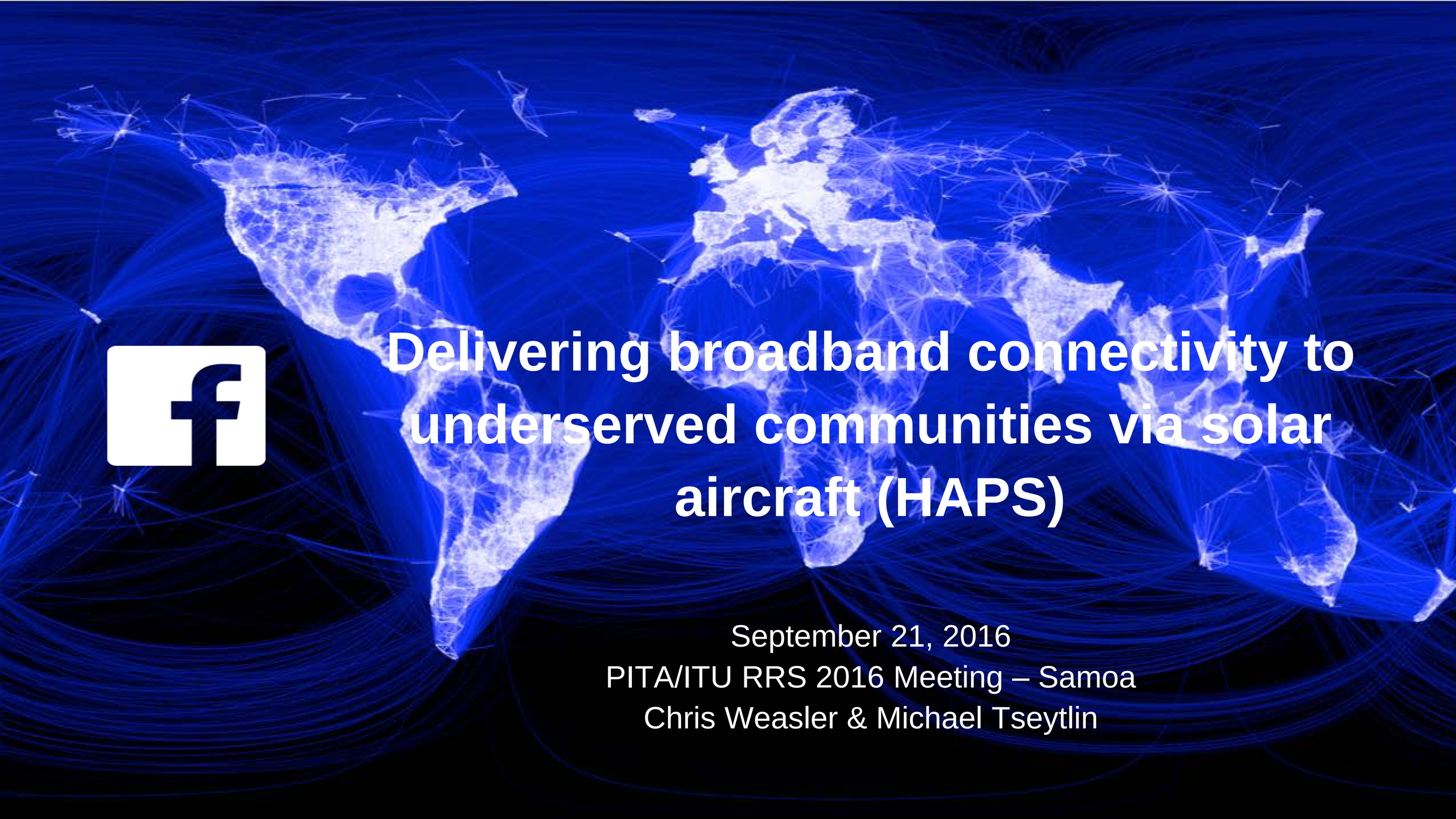


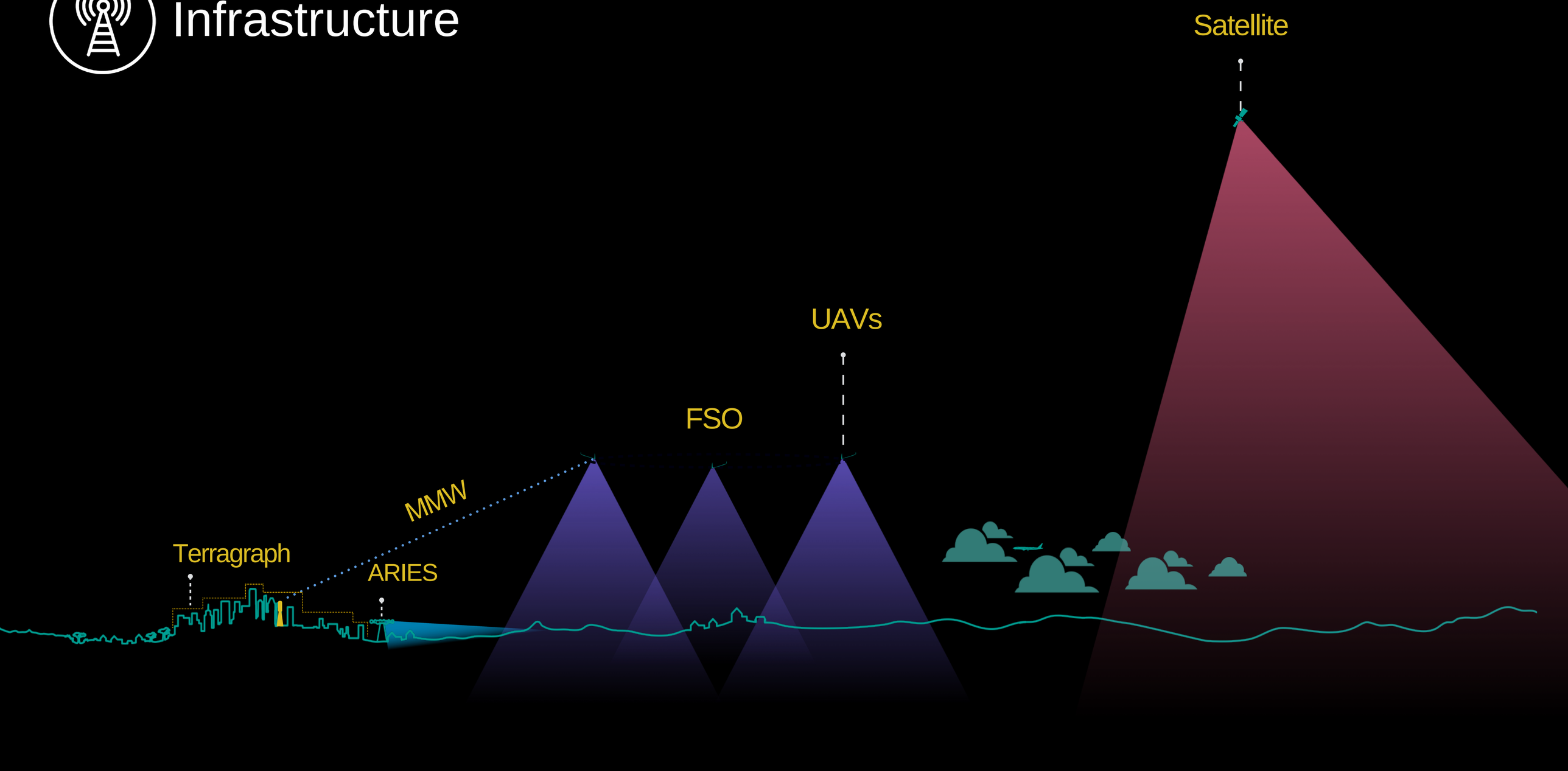
Delivering broadband connectivity to underserved communities via solar aircraft (HAPS)

September 21, 2016

PITA/ITU RRS 2016 Meeting – Samoa

Chris Weasler & Michael Tseytlin

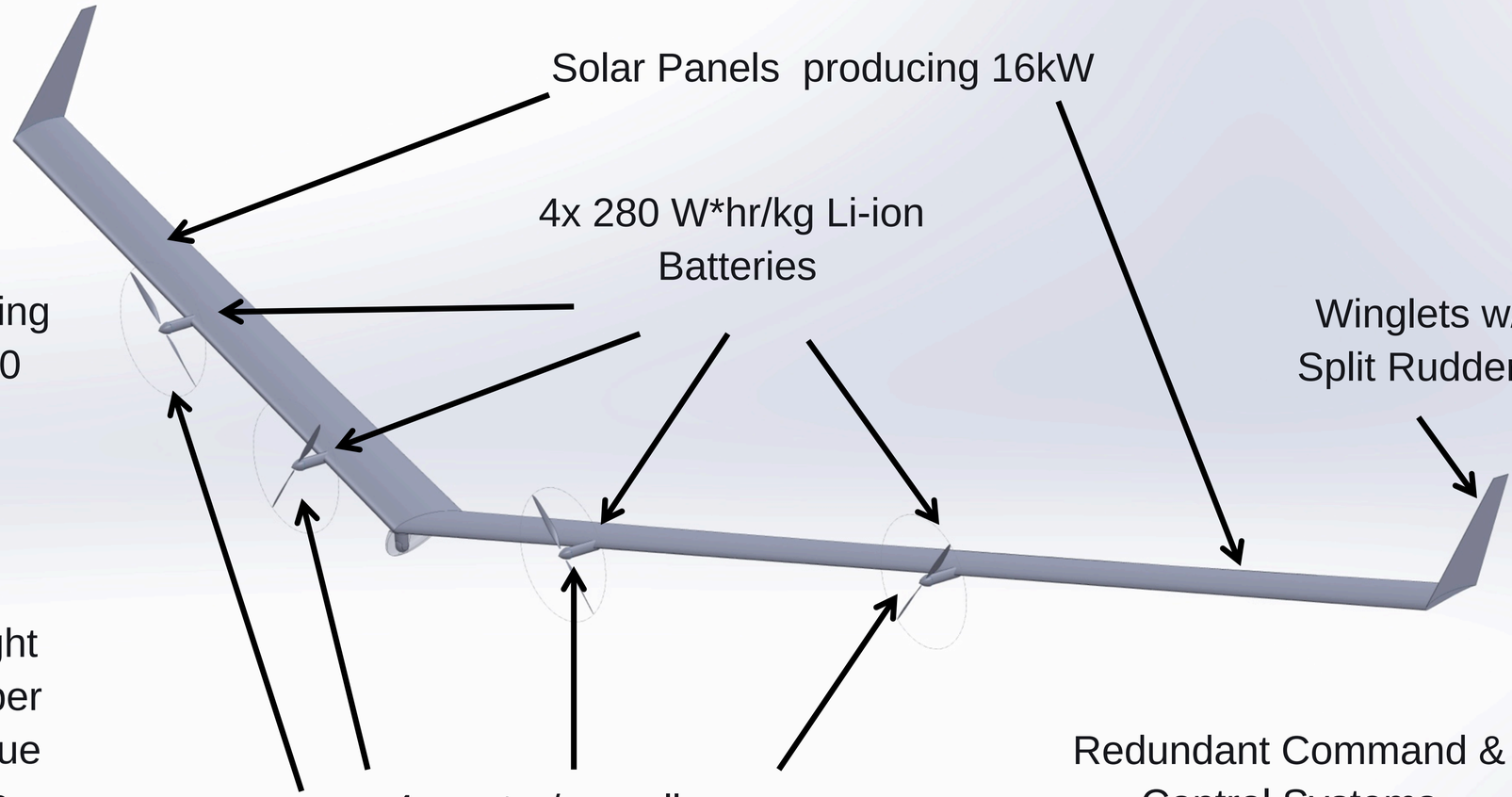
Infrastructure




Carbon fiber
monocoque airframe
Optimized aerodynamics
(minimum drag)
Solar cells
on top surface
Propeller propulsion
Communication payload

Aquila Key Features

Completely Autonomous
Autopilot Design



Key attributes of Facebook’s Aquila solar aircraft

- Footprint – up to 100 km diameter
- Throughput – >10 Gbps
- Altitude – 20 km (well above commercial airspace)
- Circles in approximately 2-3 km radius to station keep
- Continuous station-keeping – 3-12 months
- Service life – approximately 10 years

Today’s enabling technologies for high altitude solar aircraft

- Li-ion batteries
- High efficiency solar panels
- Composite materials
- Autonomous aircraft avionics

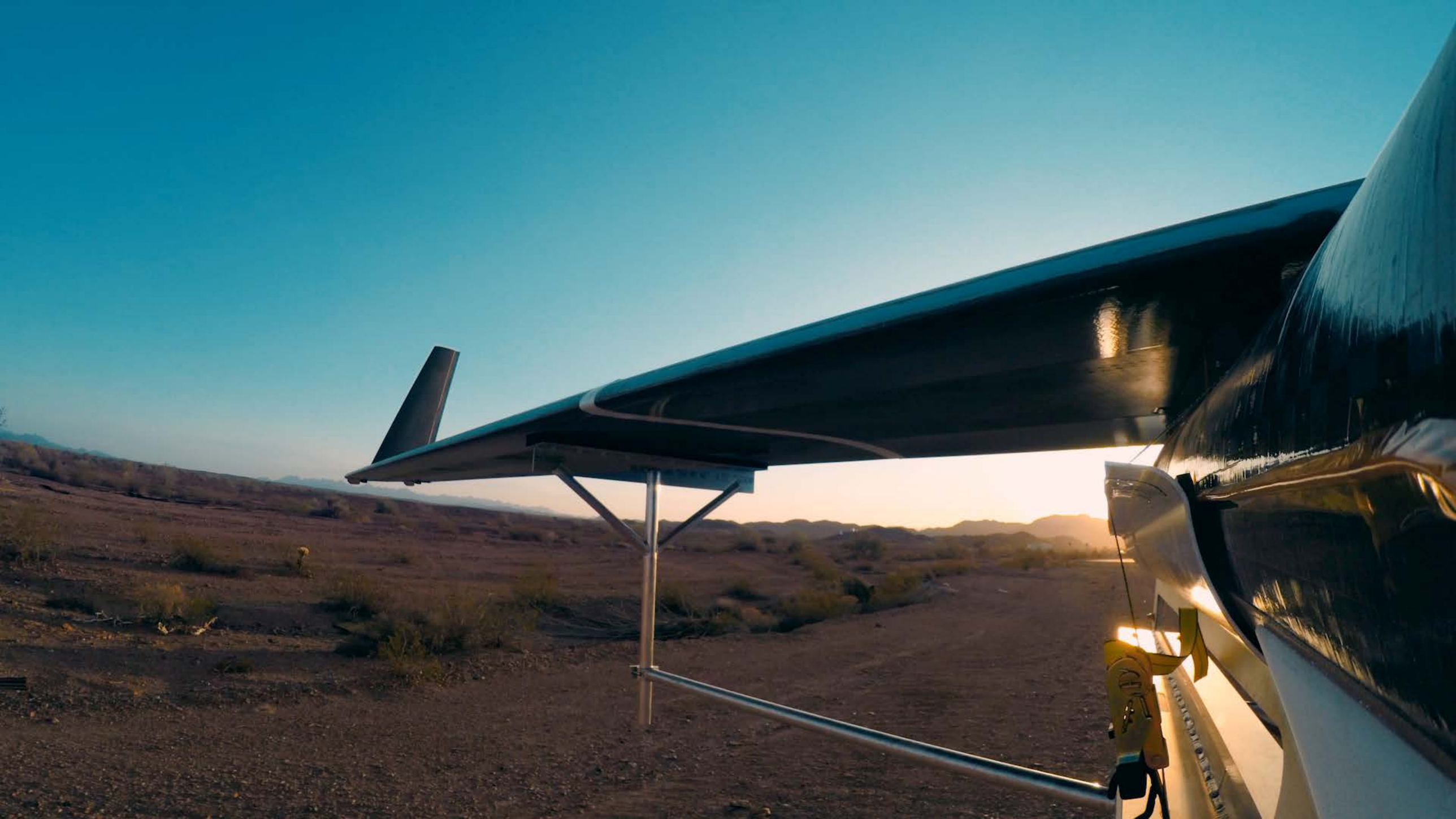
Aquila Comparison

Boeing 737

Aquila

Parameter	737-300	Aquila
Wingspan	33.4 m / 110 ft	42 m / 138 ft
Empty Weight	32,881 kg / 72,490 lb	400 kg / 880 lbs
Cruise Altitude	10,195 m / 33,440 ft	18,000 m / 60,000 ft
Cruise Speed	220 m/s / 492 mph	30 m/s / 67 mph

Current Endurance Record 14 days… Aquila will fly 90 days...



Unmanned Aircraft System (UAS)

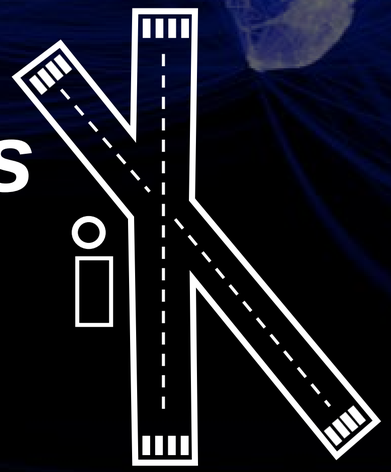
Aircraft

- Propulsion
- Power Collection
- Power Storage
- Avionics
- Structure
- Payload

- Communication
- Aircraft Control

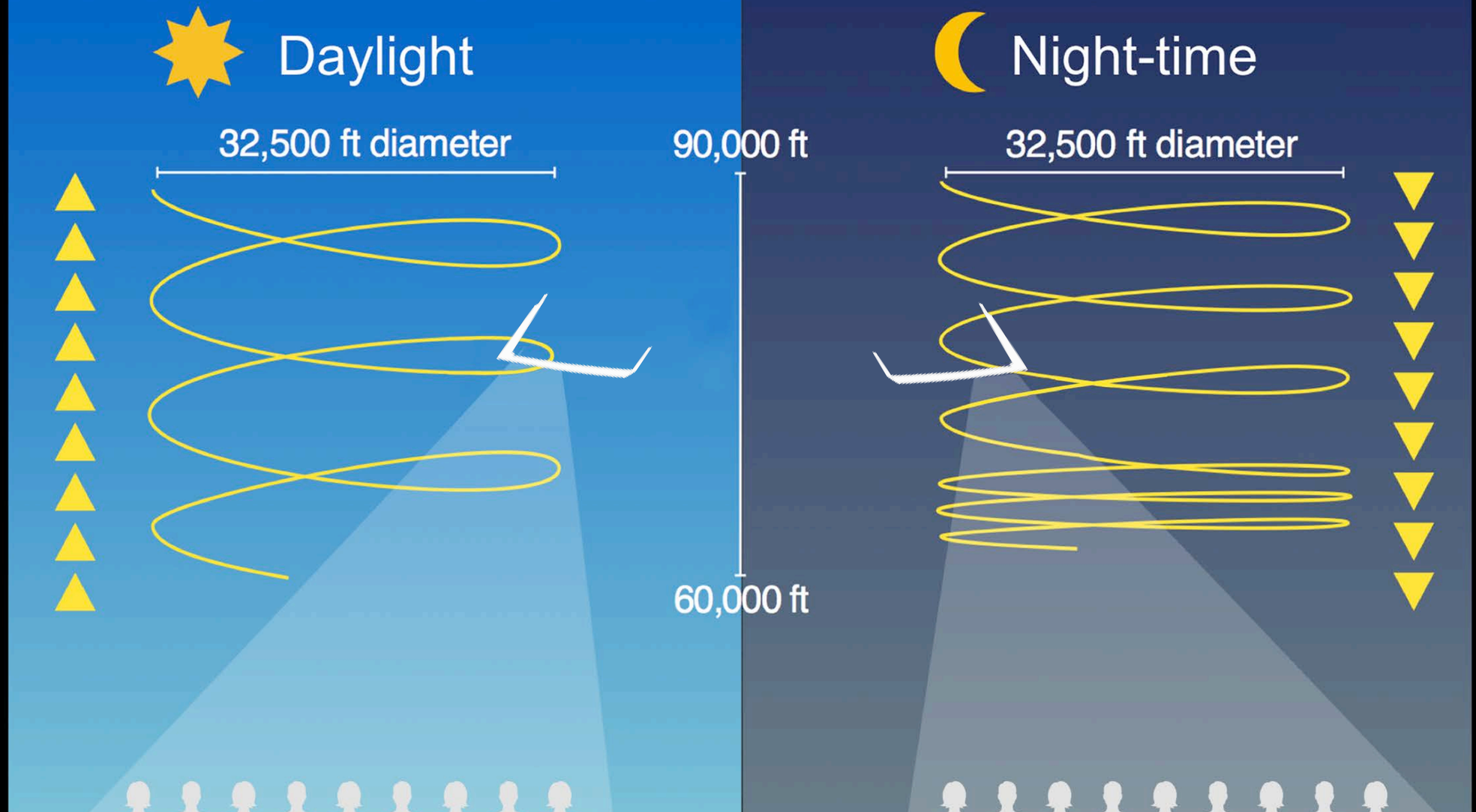
Ground Control Station

Airfield & Ground Ops

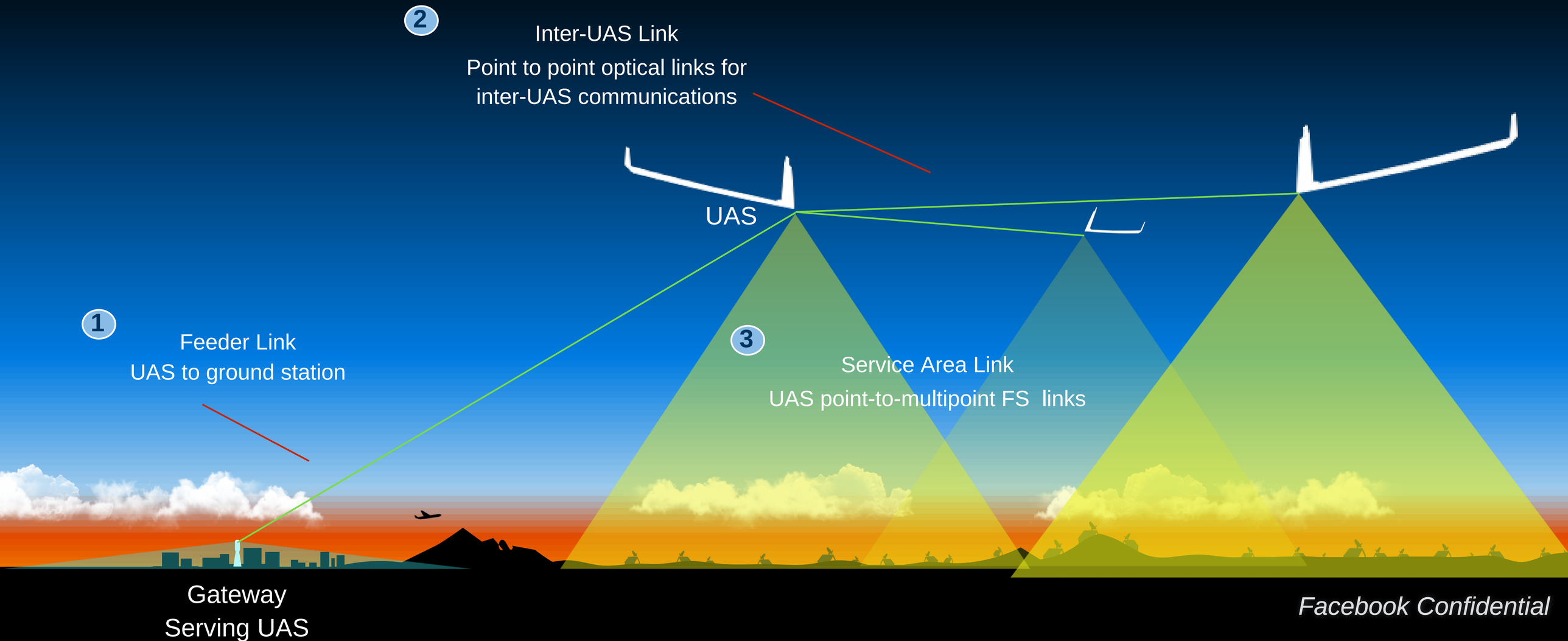


- Airfield & Local ATC
- Support Equipment
- Training & Maintenance

Mission Profile



Connectivity Architecture



Spectrum for use by HAPS was accepted as Agenda Item 1.14 at WRC-19

- ✓ Study additional spectrum needs for gateway and fixed terminal links for HAPS to provide broadband connectivity in the fixed service
- ✓ To study the suitability of using the existing identifications on a global or regional level (including 47.2-47.5 GHz and 49.9-48.2 GHz globally, and 27.9-28.2 GHz HAPS-to-ground and 31-31.3 GHz ground-to-HAPS outside Region 2)
- ✓ To study appropriate modifications of existing footnotes and associated resolutions
- ✓ To study the following frequency bands already allocated to the fixed service on a primary basis
  - ➢ On a global level, 38-39.5 GHz, and
  - ➢ On a regional level, in Region 2, 21.4-22 GHz and 24.25-27.5 GHz
- ✓ These studies include sharing and compatibility studies to ensure protection of existing services allocated in the frequency ranges identified

Ongoing ITU-R Activities

ITU-R Working Party 5C (Fixed Service) was identified by the Conference Preparatory Meeting (CPM19-1) as the responsible group for technical studies.

- *May 2016* Meeting (Geneva): Continued development on a new Report on the deployment scenarios and technical characteristics of new HAPS systems
- Upcoming *November 2016* Meeting (Geneva):
  - Consider spectrum needs for gateway and fixed terminal links for HAPS
  - Begin developing a framework for sharing and compatibility studies
  - Continue development of new HAPS Report describing the new systems

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