STRATOSPHERIC PLATFORMS

Welcome to the future of Global Communications

Delivering transformational next generation network capability

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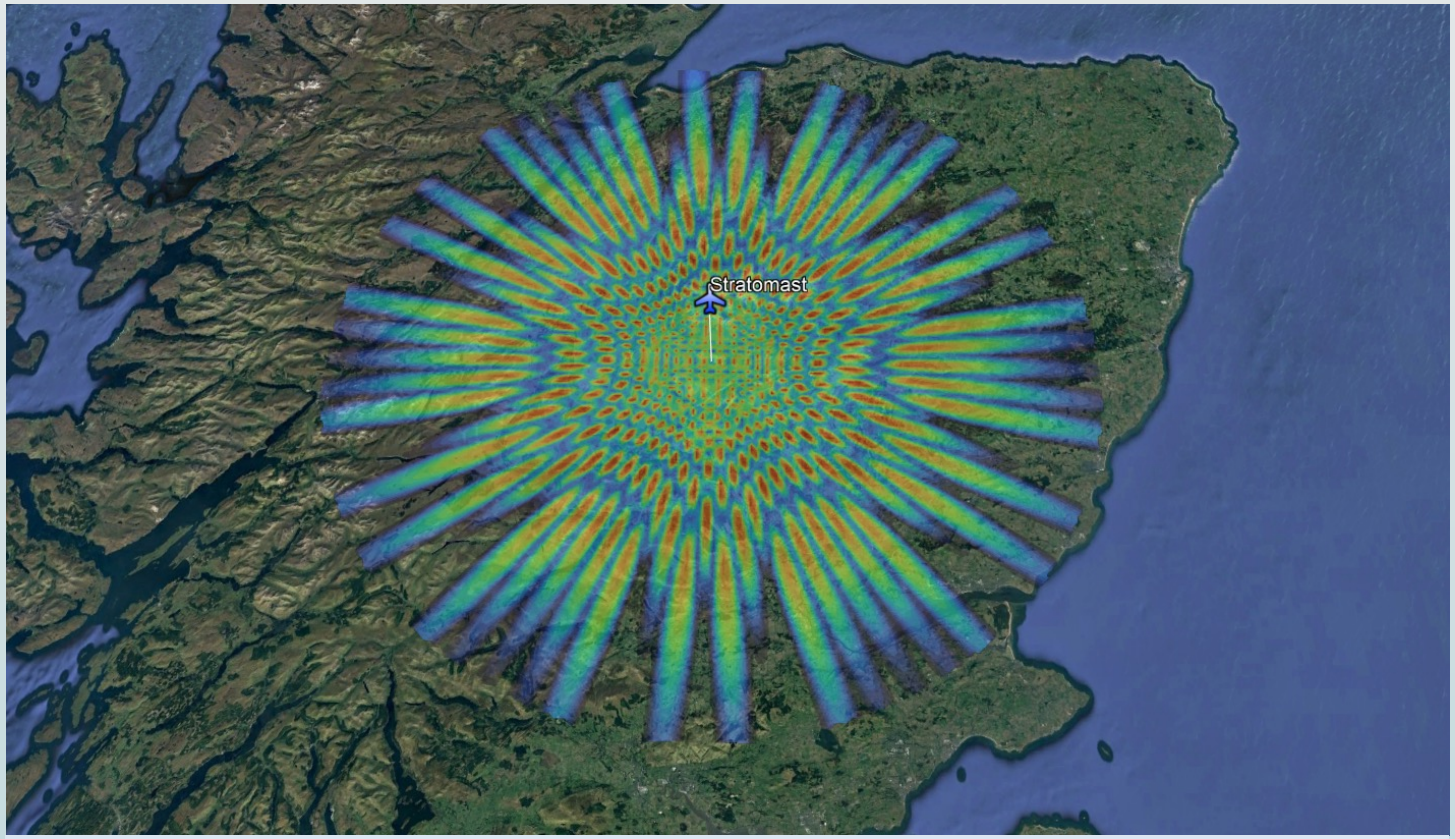
bsi AS/EN 9100 Aviation Space and Defence CERTIFIED FS 717892 ISO 9001 Quality Management CERTIFIED FS 717892

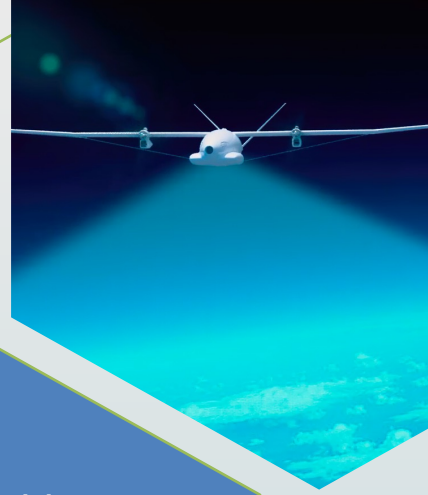
What’s the breakthrough?

Ubiquitous voice & data coverage in complex terrain

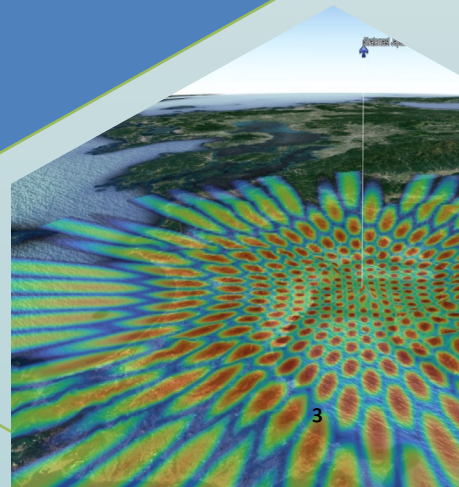


1 HAP provides area coverage equivalent to ~450 terrestrial masts

User experience:
- same as being 300m away from a terrestrial tower
- providing speeds of over 200MbpS
- with coverage at least 15,000km^2



STRATOMAST provides
3G / 4G / 5G / 6G connectivity
direct to user handsets
across vast areas,
opening up new 5G services and
providing significant additional
revenue opportunities for MNOs at
up to 90% cheaper than rural
terrestrial masts.



SPL's STRATOMAST platform delivers a unique telecoms capability

USPs

- ✓ **Ubiquitous signal coverage** vs short range terrestrial masts
- ✓ **Direct handset connectivity** to high speed 4G/5G broadband networks
- ✓ **Very low latency** vs satellites
- ✓ **Low service provision costs**, dramatically so, outside cities
- ✓ **Dynamic configurable flexible service**
- ✓ **Zero emissions** liquid hydrogen propulsion and power system
- ✓ **Ease of upgrade** of **proprietary technology**

PAYLOAD PERFORMANCE

- ✓ Up to **500k simultaneous voice calls**
- ✓ Up to 200 Mbps connectivity direct to consumer handsets
- ✓ Up to **140km beam** diameter covering 15,000 km² area
- ✓ **4G/5G/6G LTE & FWA connectivity**
- ✓ 3m x 3m phased array antenna system with up to 500 steerable beams
- ✓ OpenRAN & Neutral Host platform

STRATOMAST provides clean, safe, certified routine flight in the stratosphere enabling massive, configurable, "Coverage as a Service", at low cost

SPL STRATOMAST – Hydrogen HAPS vs Satellites

9x lower latency, 2x faster download, 7x faster upload & 1,250x higher density

	Latency	Download speed	Upload speed	Throughput per km²	Smartphone connect
STRATOSPHERIC PLATFORMS	6ms[2]	220 Mbps[3]	100 Mbps[3]	~5 Mbps	✓
Typical LEO Satellite	56ms[1]	84Mbps[1]	14Mbps[1]	~0.004 Mbps	✗

STRATOMAST outperforms across speeds and latency, with direct smartphone connectivity allowing for mass market consumer applications

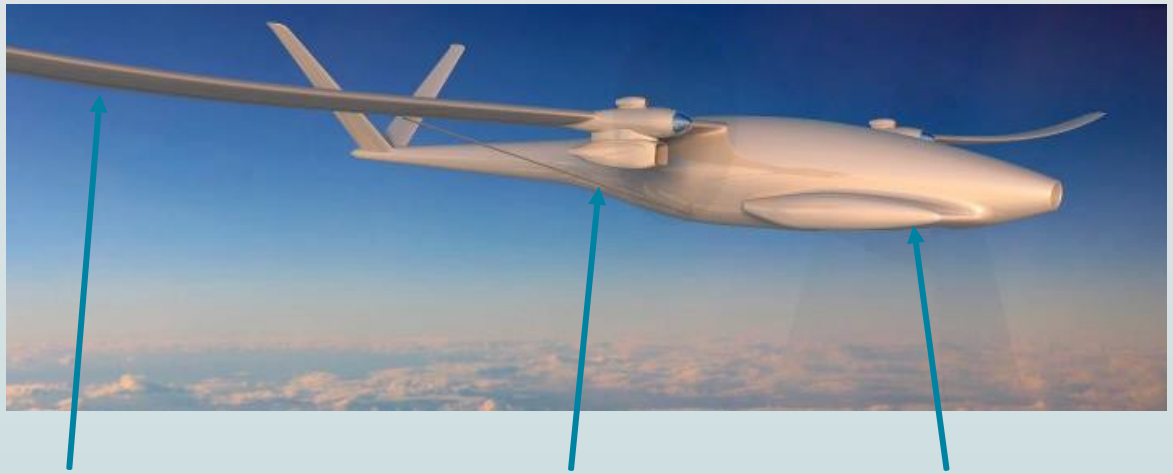
[1] Speedtest.net Canada median speeds (Q3 2021)

[2] Stratomast latency is 1ms – 5ms is approximate 5G network latency

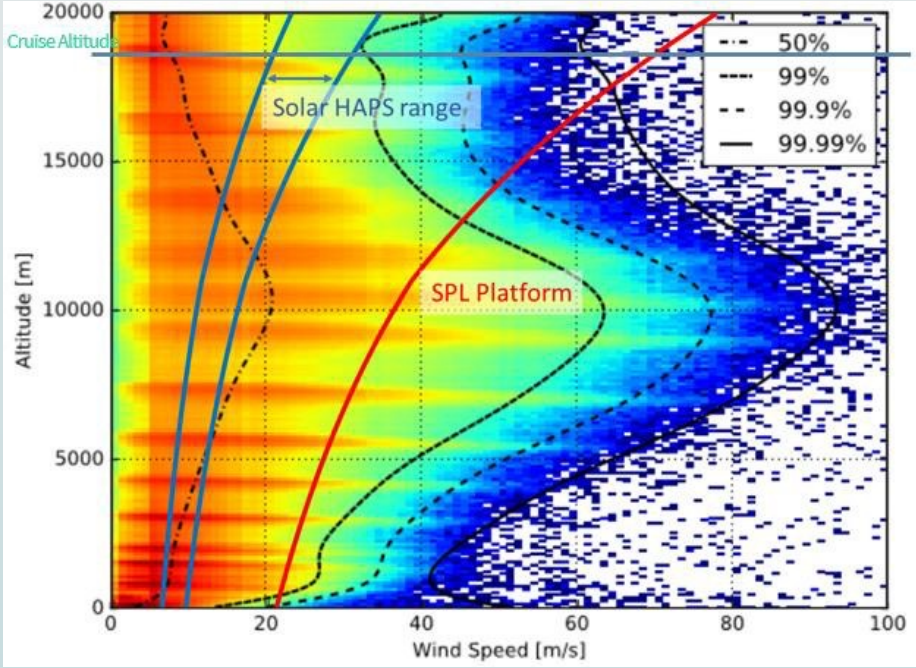
[3] Download and Upload speed dependent on User Element and user distribution (these are maximums, assuming single pol. handset for uplink)

Where are we with the technology?

Stratomast – a unique HAP independent of solar power limitations, latitude & winds



- 2 x 50kW hydrogen engines provides 22kW payload power
- Unrestricted all-weather 365 day operation
- No operational latitude restrictions
- Capable of station holding in all stratospheric conditions
- 20 year+ airframe life
- Certified for flight in civilian controlled airspace



Stratomast cruise speed more than capable of overcoming winds in the upper atmosphere

Hydrogen powered system developed to provide >99.9% station-holding in Northern Hemisphere

Worlds largest civil airborne comms system

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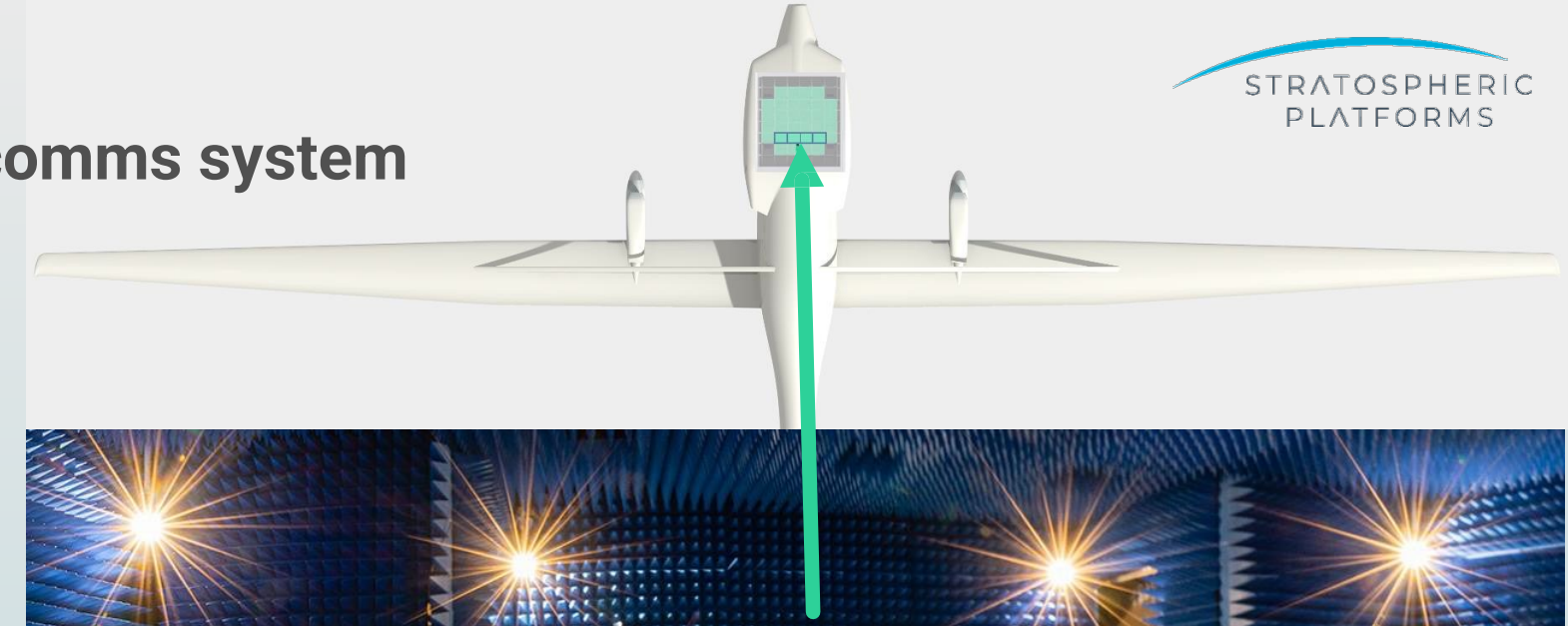

- Phased array with all current standards (including 3G, LTE/4G, 5G)
- Compatible with all consumer smartphones without any hardware or software changes
- 22.5kw power supply with stratospheric cooling weighing 140kg
- 500 independent steerable beams: dynamically maintains cell location
- Tested in lab environment and delivers required results

With >100 Gbps, highest capacity 5G enabled airborne antenna in the world

Patented next-generation system

Shown above: 256 antenna elements out of 2,048 total

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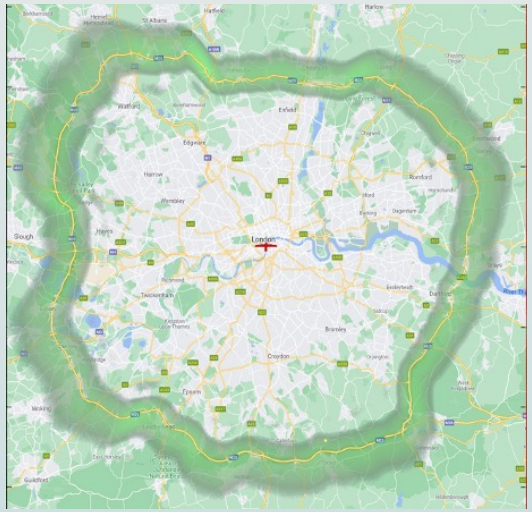
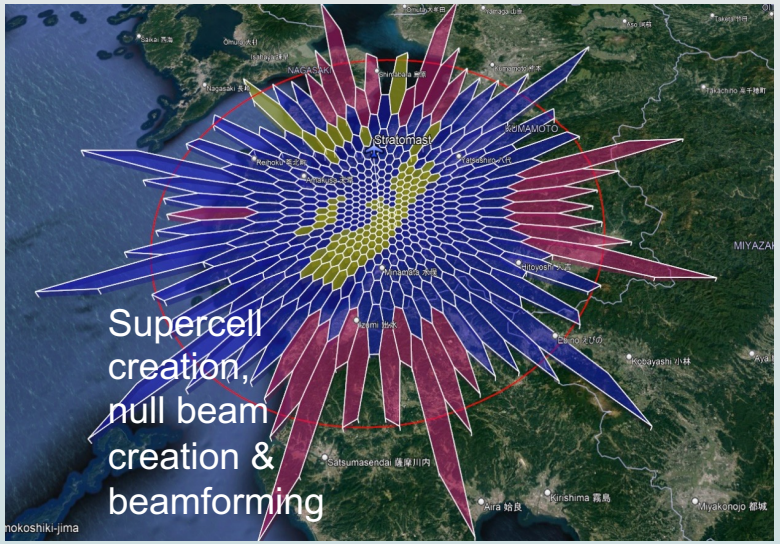
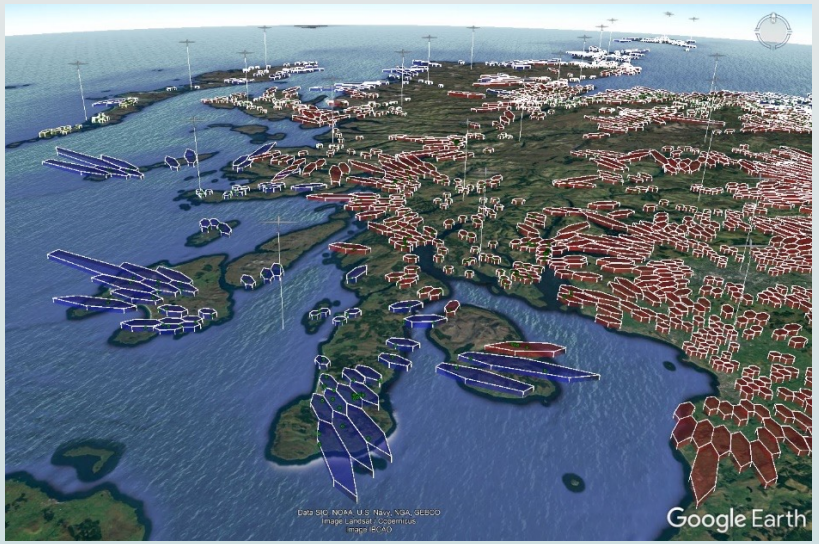
…with virtually any 3G/4G/5G dynamic beam patterns that can be changed in-flight



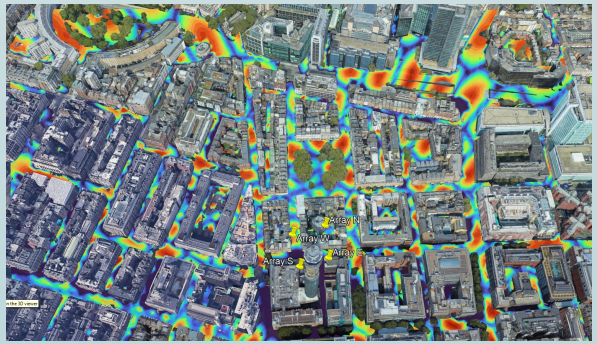
M25 motorway -shaped beam



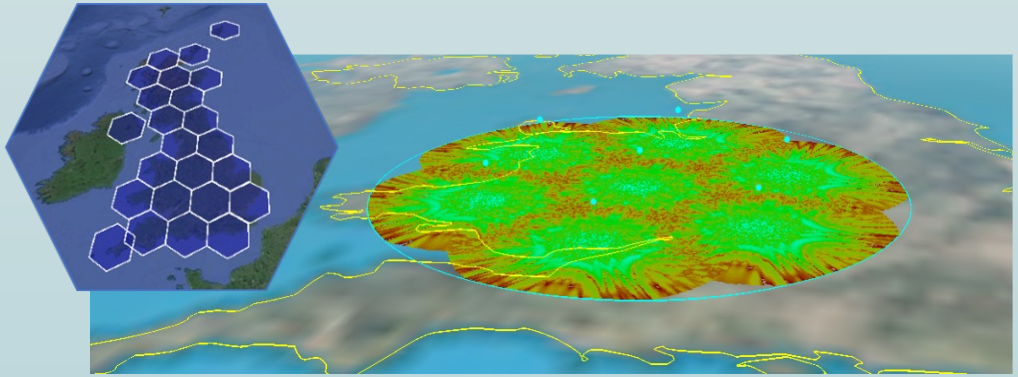
Power Control modelling – over Japan



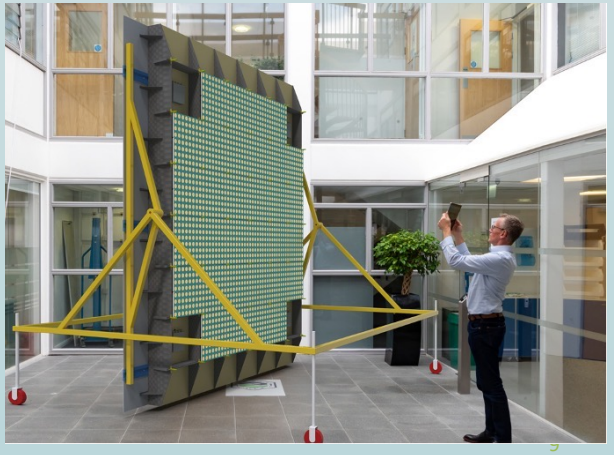
500 beams placed on individual postcodes



UK BT London terrestrial modelling



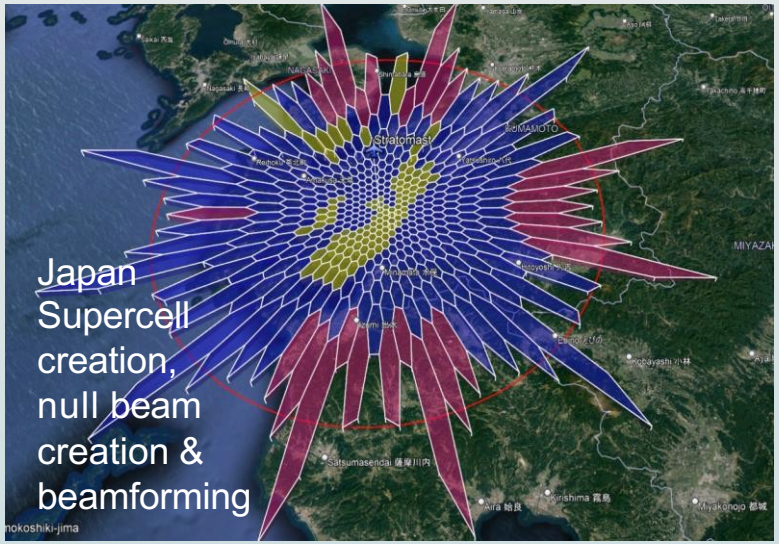
UK wide area coverage modelling
M25 motorway -shaped beam & midlands coverage



3m x 3m phased array antenna

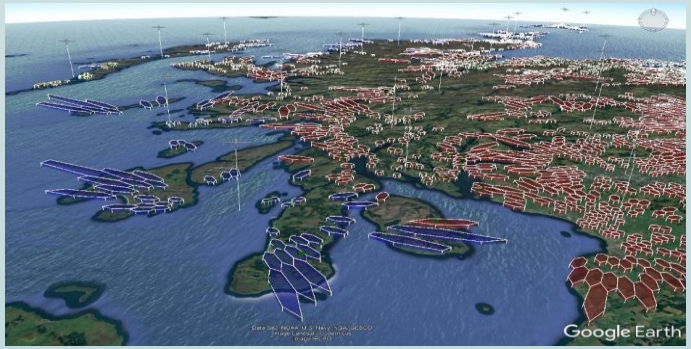
…with 500 individually steerable beams to create virtually any coverage

USA Hurricane / disaster resilience 15,000km² coverage

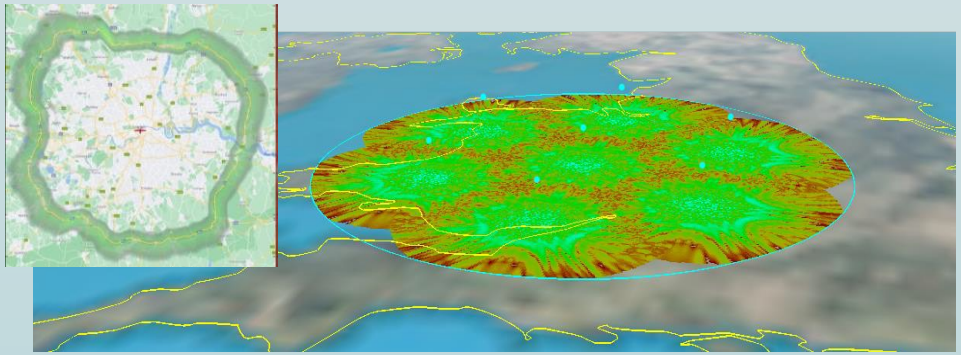


Japan Supercell creation, null beam creation & beamforming

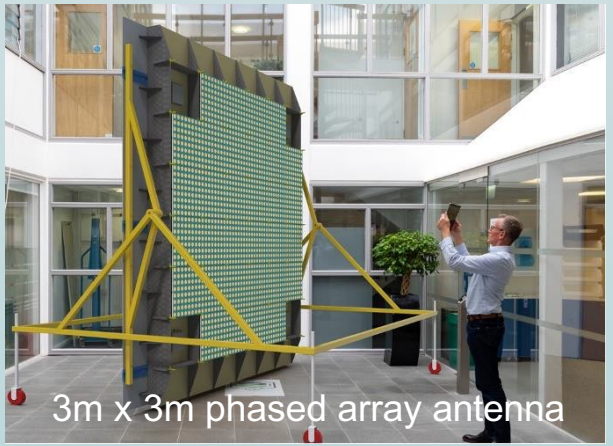
UK DCMS modelling



DCMS modelling for Scotland
hard to reach areas 1 beam on each ZIP code to cover rural communities



UK coverage modelling
M25-shaped beam & midlands coverage



3m x 3m phased array antenna

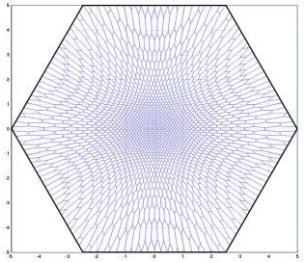
World's First 5G service from the Stratosphere

- 90 Mbps peak download speeds
- 1 ms latency
- 5G video calls from base camp to Riyadh and boat off coast
- 5G video calls from a AW139 helicopter to Riyadh and boat off coast
- Three-way calls connecting the base camp, to the boat and to Riyadh
- Guest of Honour: HE Mohammed Al Tamimi

- Service provided for 4 hours from 45,000ft
- Coverage area 450km²

DELIVERED FEB 2022

TODAY		TOMORROW
RED SEA DEMO	→	**STRATOMAST PRODUCTION ANTENNA**
5G Proof of Concept antenna	→	**3.6m x 3.6m active phased array antenna**
• Creates 1 Cell	→	• 500 Cells
• 450 km² coverage	→	• 15,000 km² coverage
• 10 users connected	→	• 500,000 users connected
• 90Mbps DL	→	• Up to 180 Mbps DL per cell



Creating history

On 5th February 2022, Stratospheric Platforms, working with its partners Deutsche Telekom and in collaboration with the Saudi Communications & Information Technology Commission and The Saudi Space Agency demonstrated the world's first 5G service from the Stratosphere, over The Red Sea Project area

HAP/Satellite Connectivity System

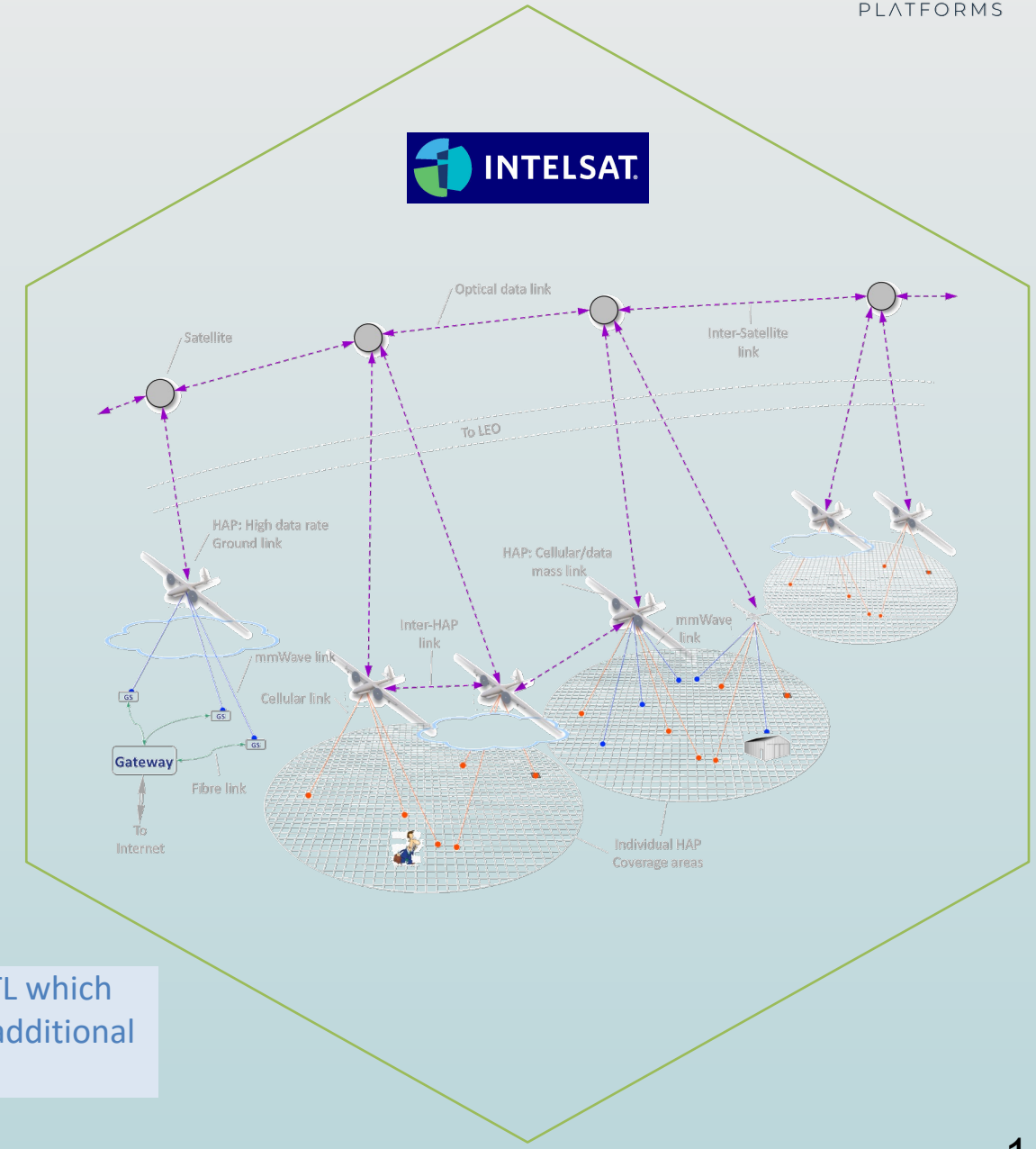
SPL's joint patent application with Surrey Satellite Technology enables satellite transmissions to be broadcast across wide areas on mobile phone frequencies

Very fast optical links between HAPs and satellites enable moving very large data sets globally with low latency

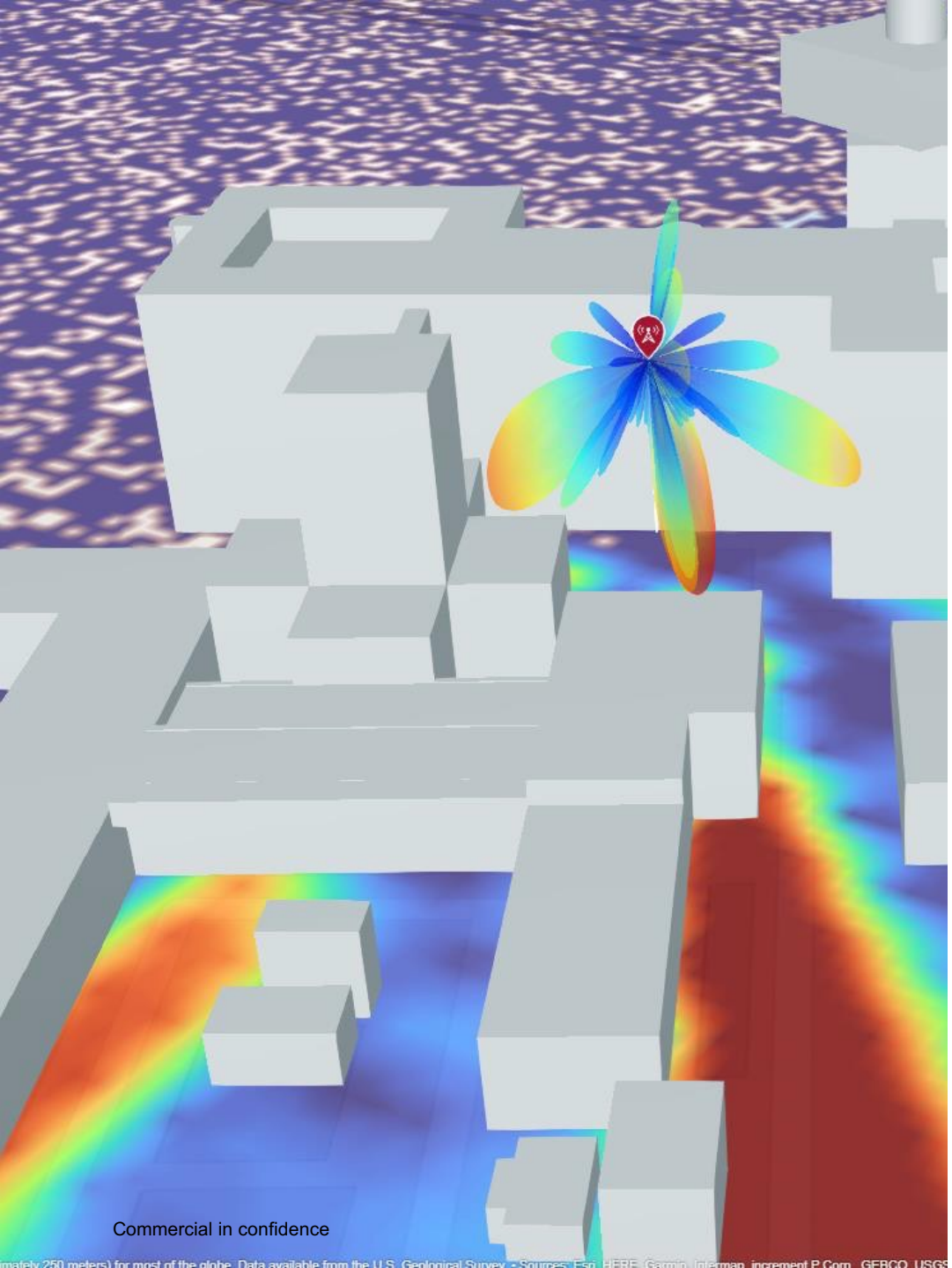
Linking HAPs with satellites, to enable high-speed direct satcom to handset connectivity

Breakthrough opportunity for satellite network operators to connect constellations direct to consumer handsets

Can interface with existing satellite networks (i.e. OneWeb / Starlink / LEO & MEO satellites)



SPL has developed the Globecell technology in partnership with SSTL which enables satellite to HAP to consumer handset connectivity. Multiple additional satcom use cases



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BT

High Altitude Intelligence Cross-Sector innovation Challenge

- SPL, with its partner BT are taking part in the Innovate UK HAIC programme.
- November this year we intend to demonstrate the array from an elevated position attached to BT AdAstral tower.
- We will demonstrate 5G beam steering and beam forming.
- UE Handover between multiple array formed cells and handover between the array and terrestrial towers.

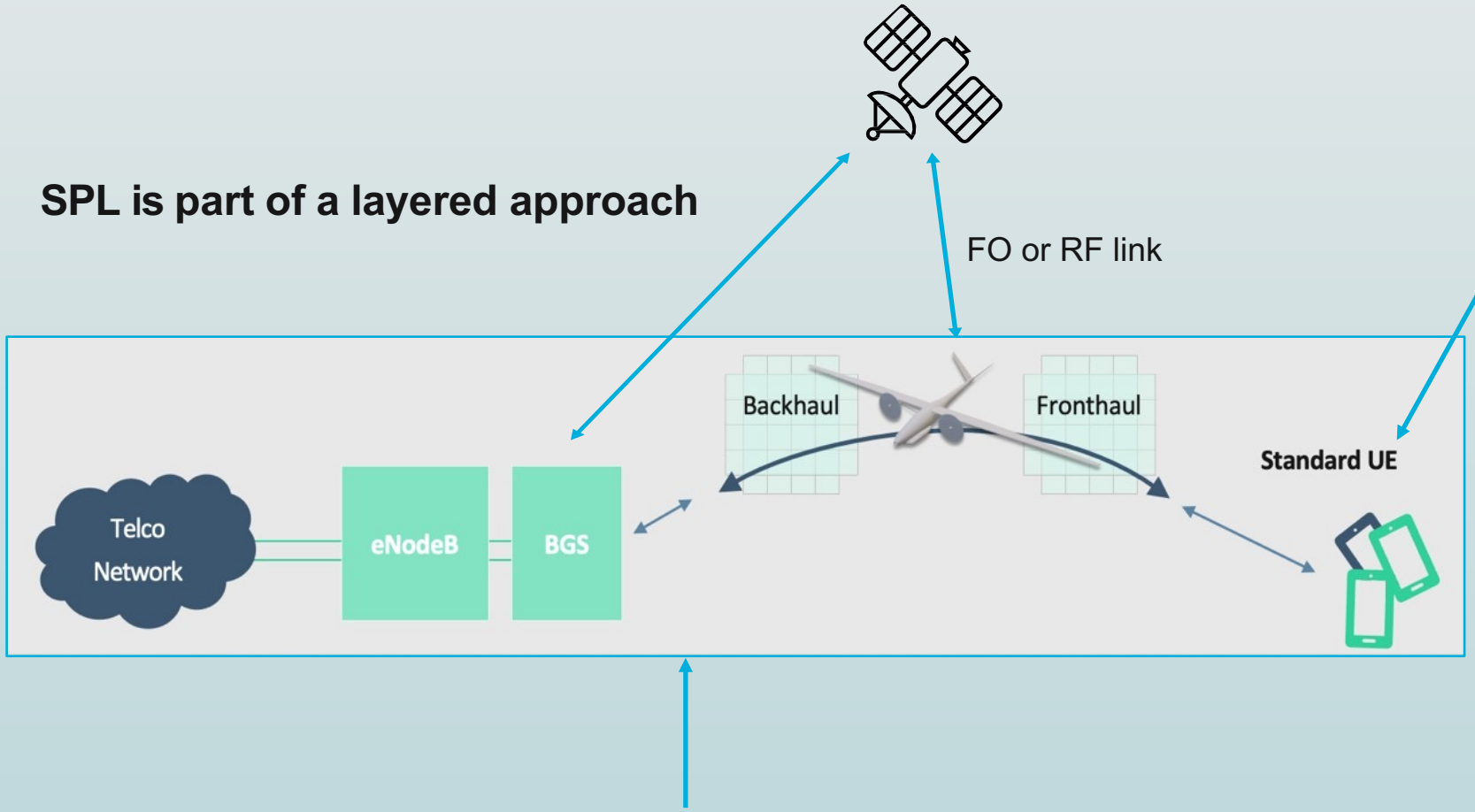
Spectrum Requirements – for 5G Use Case

Same frequency as terrestrial tower eg (2.1 or 2.6 GHz (LTE Band 1 & 7)) – higher frequencies possible.

Fundamentally we are a tower in the sky integrated into existing MNO systems

Future higher 5G frequencies planned.

SPL is part of a layered approach



mmWave backhaul – highly directional links – 40 – 60 GHz depending on different countries needs

<u>UAV command and control</u>

Low data rate (~100kbps)

Mixture of Satellite systems (Iridium/Inmarsat type systems) and Line of Sight Link (C-Band links)