



Zephyr, pioneering the Stratosphere

ECHO workshop, Eurocontrol, Apr 20th 2022

Roser ROCA-TOHA,
Head of UAS Product Marketing

AIRBUS

High Altitude Platform Stations (HAPS) fill in a unique capability gap



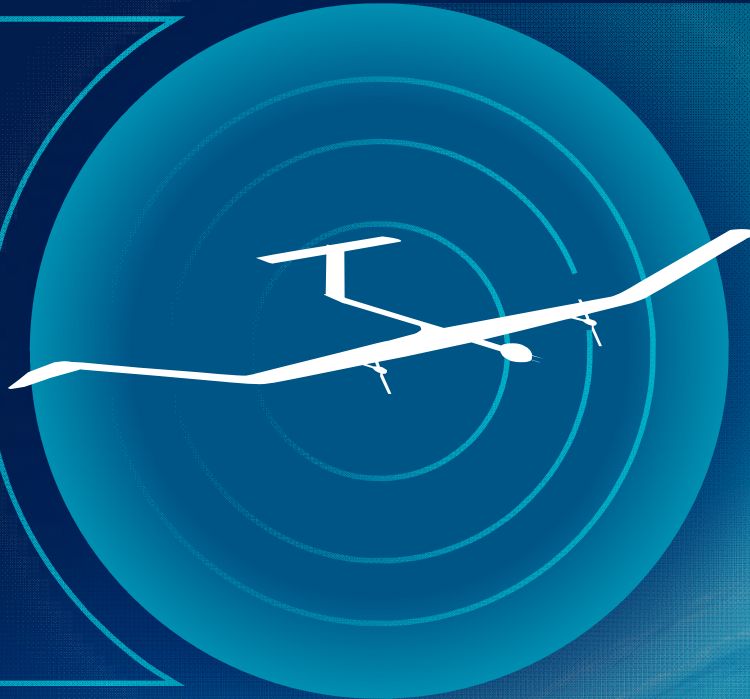
SATELLITE

- Endurance
- Global reach



DRONES AND MANNED MISSION AIRCRAFT

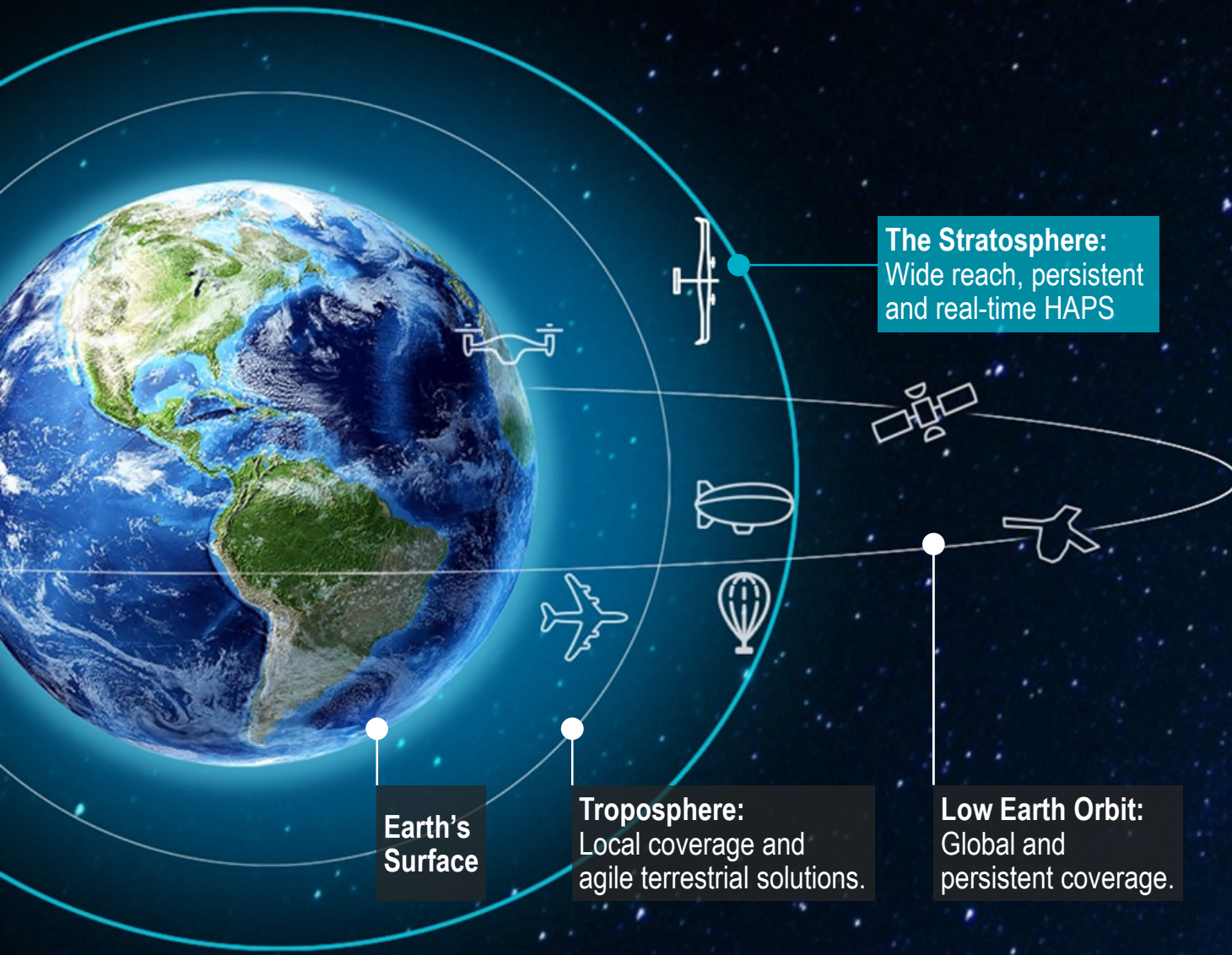
- Low latency
- Affordability
- Precision



- ✓ Wide reach
- ✓ Flexibility and retasking
- ✓ Real time
- ✓ Stationary & persistent
- ✓ Accuracy
- ✓ Low latency
- ✓ Low detectability

Combines the persistence of satellites with the flexibility and accuracy of a drone.

Our passion for non-stop exploration has led to new discoveries



Complementary solutions will work together to compose a layered network of

multi-domain solutions,

enhancing existing infrastructure.

Supports a large diversity of

civil and defence missions.

Meet Zephyr, the Airbus HAPS

✓ Facts

Figures



Sustainable,

Relies

100%
on solar power.



Electrical,

Uses sunlight to fly and
recharge its batteries to
continue operating

day & night



Autonomous,

Has demonstrated almost
26 days of continued,
precise operations in the
Stratosphere.



Connected,

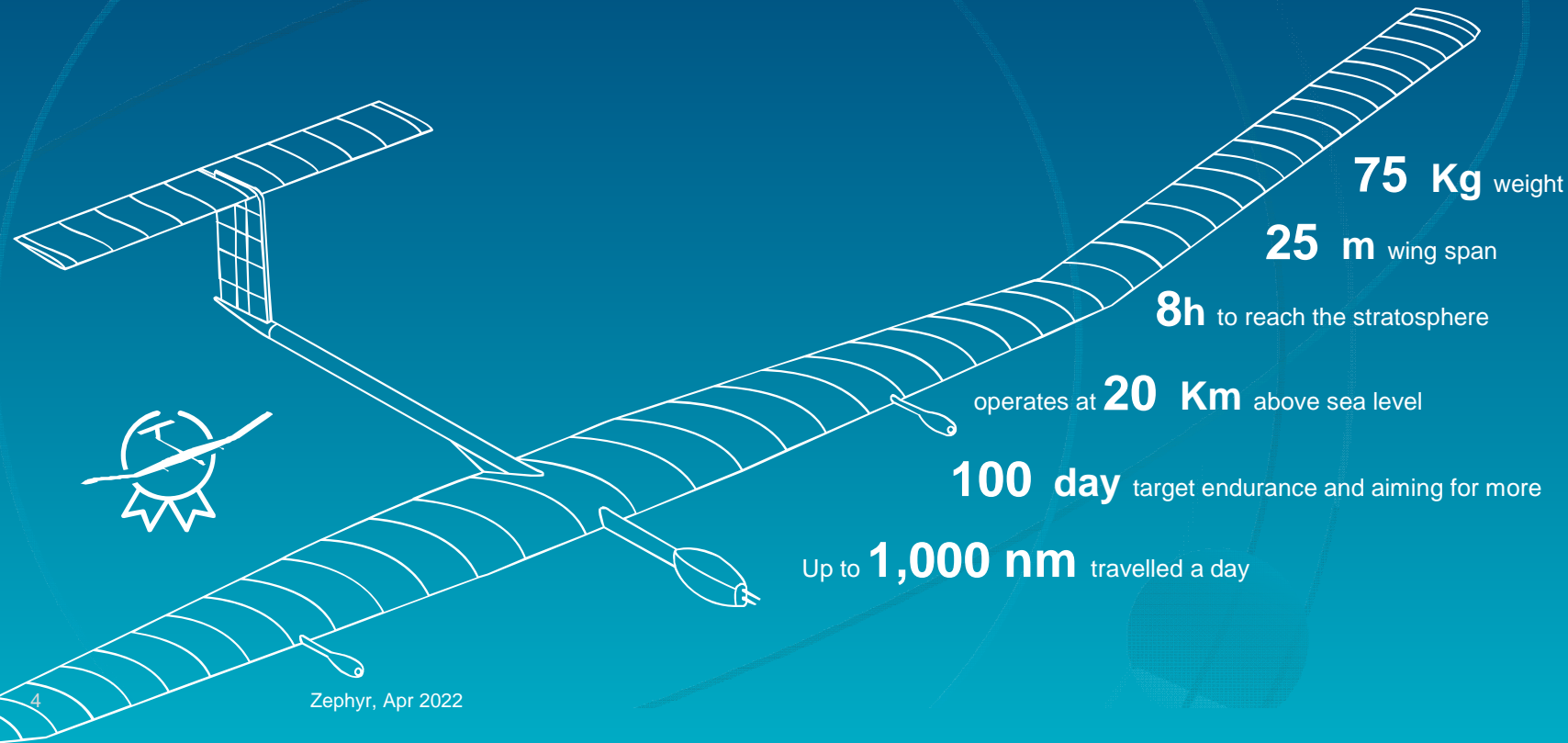
Provides Earth Observation and
Connectivity:

**See, Sense
& Connect**



10 years

of research, **design, prototyping**
and **flying** development activities.

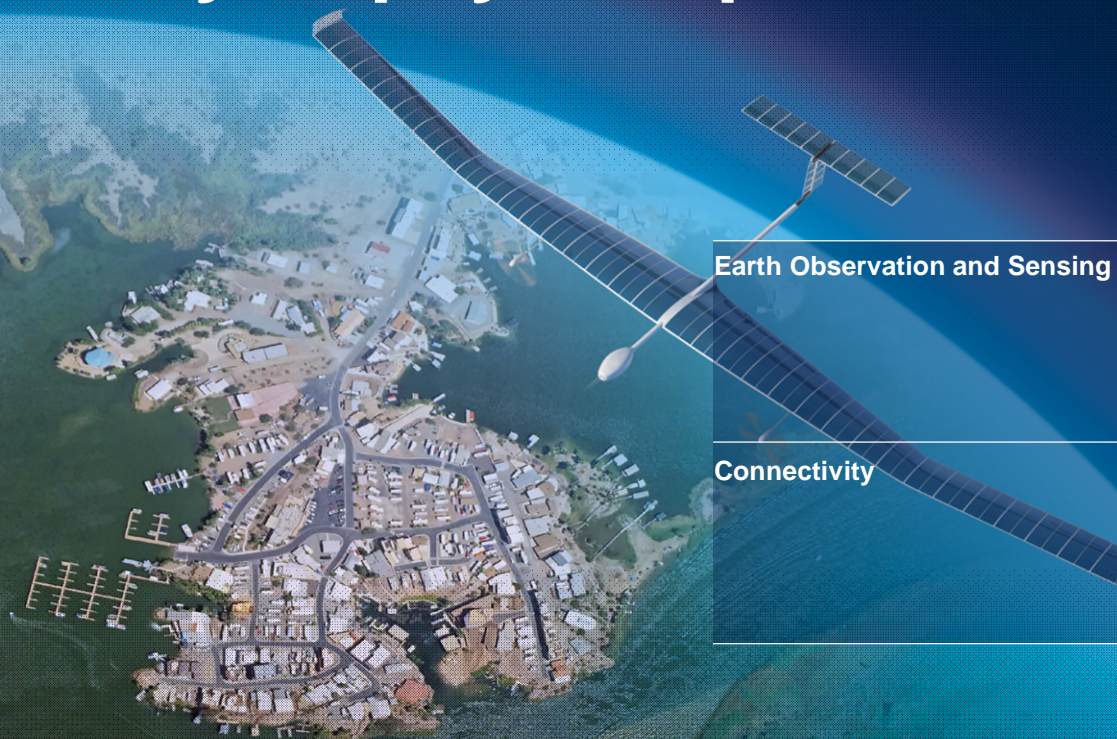


Zephyr, Apr 2022

Zephyr is payload-agnostic
compatible with
Airbus in-house OPAZ system
or other payloads

AIRBUS

A wide array of payload possibilities



Earth Observation and Sensing

Connectivity

Commercial

Oil and Gas
Crop Monitoring
High-res typography
Smart Cities
Comm. LTE bubble
Direct LTE
Cellular backhauling
Broadband services

Institutional

Wildfire Monitoring
Land Administration
Environmental Monitoring
Land Border Protection
Disaster recovery
ADS-B + voice over ocean

Military

Maritime Security Persistent ISR
Land / Coastal Border Protection
SIGINT
Carrier Strike Group
V/UHF
Military LTE Bubble
Mobile COMs/MESH

OPAZ images – © Airbus DS – view from Airbus Zephyr

Zephyr is capable of providing a range of continuous surveillance, communications and monitoring services

Zephyr keeps advancing



1 Operational Launch and Recovery site (WA, Australia)



10 Aircraft Produced



1 State of the art Production Facility (Farnborough, UK)



10+ Patents Filed



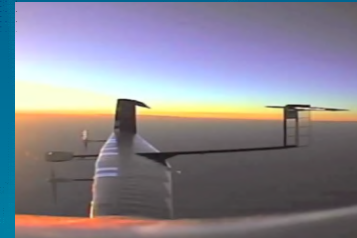
3 World Records (Not overtaken)



3,000+ Stratospheric flying hours recorded



1 HAPS Earth Observation payload Center of Excellence (Toulouse, France & Barcelona, Spain)



Zephyr reached new heights in 2021



The world's leading
solar-electric, fixed-wing
stratospheric HAPS

Zephyr achievements to date:

3

World records

3,000+

Stratospheric Flying hours

Zephyr completed another stratospheric flight campaign in 2021, setting a new world record for absolute altitude for this class of UAS at 76,100ft, and adding an additional 36 days of stratospheric flights to the books.

20,000+

Images, in only one test flight

Secured and exercised FAA flight approvals operating inside the US civil National Airspace.

Demonstrated successful flight with multiple payload integrations and tested new imagery OPAZ payload, streaming earth observation data.

2021 Zephyr flight test campaign achievements

6 flights

2 stratospheric
for 18 days each



Continuing
airworthiness
demonstrated on
two aircraft by
“re-flying” both



FAA approval for
commercial
overflight in US
National Airspace



Precision flying
stratospheric
manoeuvrability
& station keeping
250 way points
for airways work



Highest quality
images received
from OPAZ
payload from
>60,000 feet

5 days

of continuous
live data
streaming from
OPAZ EO
payload



Team growth in a
combined UK, US and
European team with
more people than ever
trained and qualified
to fly the air system

Zephyr will stretch boundaries even further in 2022

2 flights
in national
airspace
and beyond



Beyond Line of
Sight operation



Further technical
improvements to
systems and
operational
processes



Integration of
new
payloads



New technical
solutions
on-board this
year



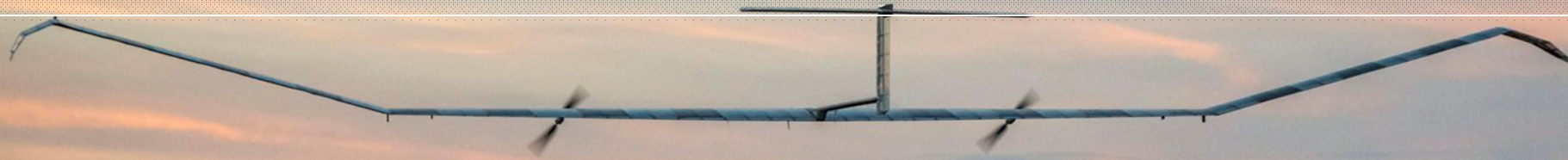
Further
expansion
in the team



Remote
operation of
the air system



Longer flight
durations than
ever before



OPAZ, the Airbus imagery payload for Zephyr

Real world images captured from the stratosphere

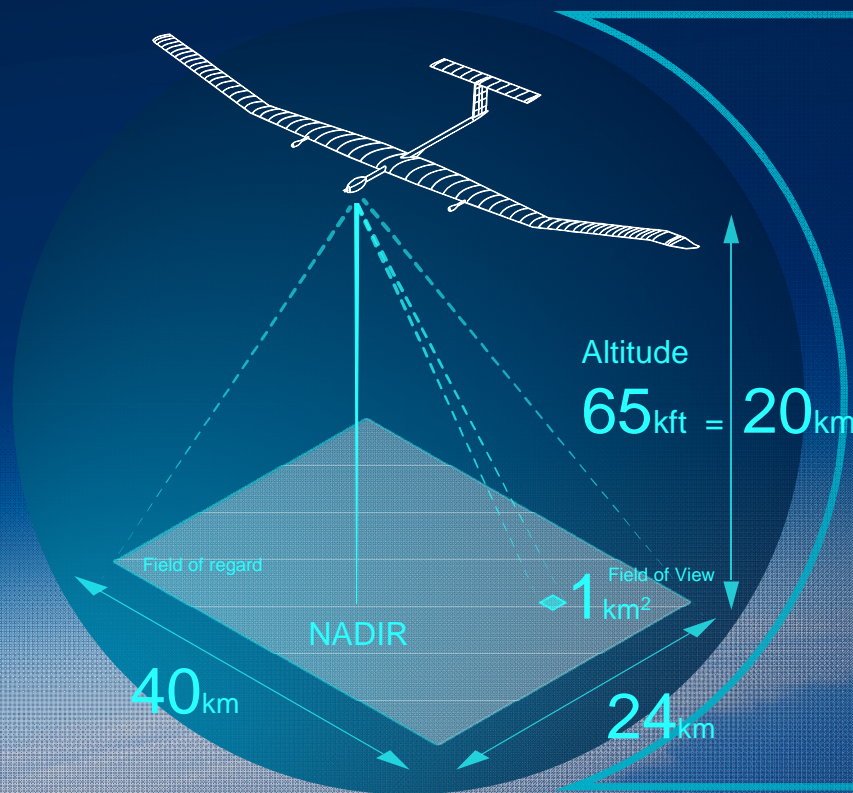


High resolution imagery captured from OPAZ

2021 flights tests confirm possibility to track people and convoy movement on a persistent basis

AIRBUS

Meet OPAZ, the Airbus stratospheric Earth Observation payload



Live video & imagery

Main sensor (steerable)

- Electro-optical RGB @18cm resolution
- Medium Wave Infra-red @70 cm resolution

Secondary sensors (fixed)

- 100km² RGB @ 2m resolution
- AIS sensor

Zephyr + OPAZ + imagery & video processing
The only end-to-end solution on the market

OPAZ Images - © Airbus DS 2018 - view from Airbus Zephyr

OPAZ, a new level of detail

OPAZ Color and Infrared pictures



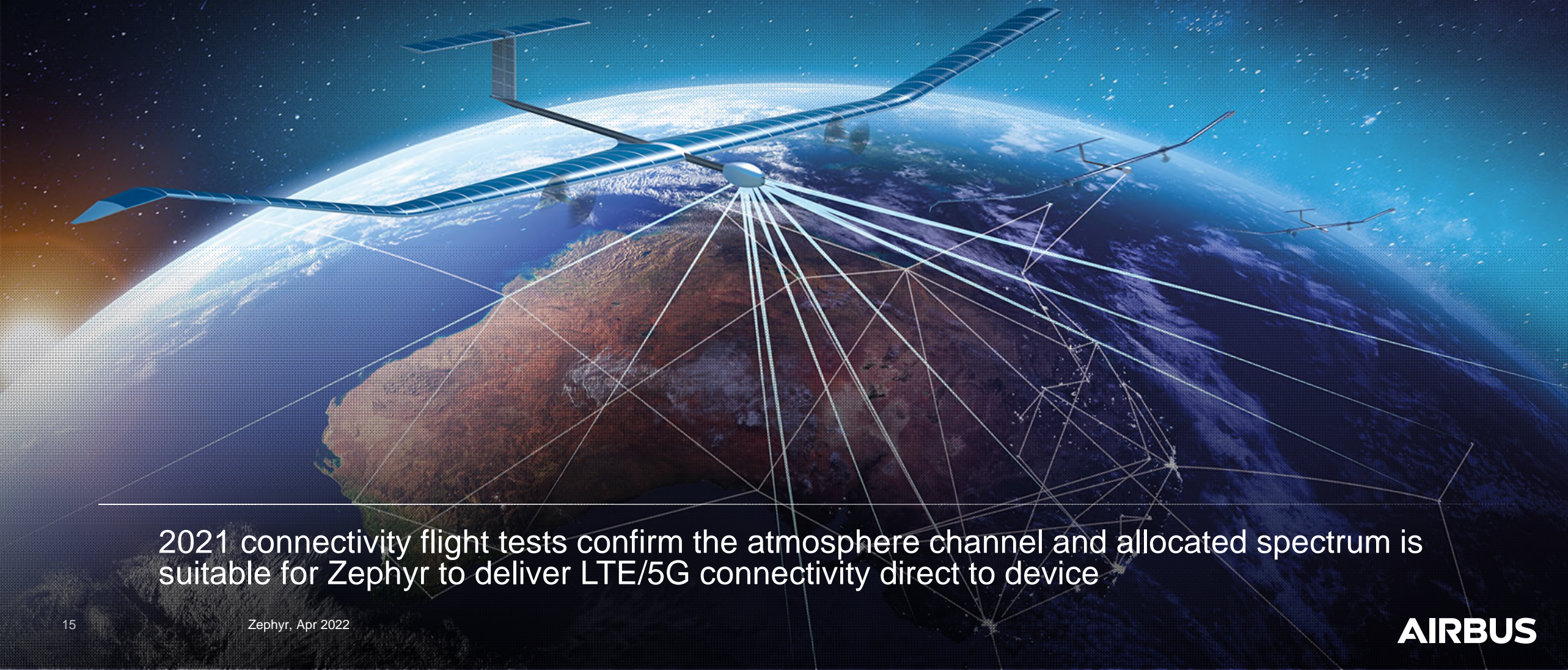
OPAZ V3 – 18cm GSD from 65,000 ft

OPAZ – First 3D Model - Castle Dome, AZ, USA



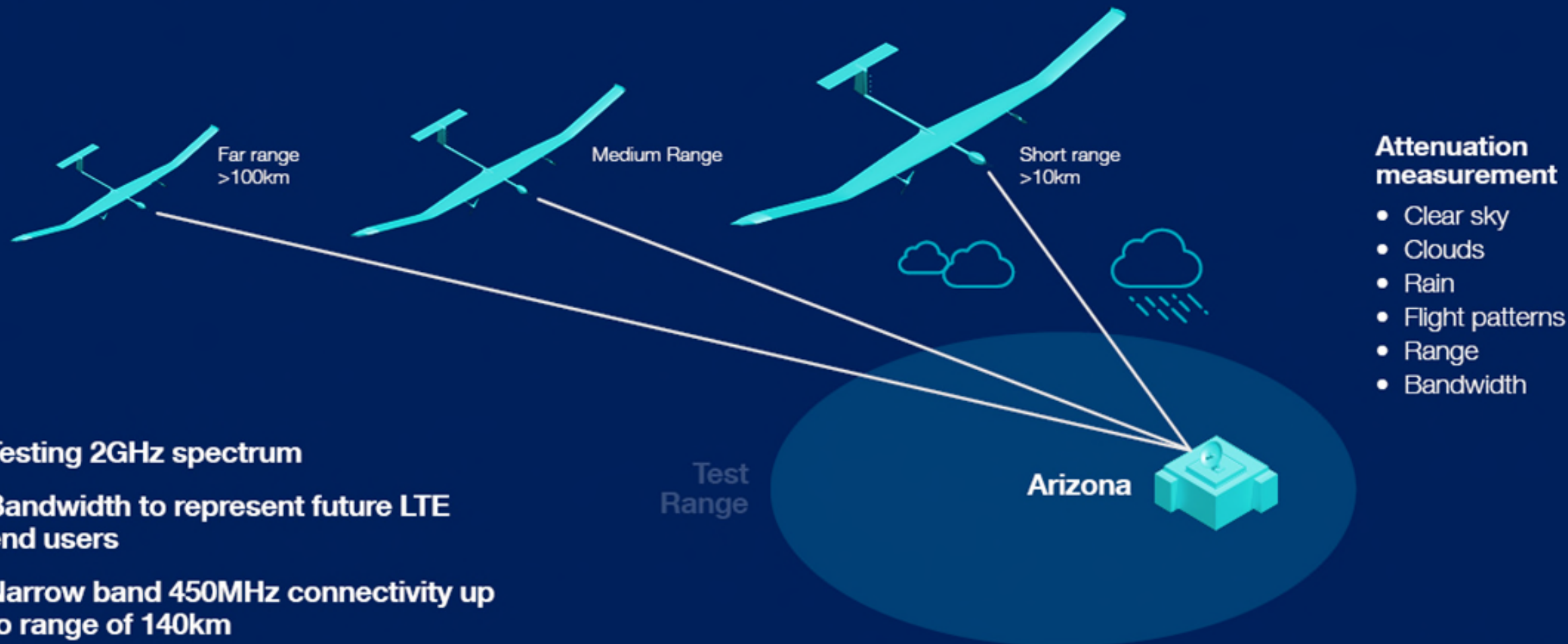
OPAZ Images – © Airbus Defence and Space 2018 – view from Airbus Zephyr

Zephyr, acting as a communications node, will enable terrestrial and sea network extension & interoperability for government and civil users



2021 connectivity flight tests confirm the atmosphere channel and allocated spectrum is suitable for Zephyr to deliver LTE/5G connectivity direct to device

Testing Zephyr Connectivity Services

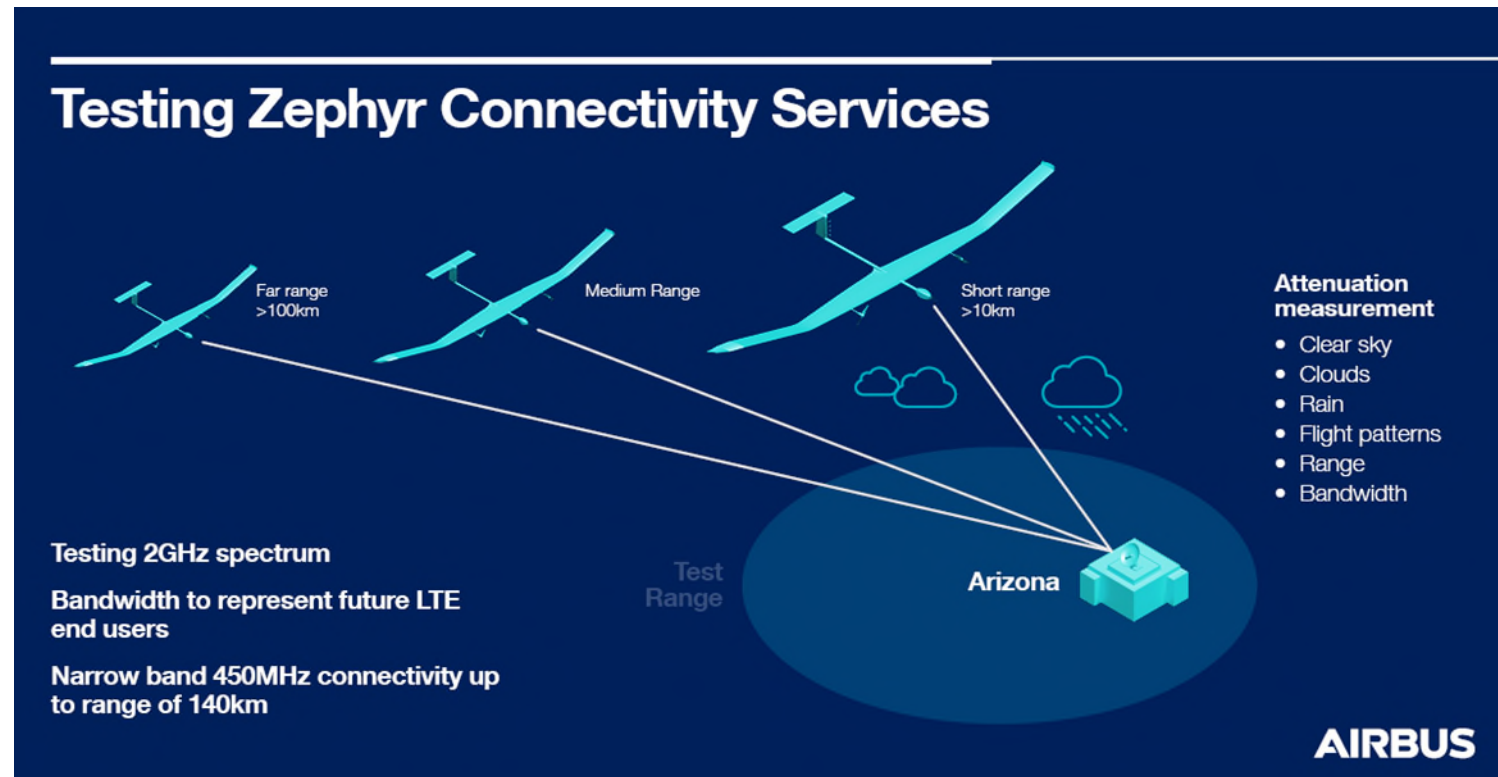


Zephyr connectivity trials from the Stratosphere

US, Aug. 2021:

Airbus and NTT DOCOMO successfully demonstrated the ability to use Zephyr to deliver future wireless broadband connectivity.

- Test demonstrated various bandwidths to simulate direct-to-device service from the HAPS to end users using low, nominal and high throughput.
- The demonstration confirmed the viability and versatility of the 2GHz spectrum for HAPS-based services and also the use of a narrow (450MHz) band to provide connectivity in a range of up to 140km



All indicators at green to proceed to Zephyr operations ramp up



Preparing for operations at scale:

450,000 hrs by 2026
900,000 hrs by 2027
1,350,000 hrs by 2029

Under contract with 5 customers:

Government & commercial
Europe, US, Asia-Pacific

“All air vehicles are limited by physics,
some by fuel,
all others by imagination.”

Chris Kelleher, father of Zephyr

