



# UK Experimental Platforms

- National Dark Fibre Facility (NDFF)
- Joint Open Infrastructure for Network Research (JOINER)
- SONIC Labs
- UK Telecoms Lab (UKTL)

## NDFF provides:

- Software defined 1,300km optical long-haul network plus linked metro networks, plus connections to other national and international networks.
- Physical layer access, through access points at five universities, national labs and major internet exchanges. Also interfacing with future wireless networks.
- Access for researchers throughout the UK via Layer-2 connections and JOINER network, with equipment hosted at access points and remotely.
- Metro to national scale network that can be configured and managed remotely and dynamically, to allow simultaneous quantum and conventional transmission, including future protocols, control plane and resilience testing.

**More Information:** [a.seeds@ucl.ac.uk](mailto:a.seeds@ucl.ac.uk) [www.ndff.ac.uk](http://www.ndff.ac.uk)

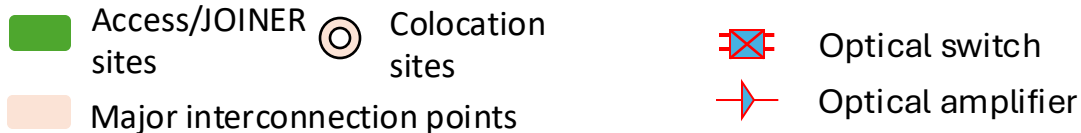
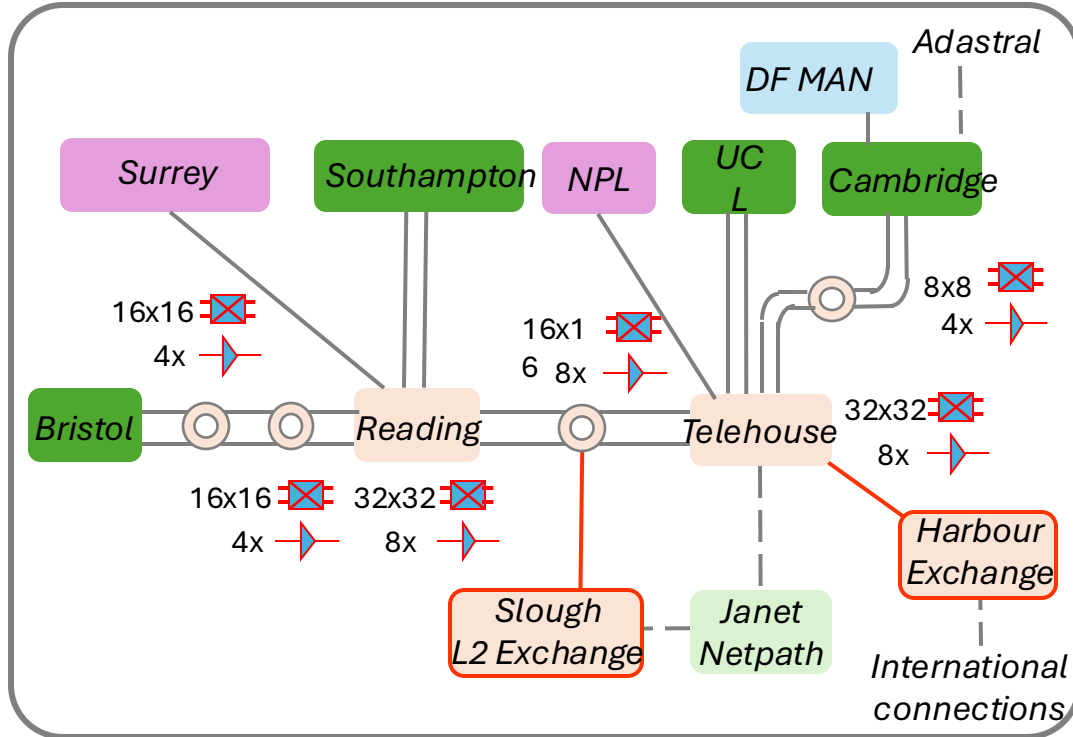




# NDFF

EPSRC National Dark Fibre Facility

# Remotely Configurable Network



- All nodes have optical switches and amplifiers installed.



*Polatis optical switch*



*LeaPhotonics C-band EDFAs*

- All nodes have L2 switches hosting up to 48 channels using 10 Gbit/s SFP+.



- All nodes have switchable optical dispersion compensation.

Experiment management system includes scheduling, planning, measurement, resource allocation and booking thus supporting large scale remote experiments

# Project Overview





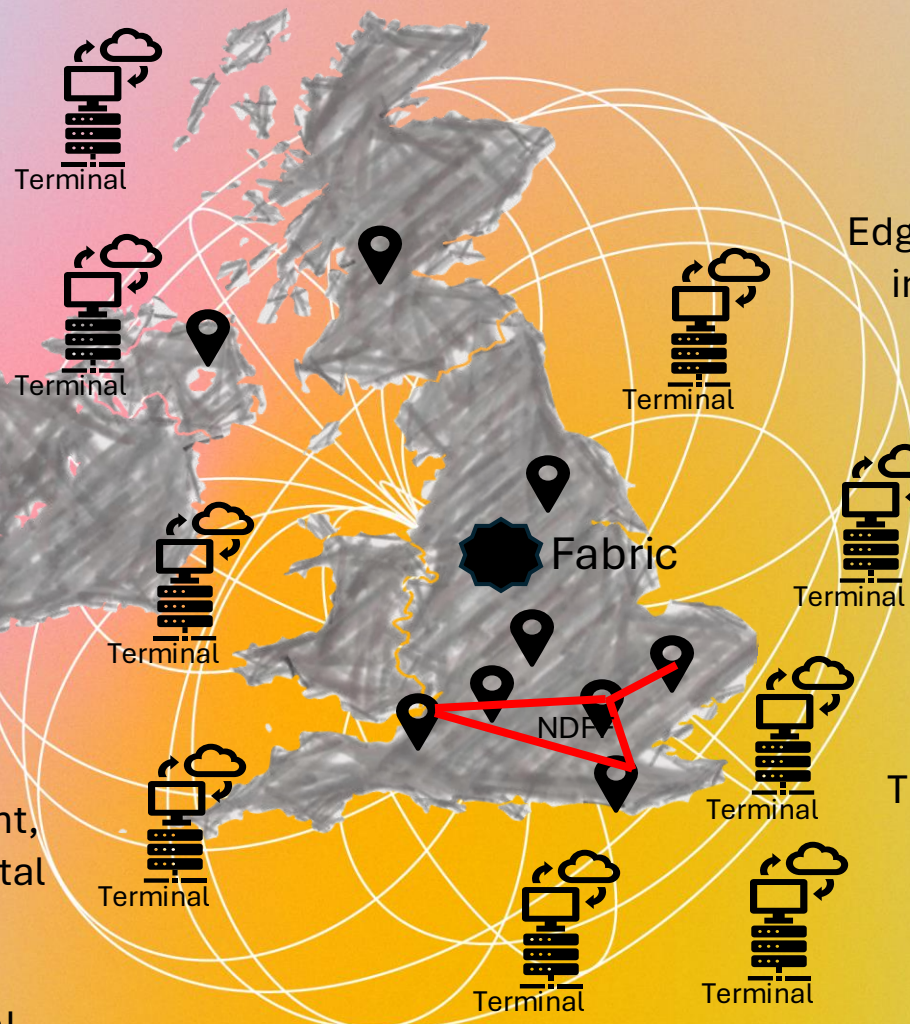
# About Joiner

- JOINER is a **national scale experimentation platform** aiming to support the needs of the Federated Hubs and other Future Networks R&D initiatives such as DSIT and Innovate UK programs.
- It enables innovation in communications and computing within a collaborative experimental environment.
- It is developing capability to support the wider telco ecosystem in the UK, including academia (inside and outside the existing Hubs) and industry including SMEs.
- JOINER will allow us to explore new research questions challenging end-to-end assumptions and developing system thinking to Future Networks research. Therefore, JOINER will be not only a key research enabler but also a research project on its own right.
  - Evaluation of Machine Learning algorithms for large scale networks
  - System-wide energy consumption optimisation in 6G networks
  - Global automated spectrum management and assignment techniques
  - Evaluation of end-to-end and multi-layer network security solutions

# UK-wide 6G Innovation

**JOINER** info@joiner.org

**Glasgow:** RF research and  
Wireless Networks (UoGlasgow),  
Scotland 5G Centre



**QUBelfast:** Antennas, Channels  
(microwave, mmWave and THz), XL-MIMO,  
Cell-free Massive MIMO, RIS and Sensing

**Cranfield Uni:** Timing &  
PNT, Satellite and  
Autonomous Systems

**UoBristol:** E2E Networks,  
Convergence, Control, Management,  
5G O-RAN testbeds, BDFI large digital  
Twin facility, Quantum Nets, AI  
Isambard Supercomputer, CSAC  
Telecoms Lab, NDFF, International

**UoOxford:** Quantum Computing,  
free space optical comms

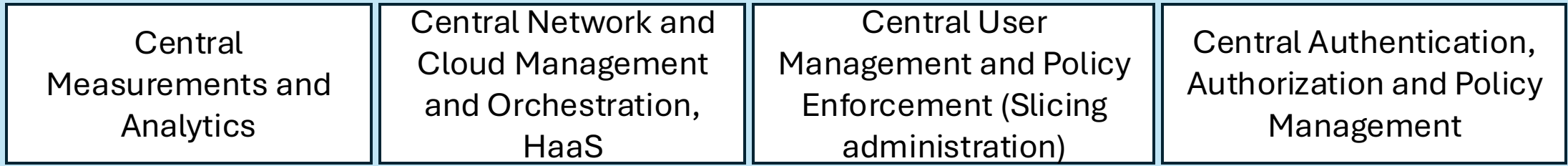
**UoLeeds:**  
Edge, Cloud, THz, mmWave,  
immersive and agritech  
applications

**UoCambridge:** Quantum  
Comms, III-V Photonics,  
Optical Wireless, NDFF

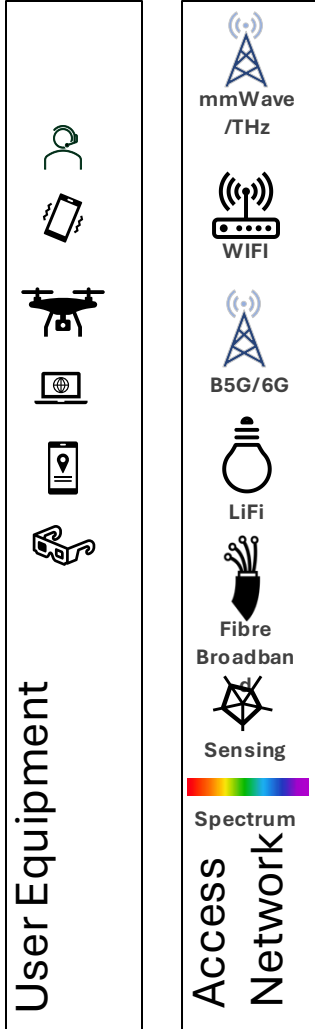
**London:** Imperial (Cloud, Information  
Theory, AI/ML), UCL (THz, NDFF), Digital  
Catapult (SONIC)

**UoSouthampton:**  
New fibre, Optical comms, Wireless &  
Satellite comms, Silicon Photonics,  
NDFF

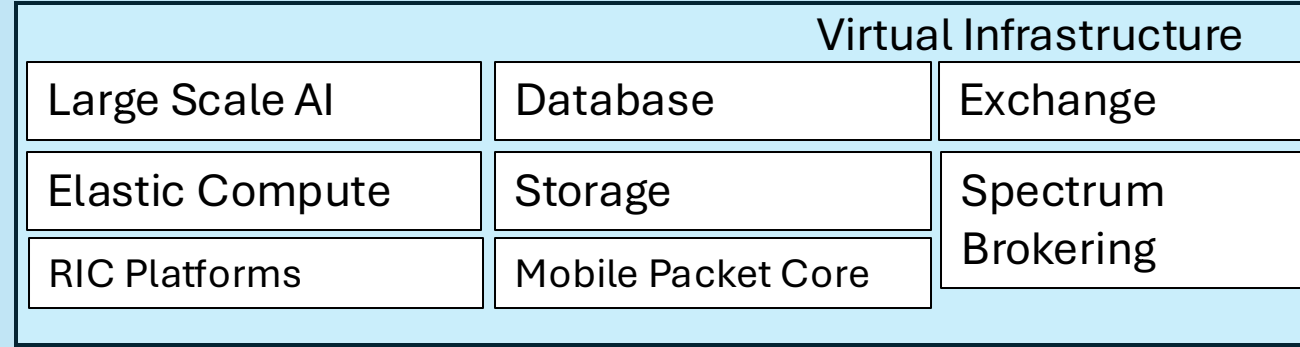
# JOINER Brain: Measurement, Orchestration and Management Platform



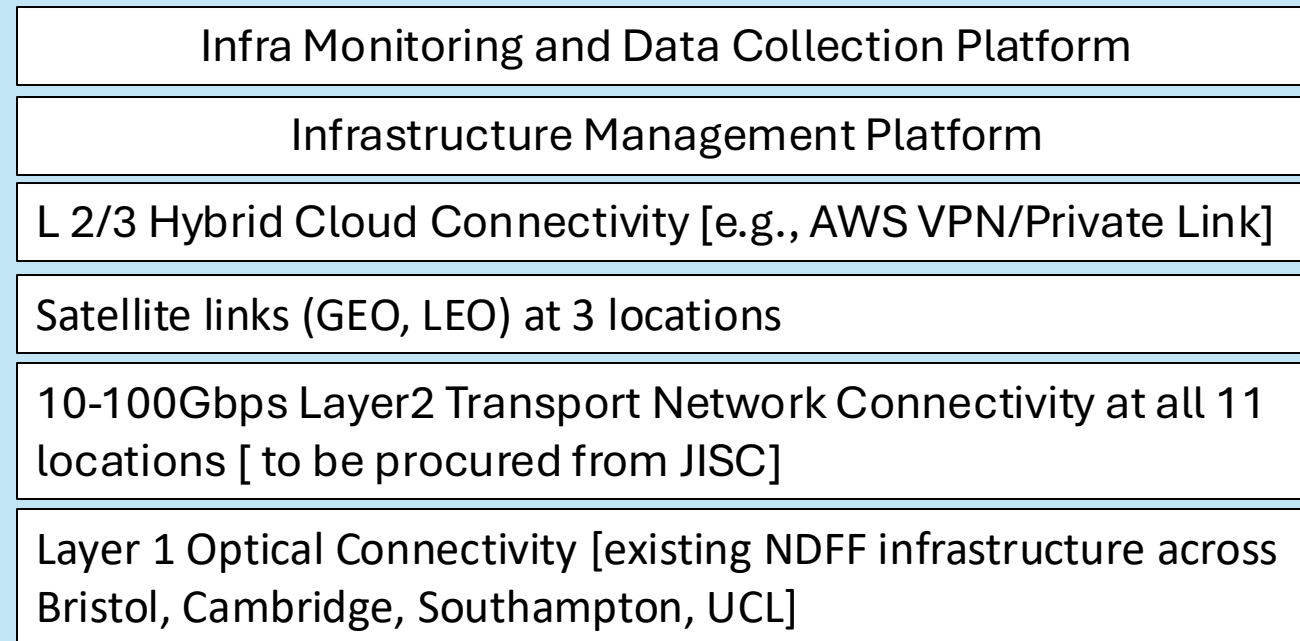
Labs and/or testbeds in the JOINER Hosting Sites



JOINER Terminals

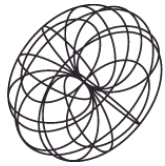


Public Cloud  
Hybrid Private-

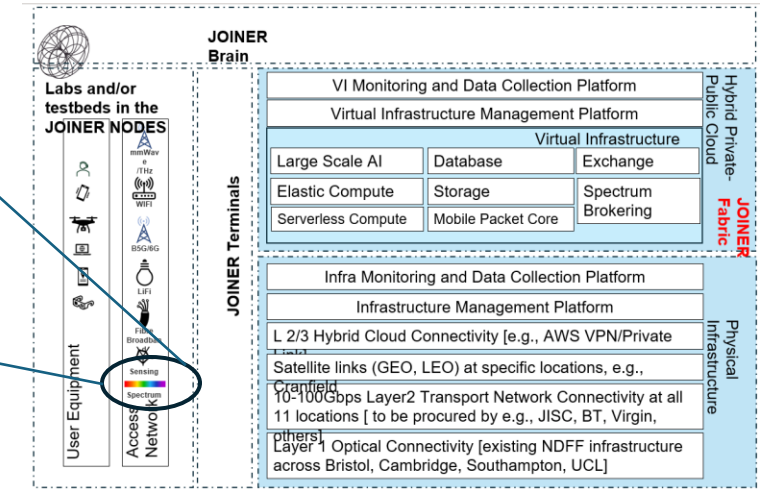
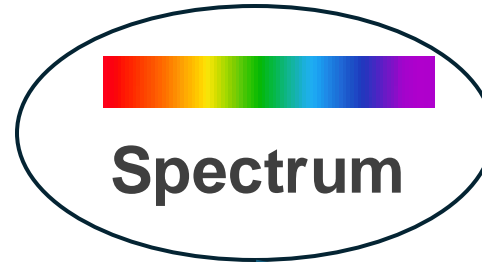


Physical  
Infrastructure

JOINER Fabric



# JOINER for spectrum access



- JOINER capabilities for spectrum access research have been envisaged since the conception of JOINER
- We are now:
  - Identifying what specific roles JOINER can play in such research;
  - Commencing procurement of associated hardware & software;
  - Planning for deployment.
- NB: the focus is on spectrum access research: how spectrum can be allocated, assigned and managed more efficiently across all services, informing policy and regulation and use of spectrum, rather than on the spectrum efficiency of individual services





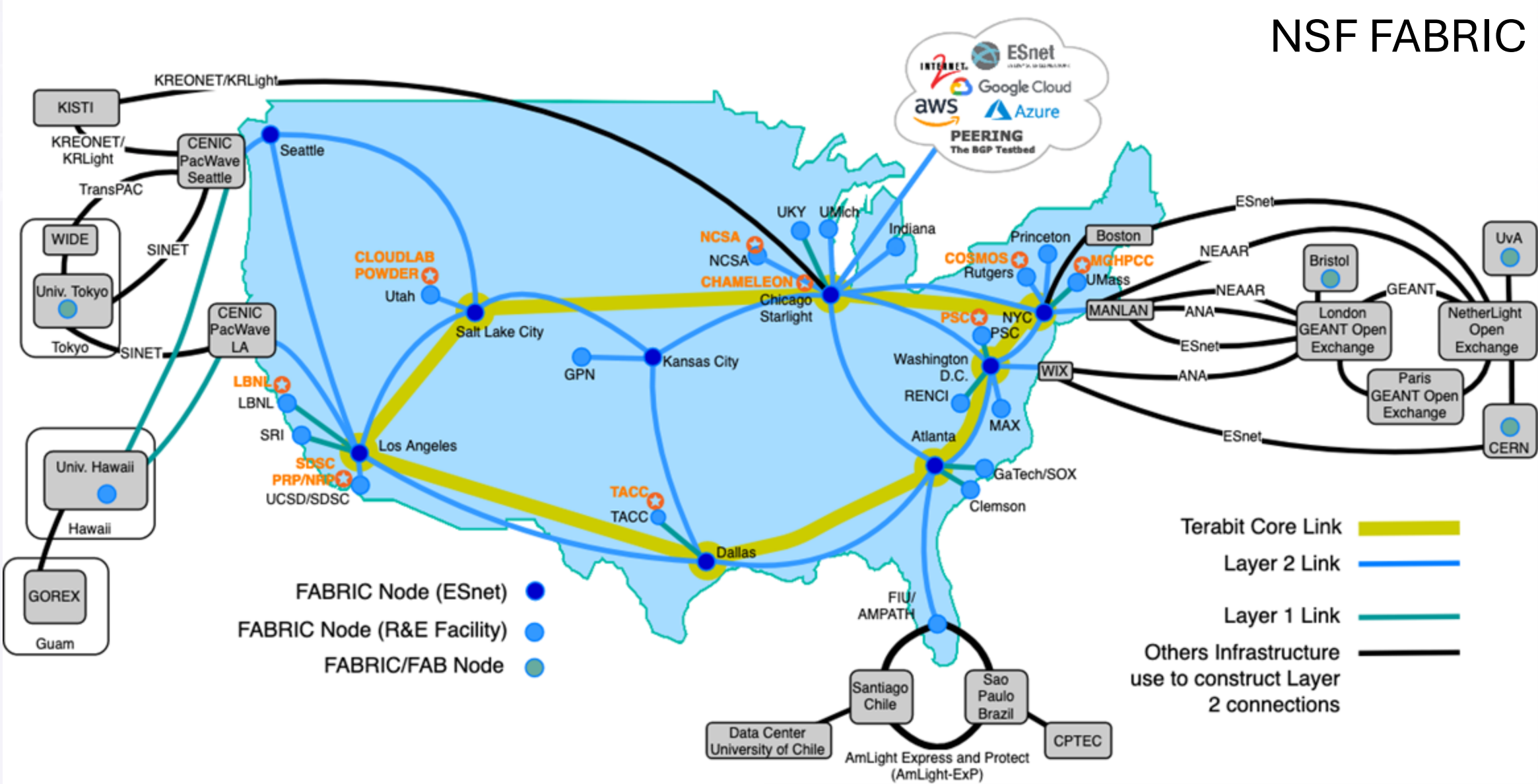
# JOINER Nomadic Van

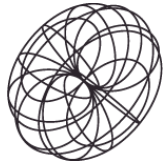
- **JOINER Anytime and Anywhere.**
- **JOINER Hotspot Terminal**
  - ✓ Outdoor Mobility.
  - ✓ Rural Areas.
  - ✓ Events / Stadiums / Concerts / etc.
  - ✓ Partners without dedicated lab spaces.



# JOINER: A Champion for International Collaborations

## NSF FABRIC





# Outcomes

1. A federated testbed enabling **sharing of experimental resources, and introducing new technologies, services and applications** resulting from R&D programmes
2. **A large-scale host for research and pre-commercial collaboration** across the Hubs' academics, the wider academic ecosystem, industry and Government.
3. A platform that helps to accelerate the **translation and TRL advancement of early-stage research** and provide credible experimental evidence towards the introduction of new IP and products into the UK supply chain.
4. A place for hands-on training on telecoms systems and therefore a key contributor to a national (multidisciplinary) **skills development** pipeline.
5. A national champion that demonstrates UK capabilities on future network concepts **supporting UK's ambitions into standards and international collaborations** with similar experimental initiatives/platforms.
6. The host of the UK's first 6G trials

# Introduction to SONIC Labs

Is a joint programme between Digital Catapult and Ofcom to **accelerate the introduction of open network products**, starting with Open RAN.

The key objective is to **enable and encourage innovative vendors** to participate in the UK telecoms ecosystem and facilitate a more rapid path towards deployment in the UK.

SONIC Labs:

- provides a **commercially neutral collaborative environment** for testing interoperability and integration.
- carries out a programme of **engagement with the telecoms ecosystem** with innovative vendors and products and potential adopters.
- examines and shares the **reality of Open RAN** and subsequent open, disaggregated and software-centric network products and solutions.



SONIC LABS IN NUMBERS

14

COUNTRIES ENGAGED



20  
TOTAL ORGANISATIONS  
SUPPORTED BY  
SONIC LABS

24  
TELECOMS  
COMPANIES  
PARTICIPATING

3  
CORE  
INDUSTRY  
GROUPS

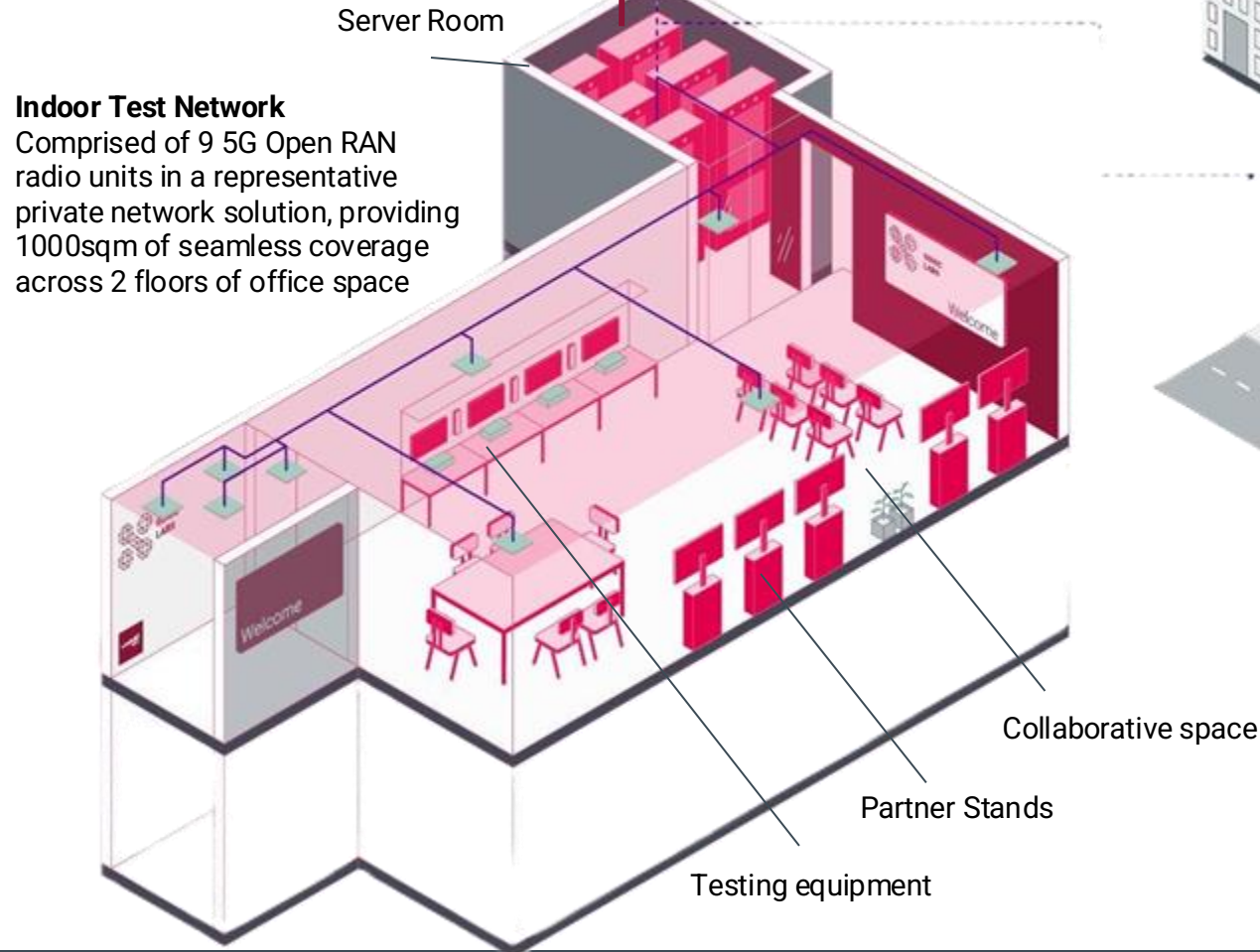


150+  
STRATEGIC ENGAGEMENTS

£20M  
UK GOVERNMENT FUNDING

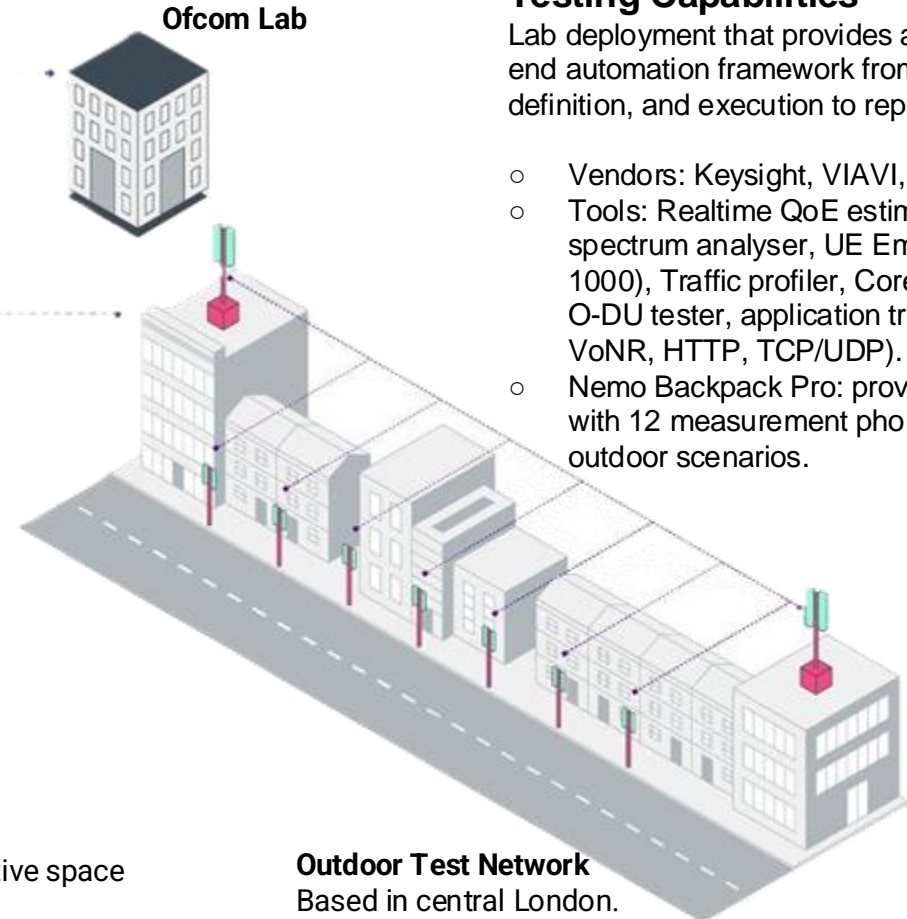
# SONIC Labs

## Open Networks Interoperability Testing



### Indoor Test Network

Comprised of 9 5G Open RAN radio units in a representative private network solution, providing 1000sqm of seamless coverage across 2 floors of office space



### Outdoor Test Network

Based in central London. Comprised of 2 rooftop macro sites and 7 microcell street-level site providing 1.5km of urban coverage, enabling real-world test and verification

### Testing Capabilities

Lab deployment that provides a unified UI end-to-end automation framework from the test-plan definition, and execution to reporting and analysis

- Vendors: Keysight, VIAVI, Rohde & Schwarz
- Tools: Realtime QoE estimation, Hand-held spectrum analyser, UE Emulator (Capacity 1000), Traffic profiler, Core & RAN Emulator, O-DU tester, application traffic emulator (e.g., VoNR, HTTP, TCP/UDP). RIC tester.
- Nemo Backpack Pro: provide OTA RF testing with 12 measurement phones for indoor & outdoor scenarios.

# UK

UK  
Telecoms  
Lab

## UKTL network overview

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17/01/2025

TLP:AMBER



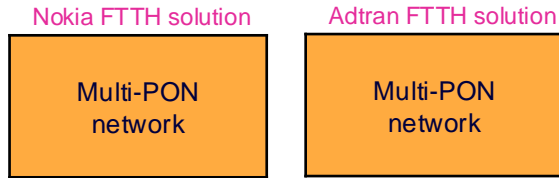
# TTL

# Objectives of UKTL

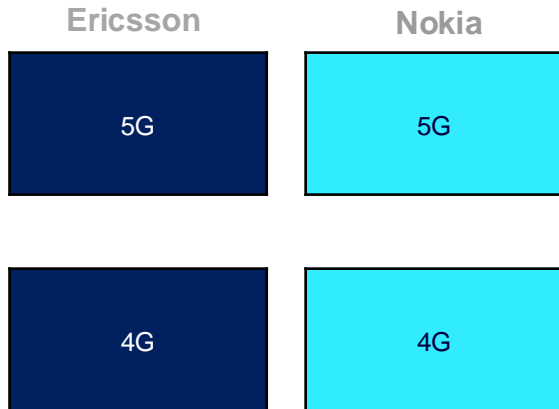
- UKTL is the **UK Government's flagship telecoms lab, focused on telecoms security**, resilience, and vendor diversification.
- UKTL exists at the periphery of the innovation ecosystem, supporting it through learnings and findings and best practice around security by design and default.
- UKTL is the **UK's independent carrier-scale test environment**, covering all access and core vectors – wireless, cellular, fixed, and future emergent ones.
- As the UK's national telecoms lab, to support the telecoms critical national infrastructure we **carry out deeper security testing of products, devices and systems** than are generally done by industry.
- As part of the periphery of the innovation ecosystem, we are keen to be aware of innovation and **support people around the wider ecosystem** and to grow strategic influence.

# UKTL Test Lab

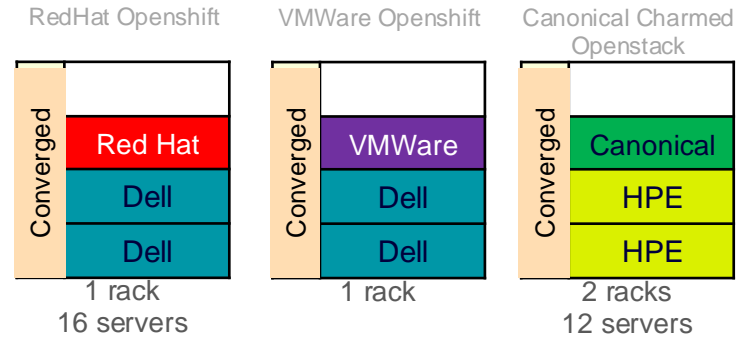
## Fixed line



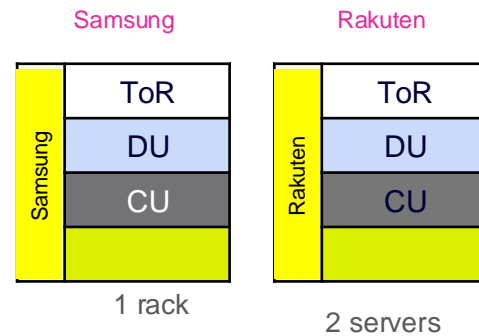
## Radios



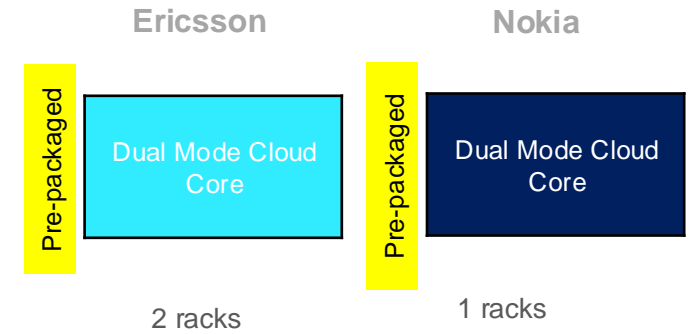
## Virtualisation test beds



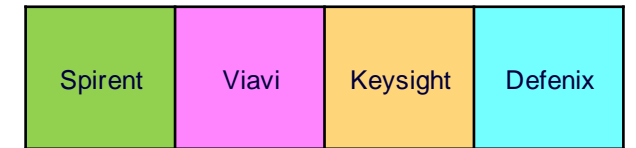
## ORAN



## Next gen 5G core networks



## Test tool suite



## Test Connectivity Framework (TCF)





**JOINER**



**Thank you.**