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5G for Military Use

Kennet Nomeland

Radio Systems Architect

2021 Joint European Conference on Networks and Communications & 6G Summit

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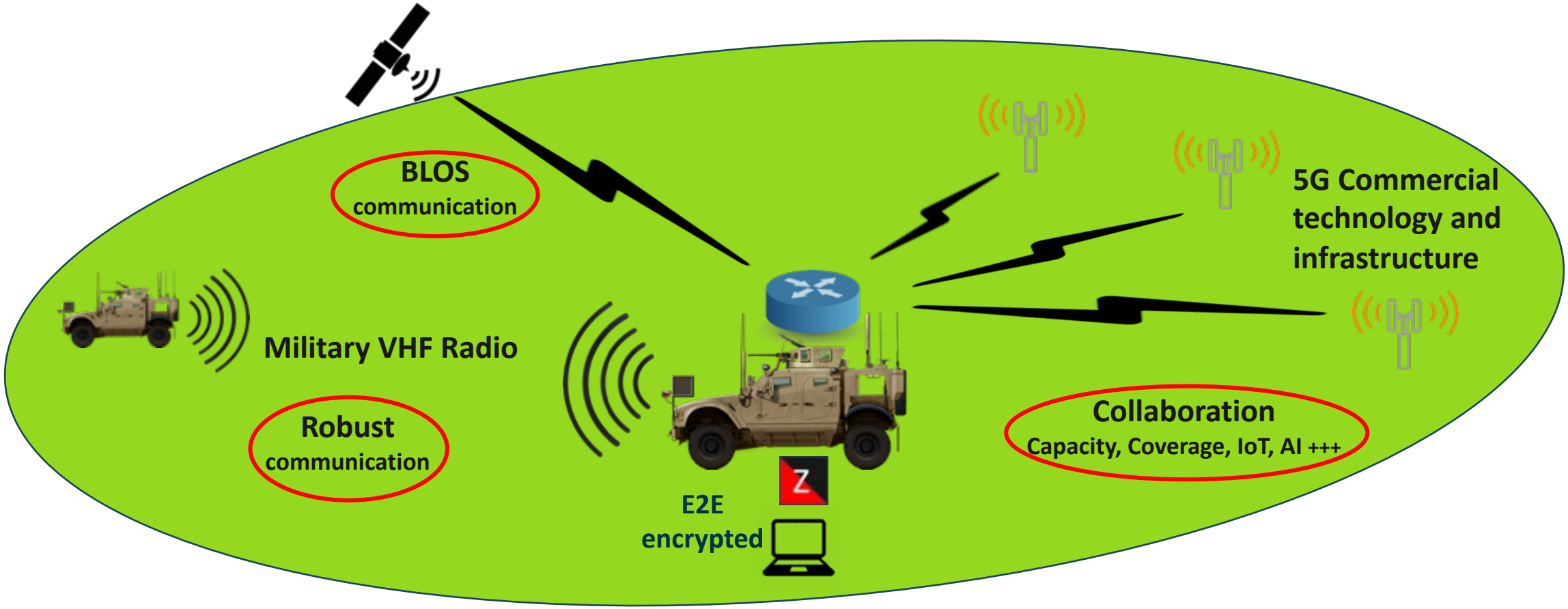
Communication for different scenarios



3GPP ecosystem gives many new possibilities

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Why is 5G interesting for military use?

Open Standards and Interoperability

A new threat picture > Collaboration in the "Total Defence" is needed

5G New Radio

MIMO/Beamforming > More reliable communication

Network Slicing

Dedicated Defence NW slice > Separation from commercial traffic

Edge Computing - the extended cloud

Services can run autonomously in the "edge" of the network

Foto: Johan Ludvig Holst/ Forsvaret

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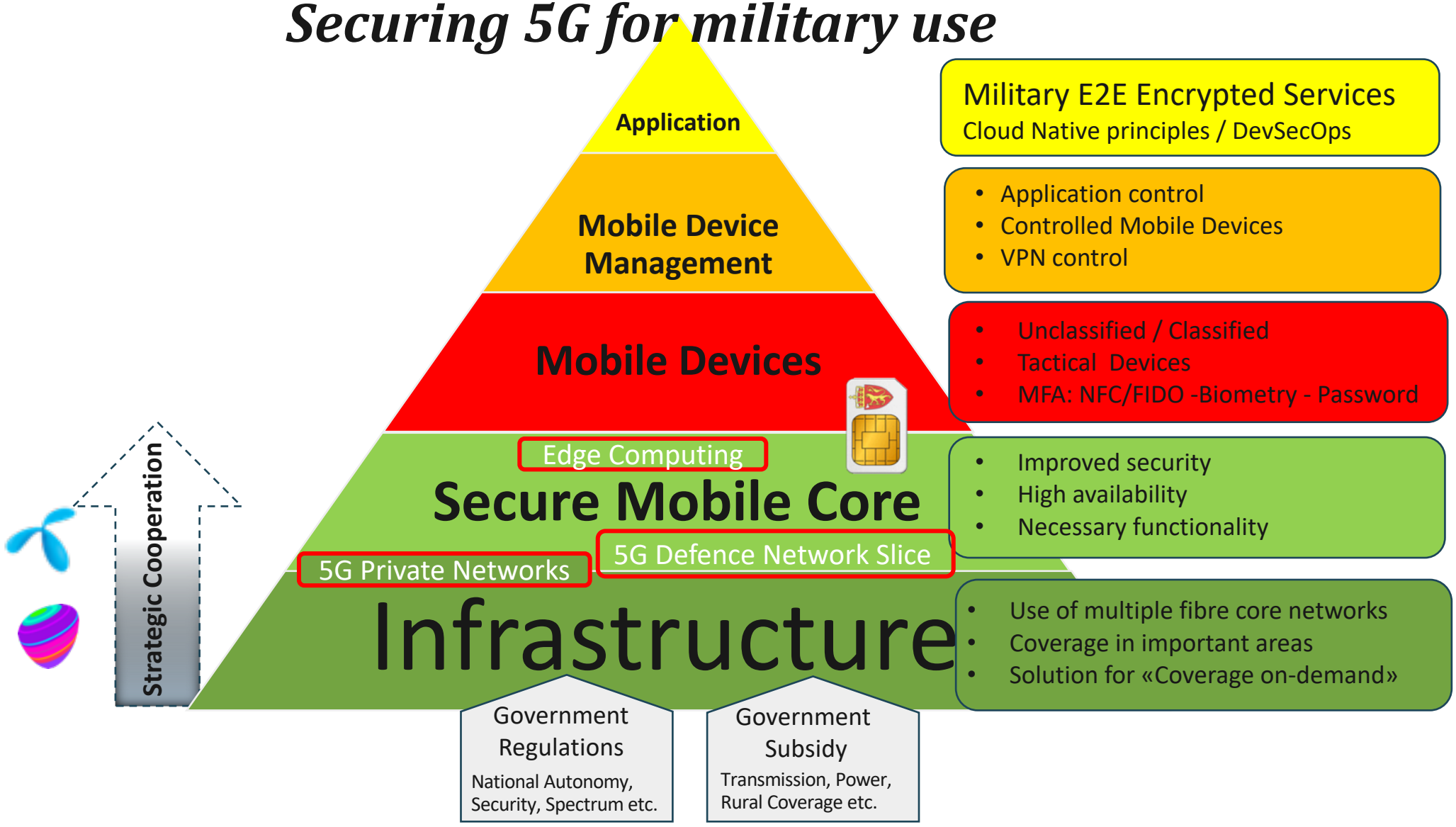
Securing 5G for military use



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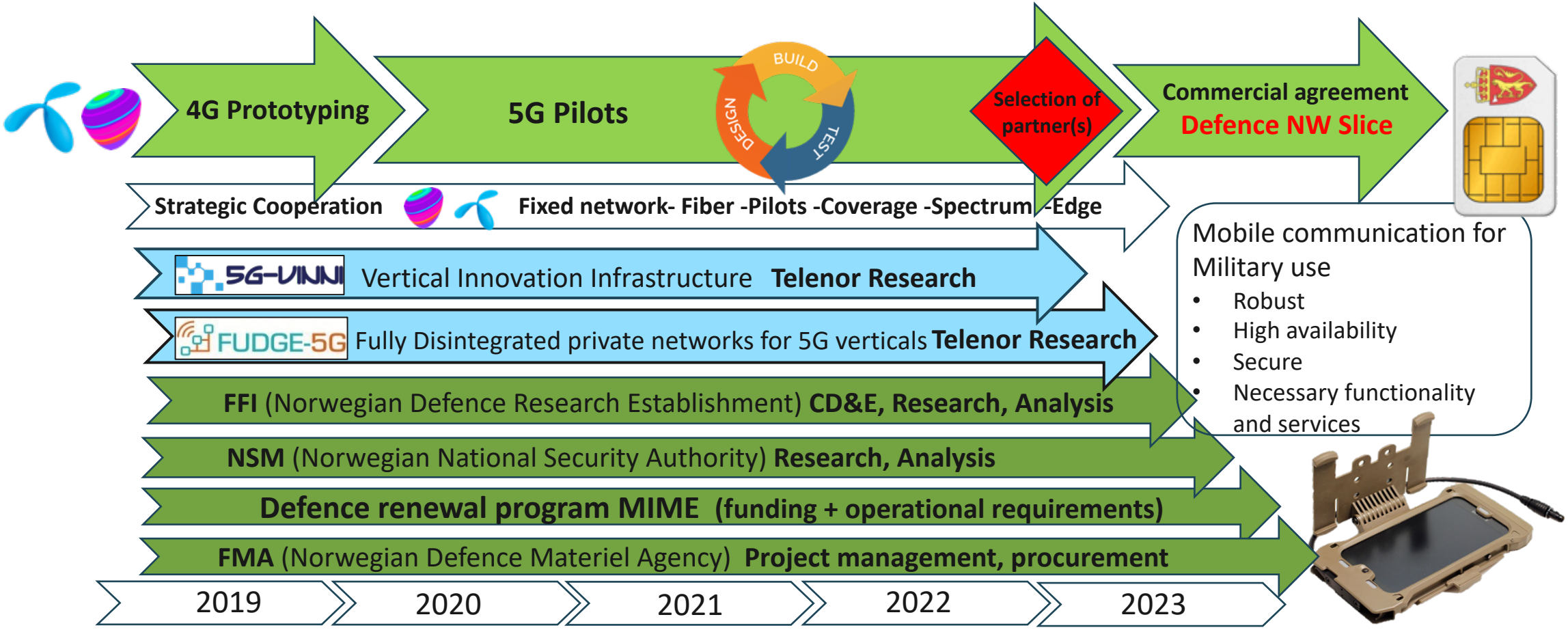
Broad collaboration & Iterative Development



Adapting 5G to military use

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Rygge military airbase

5G-VINNI

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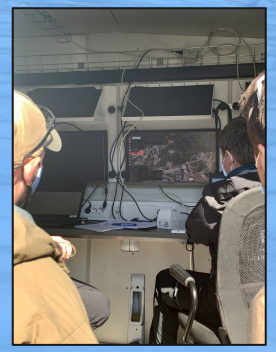
5G-VINNI

5G New Radio testing at Rygge military airbase

Range, Capacity and Robustness in different frequency bands



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FUDGE 5G pilot

5G Private Network

FUDGE-5G

Fully Disintegrated private networks for 5G verticals (FUDGE)

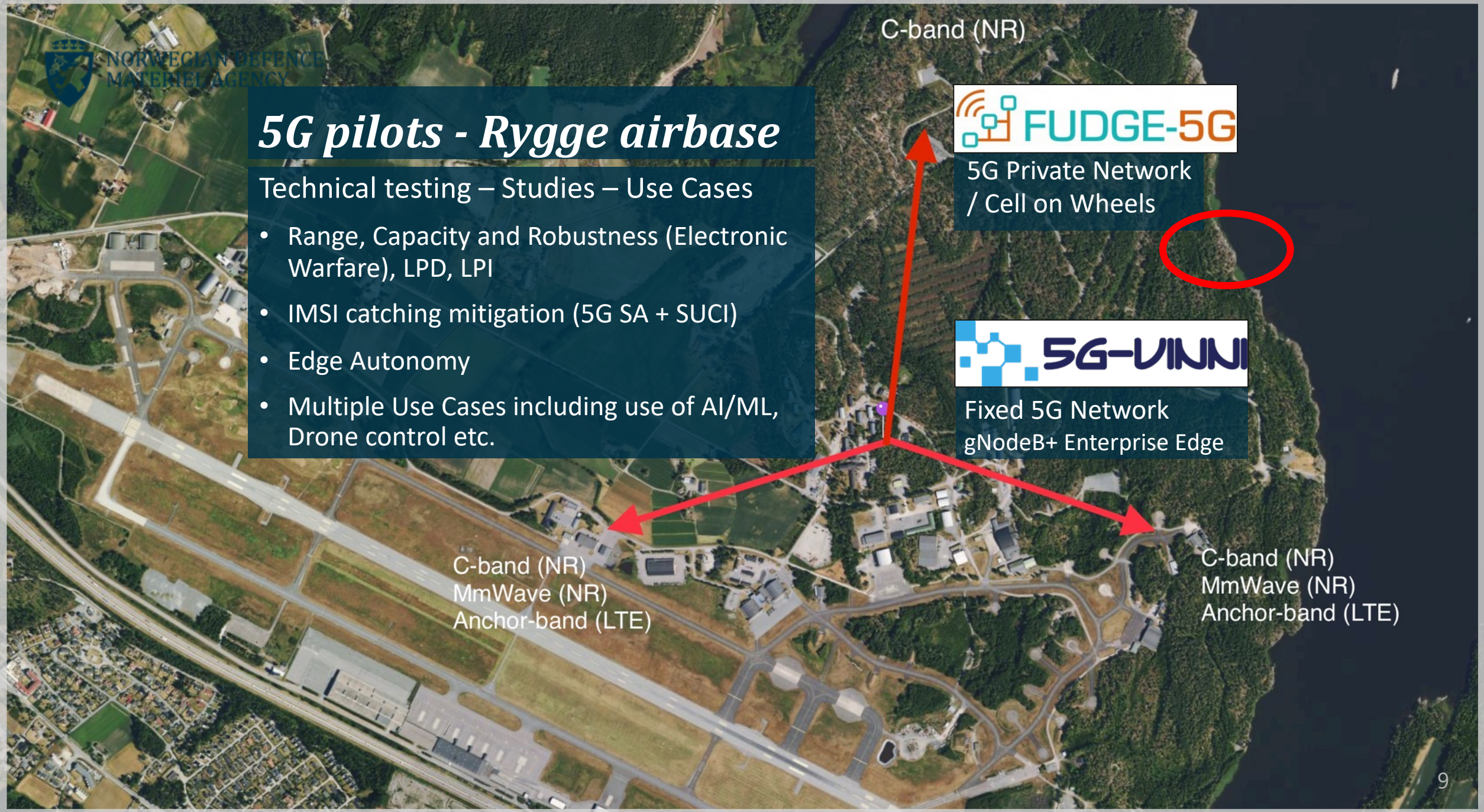
- EU funded 5G pilot
- Started in September 2020 – Running until February 2023
- Fully autonomous 5G Private Network built on a trailer
- COW equipped with Edge for PPDR / Military Use Cases

Goal:

- Utilize both **Public** and **Private** 5G network (NPN)
- Utilize centralized clouds, 5G and Edge to create **Better** and more **Robust** services
- Leverage 5G SUCI security concept (Subscription Concealed Identifier) to **mitigate IMSI catcher problems**

Cell on Wheels

5G Private Network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5G pilots - Rygge airbase
Technical testing – Studies – Use Cases
• Range, Capacity and Robustness (Electronic Warfare), LPD, LPI
• IMSI catching mitigation (5G SA + SUCI)
• Edge Autonomy
• Multiple Use Cases including use of AI/ML, Drone control etc.
C-band (NR)
FUDGE-5G
5G Private Network / Cell on Wheels
5G-VINNI
Fixed 5G Network
gNodeB+ Enterprise Edge
C-band (NR)
MmWave (NR)
Anchor-band (LTE)
C-band (NR)
MmWave (NR)
Anchor-band (LTE)

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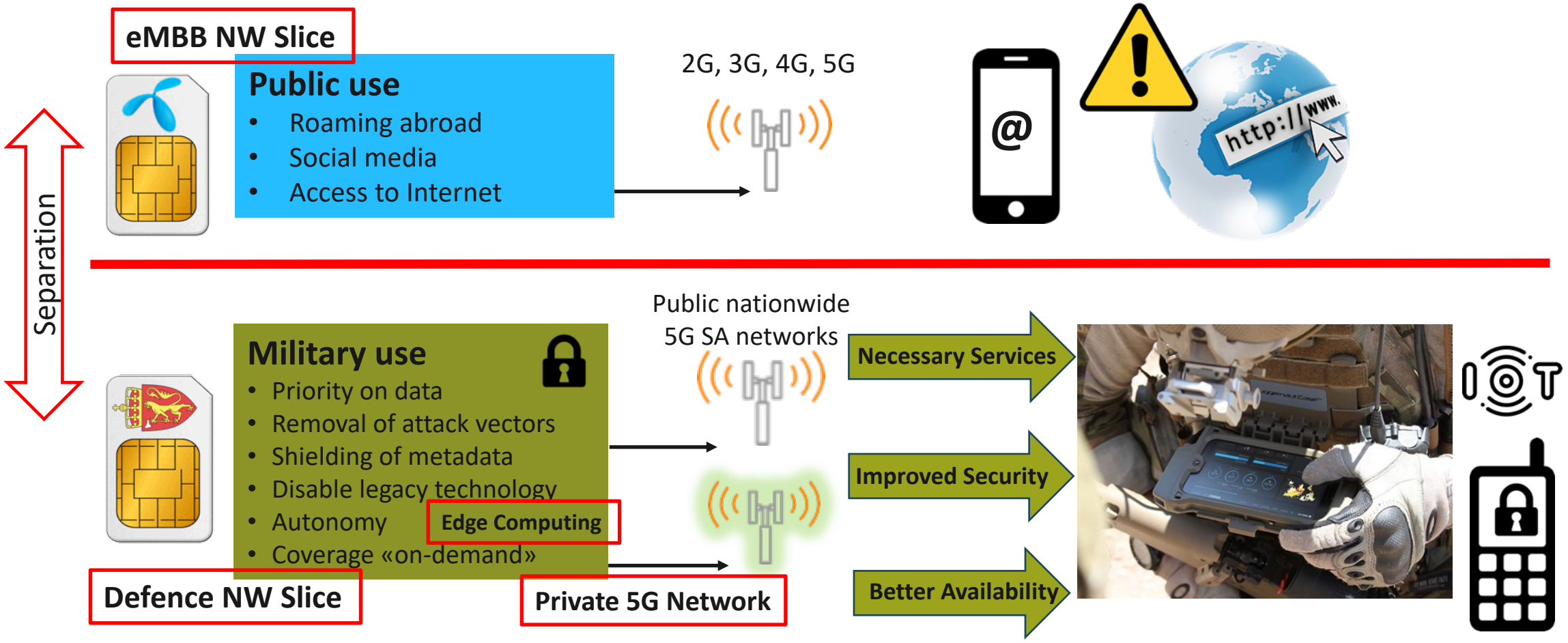
Network Slicing *to separate Public and Military traffic*



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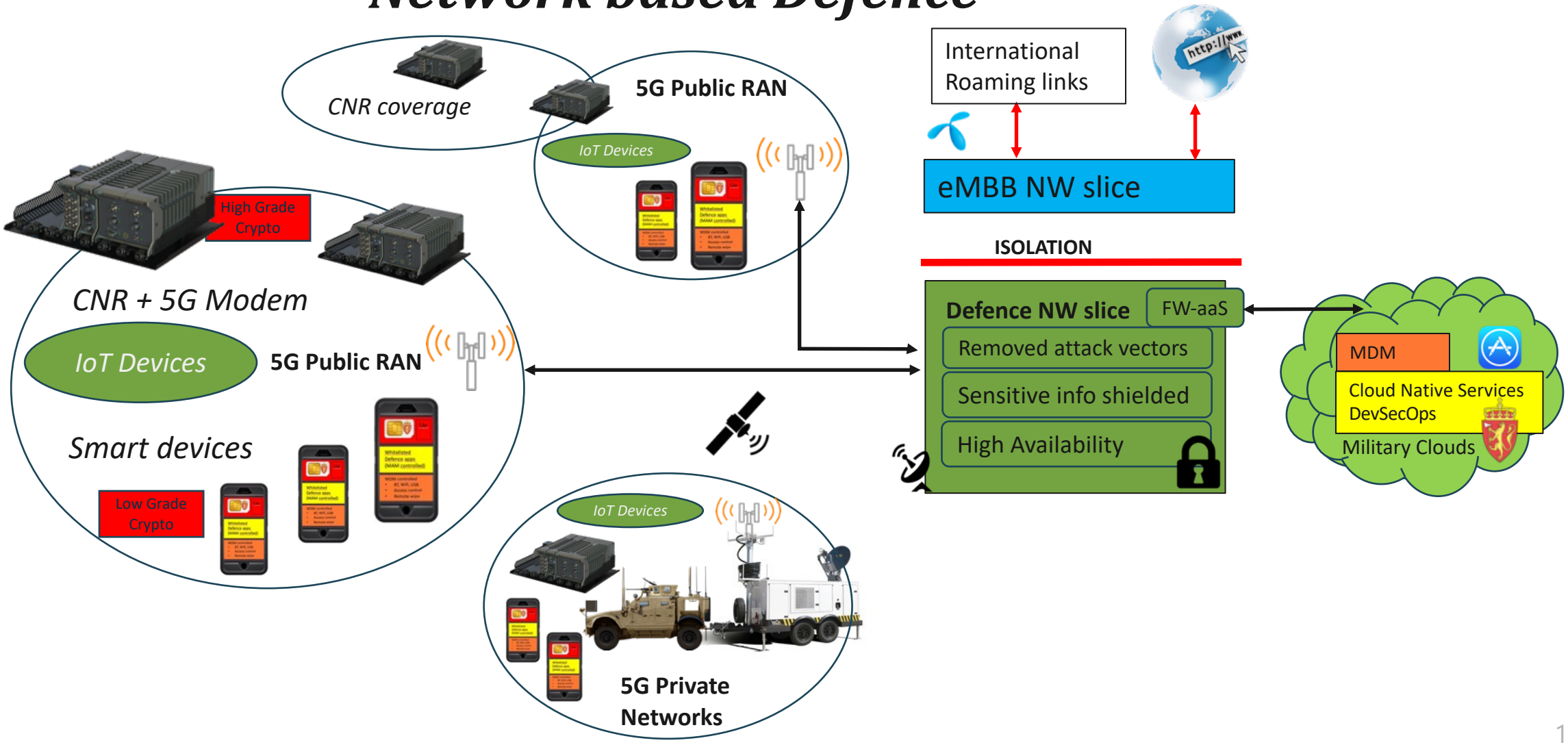
Network based Defence



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Autonomy

Enabled by **Edge Computing** and **5G Private Networks**

Foto: Lars Rørås/ Forsvaret

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5G-VINNI

Autonomous Edge in strategic important areas

Defence Slice with full 5GC functionality + Services running in the Edge is providing services in important areas (airport, hospital, naval base) even when the central 5GC DC is not available

5G Core

Central Data Center Oslo

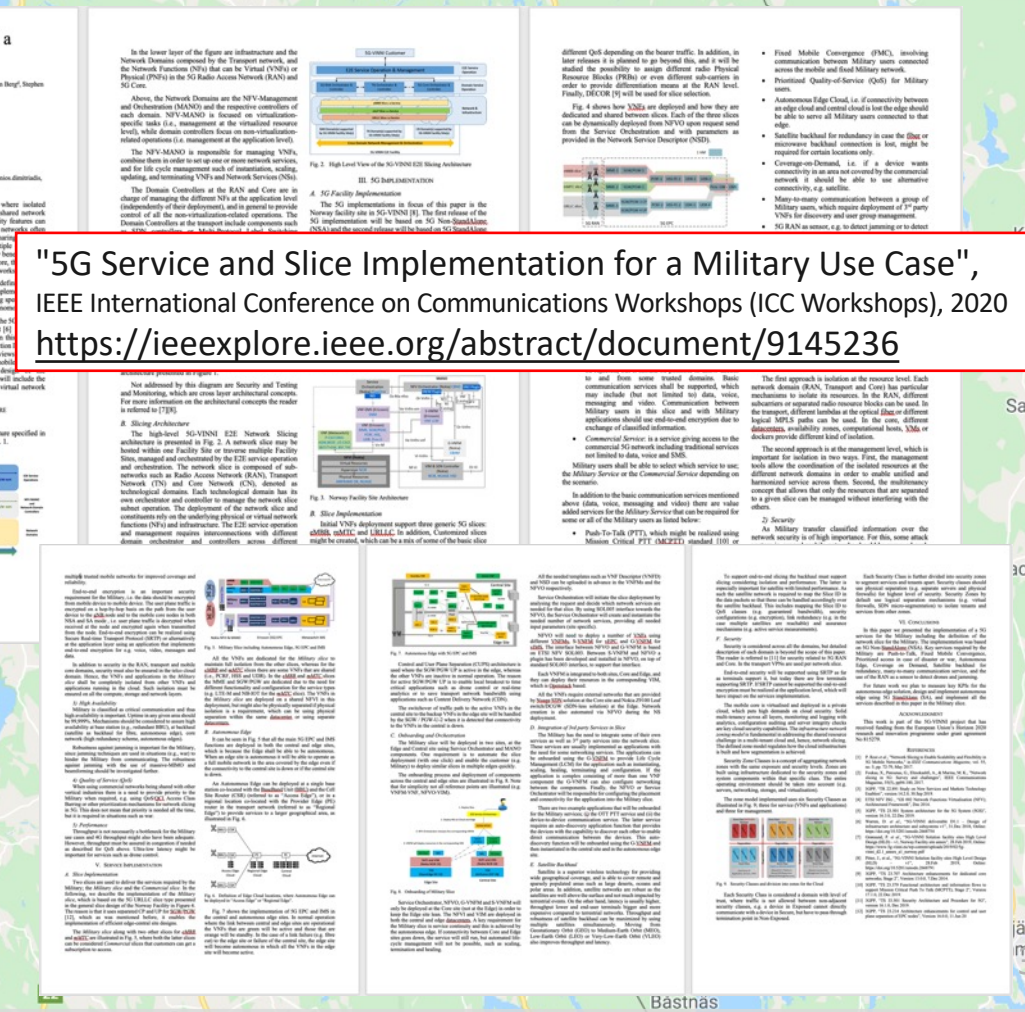
Fiber Cut

Defence Slice has dedicated 5G Core also in Edge

Important Services available in our Defence NW Slice: Voice, Video, Chat, PTT (Application Function)

Autonomous Edge

(MEC) connected to gNB (basestations) Rygge Airbase


5G Service and Slice Implementation for a -Military Use Case

"5G Service and Slice Implementation for a Military Use Case",
IEEE International Conference on Communications Workshops (ICC Workshops), 2020
https://ieeexplore.ieee.org/abstract/document/9145236

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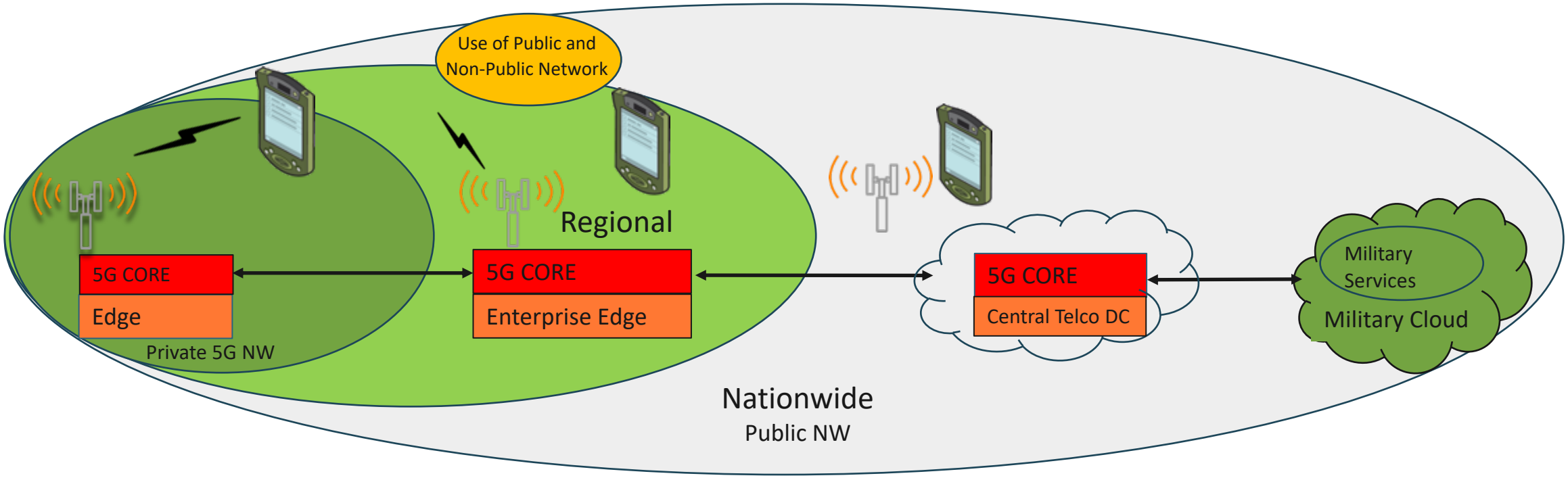
5G Private Networks (NPN)

FUDGE-5G



From a **Telco** perspective

How to utilize both **Private** and **Public** 5G networks

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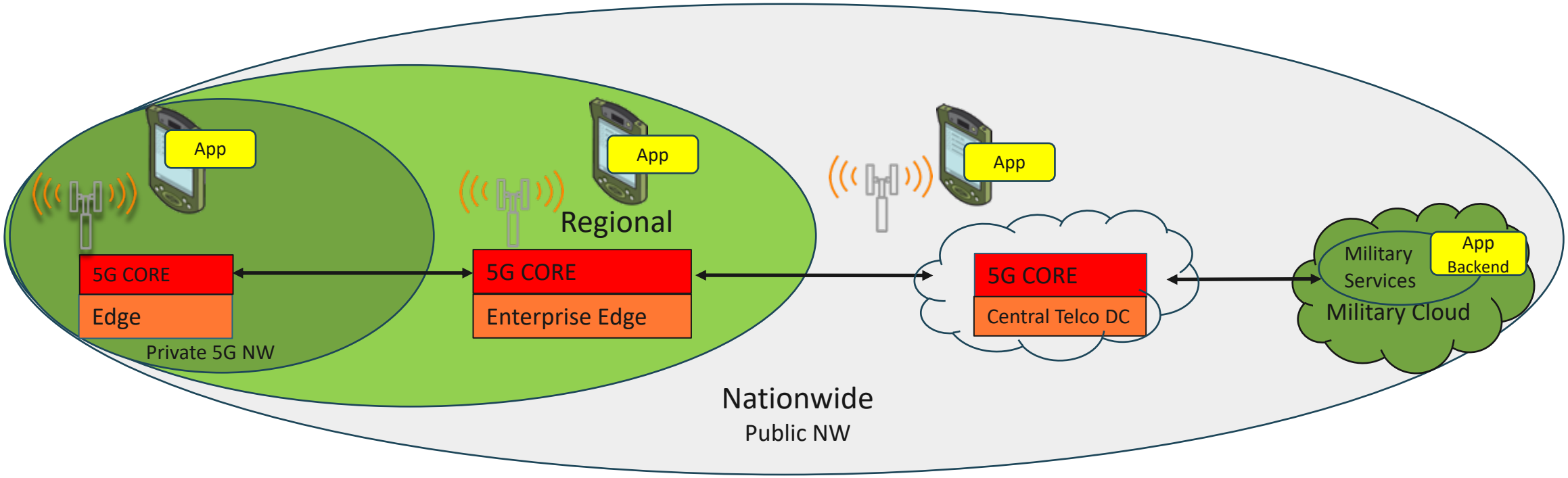
Edge Computing – The extended cloud



From a **Service** perspective

How to utilize centralized clouds, 5G and Edge to create **Better** and more **Robust** services

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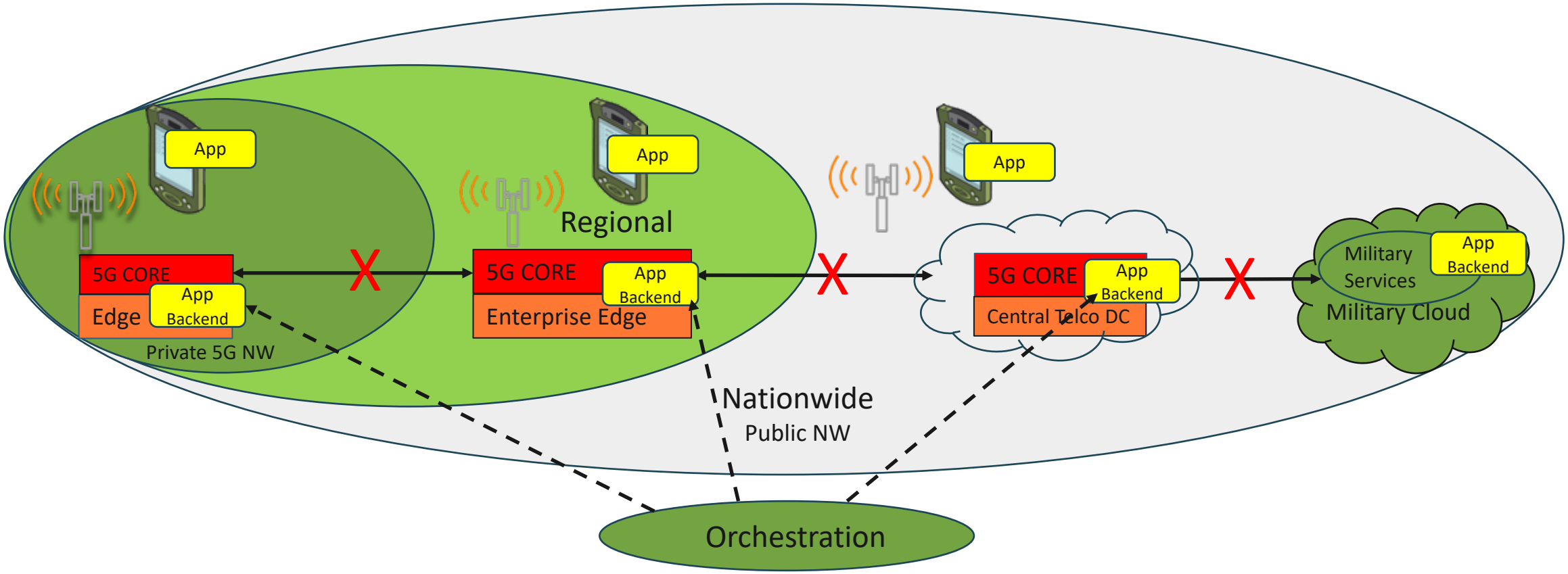
Edge Computing – The extended cloud



How to utilize centralized clouds, 5G and Edge to create **Better** and more **Robust** services
(Cloud Native principles)

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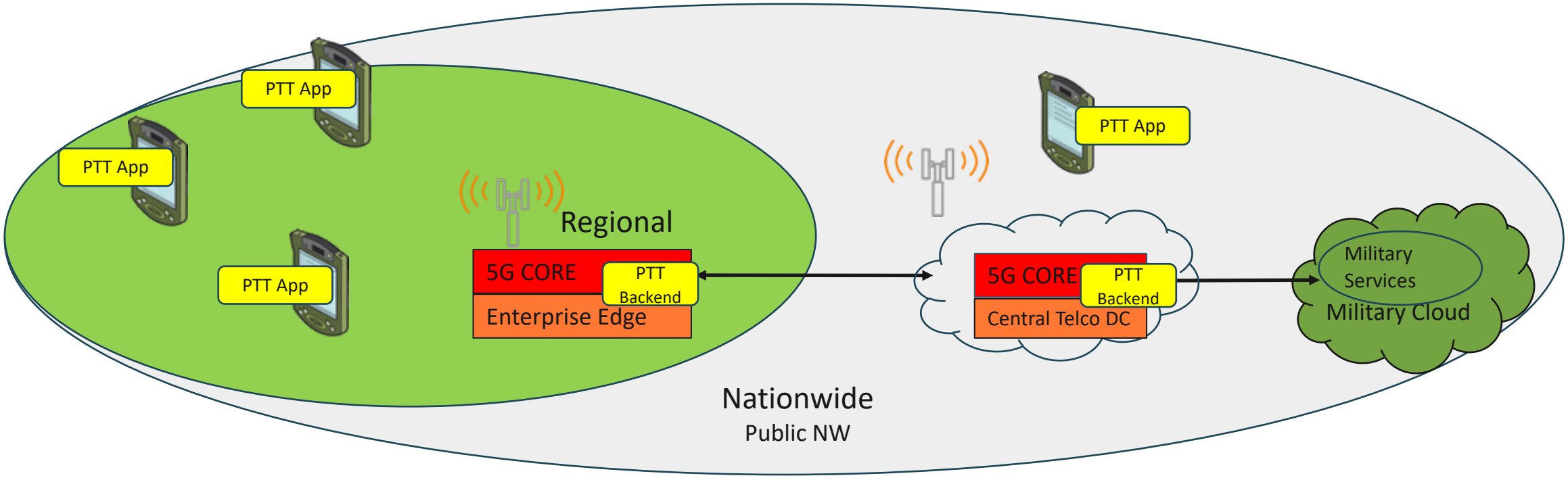
Edge Computing – The extended cloud



Services offered in close cooperation with a strategic MNO partner

Application Function in Defence Network Slice + Enterprise Edge

(PTT=Push-To-Talk)

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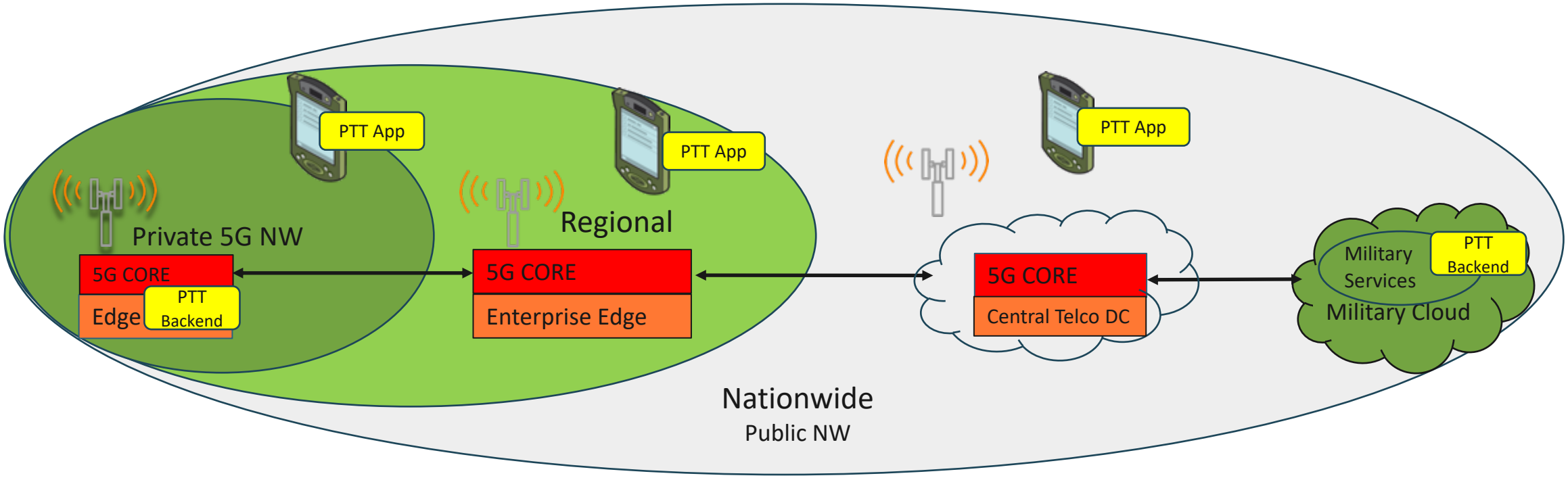
Edge Computing – The extended cloud

FUDGE-5G



Services offered from 5G Private Networks (NPN) and Military Clouds

(PTT=Push-To-Talk)

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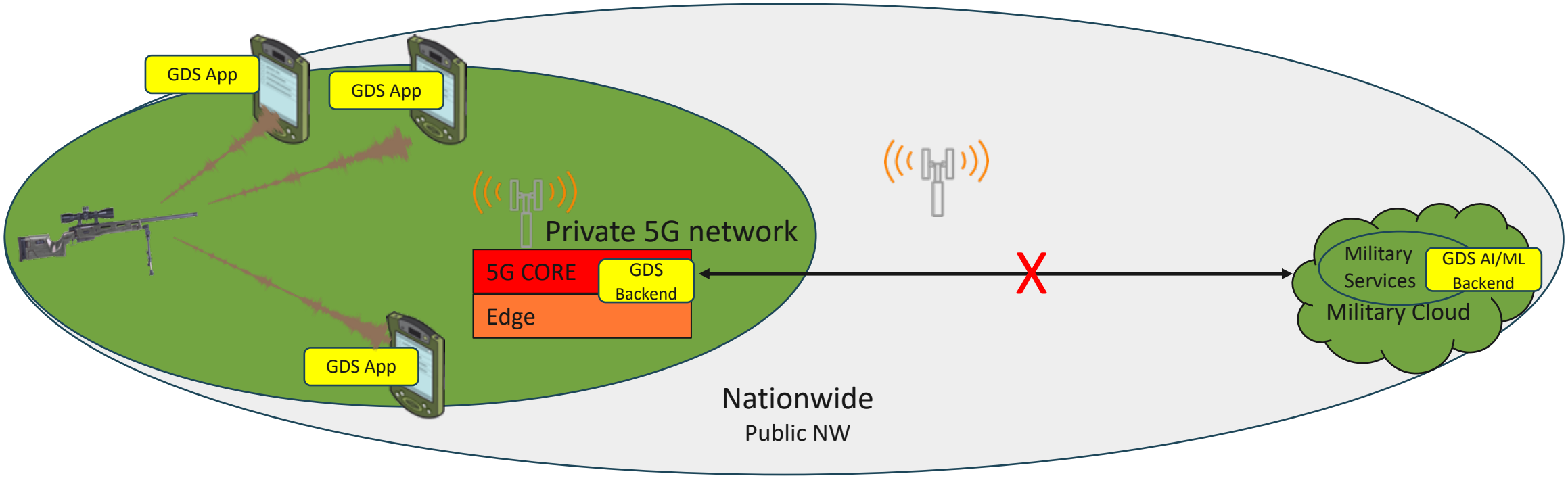
Edge Computing – The extended cloud

FUDGE-5G



From a **Service** perspective

How to utilize centralized clouds, 5G and Edge to create **Better** and more **Robust** services

(GDS=Gunshot Detection System)

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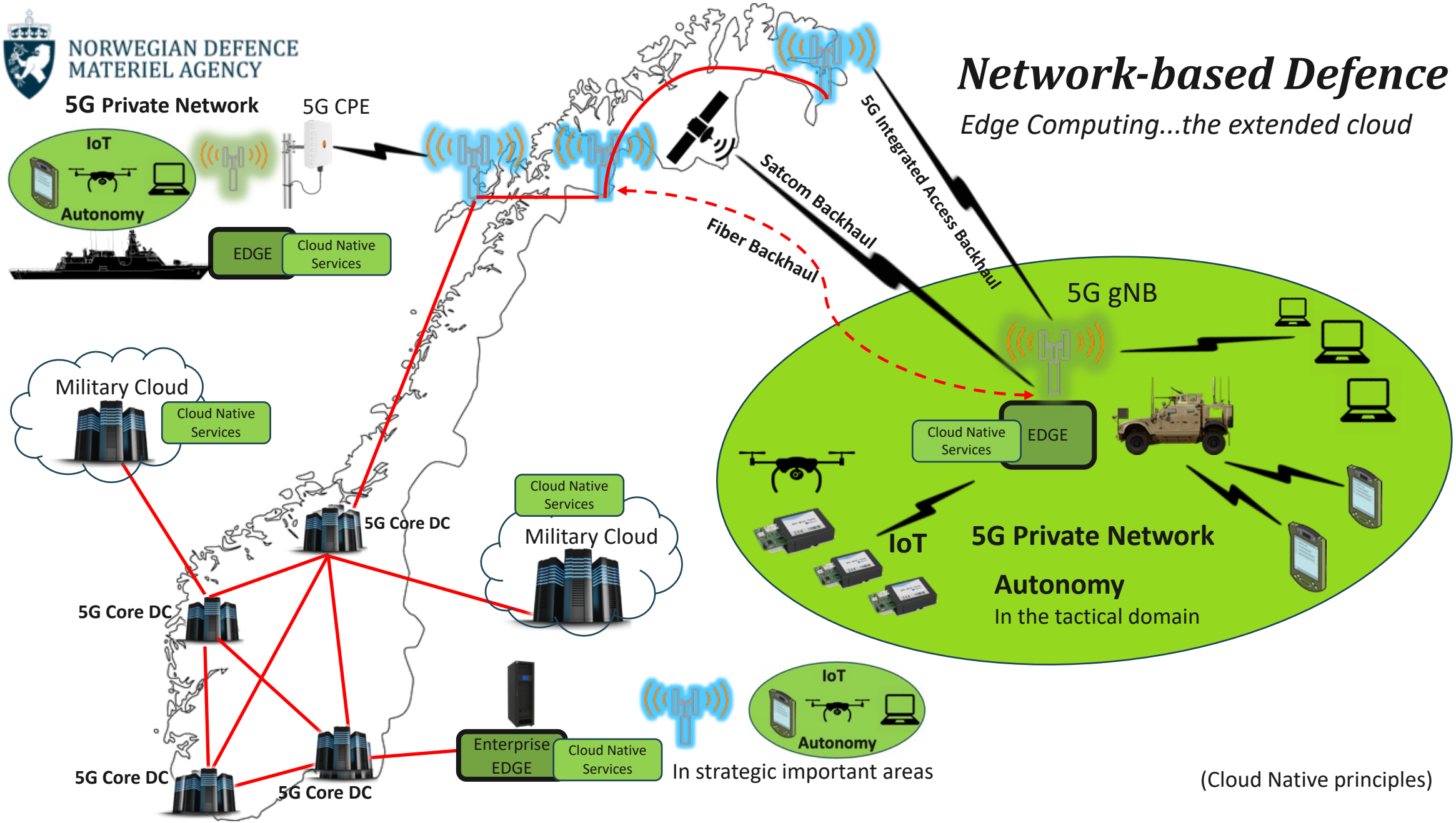
Network-based Defence

Edge Computing...the extended cloud



(Cloud Native principles)

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5th Generation Changes Everything

Kennet Nomeland
Radio System Architect
Norwegian Defence Materiel Agency

Foto: Morten Hanche/ Forsvaret