Lancaster University

Lancaster University Networking Group

Edward Austin, Lancaster University

School of Computing and Communications

- Established in 1984
- ~1k undergraduates, ~200 Master students
- ~50 academic staff
  - Networking, Security, HCI, Data Science, Software Engineering, Digital Health.
- NCSC/EPSRC Academic Centre of Excellence in Research & Education, Security and Protection Science, Data Science Institute, Digital Health Hub

UKRI Engineering and Physical Sciences Research Council

Academic Centre of Excellence in Cyber Security Research

ACE-CSR in association with National Cyber Security Centre

Gold Award in association with National Cyber Security Centre | Department for Digital, Culture, Media & Sport

Academic Centre of Excellence in **Cyber Security Education**

Security and Protection Science | Lancaster University

Security Lancaster | Lancaster University

Data Science Institute | Lancaster University

Networking@Lancaster SCC

- ~40 years of internationally recognised network research
- Applied open-source research, and extended collaborations with industry, including BT, BBC, NEC, Toshiba, BAE Systems, NCSC and GCHQ
- Themes:
  - Media delivery
  - SDN/NFV and network programmability
  - Management and orchestration
  - Mobile communications (5G, 6G)
  - Security and resilience
- Testbeds: ICS Lab, 5G RAN and Core, Small-scale cloud with SDN programmability
- Active participation in standardization bodies: IETF/IRTF, ETSI NFV, TMForum

SAI2

HyRiM
Hybrid Risk Management for Utility Providers

seccrit
SEcure Cloud computing for CRitical infrastructure IT

AI4ME
AI for Personalised Media Experiences

mpat

P29 NEXT

FI content

NG-CDI
NEXT GENERATION • CONVERGED DIGITAL INFRASTRUCTURE

MANY
Mobile Access North Yorkshire

steer

TUDOR

5GRIT
Rural Integrated Testbed

TOUCAN
ULTIMATE NETWORK CONVERGENCE

INITIATE

FED4FIRE
FEDERATION FOR FIRE PLUS

FELIA

ETSI

IETF

tmf

Security & Resilience

Media Delivery

Network Management/
SDN/NFV

Testbeds

Standards

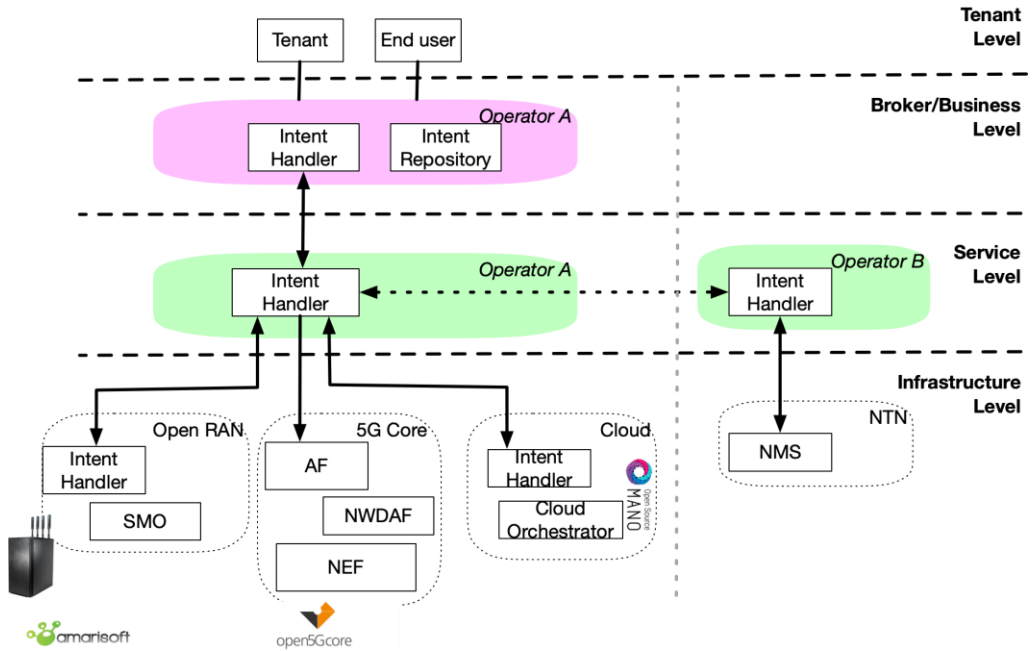
Network Management/ SDN/NFV

BT Lancaster University

Intent Based Networking:

Intent handler prototype for service delivery in TN/NTN future mobile infrastructures (in collaboration with BT).

- Core, Transport and cloud orchestration.
- Support for TMForum Intent Common model.
- Novel model integration mechanism, based on semantic web technologies.
- Realtime intent-driven telemetry.
- Autonomic slice delivery intent scenario using local testbed.

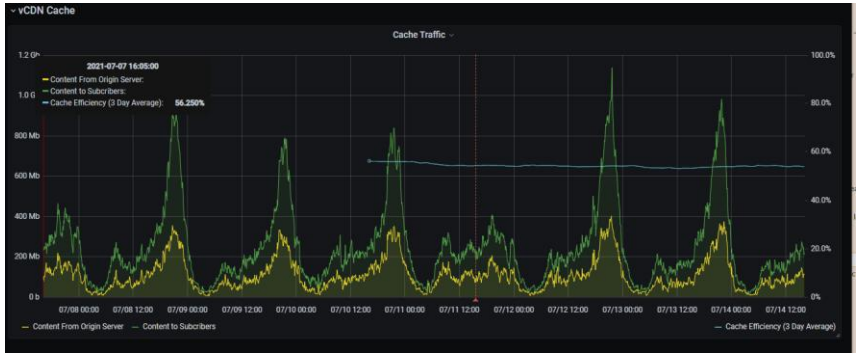


Anomaly Detection:

Lancaster has a track record developing novel anomaly detection methods for cyber, telecoms, and energy use cases, including a tool currently used by BT to monitor the UK's national 5G infrastructure.

Network security tools such as Tennison monitor inside the network for anomalous behaviour such as intrusions.

Mathematical and probabilistic AI algorithms such as FAST, NUNC, and SCAPA-UCB monitor for anomalous behaviour in data, for example network telemetry or energy usage.



TENNISON
Next Gen Network Security

Security & Resilience

BT

Lancaster University

Network Security Monitoring

Security & Resilience

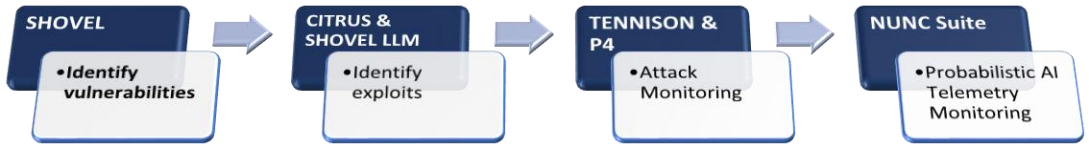
Lancaster University

Lancaster has developed a pipeline suite of tools for enhancing network security at scale:

- **SHOVEL** identifies vulnerabilities using EASM. Leverages OSINT to identify more IPs than tools such as Shodan and Censys.
- **CITRUS** identifies threat vectors that would exploit the vulnerabilities.
- **SHOVEL** has an LLM pipeline that summarises the vulnerabilities and risks.

Once the risk points have been identified monitoring tools detect threats:

- Methods for such as **TENNISON** intelligently monitor the network for anomalies.
- The **NUNC** suite contains telemetry monitoring algorithms that leverage explainable mathematical techniques to identify anomalies.



Media Delivery

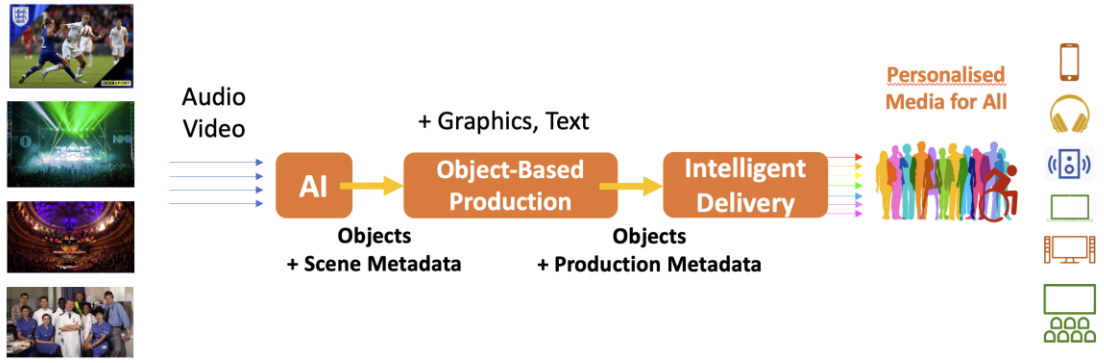
BBC Lancaster University

Intelligent Media Delivery:

Current: ‘One-size-fits-all’ streaming media

Every viewer receives the same content...

Future: Personalised Media Experiences



Content adapts to individual

Testbed capabilities:

- 5G/6G indoor testbed (Amarisoft SDR, Fraunhofer 5G Core) with NTN integration
- Local Kubernetes/OpenStack clusters with support for AI processing (Nvidia L4) and network programmability (P4)
- Prototype next-generation video delivery service (in collaboration with BBC)
- Industrial Control System testbed with support for SMR emulation.

Our interests:

B 01-01: Advanced Architectures Systems and Technologies
B 03-01: 6G NTN-TN Unification/Integration
B 04-01: Smart Security / Security Services
B 04-02: Reliable Services Operation
C 01: 6G Telco Cloud and Service Provision Enablers

Thank You

networkedsystems@lancaster.ac.uk