WHAT'S INSIDE

BRINGING NETWORK REALITY TO 5G TESTBEDS

Cambridge Wireless (CW) is the leading international community for companies involved in the research, development and application of wireless and mobile, internet, semiconductor and software technologies. It has over 400 members that come from every area of the mobile and wireless ecosystem. Those members include silicon producers, infrastructure providers, mobile network operators, networking specialists, testing specialists and device producers.

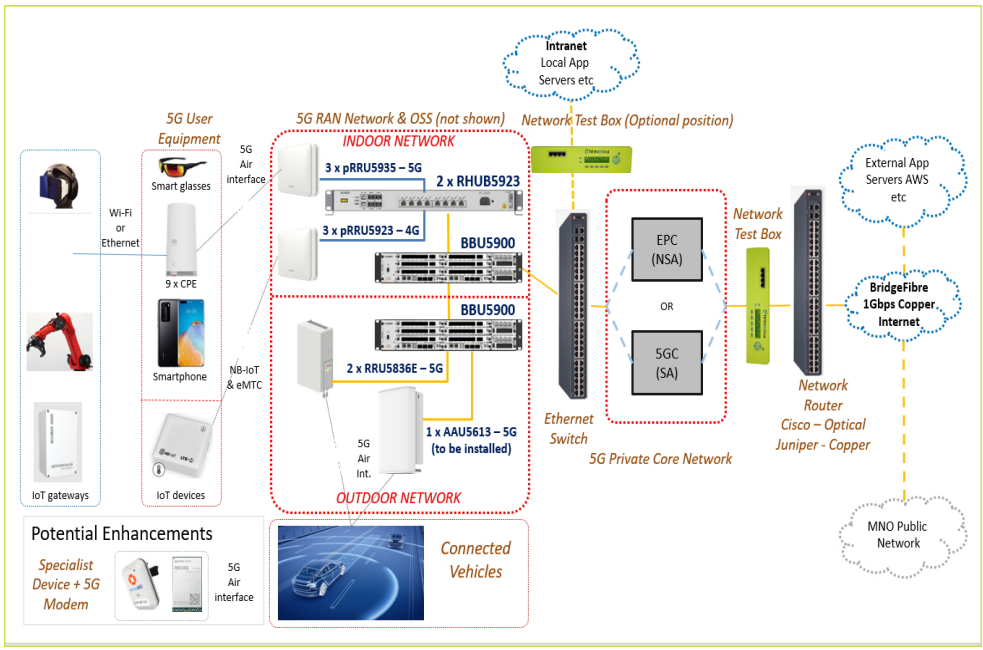
In January 2021, Cambridge Wireless launched the first private 5G testbed within Cambridge Science Park. The testbed hosts multiple 5G enabled accelerators and allows the technology community to undertake cutting edge digital research and application in key areas such as healthcare, mobility, electric vehicles, mobile and cloud gaming, remote surgery, robotics and more.

Initially, it was solely an indoor test network where companies could go to try out 5G to ensure that their products and services worked. However, more recently the CW testbed's facilities have been expanded to include an IOT network and an outdoor network in order to test applications for connected vehicles.

As part of this process CW sought a way to introduce real-world network conditions into the testbed and selected NE-ONE Software Defined Test Network technology to provide this capability.

THE CAMBRIDGE WIRELESS 5G TESTBED

The CW 5G Testbed features a fully functioning E2E 5G network with indoor and outdoor coverage together with 5G enabled devices such as CPE (Customer Premise Equipment) handsets, virtual reality glasses, modules and modems.



THE CAMBRIDGE WIRELESS 5G TESTBED (CONT./)

Through the CW Accelerator programme, companies and organizations are invited to undertake cutting-edge R&D in key areas such as:

- Mobility as a service using Connected Autonomous Vehicles
- Electric vehicle charging
- Remote working and communication
- Waste management, air pollution, sustainability and clean energy
- Traffic management
- Digitalization of building services around wellness and health
- Increasing efficiency, learning and collaboration of workers through e.g. high bandwidth low latency video communication to international offices and science parks
- Remote surgery, ultrasonography and emergency medical treatment for hospitals
- Increased AGV and automation in and outside of hospitals such as 5G vehicle for mobile temperature monitoring, disinfection, medicine delivery vehicle, robot for hospital guide etc.

In addition to having access to the 5G testbed, being part of the Accelerator programme also provides mentorship from industry experts and knowledge sharing for accelerator partners.

THE ROLE OF THE NE-ONE

Cambridge Wireless and Calnex are both members of the Innovate Martlesham community, an established cluster of high-tech ICT companies located at BT's Adastral Park. Besides being home to a diverse range of large, medium and small companies, Innovation Martlesham is a 'collaborative ecosystem' for technology companies.

It was through Innovate Martlesham that Calnex became aware of the, then proposed, CW 5G testbed and recognizing that its Software Defined Test network technology had the potential to significantly enhance the realism of the test environment, engaged with David Roberts, CTO of Special Projects for Cambridge Wireless, who runs the testbed.

With its ability to rapidly create a wide range of network conditions such as restricted bandwidth, latency and congestion, the NE-ONE Network Emulator enables users to easily introduce the effects of degraded networks into their test environments in order to see how applications, systems and devices will be able to perform across a wide range of network conditions and verify their resilience before they are introduced into a live production environment.

The NE-ONE Professional Network Emulator can mimic a wide range of different networks including Mobile, Satellite, WAN, Internet, Cloud or WiFi.

Appreciating the benefits that the NE-ONE could bring, David incorporated it into the CW 5G testbed. "At the back end of the testbed, we have our core network and it is there that we deploy the NE-ONE. There are two positions on the network, where we place the NE-ONE box, one is to manage the traffic between sites and the other is to manage traffic within the site. That gives us great flexibility to essentially create networks both inside and outside of our own network that can mimic any network in the world," explains David.

USE CASE - HADO

One company that has benefited from using the CW 5G testbed is Japanese augmented reality gaming company, HADO. Their techno sport game involves playing in a 10 metre by 6 metre court where a team of up to three throws virtual plasma bolts at their opponents while defending themselves from any bolts being thrown by the opposing team by using virtual shields.

It is very popular around the world, especially in Japan, and southern Europe but traveling to compete against other teams is going to be prohibitively expensive. To overcome this HADO was looking to set up a distributed game environment where teams could visit local courts in order to play other teams overseas.

HADO used the CW 5G network where 5G routers connected all the equipment within the court over Wi-Fi and then streamed over Facebook Live via a smartphone for viewers to watch the action.

The NE-ONE appliance was used to introduce latency and jitter to assess their impact, on both the player experience and the viewer experience. This involved not just the 5G network but also a transition to other networks such as Wi-Fi and 3G and 4G. The viewer experience, which was delivered over a public network, degraded first, while degradation of the player experience was only achieved at very high levels of latency and jitter. The use of the NE-ONE enabled HADO to understand the circumstances when the game would work well and the point at which it would fail.

CONCLUSION

When asked what value NE-ONE technology has added to the CW 5G testbed, David commented that “Using the NE-ONE network emulator has allowed the companies developing their next-generation, 5G-enabled products in CW’s controlled and predictable private 5G testbed to discover, in a managed way, how their applications and services will function in the real world where delays, jitter and other network variances are more likely to occur. This gives the companies confidence that their offerings are mature enough for use in future phases of development such as early field/customer trials. Just as importantly, it lets them know the level of network performance variance their offering can deal with. By using the NE-ONE network emulator, the companies in the CW 5G Testbed can hopefully save a good deal of time, effort and expense during this critical time of development.”

Desktop Appliance

Half-Rack Appliance

Virtual Appliance

The NE-ONE Professional Network Emulator referenced in this case study is available on a variety of different platforms

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