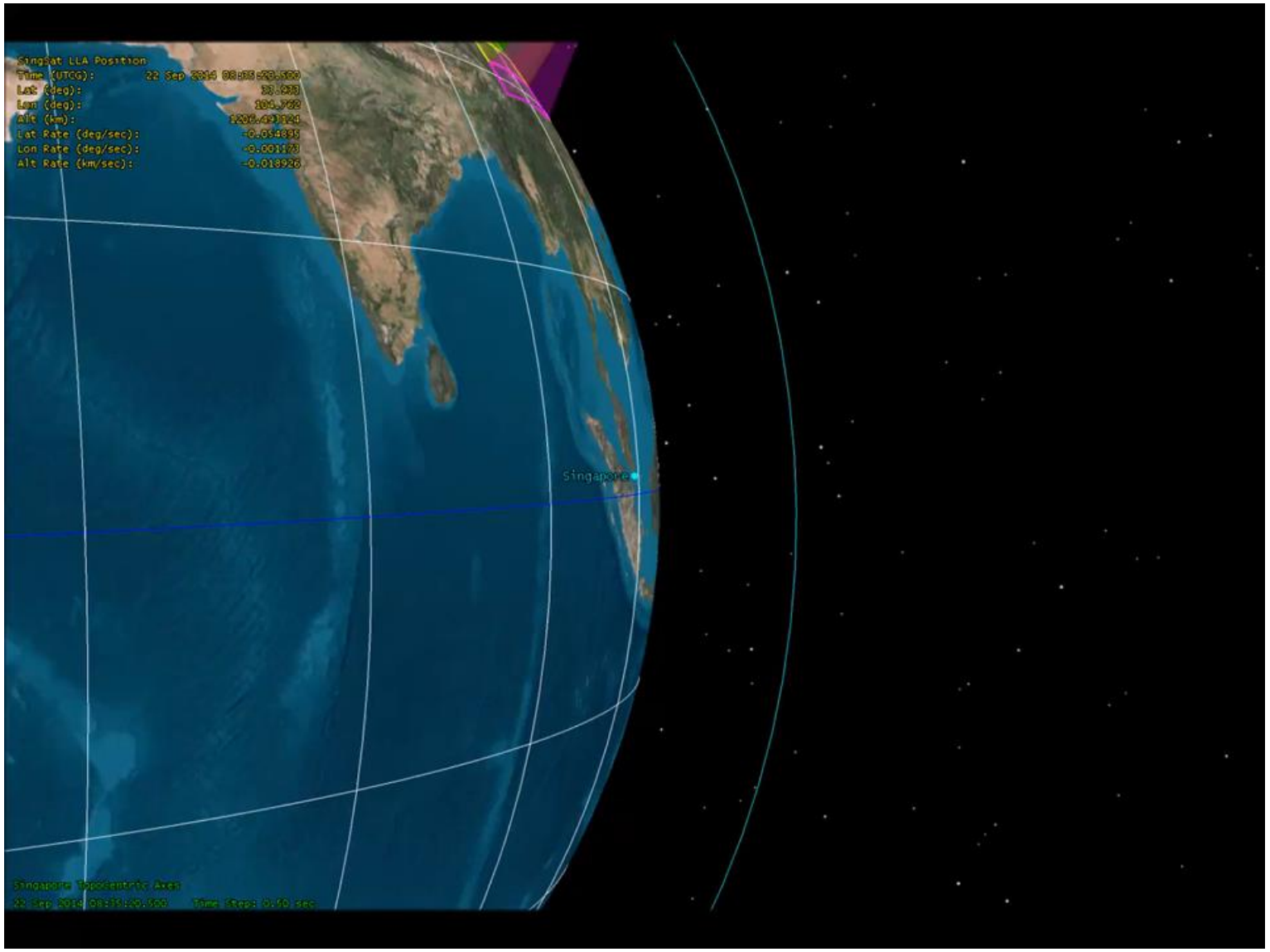
- Multiple gateway (SNP) locations (~44) globally
- Connect to core networks via standard 3GPP technology

User Terminals (UTs)

- UT Portfolio; Size, Weight, Power, Throughput optimized per market
- User Terminals delivering ten-fold throughput over traditional VSAT

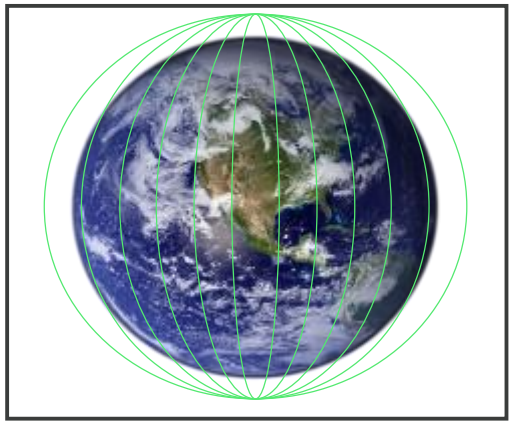


Progressive Pitch™



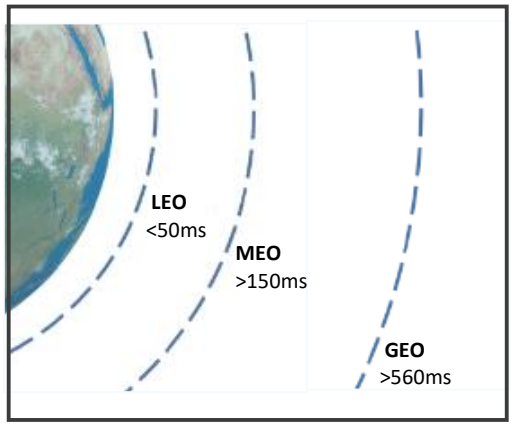
OneWeb's Competitive Advantage Unlocks Significant Market Opportunities

Global Solution



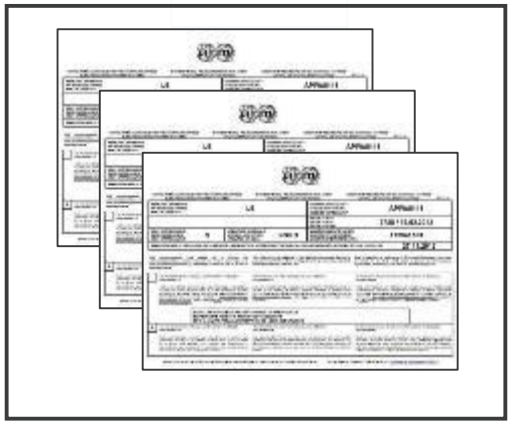
- Seamless global coverage
- System resiliency with largest satellite network in world

Lowest Latency



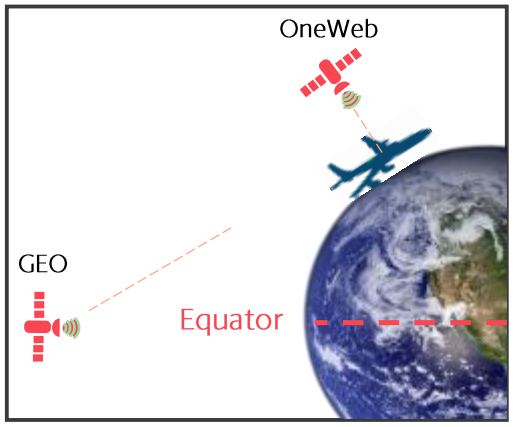
- Best user experience
- Most in-demand applications require low latency

Priority Spectrum



- Seniority ITU status on Ku-band
- Large spectrum block: 6.0 GHz

Look Angle Advantage



- Clear differentiator over GEOs
- Excellent quality over high traffic northern latitudes and obstacles

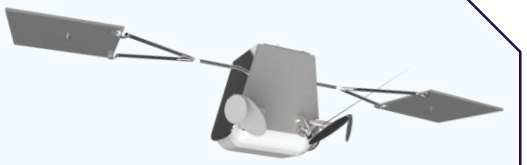
OneWeb By The Numbers...To Date

OneWeb has achieved major technical, financial, commercial, and regulatory milestones in pursuit of global satellite internet

$3.4 BILLION
FUNDING TO DATE

SoftBank · AIRBUS GROUP · GRUPO SALINAS · Qualcomm · HUGHES · Virgin · Republic of Rwanda · Coca-Cola · bharti

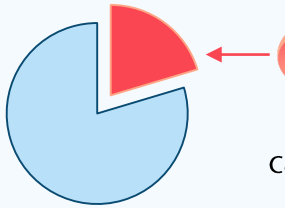
650 satellites
Built by OneWeb Satellites



22 firm launches
Arianespace Launch Plan

OneWeb

1.1 Tbps
of system capacity



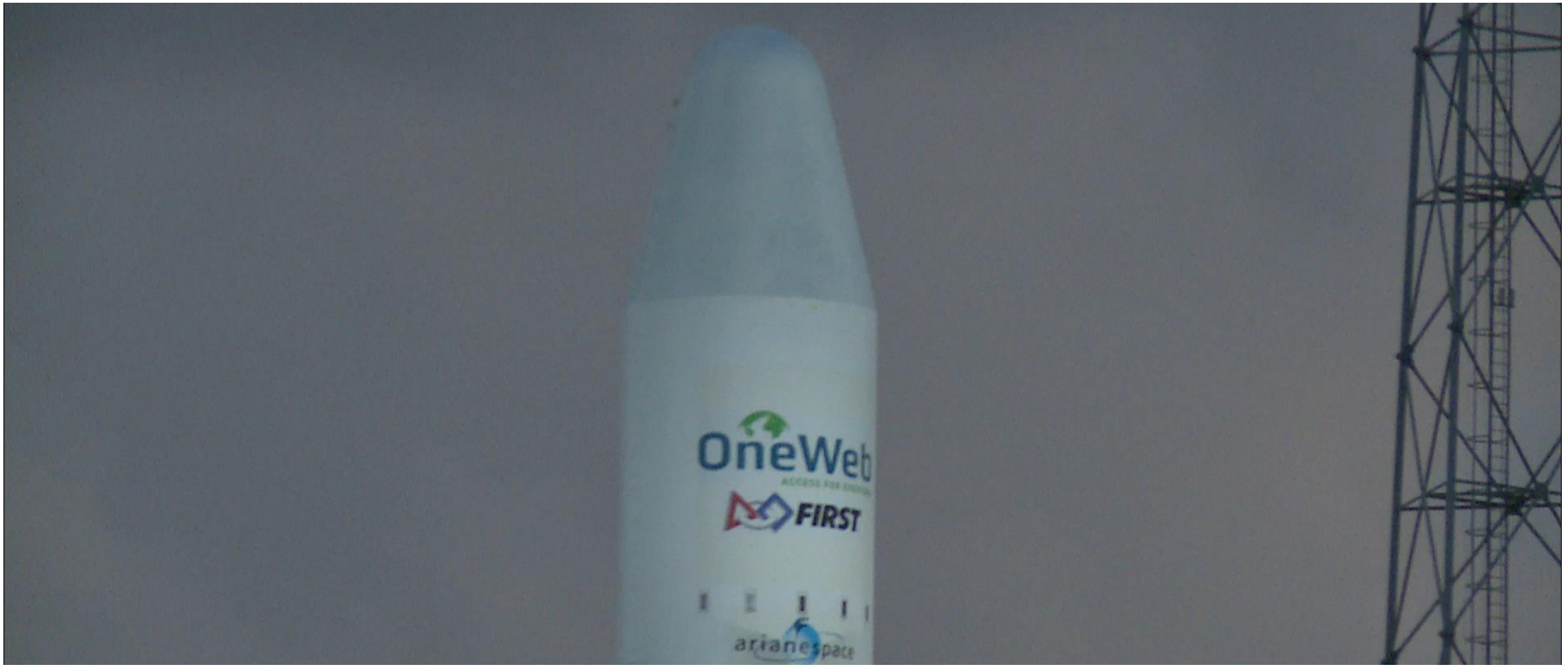
OneWeb

25% of global capacity by 2021

6.0 GHz
of Ku-band (2.5 GHz) and Ka-band (3.5 GHz) spectrum

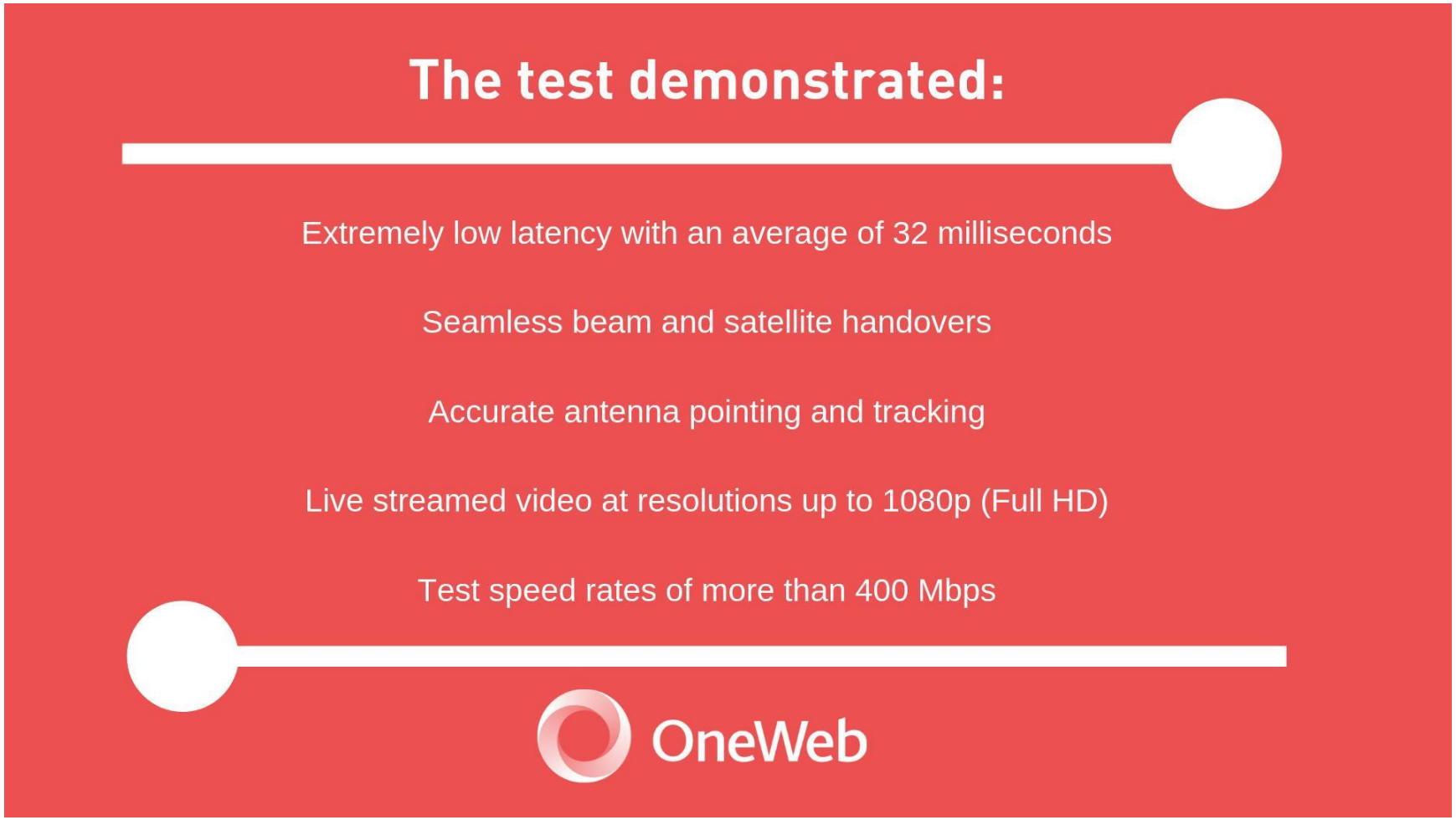
ITU

First Six Satellites Successfully Launched into Orbit on February 27, 2019



Pruebas en curso

OneWeb's Satellites Deliver Real-Time HD Streaming from Space - July 16, 2019



Constellation Deployment Using Established, Reliable Vehicle

Soyuz (Arianespace)

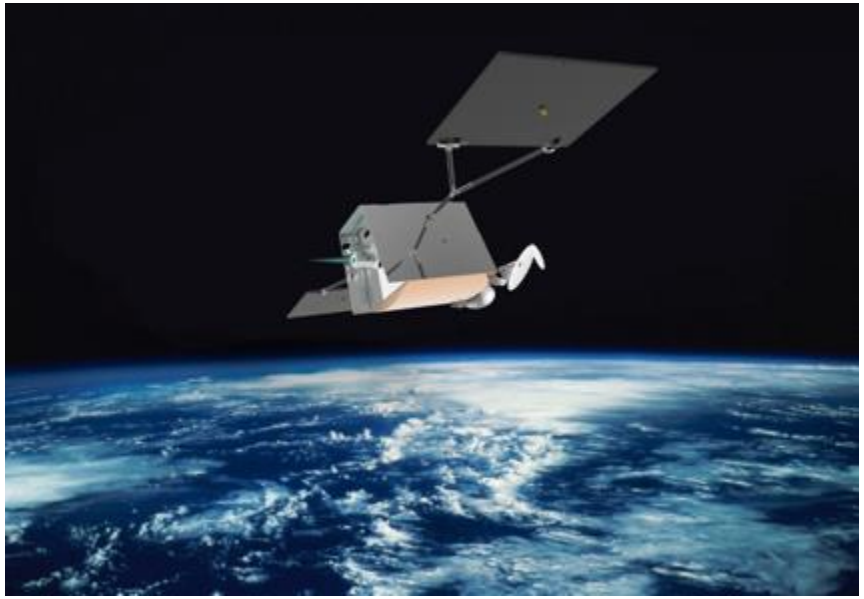
- 21 firm launches; contract update in process
- 34-36 satellites on each launch
- 3 Launch Sites: Baikonur, Kourou (French Guiana) and Vostochny
- Industry leading 97% success rate with 1,800+ launches

Ariane 6

- 1 firm launch
- Launch site: Kourou
- Next generation launcher from Arianespace

Revolutionary Satellite Design Enables Low Cost and Mass Production

OneWeb LEO Satellite



- Small, low-mass satellites with unique modular design
- Produced in new manufacturing facility for high-rate and low-cost production
- Leverages existing and proven technology
- Strong industry participation

Florida Manufacturing Facility

Sustainable Space

Space is a shared natural resource and all stakeholders must have responsible design and operation practices to ensure the long-term preservation of space

- The altitude between satellites within a large constellation and between different constellations must have a minimum distance
- In case of failure during the deployment of a constellation, its origin must be identified and corrected on Earth prior to future satellite launches
- The operator of the spacecraft must have the ability to control the flight path of its assets
- The satellite must be safely removed within a short period at the end of its mission
- Any orbital object should not pose any risk to people or property on Earth

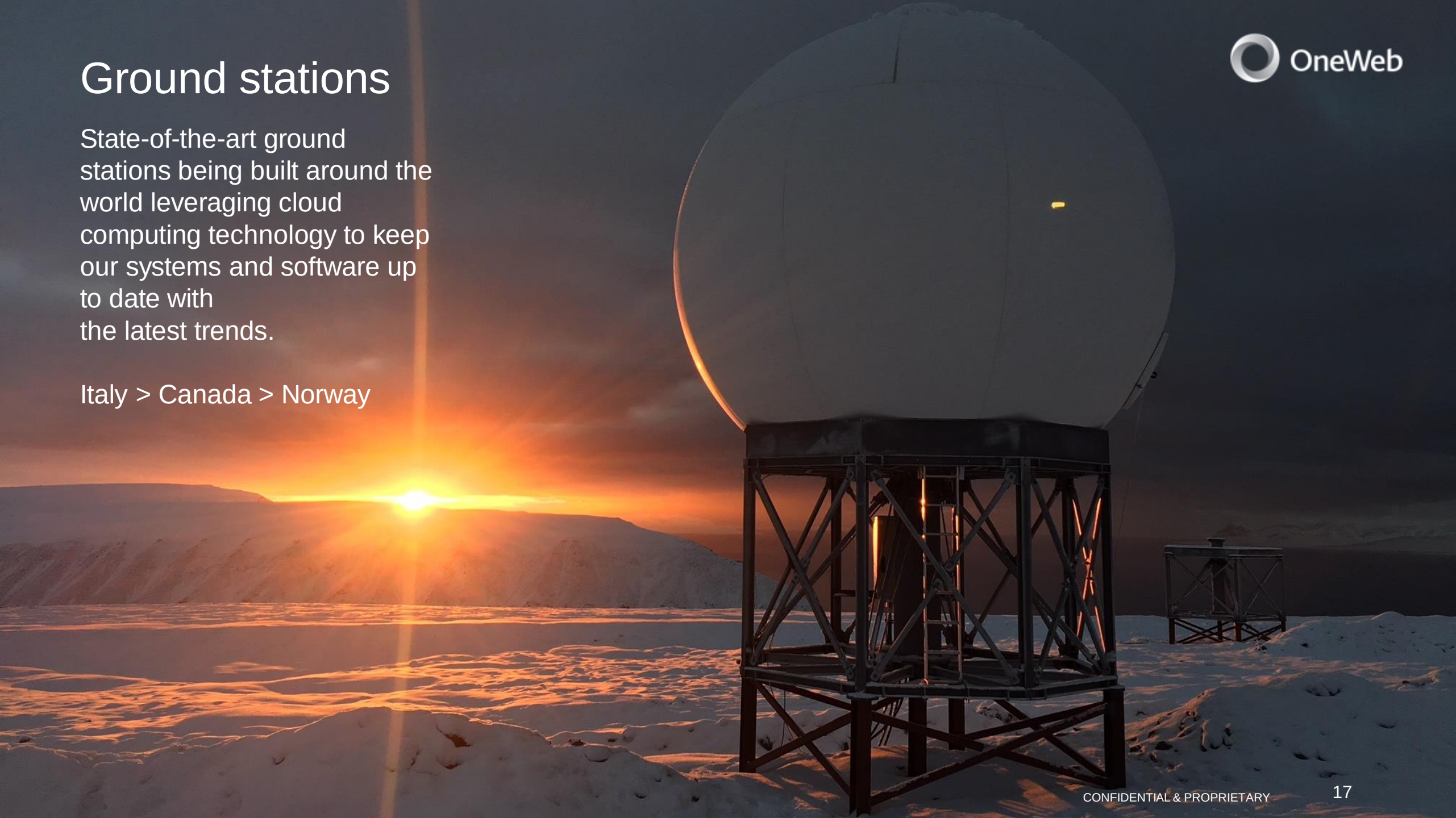
www.responsible.space

Ted talk: How do we bridge the digital divide sustainably?

Ground stations

State-of-the-art ground stations being built around the world leveraging cloud computing technology to keep our systems and software up to date with
the latest trends.

Italy > Canada > Norway



OneWeb user terminals

Variety of User Terminals planned to meet different vertical market requirements.
Design leverages Core Modules for ease of manufacturability and production.

1

Compact user terminals enable mass market connectivity with multiple users per terminal

2

Throughput - up to 400 Mbps down/30 Mbps up * (using 3OW rate)

3

Optional Wi-Fi, LTE / 3G integration possible for variety of access technologies

4

UT Types Tailored to vertical use cases:

- Dual-Parabolic UTs – Fixed & Maritime
- AESA (flat panel) LEO UTs – SME/Small Cell/Manpack
- AESA (flat panel) LEO/GEO UTs - Aero

Dual Parabolic Maritime Vertical (Stabilized)

Enterprise Vertical

Stabilized Parabolic

Fixed Parabolic

Active Electronically Scanned Antenna (AESA)

COMPACT-ESA

Active Electronically Scanned Antenna (AESA)

AERO-ESA

The markets we support

Mobility
- Maritime
- Aviation
- Government
- Connected Car
- IoT

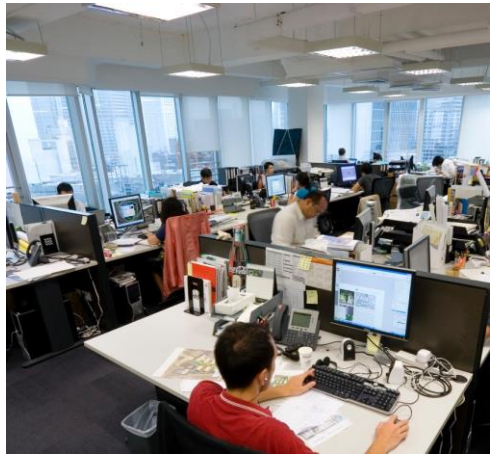
Satellite Broadband
- Corporate Enterprise
- Small & Medium Business
- Consumer Residential

Government
- Emergency Response
- Local Government
- Military

Cellular Backhaul
- Macro-cell Satellite
- Integrated Small Cells







Ready to go

Spectrum

2012

Toulouse Factory inauguration

2018

Satellites built

2018

Customer trials

Q3 2019 – Q3 2021

Series A & B Funding

2017

Initial ground sites, GNOC, SOC

2018

Launches

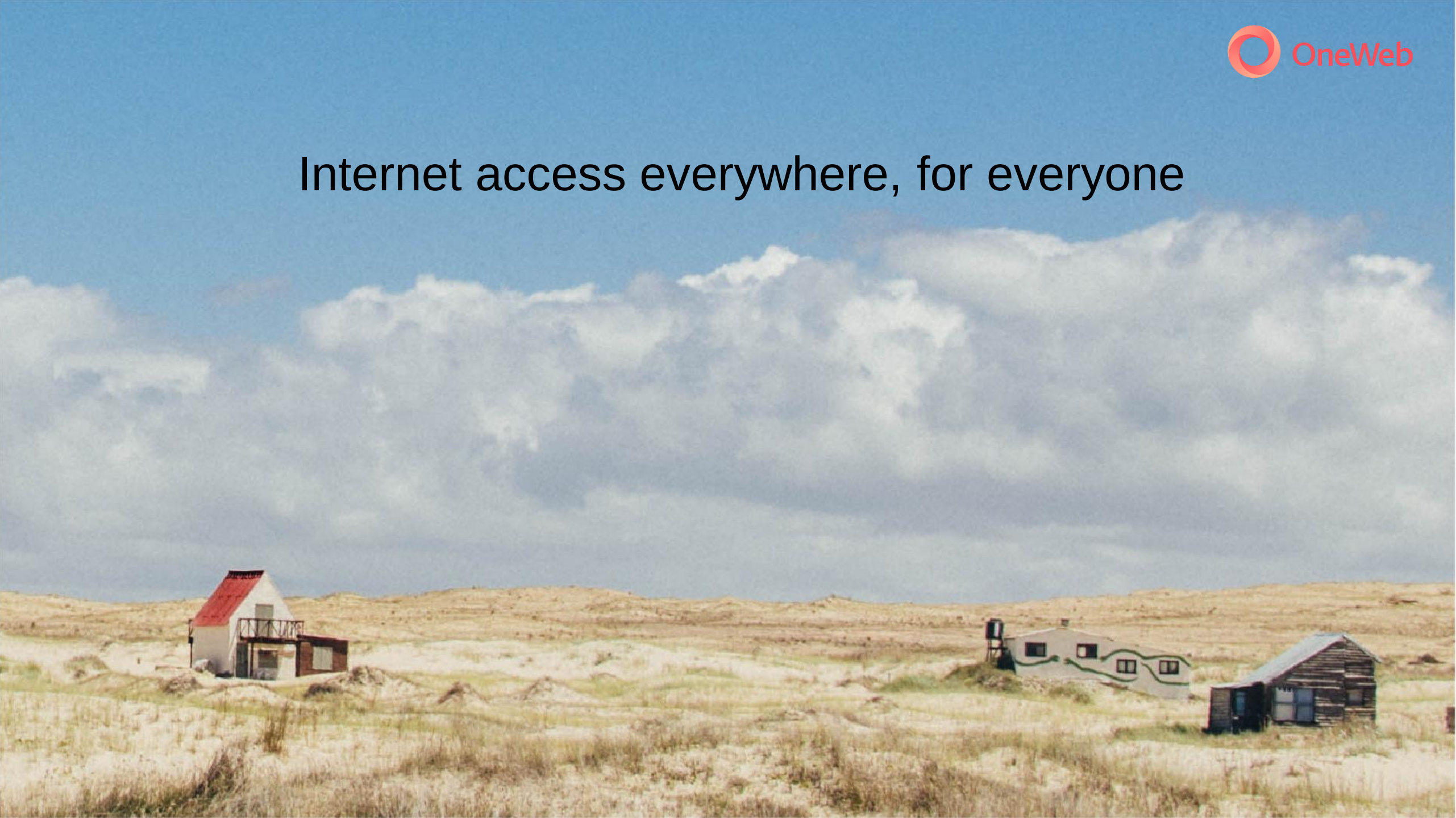
Q1 2019 – Q4 2020

Commercial Services Q3 2021

Q3 2021

OneWeb

Internet access everywhere, for everyone



Overview

WRC-19 Agenda Items for the **promotion and deployment** of non-GSO systems:

- **Agenda Item 7, Issue A — Bringing Into Use (BIU) and the new Milestone Regime**
- Agenda Item 7, Issue H — Required Non-GSO Information for API and CR/C
- **Agenda Item 1.6 — Non-GSO FSS in V- and Q-bands**
- Agenda Item 9.1.3 — Non-GSO FSS in C-band (3 and 7 GHz)
- Agenda Item 9.1.9 — Possible new allocation to GSO FSS in 51.4-52.4 GHz
- Agenda Item 10 — WRC-23 agenda items

Other WRC-19 Agenda Items for the **protection** of non-GSO systems:

- **Agenda Item 1.13 — Additional identifications for IMT-2020 in bands above 26 GHz**
- Agenda Item 1.5 — GSO ESIMs in the 27.5-29.5 GHz band
- Agenda Item 1.14 — HAPS Identification

Agenda Item 7, Issue A (AI 7A)

Bringing into use (BIU) of frequency assignments to all non-GSO systems and consideration of a milestone-based approach for the deployment of non-GSO systems in specific frequency bands and services.

The proposed measures included in the Multi-Country Proposal (MCP) to AI 7A aims to:

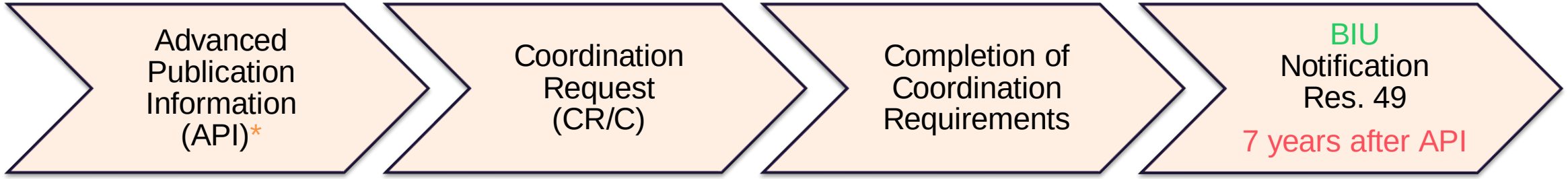
1. establish rules and timelines for the BIU of frequency assignments to all non-GSO systems,
2. develop a milestone-based approach to non-GSO system deployment in certain services and frequency bands, and
3. include transitional measures for non-GSO systems that have already been brought into use to meet the newly developed deployment milestones.

WRC-19 conclusions on AI 7A should provide a **fair balance** between the need to prevent **orbital/spectrum resource warehousing** and **operational and commercial requirements** related to the deployment of non-GSO systems

Agenda Item 7, Issue A: BIU and Milestones

Bringing Into Use the NGSO system and the subsequent Milestone-based Approach to satellite deployment

Current BIU process:



* API is automatically generated with CR/C for Ku and Ka FSS bands as of July 2016

BIU = a single Non-GSO satellite with transmit/received capability deployed on one of the notified planes at end of 7-year regulatory time limit

- Current Rule of Procedure on **No. 11.44**
- *unlikely to change*

Proposed **milestone-based approach** for Non-GSO systems (FSS, BSS, and MSS in certain bands):

AI 7A Milestone-based approach (2)

Reasons:

*The proposed timeline and objectives of a commencement date of **1 January 2021** and a **1st milestone within 2 years** after that date is suited to:*

1. *avoid a too delayed commencement of the new milestone regime that would cater for spectrum warehousing and would not solve the issue of overfilling that originated this Agenda Item in 2015;*
2. *prevent the uncertainty for non-GSO systems at any stages of development with respect to their coordination requirements;*
3. *ensure the first milestone to be in advance of WRC-23 to have the necessary hindsight, perspective and time for this conference to possibly adjust the overall approach, if cases of potential difficulty were reported to RRB before the conference.*

To address the consequences of failing to meet a particular milestone, a "Deployment Factor" (DF) is considered that leads to scaling down the constellation based on the number of satellites actually deployed as of a milestone date.

Agenda Item 7, Issue A – Regional Positions for WRC-19

Comparison of announced positions in different regions

	APT[1]	ASMG[2]	ATU[3]	CEPT[4]	CITEL	RCC
Transition measures	01/01/21	01/01/21	01/01/21	TBD	01/01/21	01/01/21
Duration of milestones (associated %)	TBD	1 year (10%) 3 years (33%) 5 years (100%)	TBD**	2 years (10%) 4 years (30%) 7 years (100%)	3 years (10%) 5 years (50%) 7 years (100%)	2 years (10%) 4 years (30%) 7 years (90%)
1st milestone	*01/01/23 or 01/01/24*	01/01/22	*[01/01/22]*	*01/01/23 or 01/01/25**	01/01/24	01/01/23

Notes: Transitional measures apply ONLY to NGSO systems whose 7-year regulatory period ended before WRC-19

(1) **APT:** First milestone in 2 or 3 years (Indonesia, Singapore, China, Papua New Guinea…: 2 years; India: 1 year). Current draft MCP proposal commencement date Jan. 2021, 80% preliminary support. MCP (1 January 2021, 1st milestone within 2 years) to be sent to WRC-19 under the auspice of Singapore, Indonesia, PNG and other countries to join.

(2) **ASMG** position is unanimous.

(3) **ATU** has 4 sub-regions: EACO and SADC support 1 year (10%), 3 years (33%) and 6 years (100%), while ECOWAS and ECCAS have not agreed on the options to be supported. Noted in the ATU meeting report was that "it is important that the 1st milestone take place before WRC-23."

(4) **CEPT:** An indicative vote showed 13 supporting 01/01/21 and 8 supporting 01/01/23 for the commencement date.


OneWeb