University of BRISTOL

UK's first urban 5G End-to-End Testbed

Dynamic end-to-end slicing and orchestration over heterogeneous wired and wireless networks

Programmable edge aggregation and mobile edge computing

5GUK Test Networks

at the University of Bristol

bristol.ac.uk/smart

What is 5GUK Test Networks?

5GUK Test Networks is an exciting new 5G Hub partnership linking three leading UK universities' testbeds which collectively delivered the world's first end-to-end 5G systems trials. This initiative was funded by the UK Government's Department of Digital, Culture, Media and Sport (DCMS) '5GUK Testbeds and Trials Programme' in an effort to create a world-class 5G technology Test Network that places Britain at the forefront of the next wave of mobile technology, adding up to £173 billion to the economy by 2030.

University of Bristol's 5GUK Test Network

We have deployed 5G capability in Bristol city centre focusing on the convergence of fibre infrastructure and 5G wireless access. The University of Bristol contributes to the key Software Defined Network (SDN) technologies for end-to-end 5G service delivery. Smart Internet Lab researchers have created a multi-technology testbed connected via a city wide fibre ring and several active switching nodes. The core network is located at the Smart Internet Lab at University of Bristol, with the majority of the access technologies located at Bristol's Millennium Square and MShed (part of Bristol Museums) for outdoor coverage and "We The Curious" (Science Centre) and MShed for indoor coverage.

The Smart Internet Lab's 5GUK Test Network extends from the University of Bristol to the City of Bath. The link between these locations is delivered by a 10Gbit/s BT Ethernet link. Within the City of Bath, fibre optics as well as 60 GHz mmWave fronthaul network capacity exists between the Guildhall and Roman Baths sites. The Roman Baths attraction is equipped with various air interface technologies to support user applications (such as Wi-Fi and LTE-Advanced connectivity).

The overall network is a fully virtualised system. It is capable of onboarding virtual and physical network experiments using the latest Network Function Virtualisation (NFV) technologies.

Capabilities

The University of Bristol's '5GUK Test Network' offers multi-vendor capabilities such as:

- SDN enabled L2 packet switched network and L3 service routers
- SDN enabled optical fibre switched network
- SDN enabled multi-vendor Wi-Fi access points
- 4G and 5G Cloud Network Solution operating: evolved EPC providing 5G core (NSA), 5G core emulator (SA), LTE-A, 5GNR with M-MIMO capability (operating on licence spectrum in 2.6GHz and 3.5GHz bands)
- Self-organising mm-Wave wireless mesh backhaul network in 26GHz licenced and 60GHz unlicensed bands
- LiFi Access point
- Datacentre, Cloud and Network Function Virtualisation hosting on Openstack and Cloudband using high end compute
- Quantum Key Distribution solution for enhanced security
- Quantum secured 5G virtualisation
- Advanced fibre optics FPGA convergence of transmission network integrating Elastic Bandwidth-Variable Transponders and Programmable Optical White-box Wavelength Selective Switches (BV-WSS)

Our 5GUK Test Network is controlled using two different SDN/NFV solutions along with its Orchestration and Management (MANO); one based on Open Source ETSI and the other a commercial solution. Hence providing network slicing and virtualisation with rapid service creation. Additional advanced security capabilities are provided utilising software defined Quantum key distribution technology.

Smart Internet Lab

The Smart Internet Lab at the University of Bristol has been recognised as one of three key academic research specialists within the UK as a concentrated 5G hub of estabilised collaborative relationships between national and international institutions, authorities and industry.

DCMS 5GUK Testbeds and Trials Programme

The University of Bristol's Smart Internet Lab, along with 5G experts from the University of Surrey and King's College London, were awarded £16 million by the UK Government's DCMS to develop a cutting-edge 5G test network, namely the '5GUK Test Networks' . The Programme will encourage and fund the creation of a series of Testbeds and Trials in a range of geographic and vertical market segments. It will explore the benefits and challenges of deploying 5G technologies. Phase 0 included a £16m investment in creating the 5GUK Test Network. In March 2018, the six winners of the first Phase of the 5GUK Testbeds and Trials competition were announced which includes the Smart Internet Lab's 5G Smart Tourism project.

Interested in using our Testbed?

Please visit bristol.ac.uk/smart/5GUK or contact Professor Dimitra Simeonidou

A Cutting-Edge Large Scale Urban 5G Test Network for Digital Innovation