



Moderne kommunikasjon for
maritim næring- global 5G

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Ved Jan Petter Torgersrud /Telenor Bedrift

- Militær anvendelse av 5G
- Telenors rolle i forhold til de store programmene
- Gjennomgang av en helhetlig arkitektur
- 5G Robusthet
- 5G FUDGE, Mobile Private Nettverk
- 5G i maritim setting, mulighetsbilde
- Software Definererte teknologier, SDWAN
- Oppsummering





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

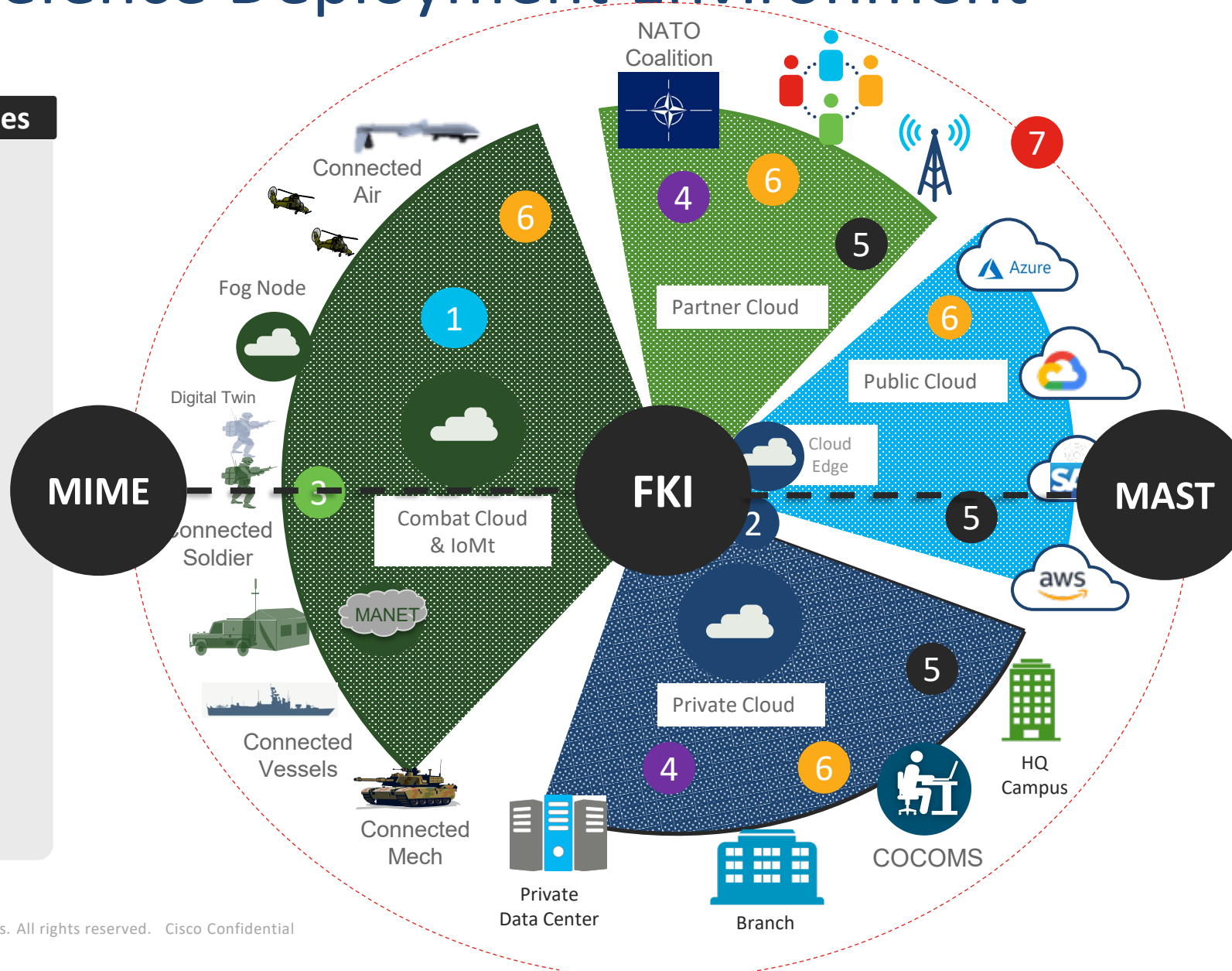
Edge Computing - the extended cloud

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

Target Defence Deployment Environment

Tactical Value Cases

- 1 Connected Battlefield
- 2 Mission Connected Intelligence
- 3 Connected Soldier
- 4 Critical National Infrastructure Cyber Threat Response
- 5 Civil Digital Services
- 6 Strategic Collaboration with Agencies & Allies
- 7 Defence Compliance
- 8 Single Information Environment



Core Value Cases

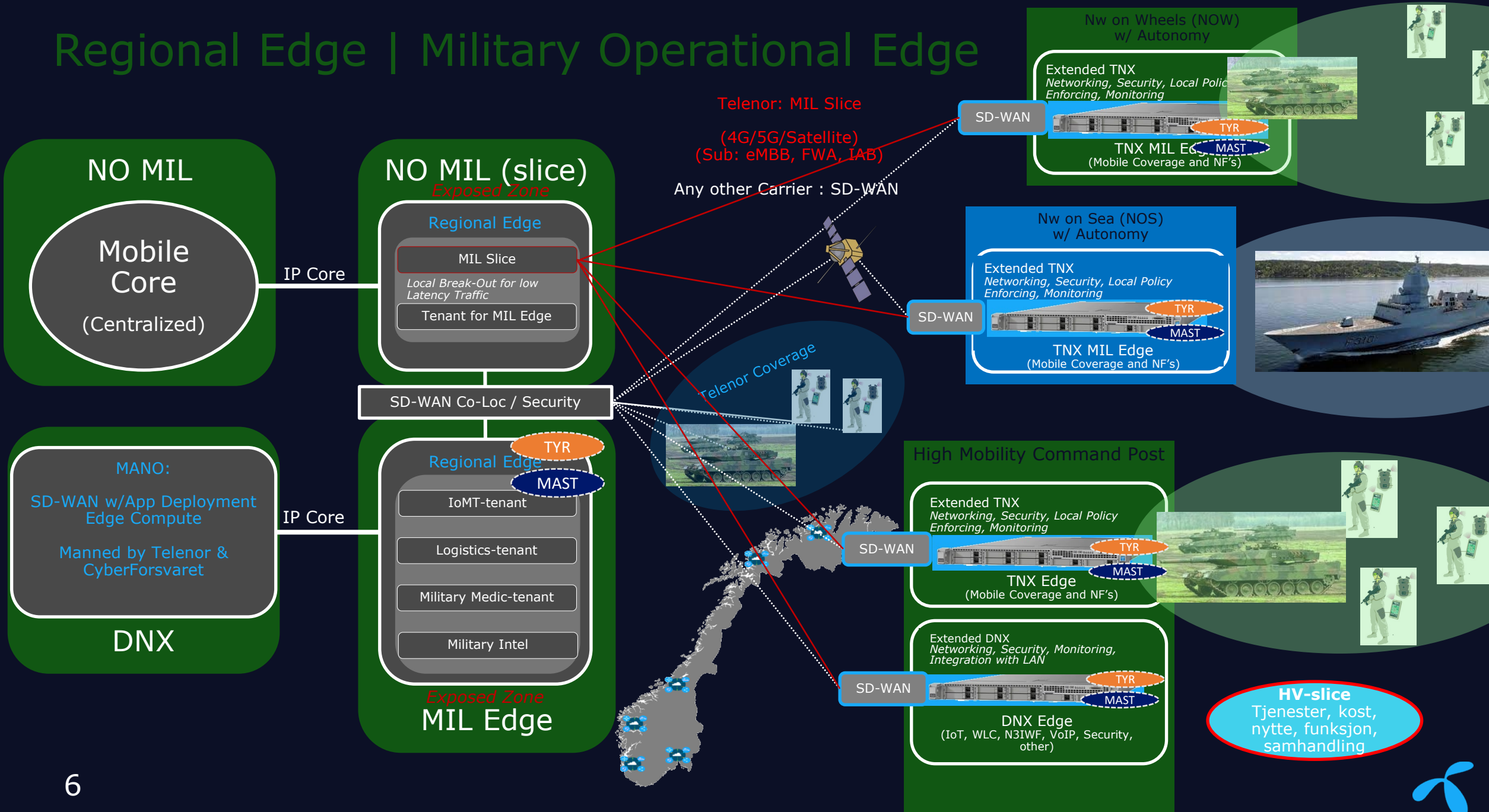
- 1 Application Visibility & Optimisation
- 2 Secure Application Modernisation
- 3 Cloud Independent Infrastructure-as-Code
- 4 Integrated Domain AIOps
- 5 Intent-Based Networking
- 6 Edge Compute & Edge Intelligence
- 7 Hybrid Cloud Solutions
- 8 Secure Cloud Connectivity Platform
- 9 Threat-Centric & Zero-Trust Security
- 10 Secure Collaboration Environment
- 11 Unified Service Integration

Helhetlig arkitektur

- Fremtidens kommunikasjonsløsninger må kunne fungere over alle 4 domener:
 - Sjø
 - Luft
 - Land
 - Cyber



Regional Edge | Military Operational Edge



NO MIL

Mobile Core
(Centralized)

IP Core

NO MIL (slice)
Exposed Zone

Regional Edge

MIL Slice

Local Break-Out for low Latency Traffic

Tenant for MIL Edge

SD-WAN Co-Loc / Security

MANO:

SD-WAN w/App Deployment
Edge Compute

Manned by Telenor &
CyberForsvaret

IP Core

Regional Edge

IoMT-tenant

Logistics-tenant

Military Medic-tenant

Military Intel

Exposed Zone
MIL Edge

Telenor: MIL Slice

(4G/5G/Satellite)
(Sub: eMBB, FWA, IAB)

Any other Carrier : SD-WAN

Telenor Coverage

SD-WAN

Nw on Wheels (NOW)
w/ Autonomy

Extended TNX
Networking, Security, Local Policy
Enforcing, Monitoring

TNX MIL Edge
(Mobile Coverage and NF's)

Nw on Sea (NOS)
w/ Autonomy

Extended TNX
Networking, Security, Local Policy
Enforcing, Monitoring

TNX MIL Edge
(Mobile Coverage and NF's)

High Mobility Command Post

Extended TNX
Networking, Security, Local Policy
Enforcing, Monitoring

TNX Edge
(Mobile Coverage and NF's)

Extended DNX
Networking, Security, Monitoring,
Integration with LAN

DNX Edge
(IoT, WLC, N3IWF, VoIP, Security,
other)

HV-slice
Tjenester, kost,
nytte, funksjon,
samhandling



5G Robusthet

- Distribuert kjerne 5G SA
 - Potensielt 350 metro core sites
 - Full autonomi på regionalt nivå
- Basestasjoner får dual homing
- URLLC(Ultra reliable low latency communication)
- Lave frekvensområder for god geografisk dekning
- Høye frekvensområder for høy kapasitet





NORWEGIAN DEFENCE
MATERIEL AGENCY

FUDGE 5G pilot

5G Private Network



Cell on Wheels

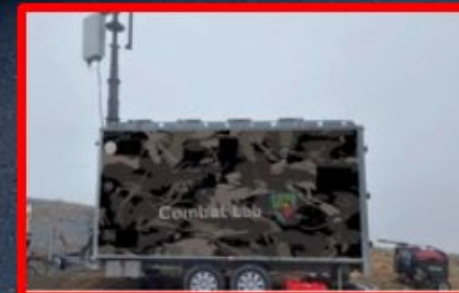
Tactical 5G

Fully Disintegrated private networks for 5G verticals (FUDGE)

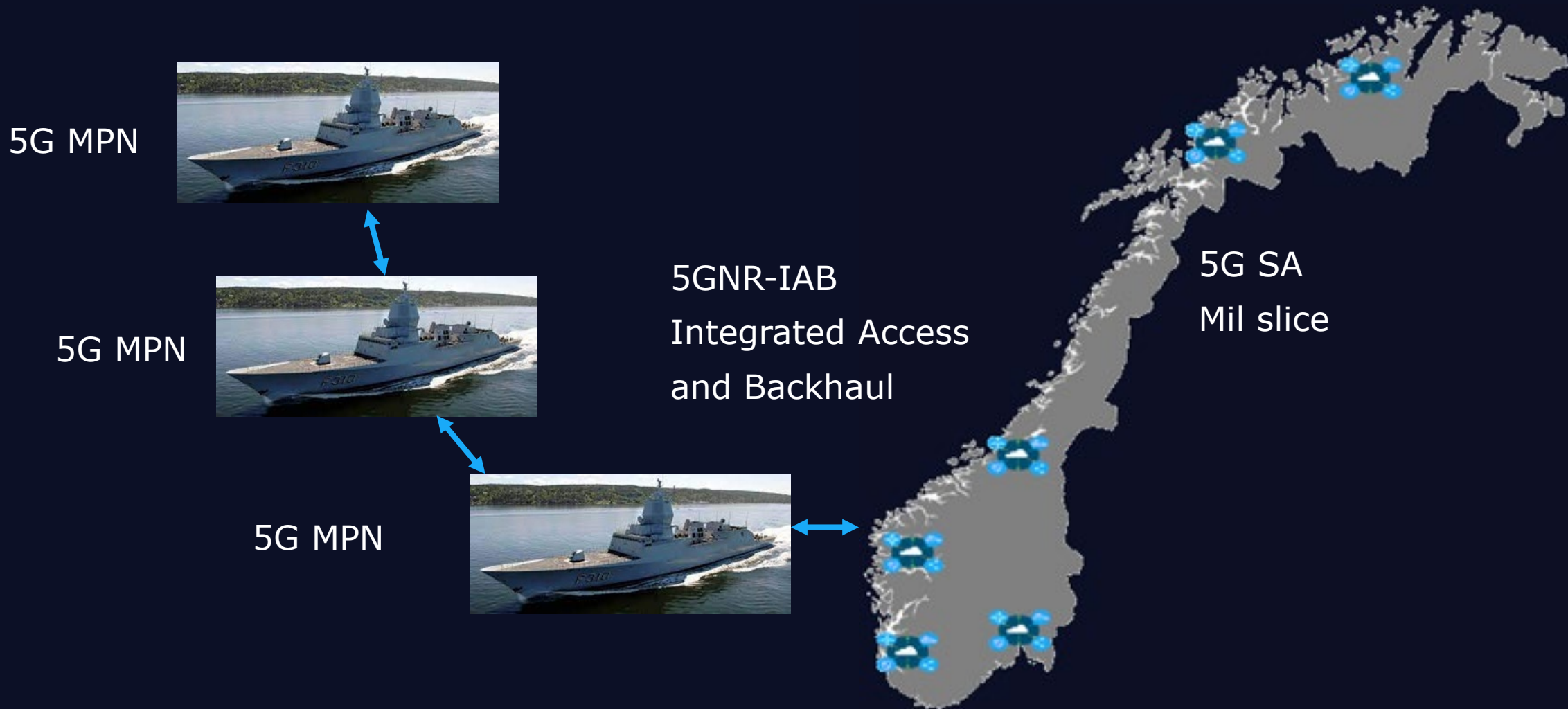
- EU funded 5G pilot - Running until March 2023
- Fully autonomous 5G SA Private Network
- Equipped with Edge for PPDR / Defence Use Cases

Goal:

- Utilize both **Public** and **Private** 5G network
- 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**



5G Mobile Private Networks, Maritime usage

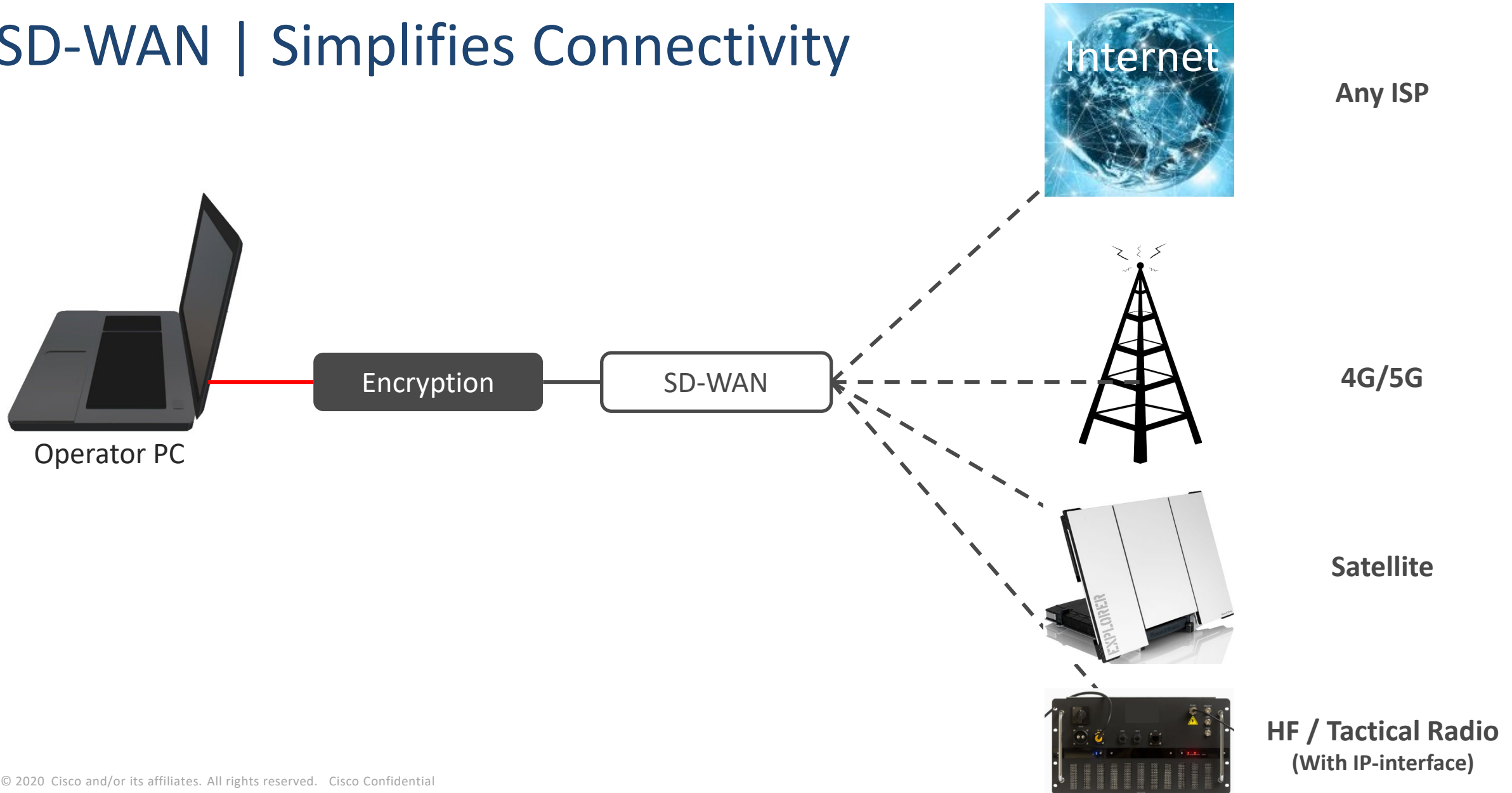


Software defined, hvorfør det?

- Automasjon
- Orkestrering
- Policies og retningslinjer
- Sikkerhet



SD-WAN | Simplifies Connectivity



Oppsummering

- 5G er mye mer enn en ny G, og gir Forsvaret mange nye spennende anvendelsesområder
- Det er fortsatt «early days» for 5G, så mye fokus på innovasjon og testing.
- Telenor ser meget spennende synergier i dialogen med FFI og Forsvarets modell for trekantsamarbeidet.
- Telenor har god domenekompetanse gjennom både:
 - Telenor Kystradio www.kystradio.no
 - Telenor Maritime www.telenormaritime.com



Takk for oppmerksomheten



Telenor. Alltid med.

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