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Collaboration based on open 3GPP standards

NNEC maturity level 4

Radio System Architect, Kennet Nomeland

11.10.2016



Challenges we face today

Economy

- High operational cost. Low volume of military produced equipment makes the prices high

Capacity

- The need for data capacity in radio networks is increasing

Mobility

- We carry much and heavy equipment.
- It takes long time to establish a command post

Complexity

- Military equipment needs very often specially trained personnel to configure and use the equipment

Interoperability

- Many initiatives for radio communication interoperability and standardization in NATO, for both narrowband and wideband, but it is very difficult to see a military solution all members will implement
- Proprietary solutions, Intellectual Property Rights and problems related to Foreign Military Sale make this very complex and time consuming



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The Gordian knot



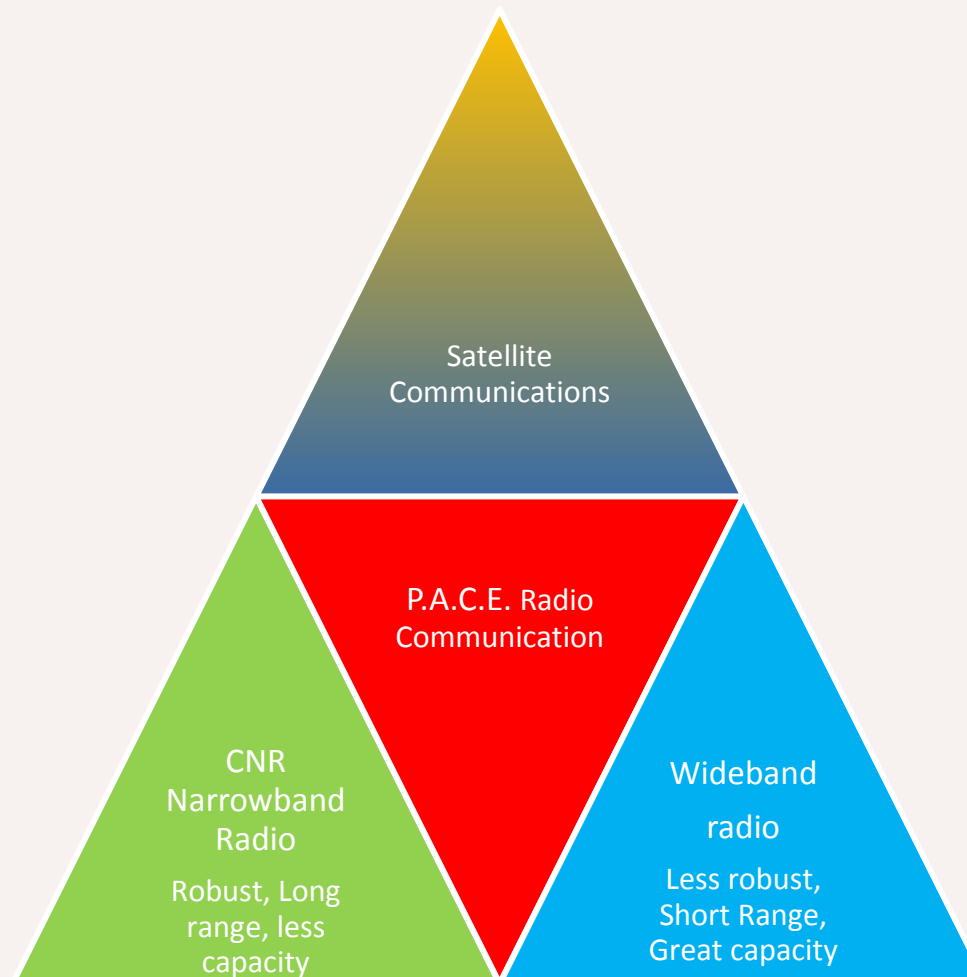
NEEC maturity level 4 – Collaboration - How do we reach our goals?



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P.A.C.E Tactical Radio communication

Primary, Alternate, Contingency, Emergency. We will plan and act according to PACE communication plan and always have alternative ways of communicating.





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3GPP Standardization – A huge Success

The internet and mobile industry is driving the innovation today

Spectrum for Mobile Broadband

Public Policy

Mobile Policy Handbook
Policy Case Studies
Capacity Building in Mobile
Sector Regulation
Mobile and Privacy
mYouth
Mobile Energy Efficiency
Tax
Roaming
Mobile and Health
Government Programme
Mobile and Environment

Personal Data Mobile Connect

Mobile for Development

Mobile for Development Impact
Digital Inclusion
Mobile Money for the
Unbanked
Utilities
mAgri
mHealth
mLearning
Disaster Response

Connected Women

Mobile Economy

Digital Commerce

Payment
Retail
Transport

Network 2020

Rich Communications
HD Voice
VoLTE

OneAPI

Managed Services

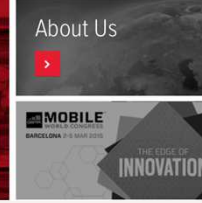
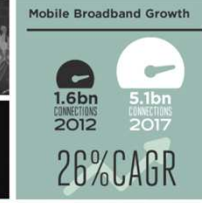
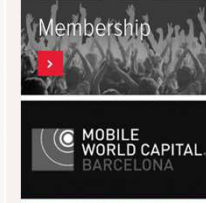
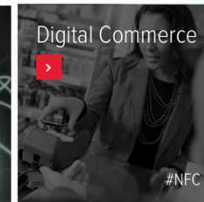
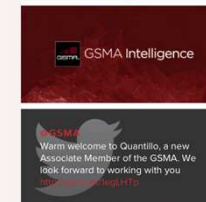
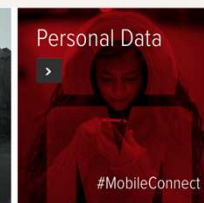
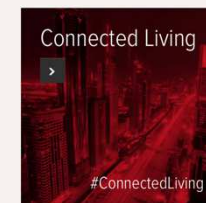
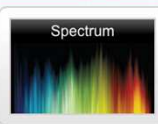
Number Portability Services
Spam Management &
Prevention
Device Blacklist Services
Device Model Characteristics
Mobile Equipment Identity

Connected Living

Automotive
Learning
Health
Utilities
Transport
Connected Living Tracker

Events & Awards

Mobile World Congress
Global Mobile Awards
Mobile World Congress
Shanghai
Mobile 360 Series
Industry Events





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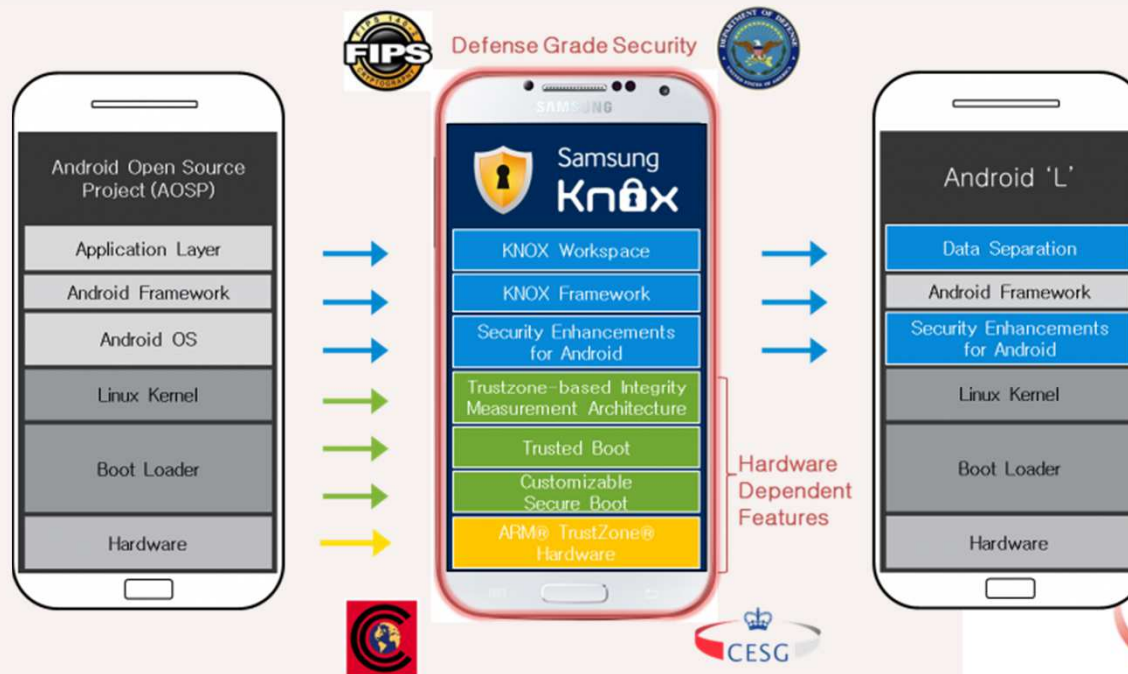
The mobile ecosystem is exploding and expanding into new business areas

- *Connected cars*
- *mPayment*
- *mHealth*
- *mAgri*
- *mLearning*
- *Public safety and defence*
- *Wearables*
- *IoT*



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More focus on security in the mobile industry



Nominees 2015

20TH
**GLOBAL MOBILE
AWARDS**

► 6e Best Security/ Anti-Fraud Product or Solution

- BlackBerry for BBM Protected
- AdaptiveMobile Network Protection Platform
- Avast Mobile Security
- Oracle Communications EAGLE 5 Security/EIR + Diameter Signaling Router
- Samsung for KNOX Workspace



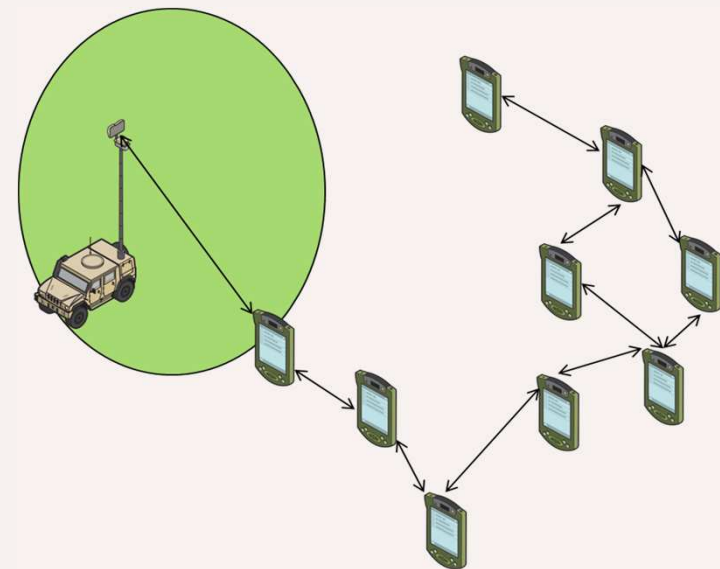
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3GPP Standardization

Standardization of 2G, 3G, 4G and 5G

3GPP has established a separate working group for Mission Critical Applications:

- LTE group communication,
- Device-2-Device communication,
- Mission Critical Push to talk,
- Mission Critical Video over LTE
- Mission Critical Data
- Indoor positioning
- Public Warning System



Other interesting features:

- LTE-Unlicensed
- Carrier Aggregation and Inter-site Carrier Aggregation
- MIMO and beamforming



A GLOBAL INITIATIVE



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Tactical 4G LTE – Bring Your Own Bandwidth

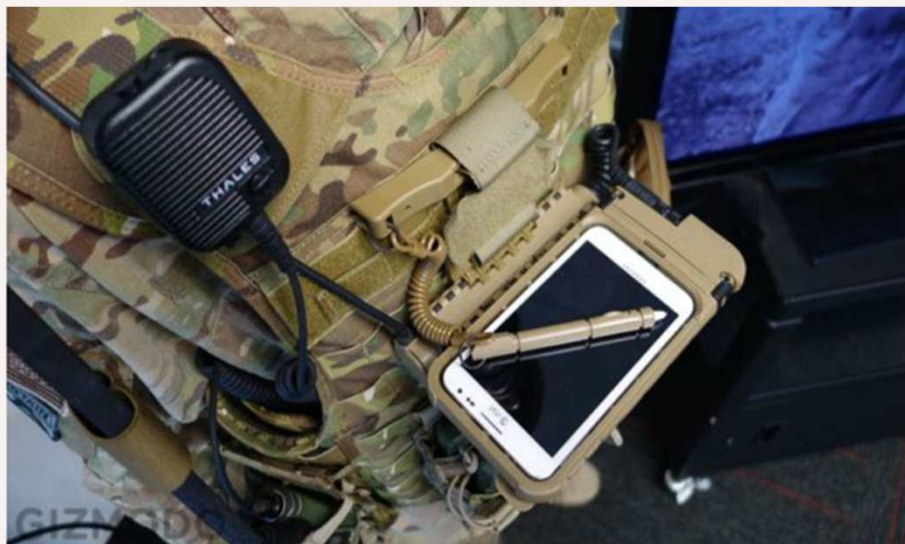
Tactical LTE solutions can operate autonomous or connected in a network.
Solution for On-The-Halt, On-The-Move and manpack. Many vendors.





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Every soldier becomes a sensor





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The Norwegian Defense wants to leverage technology developments taking place in the commercial mobile industry

How can we secure the mobile valuechain?





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Step 1

Mobile Application Management (MAM)

- Applications to improve situational awareness and reduce OODA loop

Mobile Content Management (MCM)

- Secure access to centralized content

Mobile Device Management (MDM)

- Control of your mobile devices



EMM

Enterprise
Mobility
Management

Step 2

Secure mobile core services

- Defence controlled MVNO mobile core (EPC) to:
- Improve security (e.g. SS#7, DoS/DDoS)
- Better robustness – National roaming with all 4G LTE network
- Own Appstore

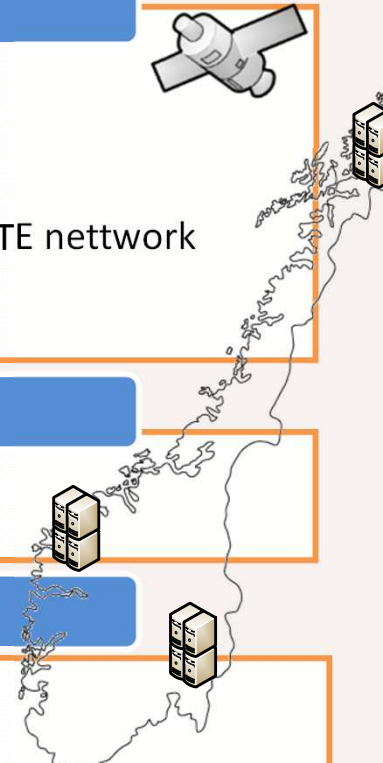


Secure datacenter

- Fortified geo-redundant datacenters

Robust backbone network

- Fiber
- Satellite



MVNO

Mobile
Virtual
Network
Operator



Control of own coverage and capacity

Step 3

Own coverage and capacity

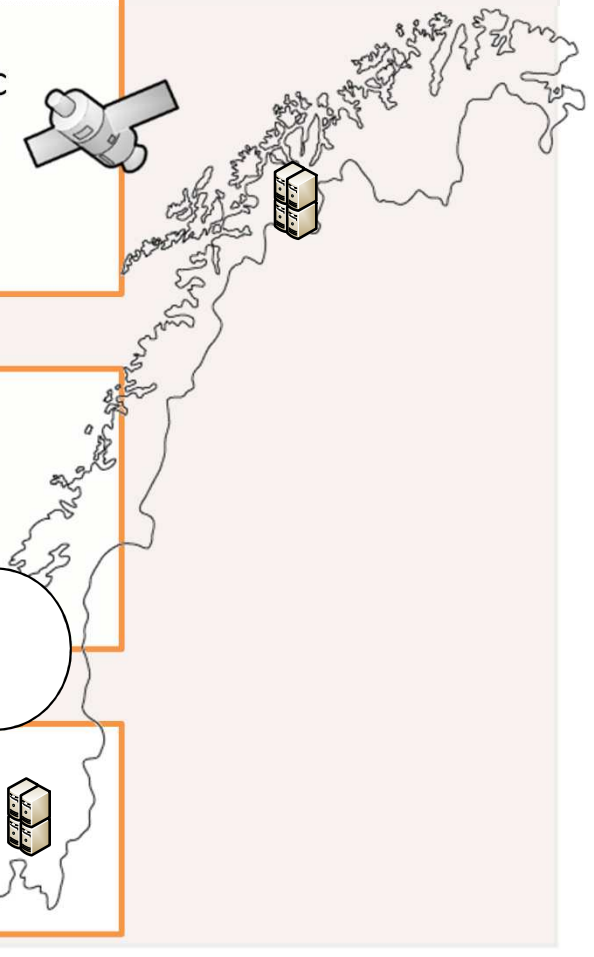
- Autonomous tactical wideband capacity based on open 3GPP standards when commercial networks is not available
- Autonomous systems can be linked together with strategic MVNO EPC core and communicate with others and makes collaboration possible both in national and international operations

Centralized Management

- Compence
- Logistics, fleetmanagement, Big Data
- Crypto key management

Collaboration and Interoperability

- Open standards and cheap commercial terminals that works globally simplifies collaboration

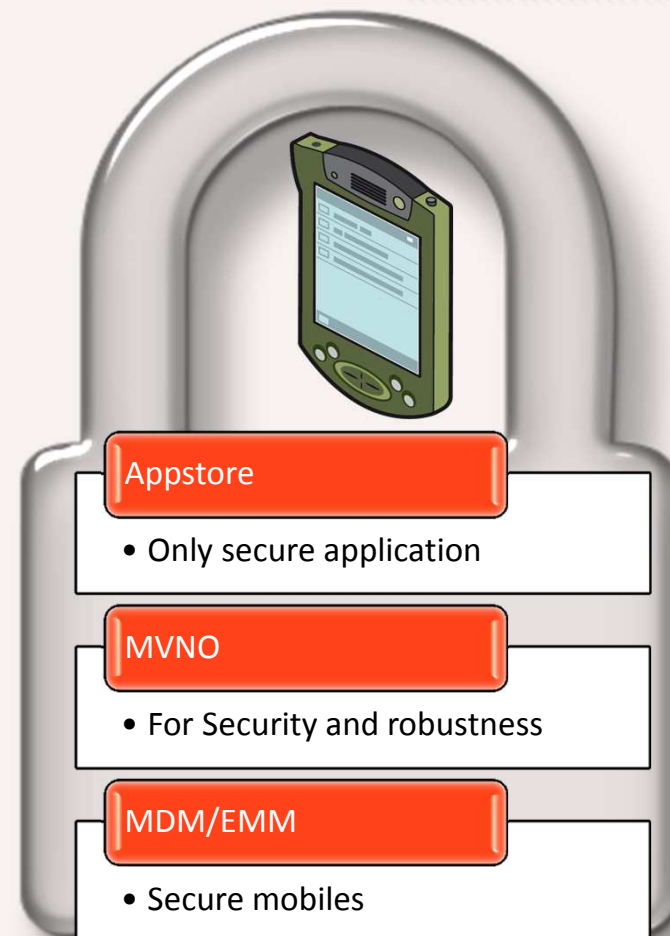




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Mobile Virtual Network Operator

- Control of the mobile valuechain
- Higher security also in a Unclassified network
- End-to-end encryption for Classified traffic
- Better collaboration





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Low Orbit Satellites

Several companies will offer Internet access from low orbit satellites.

This can give us:

- Improved coverage
- Low latency
- High data capacity on new satellites





Always Connected

Multichannelrouter

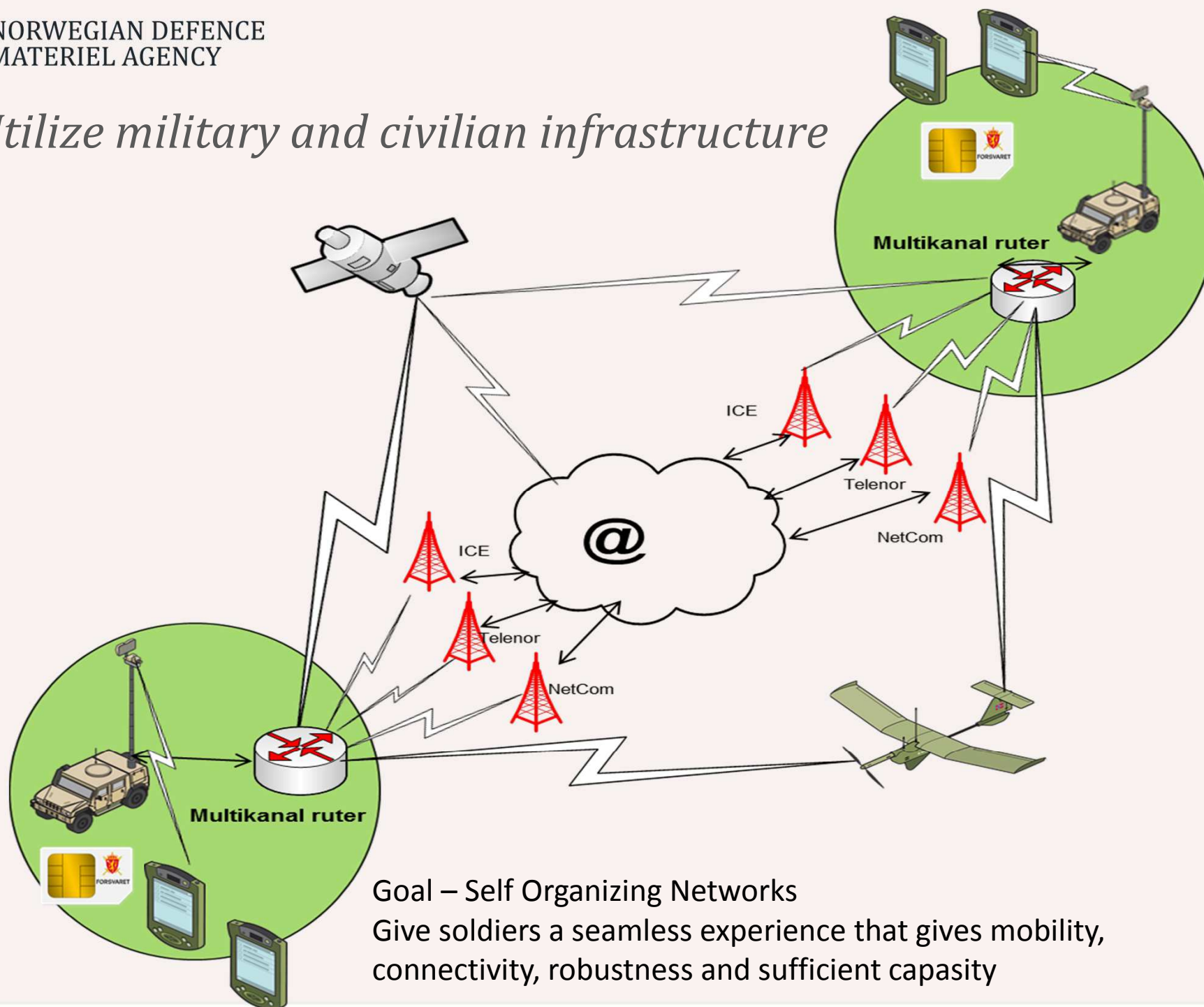
- Selforganizing Network
- Utilize military and civilian networks
- Load balanzing and "bonding" of multiple channels in parallel
- End-to-end encryption
- Modulbased, standard interfaces
- EMC approved





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Utilize military and civilian infrastructure

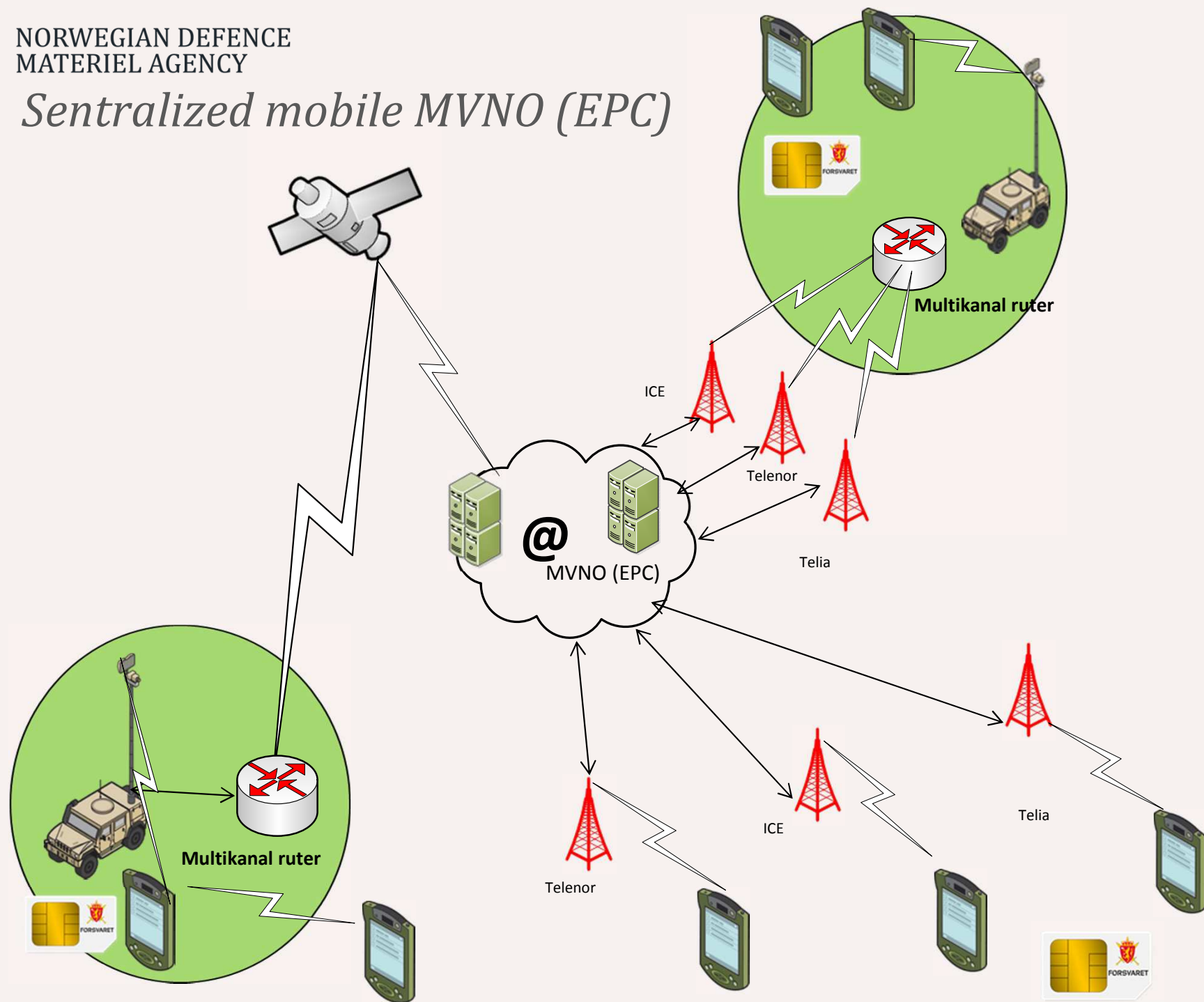


Goal – Self Organizing Networks

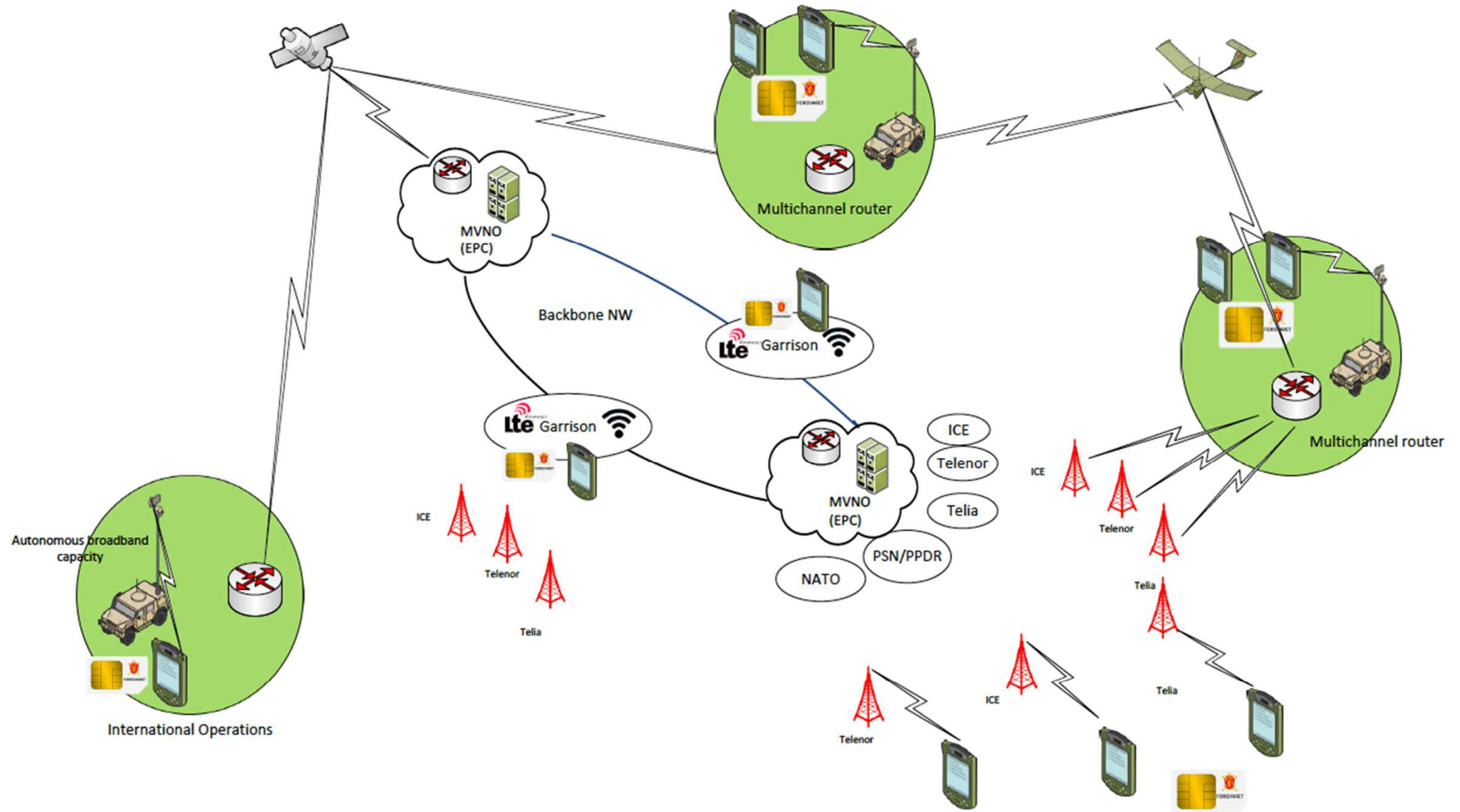
Give soldiers a seamless experience that gives mobility, connectivity, robustness and sufficient capacity



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Collaboration based on open 3GPP standards

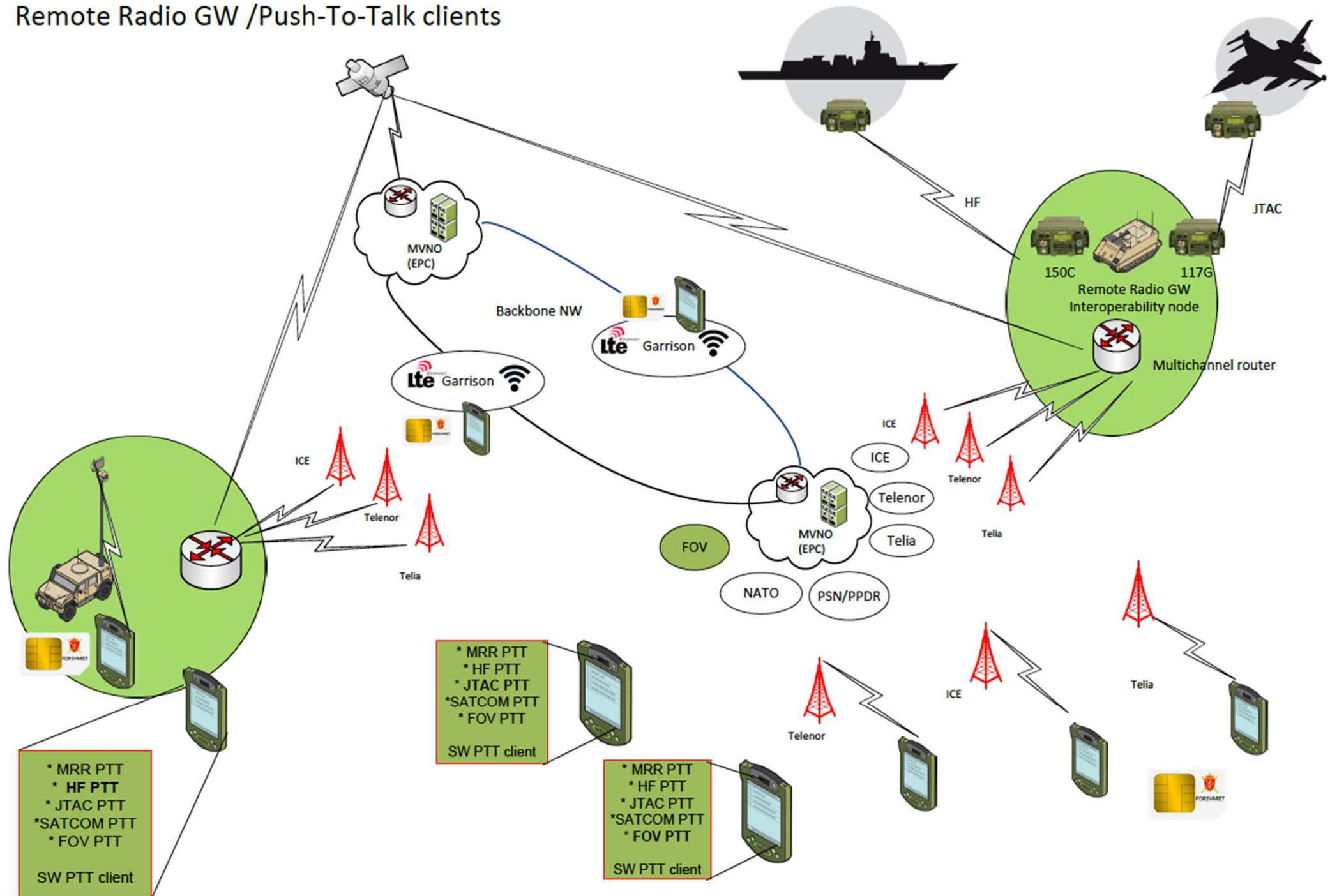


Garrison, field and international operations

Collaboration with all in total defence

Remote Radio GW /Push-To-Talk clients

Remote Radio GW /Push-To-Talk clients





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Vision

The Norwegian Defence communication systems should as far as possible be based on open international standards to:

- Improve collaboration
- Reduces cost
- Reduces complexity
- Reduces weight and makes us more mobile
- Gives us better connectivity and capacity

