'5G for Content Acquisition and Distribution'

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Presentation Overview …

- Reminder! - Wireless Revolution? What just happened?
- Skin in the Game! – Our 10 year Shared Spectrum Journey
- Scotland 5G Centre 5G Rural and Urban Testbed Facilties
- IBC Accelerator Programme: 5G Remote Production
- 5G Private Networks (Build your own with '*tier 2*' bits and pieces)
- Demonstrator Concept
- A visit to the 5G Lab at Strathclyde for n77 demo
- Software Defined Radio – Get Ready, Anyband, Anytime, Anywhere

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Wireless Revolution Day!

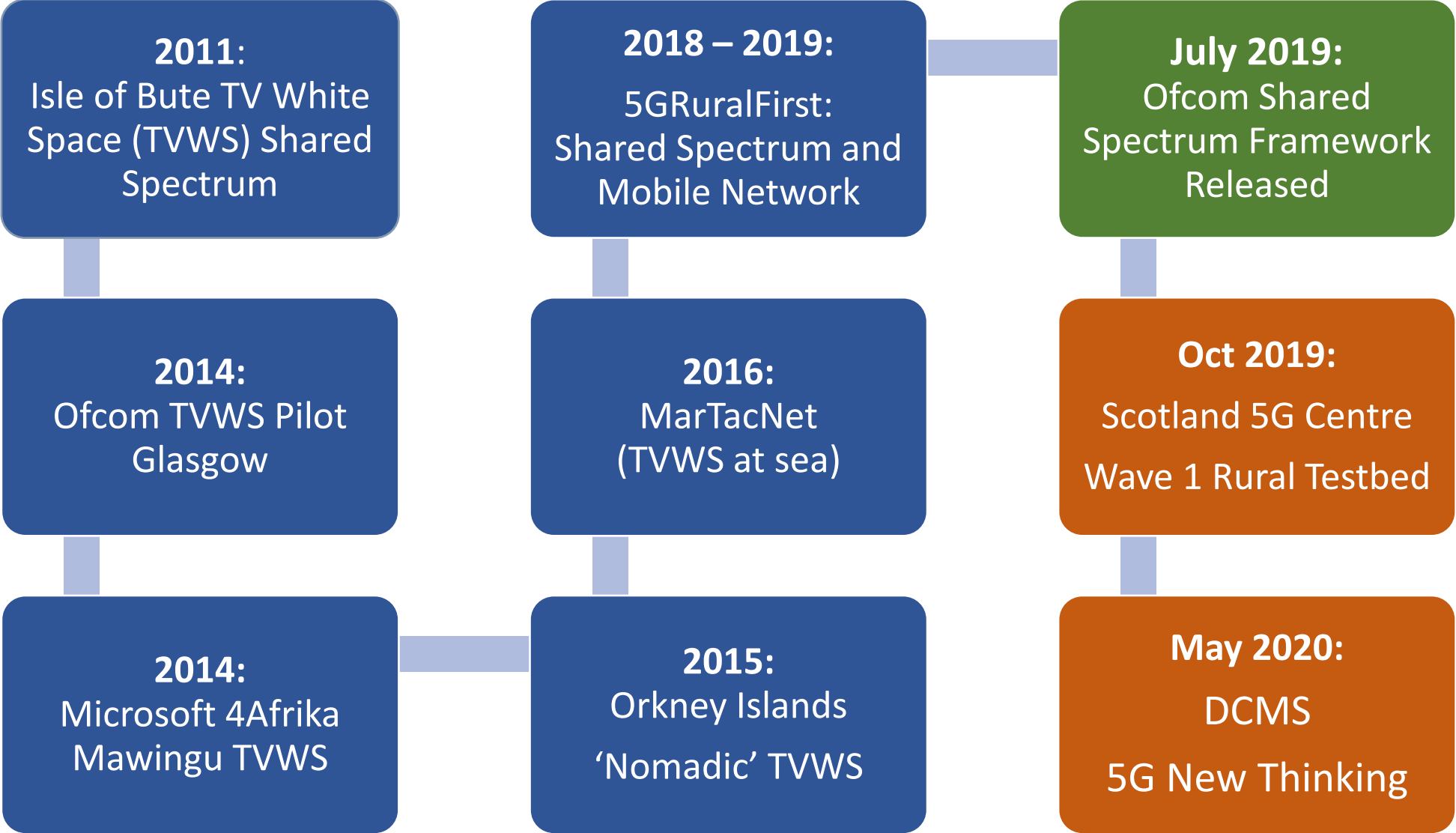**Ofcom** making communications work for everyone

Airwaves opened up to support wireless revolution

25th July 2019

To help promote wireless innovation across the UK economy, we have today decided to open up airwaves that previously could only be used by certain parties. We're also allowing different groups to access airwaves licensed to mobile companies, but not being used by them.

https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2019/airwaves-opened-up-to-support-wireless-revolution

Our Journey to (5G) Shared Spectrum

2011:
Isle of Bute TV White Space (TVWS) Shared Spectrum

2018 – 2019:
5GRuralFirst: Shared Spectrum and Mobile Network

July 2019:
Ofcom Shared Spectrum Framework Released

2014:
Ofcom TVWS Pilot Glasgow

2016:
MarTacNet (TVWS at sea)

Oct 2019:
Scotland 5G Centre
Wave 1 Rural Testbed

2014:
Microsoft 4Afrika Mawingu TVWS

2015:
Orkney Islands 'Nomadic' TVWS

May 2020:
DCMS
5G New Thinking

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A Key 5G Private Networks Driver - Shared Spectrum

5G is an opportunity to do things differently!

LICENSED SPECTRUM
Exclusive use
Over 40 bands globally for LTE

SHARED SPECTRUM
New shared spectrum paradigms
e.g 2.3GHz Europe (LSA),
3.5GHz USA (CBRS),
Spectrum Sharing Framework (UK)

LICENCE-EXEMPT SPECTRUM
Shared use
e.g TVWS,
2.4GHz / 5GHz / 60GHz global

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IBC Accelerator Projects   *ibc.org*

There are 8 Accelerator projects underway in 2020, championed by world leading media and entertainment organisations:

1) **5G Remote Production -** BBC, AJ Jazeera, BT Sport, ITV, TV2, SVT, Yle, ViacomCBS, Olympic Broadcast Services

2) **Television Delivered as Objects –** ITV, BBC, Yle, Unity

3) **AI-Automated Video Shot -** AP, AI, AlJazeera, ETC (USC)

4) **Usable VFX Archive -** Movie labs, Paramount, Universal, Sony Innovation Studios1 Unity

5) **AI-Backed Interactive Talent Show -** Warner Music1 Viacom/MTV

6) **Animation Production w/ Immersive & Real-Time Tools -** Sky, Cartoon Network, Sky, Unity, Epic Games

7) **Citizen Journalism / Live, Content Moderation for UGC-** AI Jazeera1 Reuters, AP, ETC (USC)

8) **5G Centralized Streaming for LSE ARNR -** Park Playground, Telenet (Liberty Global).

https://www.ibc.org/ibcshowcase/programmes/accelerator-programme

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IBC Accelerator: 5G Remote Production

*To design and evaluate an early stage PoC for **5G Remote Production** capabilities, particularly multi-camera synchronisation utilising **5G private networks** (5G in a box solutions).*

IBC Accelerator Champions:

BBC
Project Lead

ALJAZEERA

itv

VIACOMCBS

TV2

OBS

yle

svt

BT SPORT

BBC, AJ Jazeera, BT Sport, ITV, TV2, SVT, Yle, ViacomCBS, Olympic Broadcast Services

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5G NR Testbed Facilities: Rural and Urban

- Working on 5G Private Testbed Facilities as part of the the *Scotland 5G Centre Wave 1 testbed platforms for Urban & Rural:*

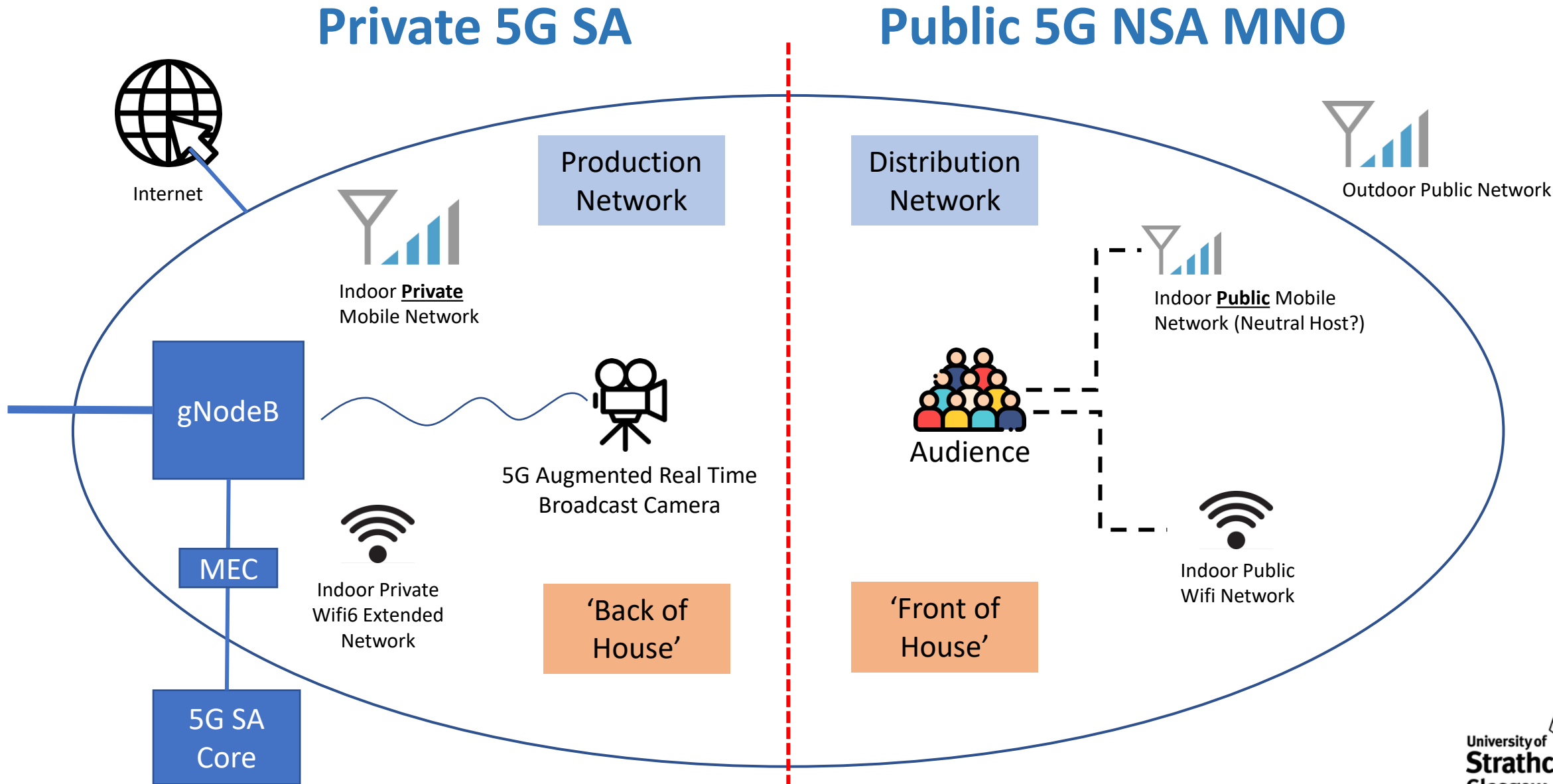Wave 1 Rural Loch Lomond Testbed
Director: Prof Bob Stewart

Wave 1 Urban UoG Campus City Testbed
Director: Prof Muhammed Imran

Enhanced Mobile Broadband   Extended Reach   Machine to Machine   Low Latency   Highly Secure   Highly Reliable   Enhanced Mobility   Broadcast   Rural
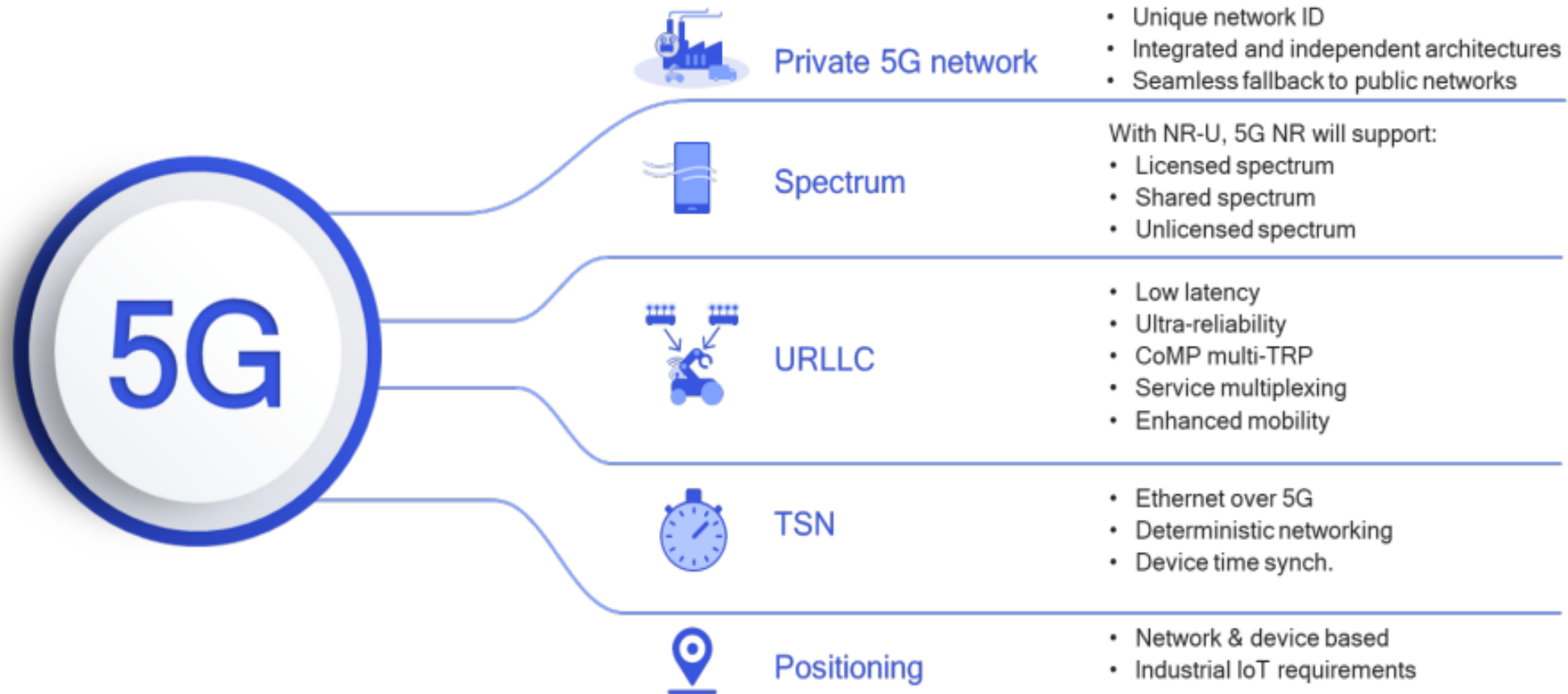
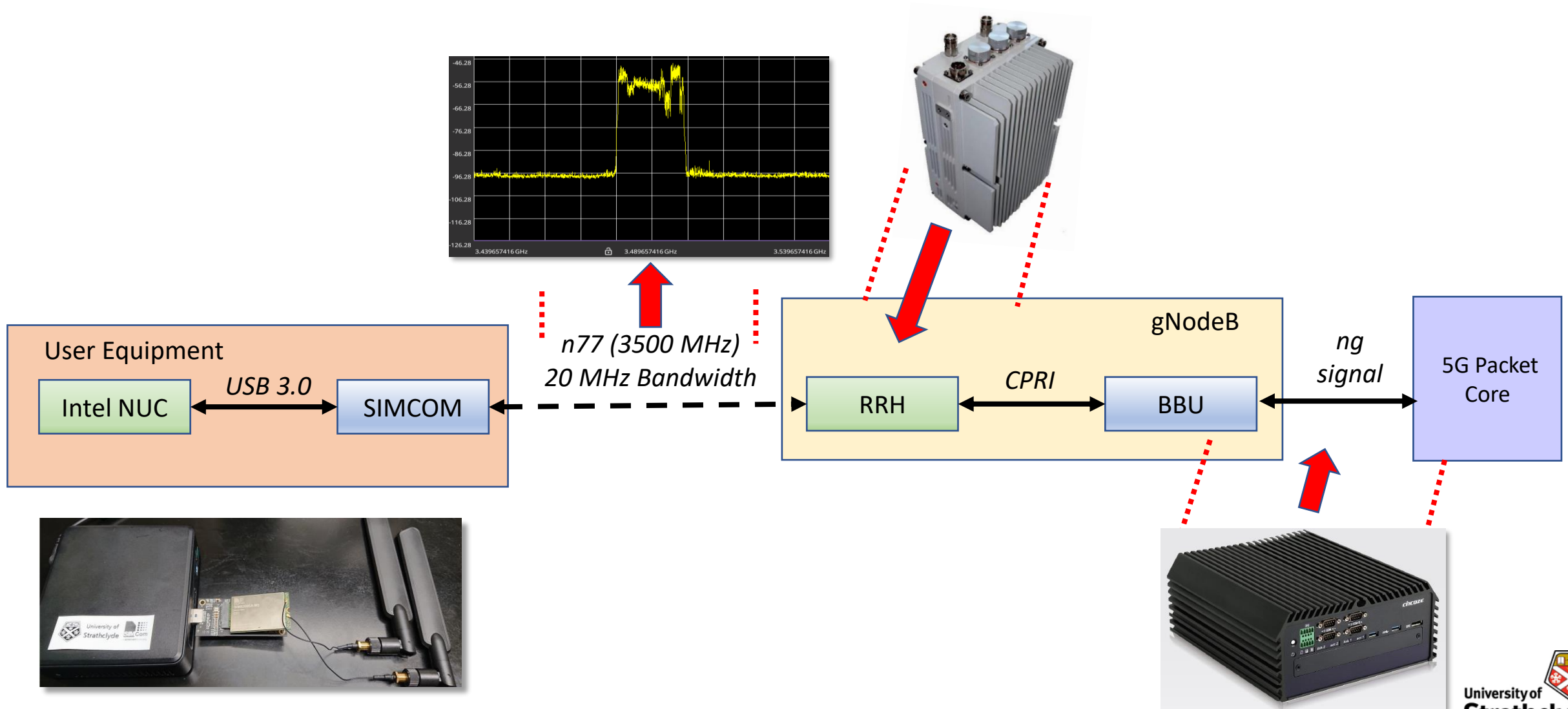# Release 16, going on 17…

Figure Source: Qualcomm

Packed full of fabulous features that will help under pin next generation of   multimedia 'Production' and 'Distribution'
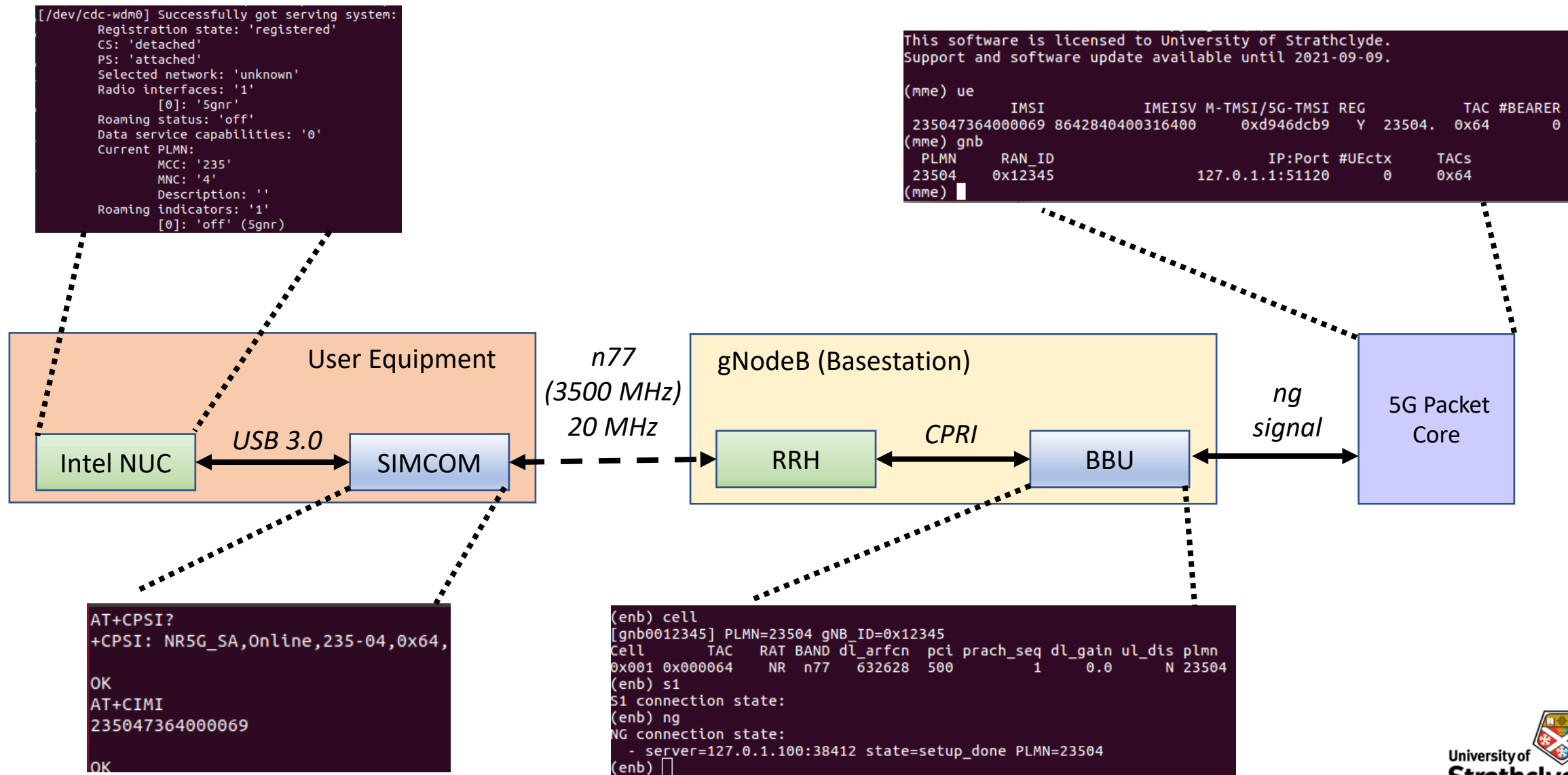
A visit *to our 5G Labs …*

(unfortunately <u>test and trace</u> called this morning for 5G Engineer Dani Anderson…!)

'Live' demo of a 5G NR n77 candidate Private Network for 5G Remote Production

End-to-End 5G NR SA Implementation

User Equipment
- Intel NUC — USB 3.0 — SIMCOM

n77 (3500 MHz)
20 MHz Bandwidth

gNodeB
- RRH — CPRI — BBU

ng signal

5G Packet Core

Complete End-to-End 5G SA Implementation

Concluding. It's "Spectrum Unleashed" time …

- 5G SA Private Network implementation: SME tier 2 suppliers from the EU/UK:

W2S — RRH & BBU

amarisoft — 5G NR Software

Neutral Wireless — Systems Integration

- **… and Get Ready:** Software Defined Radio is really here for - *Anyband, Anytime, (perhaps!) Anywhere* with technologies like the Xilinx RFSoC Direct RF Sampling across 6GHz.

XILINX VERSAL™

- OpenRAN (O-RAN),
Neutral Host – Opportunities for all!
Implementable by all!

XILINX

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