



City Experimentation-as-a-Service – Beta Live

Bristol Is Open provides City Experimentation as a Service (CEaaS) to companies that develop networking, connectivity, IoT, rich-media and other smart-city solutions. A ‘software-defined’ urban digital test-bed is being deployed across Bristol, and extended across the West of England, over the next couple of years. The test-bed is coming live in phases between Autumn 2015 and Autumn 2016. The digital infrastructure can be used by companies and developers to build and test a wide range of applications and smart city services ranging from rich-media distribution, congestion management, waste management, new forms of e-democracy, energy supply management, on-street digital games and driverless cars, to name but a few.

Bristol Data Dome

The first application of the network is showing ultra-high-definition media content across the network in the Bristol Data Dome. Housed in At-Bristol’s Planetarium, the 98-seat Bristol Data Dome, is the UK’s only stereo 3D hemispherical screen with 4K resolution, delivering 2.1bn pixels per second. It is connected via the 30Gb/s fibre network to a high-performance computer housed at the University of Bristol which enables computing power to be utilised for visualising complex experiments, creating virtual reality environments and providing individual audience members with their own unique viewpoint.

Paul Stein, Chief Scientific Officer, Rolls-Royce, said, “Visualising and creating value from a wealth of data is really important to us, and this partnership [with the Data Dome] provides us with a great opportunity to tap into the Bristol and Bath area’s rapidly growing innovative digital media capabilities. It’s also a great opportunity to engage and inspire young people with immersive sound and vision experiences of our products and show them how exciting engineering can be.”

IoT Mesh

The second application of the network, available from April 2016, is the IoT Mesh network. It will enable innovators to perfect their new technology solutions in everything from smart rubbish bins to connected streetlamps and a wide range of IoT sensors. The Mesh offers the opportunity for innovators to develop, test and showcase their apps and services in a real-time environment on a real-world, city-wide network.

With rapid urbanisation expected worldwide for the next three decades the IoT mesh helps to fulfil Bristol Mayor George Ferguson’s ambition to “see Bristol as a laboratory for urban change.”

The Wireless Mile

The mobile industry is moving towards a heterogeneous technology environment – a ‘hetnet’ – where complex multi-layered networks of overlapping big and small cells supply smartphones, tablets, cars, drones and even buildings, with a huge amount of cheap connectivity. Getting a hetnet to work is not simple, and Bristol’s Wireless Mile, available from summer 2016 (pending OfCom approval), provides an ideal test-bed for those developing solutions.



The Wireless Mile stretches across a picturesque and heavily populated area of central Bristol, combining waterscapes, old and new buildings, metal and wooden boats, and dense eight story warehouse buildings. It creates a rich and diverse urban test-bed for wireless communication companies, wanting to use the Wi-Fi, 3G, 4G, LTE & 5G experimental technologies. It includes, for example, small cell millimetre wavelength technology with access points spaced regularly along the Mile, providing very localised coverage in a challenging urban topography. The mixture of access types gives maximum flexibility.

Software Defined Network /Network Function Virtualisation

The final launch phase, sees a Software Defined Network Controller (SDNC) providing essential intelligence to Bristol Is Open's network. It enables multiple experiments to be carried-out simultaneously across the network. For example, there might be an experiment running on the IoT Mesh involving hundreds of sensors, as well as 'Over-the-Top' media being sent across the Wireless Mile and a massive visualisation project happening at the Dome involving the supercomputing at the University. In such a scenario, the SDNC will analyse the traffic on any given part of the network and take decisions on how to route the traffic at a very low level using dynamic optical switches.

This method of controlling traffic is very different from typical IP routing because it does not necessarily use just the IP address to route packets. Instead, it uses many of the different fields contained in each data packet frame to decide on the routing. This method enables much greater control over traffic flow across all the different types of infrastructure because it has a richer choice of available filters it can apply to the packets. It ensures that even under peak load conditions, the Bristol Is Open network will perform at maximum efficiency, ensuring that different experiments do not impact on one another and produce false results.

The SDNC approach works by identifying flows for given applications so that it can configure specific points in the infrastructure to properly route the data flows based on a pre-defined set of operational requirements, such as latency or bandwidth. It uses the OpenFlow protocol, an open standard that enables researchers to run experimental protocols in local networks. OpenFlow is added as a feature to commercial Ethernet switches, routers and wireless access points and provides a standardized hook to allow a wide variety of network experiments, without requiring operators to manually intervene.

Important launch dates:

November 2015 – Data Dome

April 2016 – IoT Mesh

Summer 2016 – Wireless + 5G

Autumn 2016 – SDN/NFV