



**An intelligent box for convergence of all network technologies and connected devices**

**Virtualising high-performance network functions at the edge**

**Re-purposing the network at the edge for delay sensitive and computing intensive applications**

# 5G in a Box

## Smart Connectivity for 5G

## About

Key technology sectors, such as Smart City, automotive and entertainment industries, are rapidly being transformed by capabilities offered by 5G. For 5G to support these sectors (also known as verticals), a high degree of technological convergence and programmability is required, empowering the verticals with enhanced technical capacity to trigger the development of new, innovative products, applications and services.

A "5G in a Box" utilises advanced hardware programmable platforms and high-performance commodity computing servers to offer a generic and programmable platform for deployment at the edges of a 5G network. It enables different verticals to deploy and execute on-demand, application specific and customised low latency network functions at the edge of the network. It also provides a point of convergence for various wireless and wired 5G technologies and computing platforms that can be customised for specific services and technologies.

## Let's Get Technical

An end-to-end 5G network comprises heterogeneous types of technologies from new radio such as Massive MIMO and

millimetre wave, to high speed optical network and advanced computing platforms such as mobile edge computing (MEC). Furthermore, most of the 5G network functions are virtualised as a software entity that requires a low latency computing platform often at the edge of the network.

Availability of high-performance programmable and flexible hardware enables offloading network functions to the hardware and accelerates them. FPGAs (programmable hardware devices) are receiving increasing attention as preferred programmable platforms because of low cost and high performance. Unlike the software that executes in sequential order, FPGAs execute concurrently and hence support high data rate and lower latency. A 5G in a Box node utilises FPGA platforms and high performance commodity computing servers to offer a generic and programmable platform for deployment at the edges of a 5G network. It accelerates execution of 5G network functions and also provides a point of convergence for heterogeneous wireless and optical transports as well as computing platforms.

## Smart Internet Lab

The Smart Internet Lab at the University of Bristol is a hub for internet research, which aims to address grand societal and industrial challenges. We perform cutting edge research on optical and wireless communications, offering a unique holistic approach to hardware and software co-design and solving critical problems in the global internet evolution.

## 5G Research

We are world leaders in fibre, wireless, and 5G convergence research. We have created a unique 5G Trial Test-Bed for a Smart City, Campus, Region and the Telecom Industry.

**EPSRC**

Engineering and Physical Sciences  
Research Council



European  
Commission

Horizon 2020  
European Union funding  
for Research & Innovation

**TOUCAN**  
ULTIMATE NETWORK CONVERGENCE

**5G-XHaul**

**5G-PICTURE**



Plug-able advanced  
computing capability  
at the edge of the network

Deep learning about network  
close to users and applications