Towards Programmable and Virtualized Radio Access Networks

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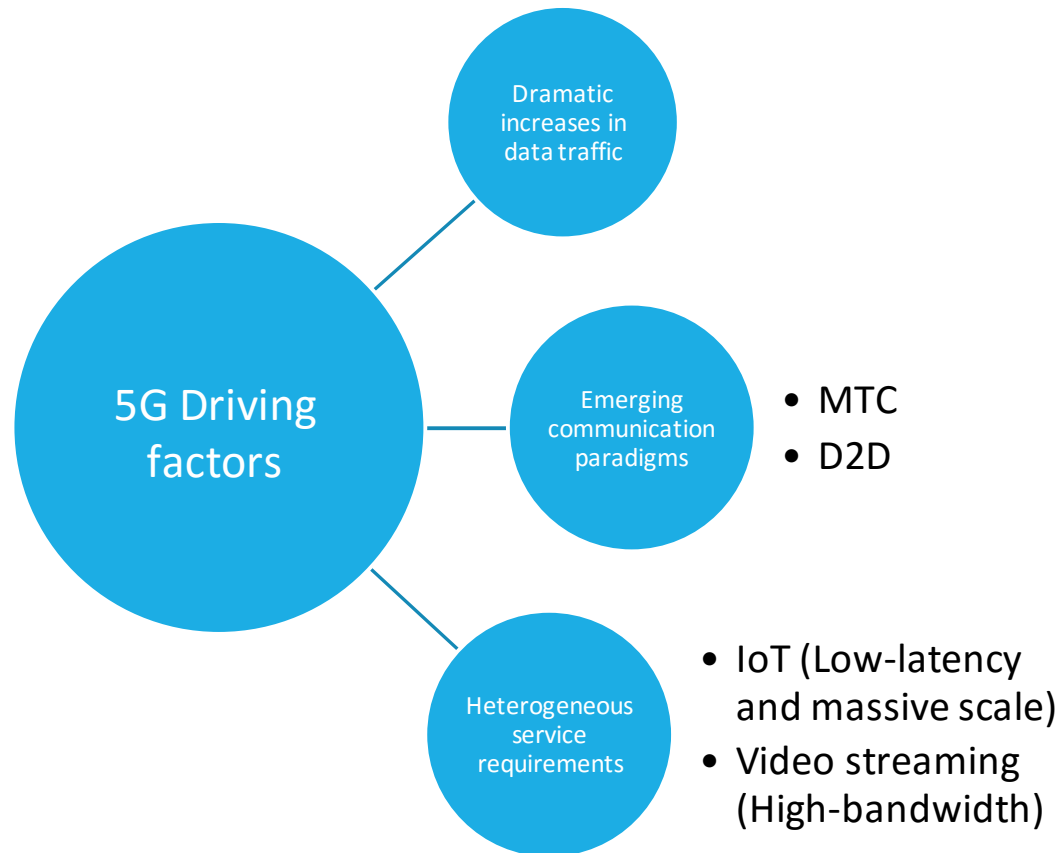
The University of Edinburgh
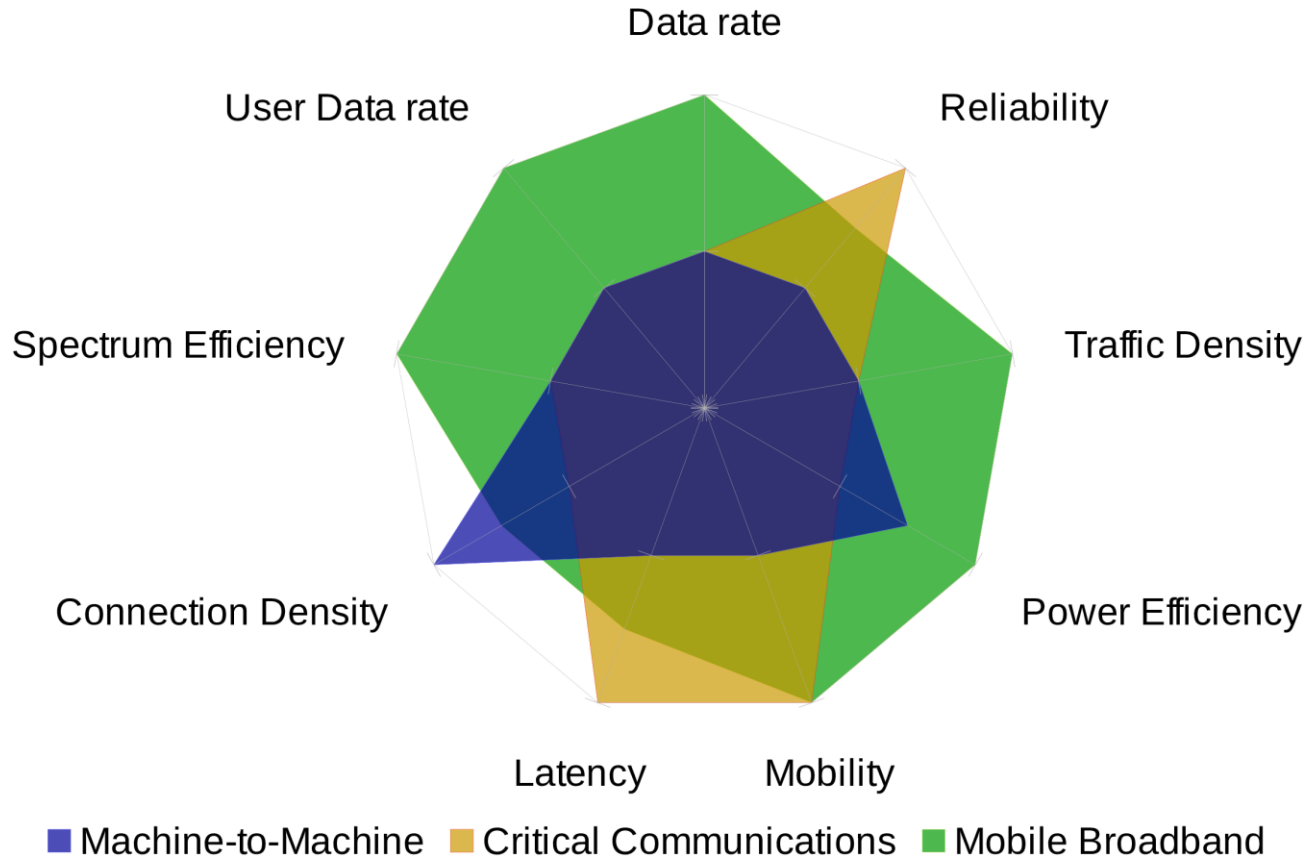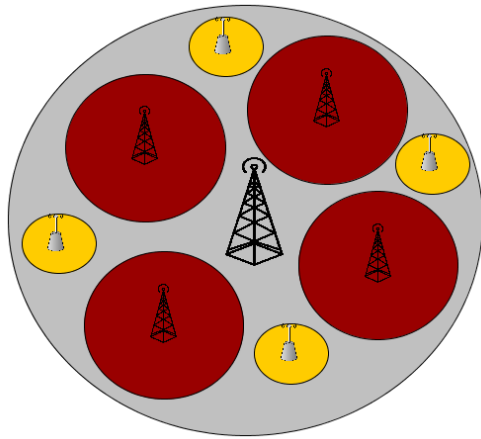
NCSR "Demokritos"

5G on the horizon

Service-oriented 5G view

Dimensions of innovation

Dense networks

NB-IoT Massive MIMO

mmWave
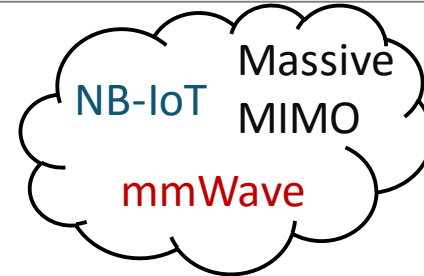
New Radio Access Technologies and Spectrum Bands

Virtual Network Slices

Physical Mobile Network
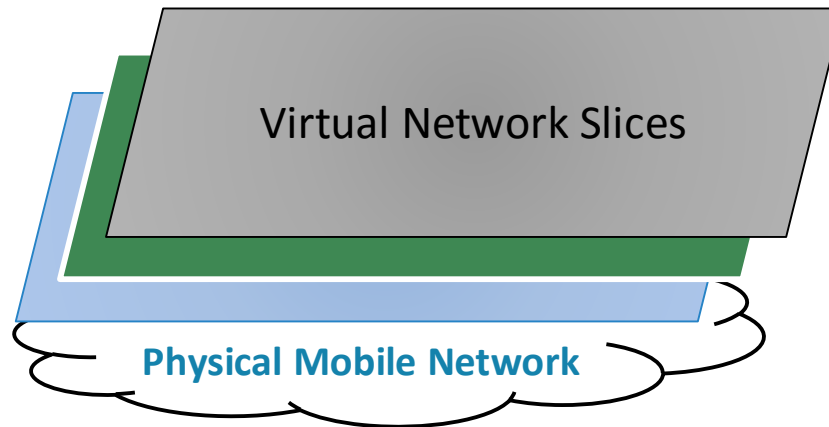
Flexible support for multiple (diverse/new/agile) services and operators

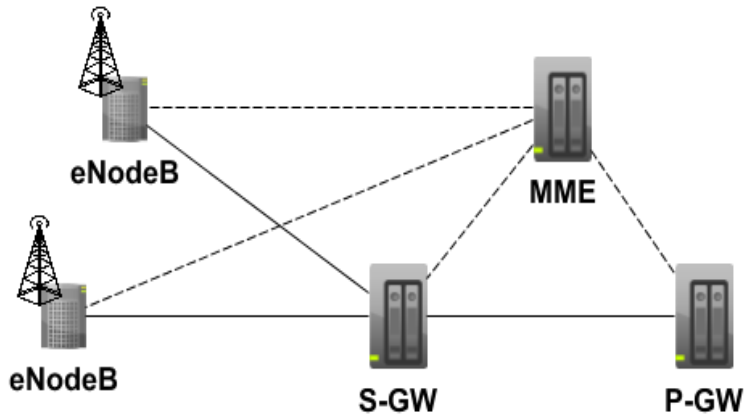# Towards a service-oriented 5G architecture

Fixed and Rigid

eNodeB

eNodeB

MME

S-GW

P-GW
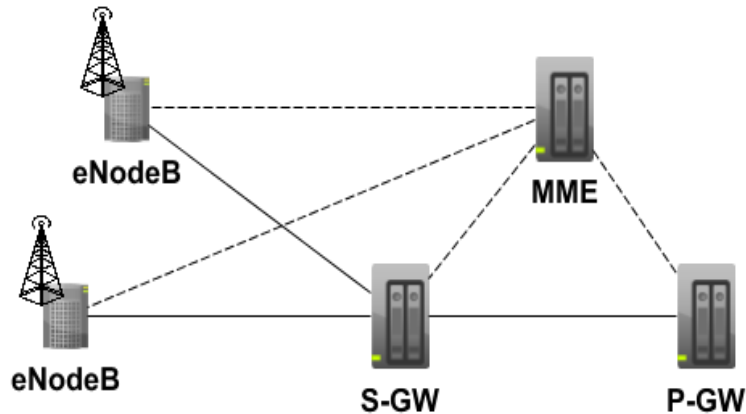
Conventional One-size Fits All
Mobile Network Architecture

Towards a service-oriented 5G architecture

Fixed and Rigid

Flexible and Customizable
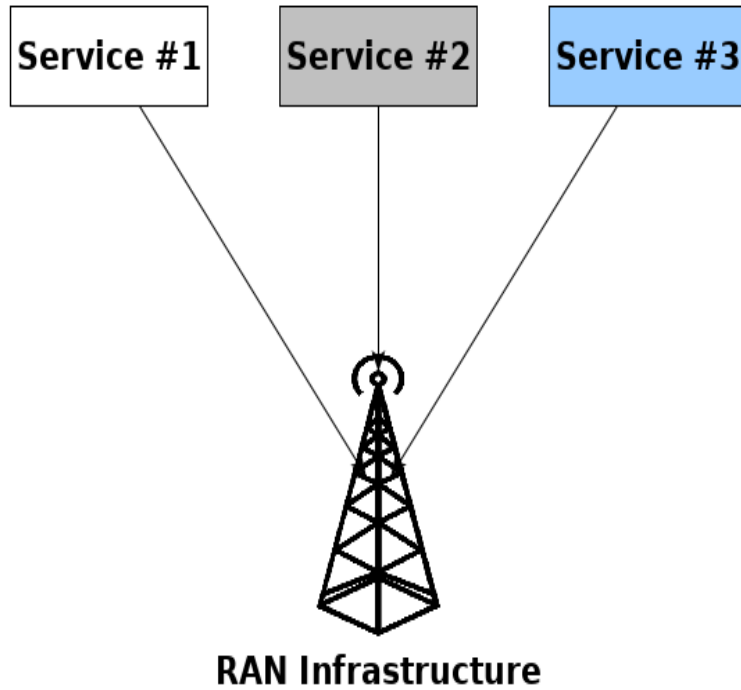
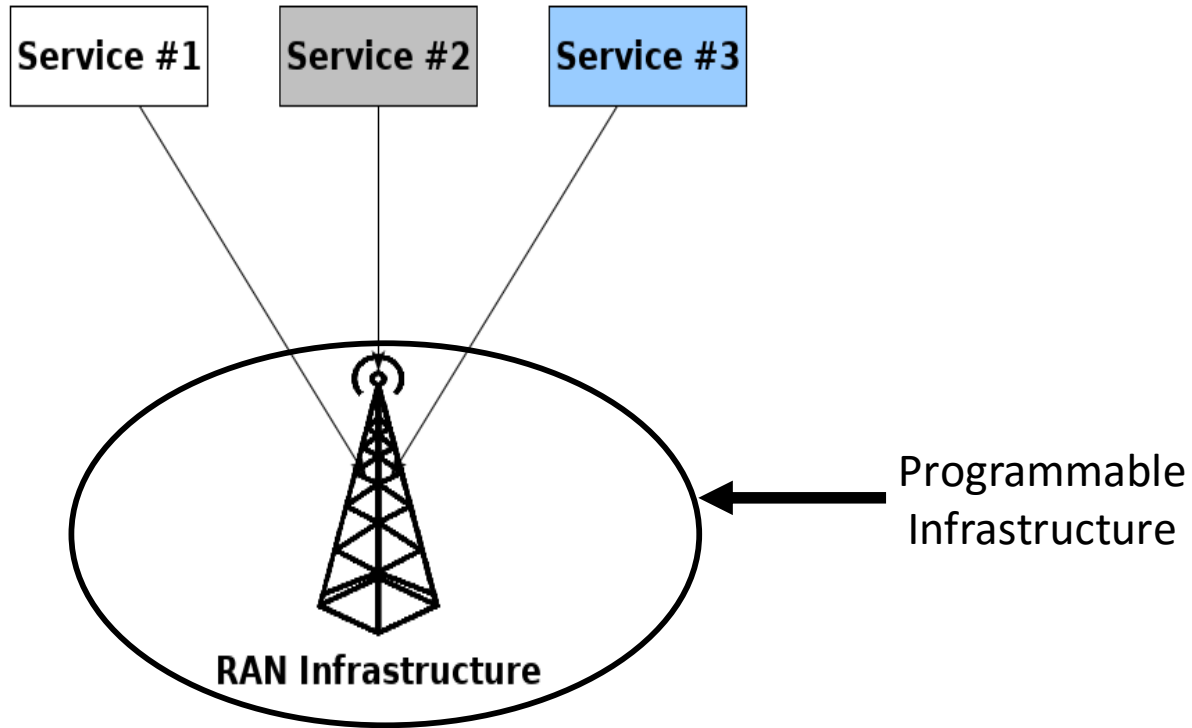Conventional One-size Fits All Mobile Network Architecture
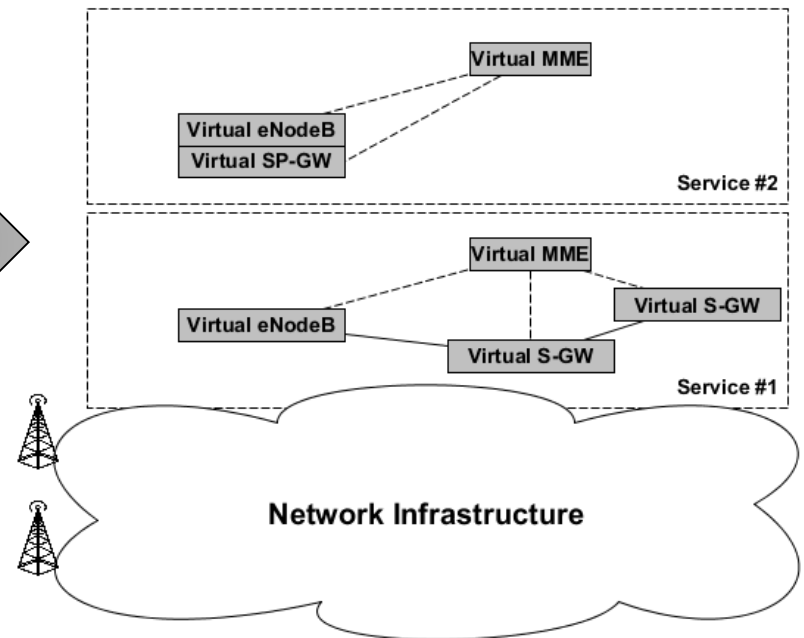
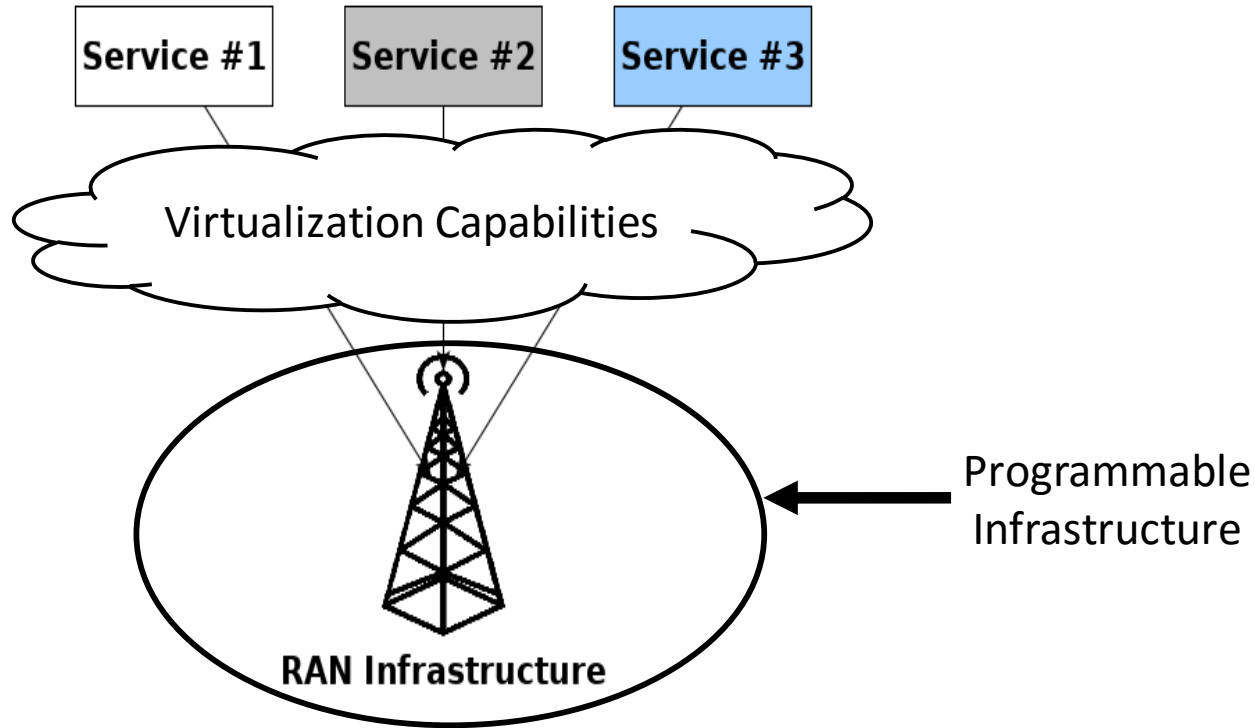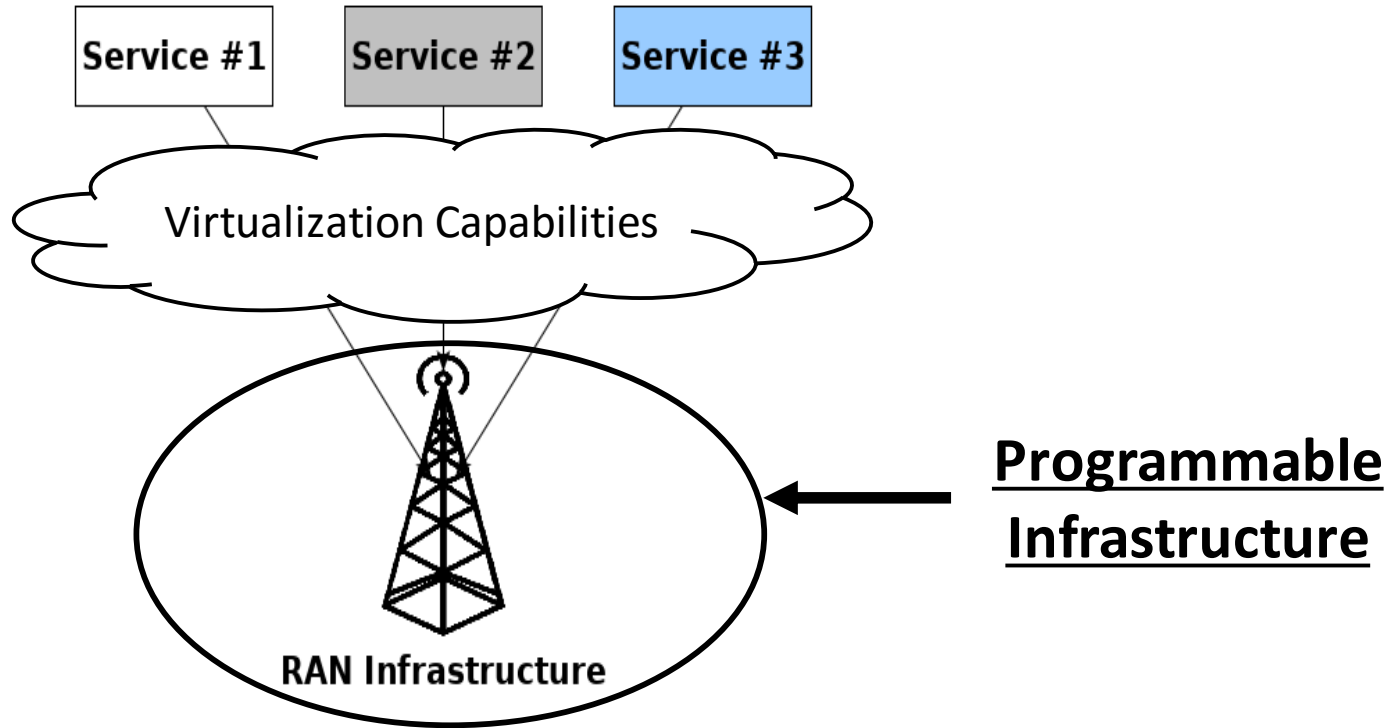End-to-end Network Slicing Architecture

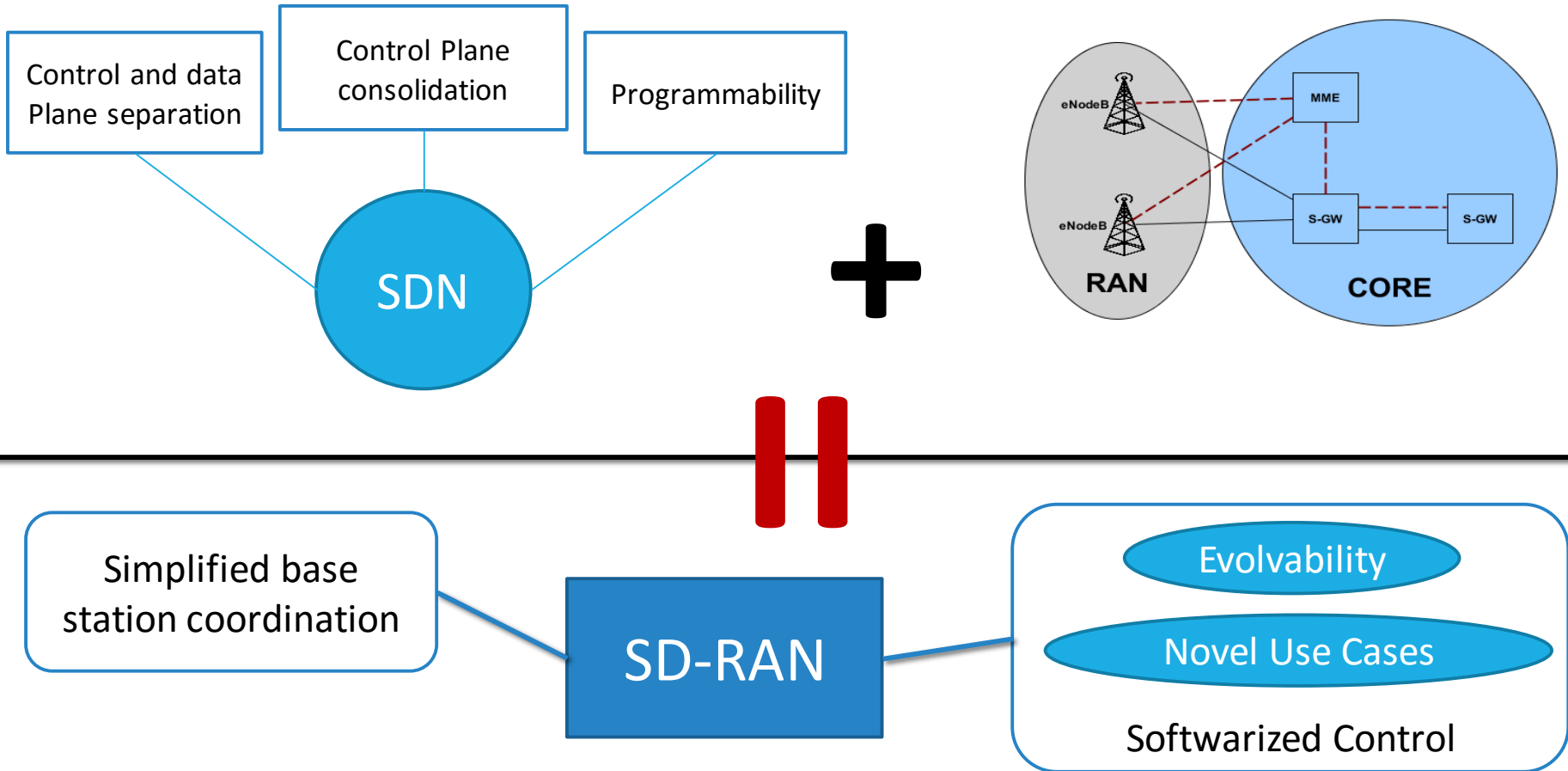# Slicing the RAN

Slicing the RAN

Slicing the RAN

Slicing the RAN

Software-Defined Radio Access Networks (SD-RANs)

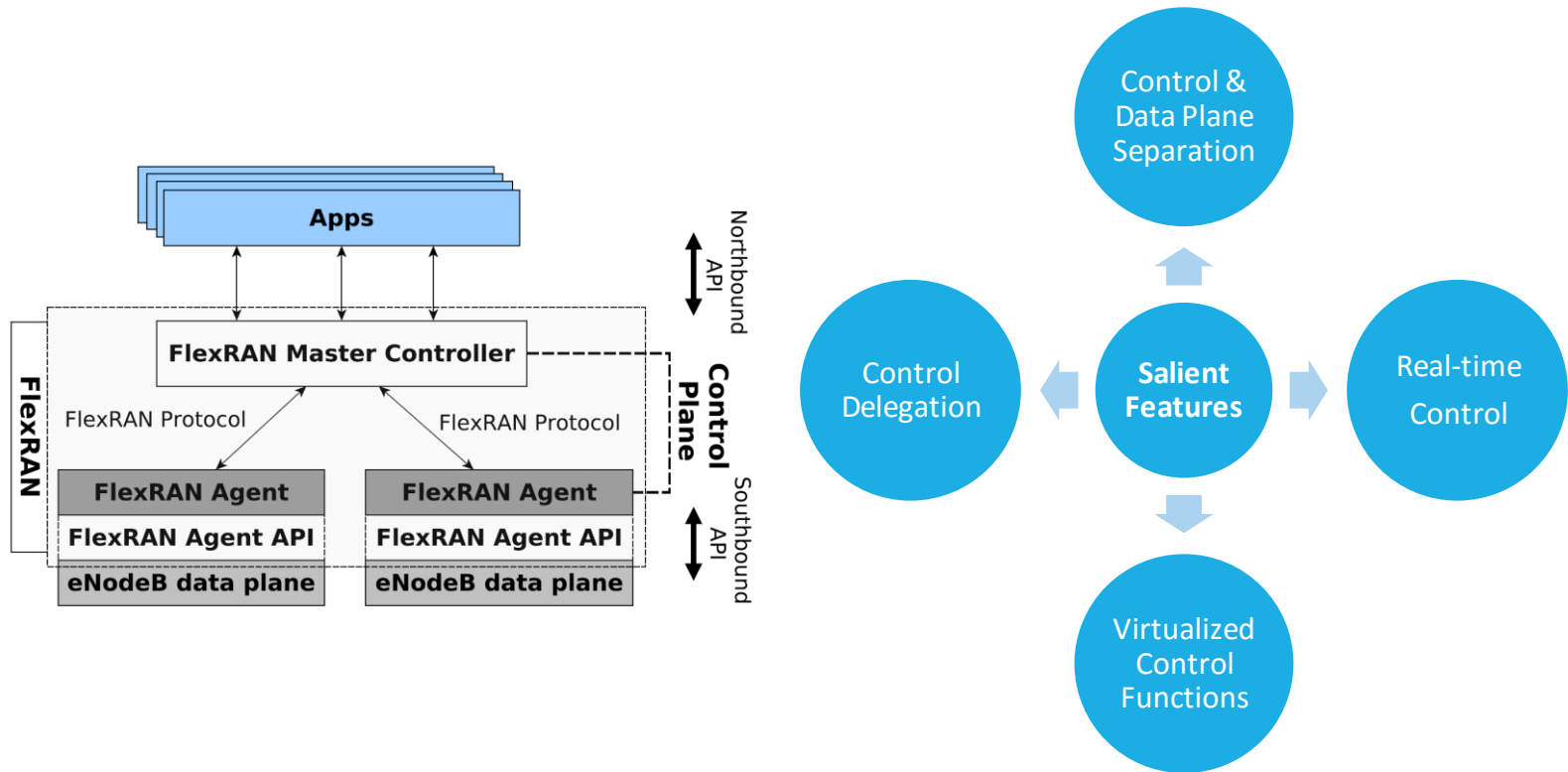# Our contribution: **FlexRAN** (CoNEXT '16)

First concrete **open source** SD-RAN platform for experimentation
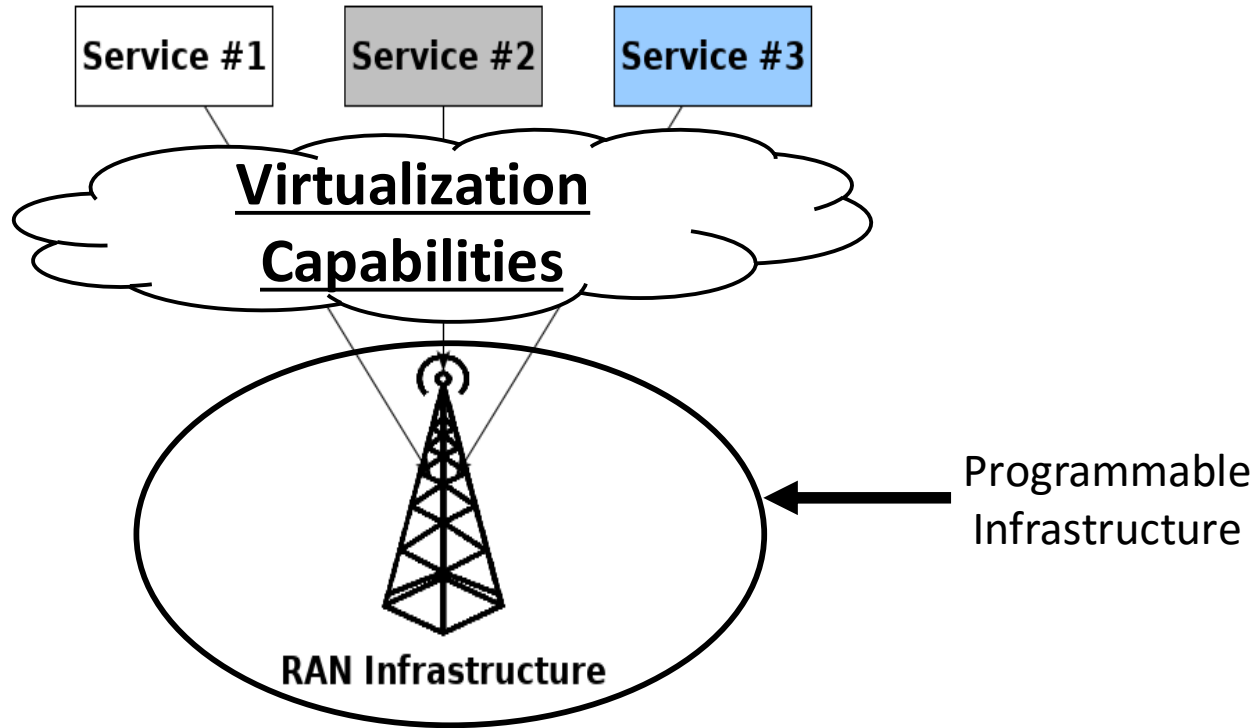
Realizable SD-RAN design

Support for real-time RAN control

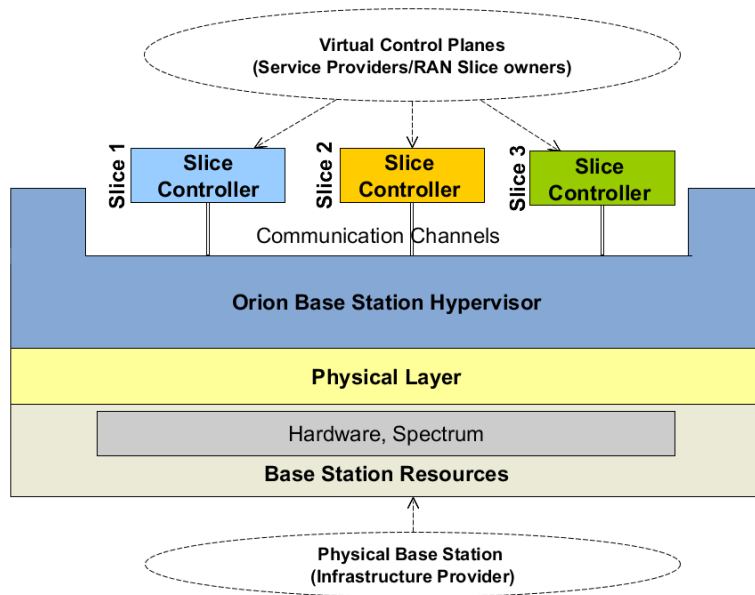Flexible and Programmable RAN architecture

FlexRAN Overview

Slicing the RAN

Virtualizing the RAN: **Orion** (MobiCom '17)

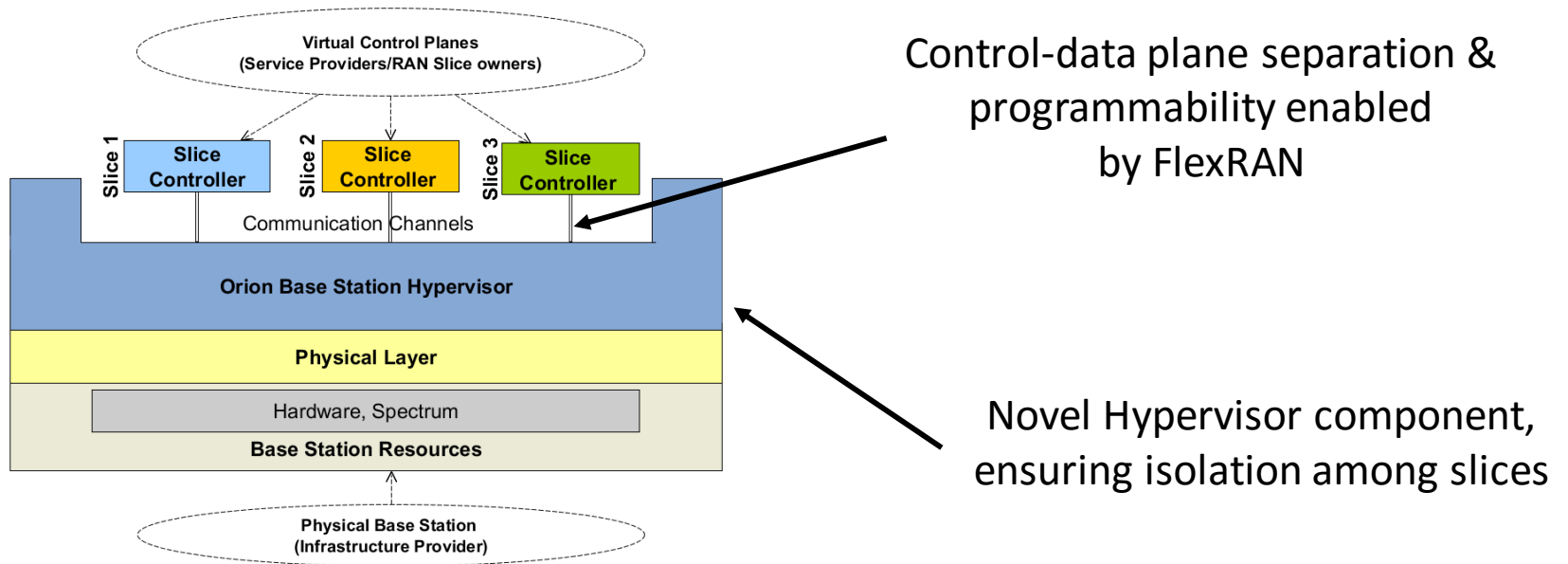

Orion RAN slicing system

Efficient sharing of radio and spectrum resources

Functional and Performance Isolation

Key Virtualization Enablers

Control-data plane separation &
programmability enabled
by FlexRAN

Novel Hypervisor component,
ensuring isolation among slices

Conclusions

RAN Programmability and Virtualization are expected to play a vital role in 5G networks
- Network slicing & multi-service support

FlexRAN SD-RAN platform
- First concrete open source SD-RAN implementation
- More information at:
  - http://networks.inf.ed.ac.uk/flexran/

Orion RAN slicing system
- Enabler of RAN virtualization for multi-service networks