IBC2022

ACCELERATOR MEDIA INNOVATION PROGRAMME

5G REMOTE PRODUCTION IN THE MIDDLE OF NOWHERE

#accelerators2022

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IBC2022

5G REMOTE PRODUCTION… IN THE MIDDLE OF NOWHERE

CHAMPIONS

University of Strathclyde Glasgow

The Scotland 5G Centre

Neutral Wireless spectrum. unleashed.

BBC R&D

BT SPORT

Paramount

OBS

WARNER BROS. DISCOVERY

TV2

RTÉ

BT MEDIA AND BROADCAST

PARTICIPANTS

AMD

Microsoft

VISLINK

MOBILE viewpoint

netinsight

aws media & entertainment

Haivision

ZIXI

NuLink Wireless Technology and Solutions

IMSC Interim Māori Spectrum Commission

SINGULAR.LIVE

PRODUCTION PARTNERS

SCOTLAND: QTV

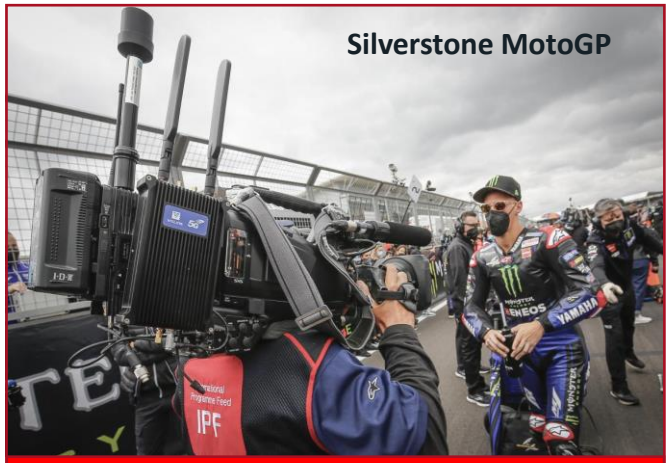
KENYA: WHAT'S GOOD MEDIA

NEW ZEALAND: WHAKAATA MĀORI

IRELAND: RTÉ

PRECURSOR – WHERE IT ALL STARTED – SILVERSTONE AUGUST 2021

Private 5G in Sports Broadcasting



High Speed Platforms
High Resolution, Low Latency
Pop-up networks

World's first standalone 5G Network for Sportscasting introduced at MotoGP

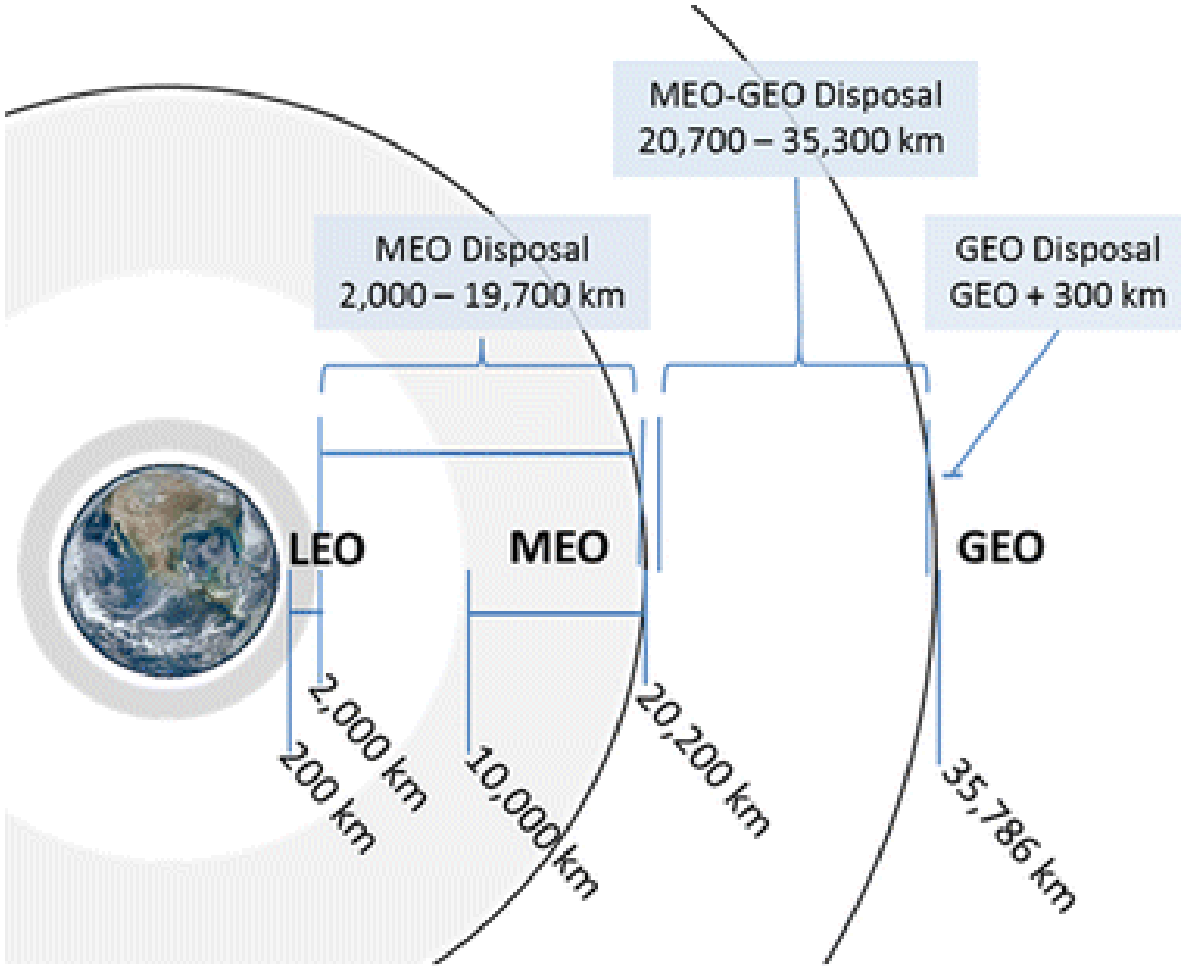
5G REMOTE PRODUCTION: WHAT ARE SOME KEY CHALLENGES?

1. Backhaul limitations – (Satellite, Fibre or MNO)
2. No mains electrical power – (Battery and/or Renewable)
3. Private or Non-Public Network (NPN)
4. Local cloud/core facility for remote production
5. Portable – deployable in <30 mins
6. … and as location & country agnostic as possible!

5G REMOTE PRODUCTION: WHAT'S JUST HAPPENED?

- Architecture & workflow development, local testing of 5G SA equipment – edge compute, spectrum requirements, NPN radios
- 5G SA – NPN UE (camera/device) selection and integration
- International trials on LEO system (for backhaul) in remote location(s)
- Track spectrum licensing processes/issues in various demo locations
- Live show-case for project PoC - IBC show in September

WHAT IS LEO?

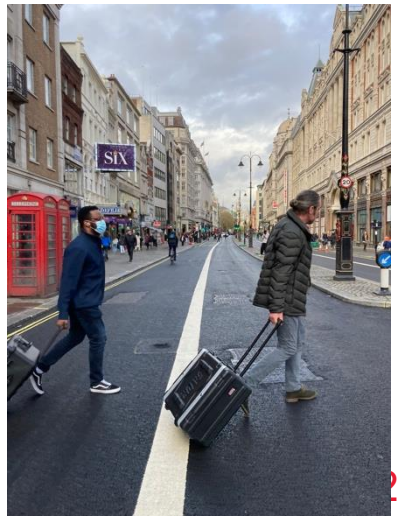


- Provide service over uncovered or underserved geographical areas
- Benefits promised by NTN's are wide-area coverage, scalability, service continuity and availability
- NTN standards set - 3GPP

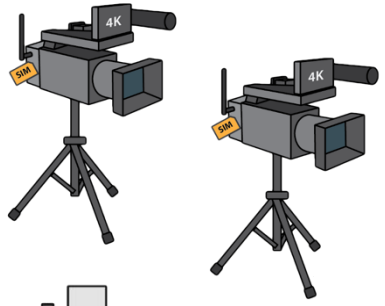
STARLINK

- 12,000 in orbit by 2026
- BBC, TV2, IBC accelerator PoC
- Progressed from beta to business subscription

HIGH LEVEL WORKFLOW – BIG PICTURE



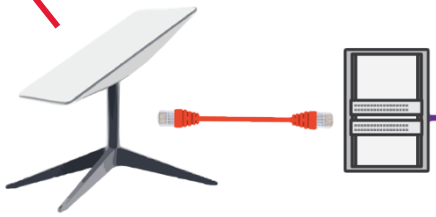
Multiple Live Camera Feeds
Backhauled over 5G to Production team



Neutral Wireless Lomond
Network-In-a-Box (NIB)

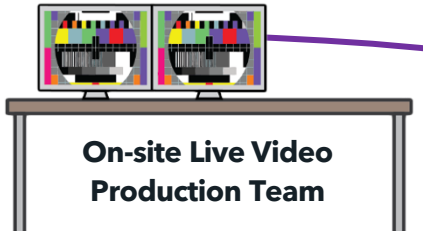
Starlink LEO
Backhaul

Starlink Routers,CGNAT



Starlink
Internet
Connection

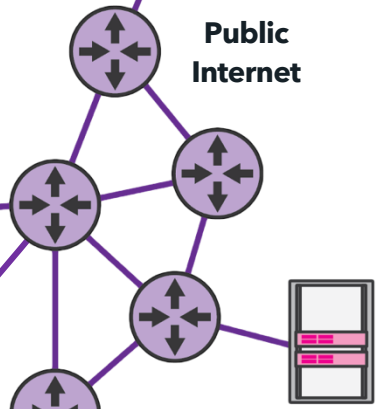
Live Video Feed out
to Broadcast Servers
over WAN Interface



On-site Live Video
Production Team

Fibre
backhaul

(Remote)
Video
Broadcast
Servers



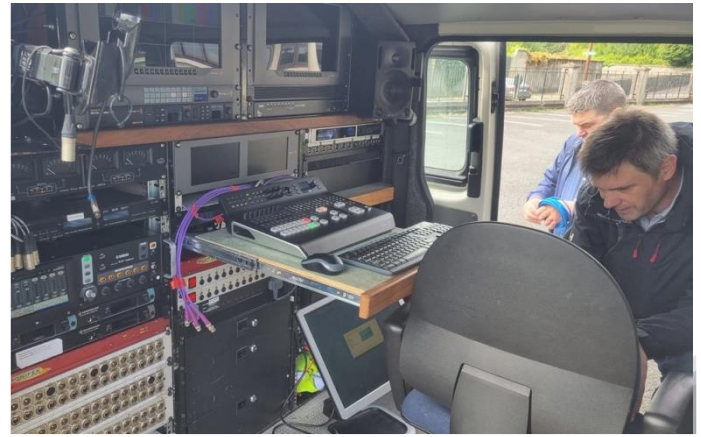
Public
Internet

(Remote)
Audience

(Remote) 5G
Core Control
Plane

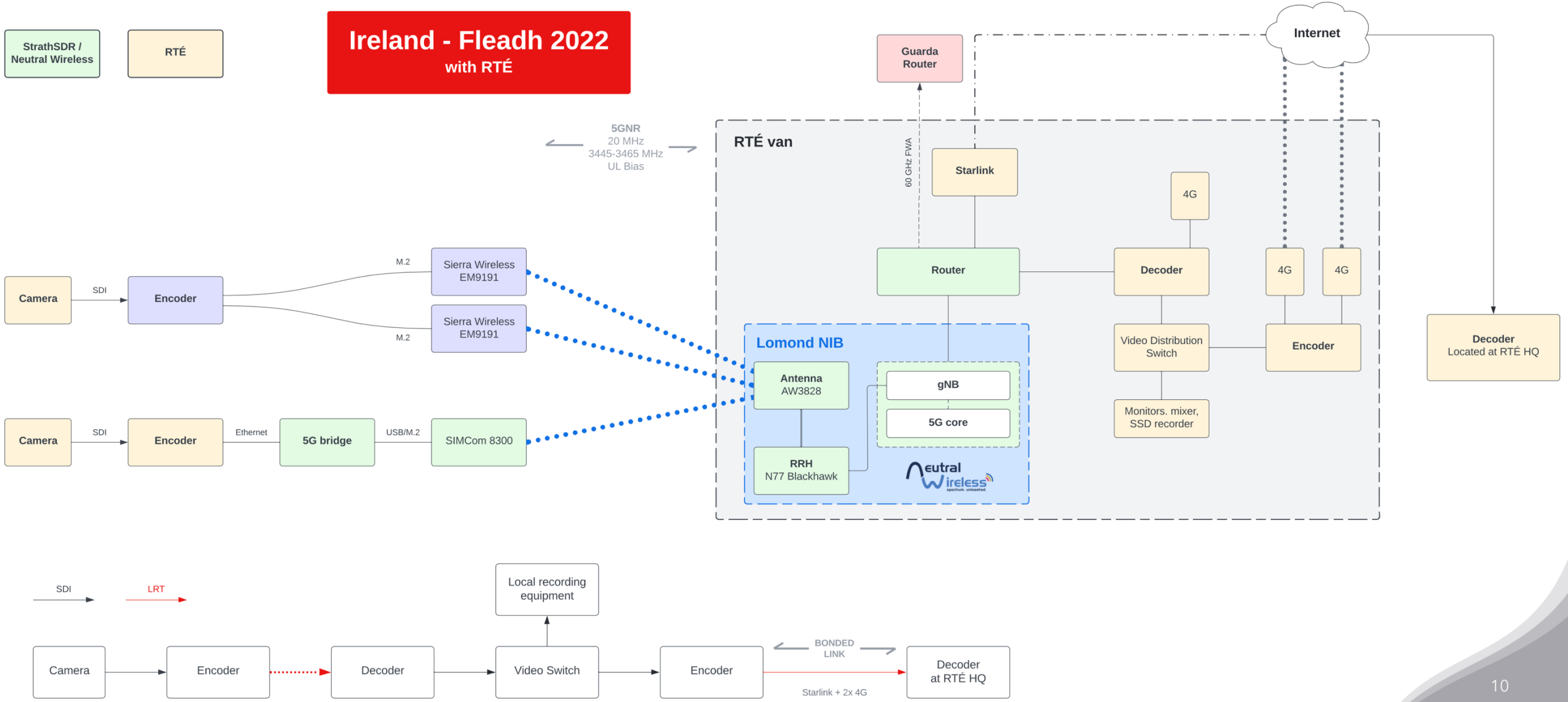
Fleadh Cheoil – Mullingar 'The Homecoming' traditional music festival

LIVE IN IRELAND, AUGUST 2022



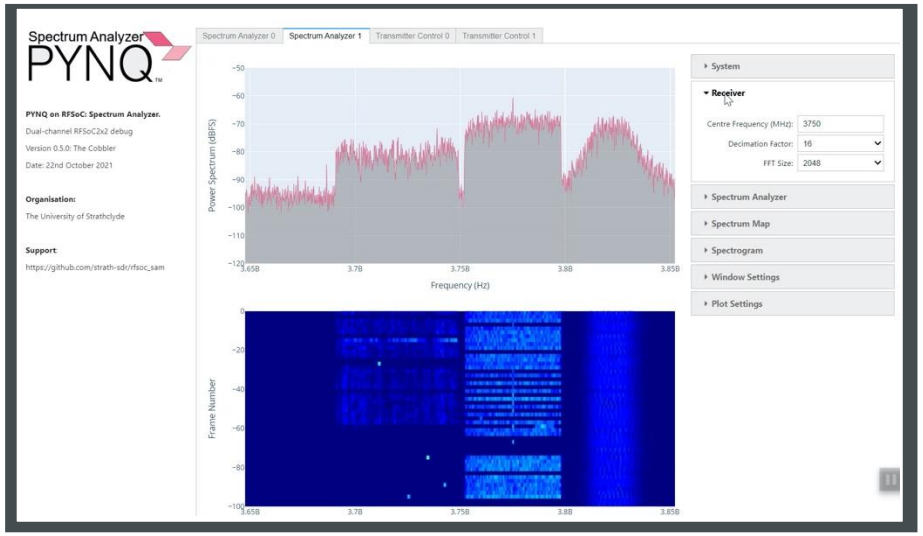
Fleadh Cheoil – Mullingar 'The Homecoming' traditional music festival

LIVE IN IRELAND, AUGUST 2022



Te Kura Kaupapa Maori o Bernard Fergusson (school) – Mau Rākau

LIVE IN NEW ZEALAND, AUGUST 2022



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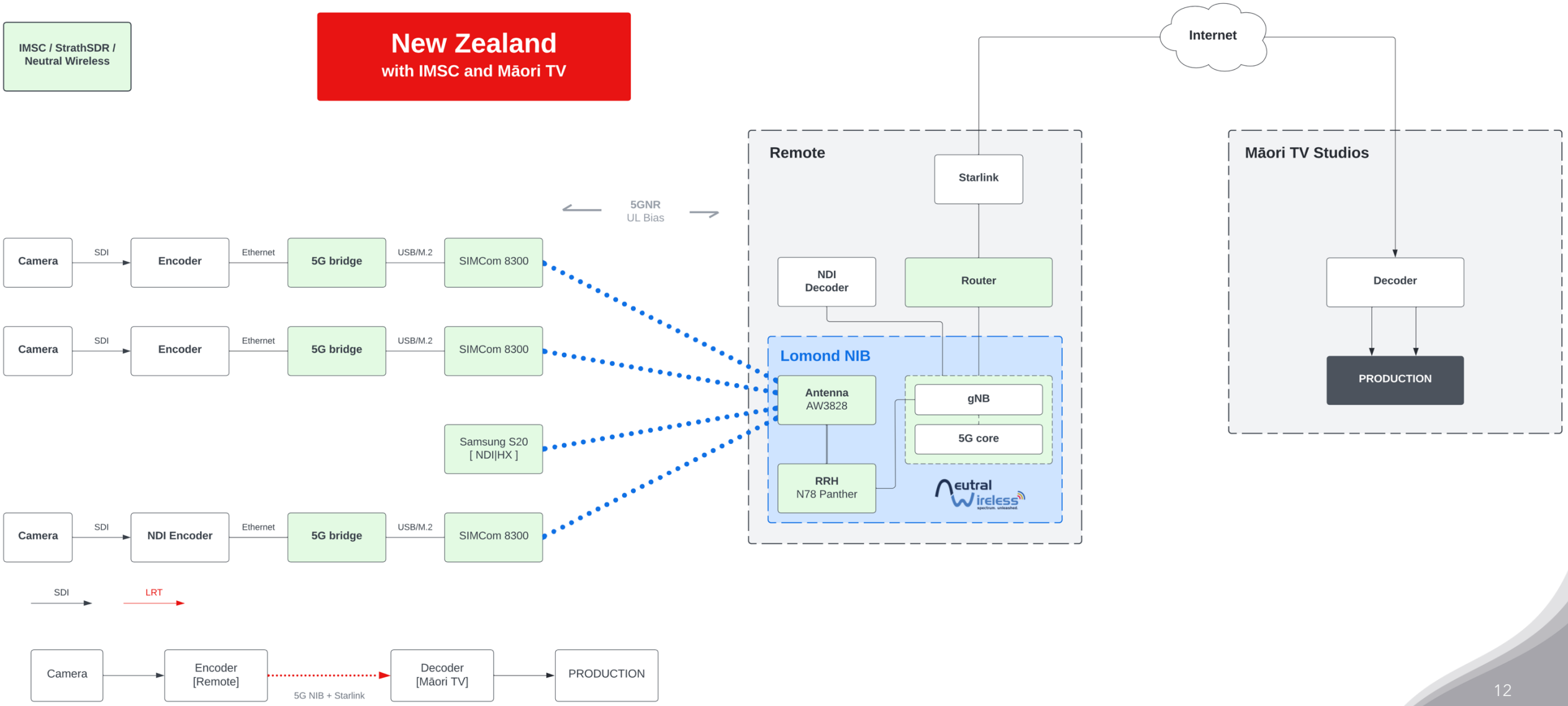
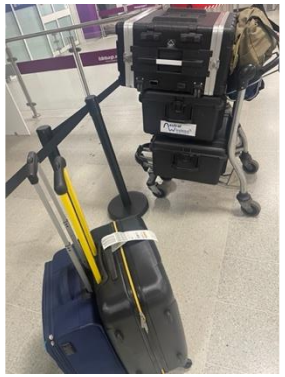


Ol Pajeta Conservancy – Live Streaming with Sheng Talk

LIVE IN KENYA, AUGUST 2022









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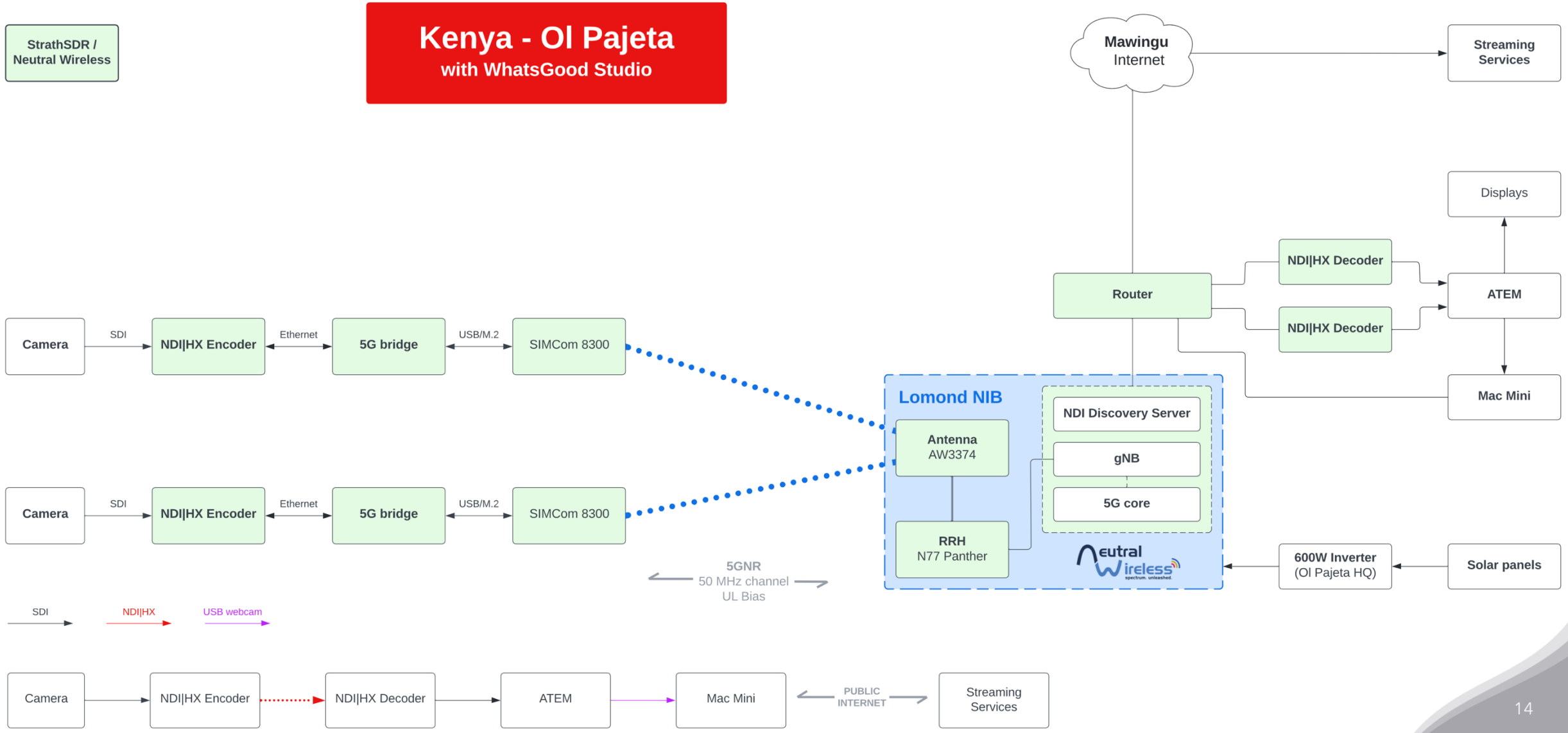
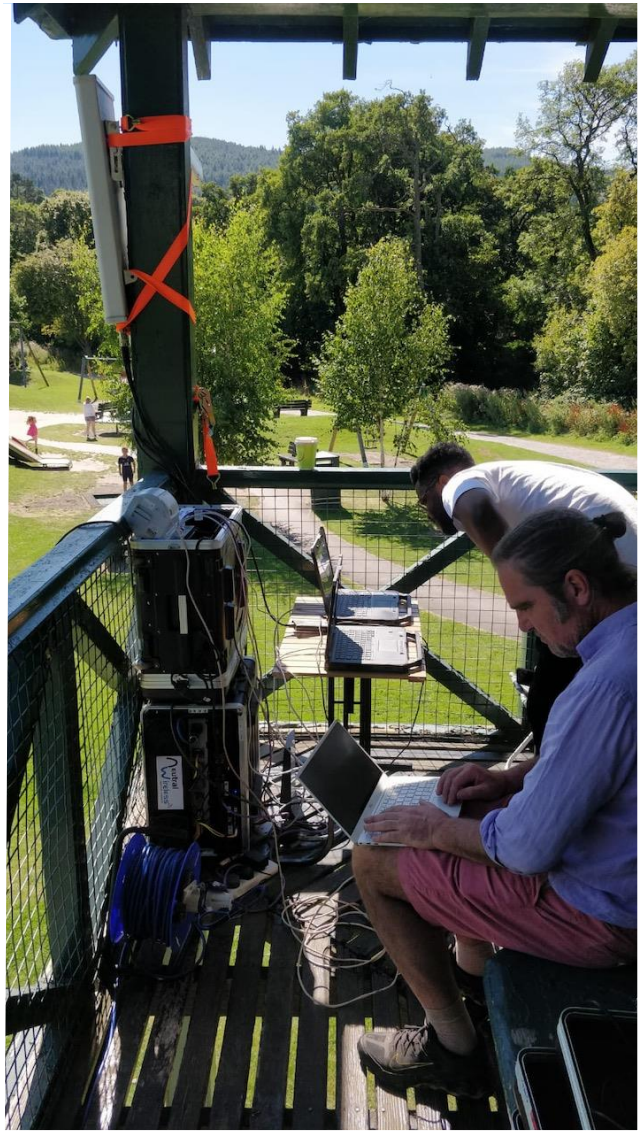
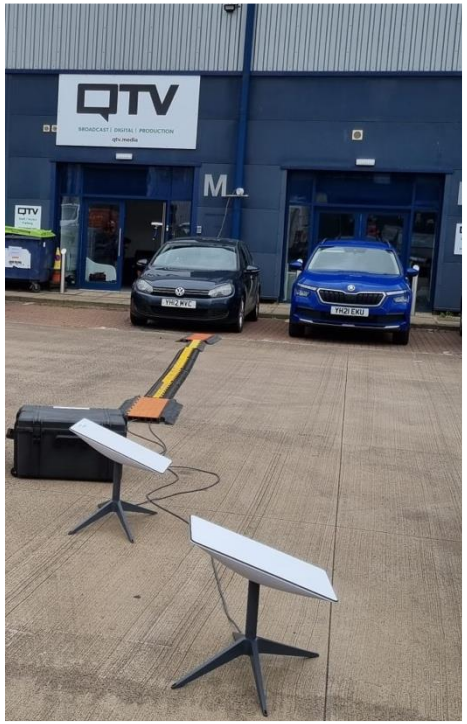


WORKFLOWS IN ACTION – ACROSS THE GLOBE

Pitlochry Highland Games – Traditional Scottish Sports and Culture

LIVE IN SCOTLAND, SEPTEMBER 2022





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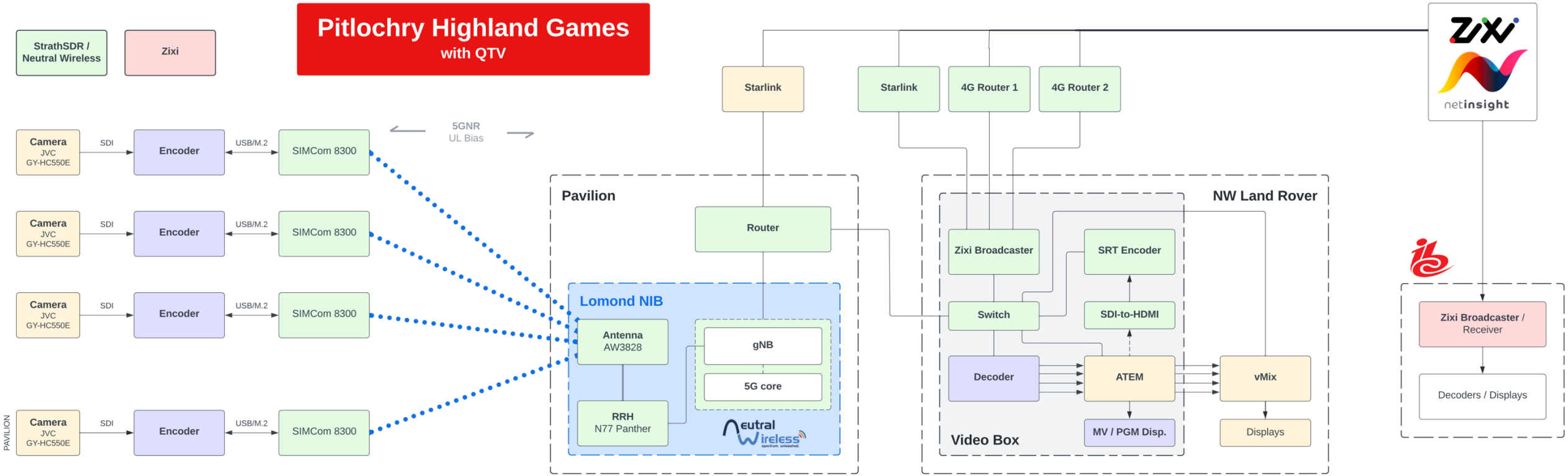

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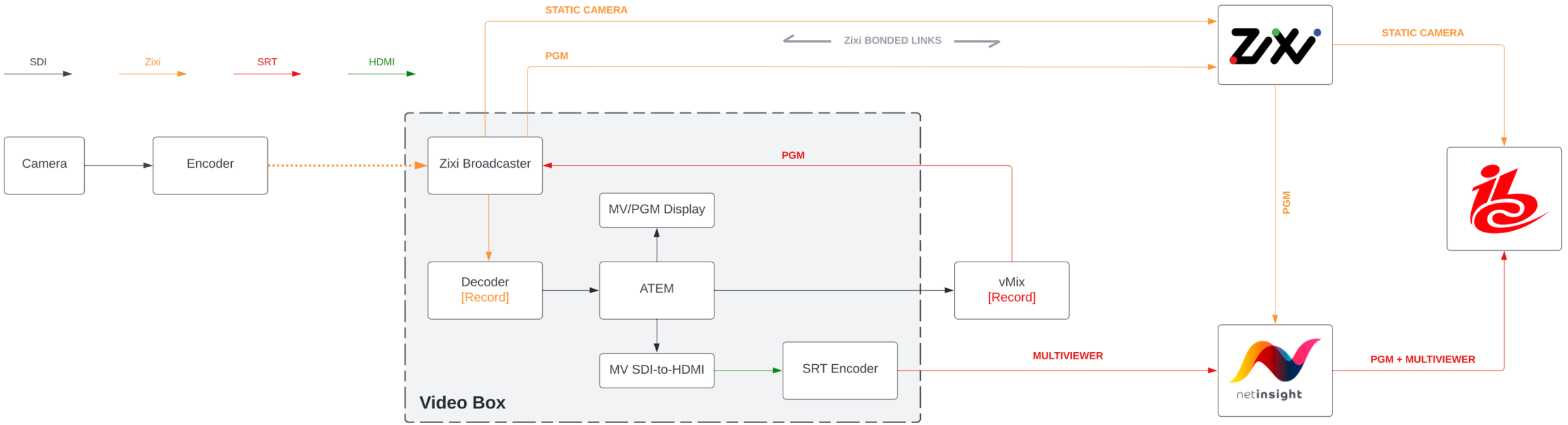

KEY FINDINGS (1)

- **No common Shared Spectrum band worldwide** – requires early intervention with regulators to ensure spectrum availability in chosen location
- In broadcast, **uplink capacity and performance are key** – c.f. traditional MNO downlink biasing
- Need to address **unease over interference**, especially if Uplink (UL) biasing is used. Can apply guard-bands to address specific out of band leakage concerns from neighbours.
- Software Defined Radio – **SDR solution brings flexibility and programmability** to Broadcast 5G use case – TDD UL biasing and UL MIMO for increased overall capacity
- Can **support multiple HD (1080p 50fps) cameras**, alongside other UEs.
- Software defined 5G solution allows for various **optimisations in core and RAN to reduce end-to-end latency** including reducing scheduling request period for UEs.
- Real-time processing for 5G gNB PHY layer and use of **Quality Of Service (QoS) flows optimised for video streaming**

KEY FINDINGS (2)

- **Fibre or copper** based backhaul typically unavailable in remote locations
- **LEO options** such as Starlink can deliver sufficient backhaul in remote locations
- Public **4G/5G MNO** networks (if available in remote location) augment backhaul
- LEO and MNO **networks can be bonded** to aggregate backhaul for uplink
- 5G is fundamentally an **IP radio technology**. Therefore employs “best effort” approach for packet delivery which needs managed
- Can mitigate jitter through careful design including use of **jitter buffers at decoding end**
- Video compression to ~20Mbps for each camera will **enable multiple HD cameras on a single 5G gNB**. (Hence NDI | HX may be preferable to full NDI)

SUMMARY

IBC Media Accelerator **set out and succeeded to demonstrate 5G enabled remote production** "in the middle of nowhere" … . i.e. anywhere!

We found that:

- **Geography is not a barrier** to success, subject to obtaining **spectrum licences**
- 5G SDR NPN and UEs are **low power** – run off batteries, generators, renewables
- Consumer-grade **LEO satellite links make for effective backhaul**
- Remote cloud-based production **minimises on-location carbon footprint**
- Broadcast equipment + 5G NPN network are **portable and quick to deploy**
- Broadcast and communications **skillsets jointly required** for success

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THANK YOU

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