





# New storytelling creates new technology

NEW TECHNOLOGY CREATES NEW STORYTELLING

How can we  
use 5G to tell  
stories?







What about OB-vans?





A future where  
we can:

Make content from almost  
anywhere?

Connect without external IP-  
equipment?

Do remote productions  
wireless?

Work more efficient with our  
staff and equipment?



Wireless



IP

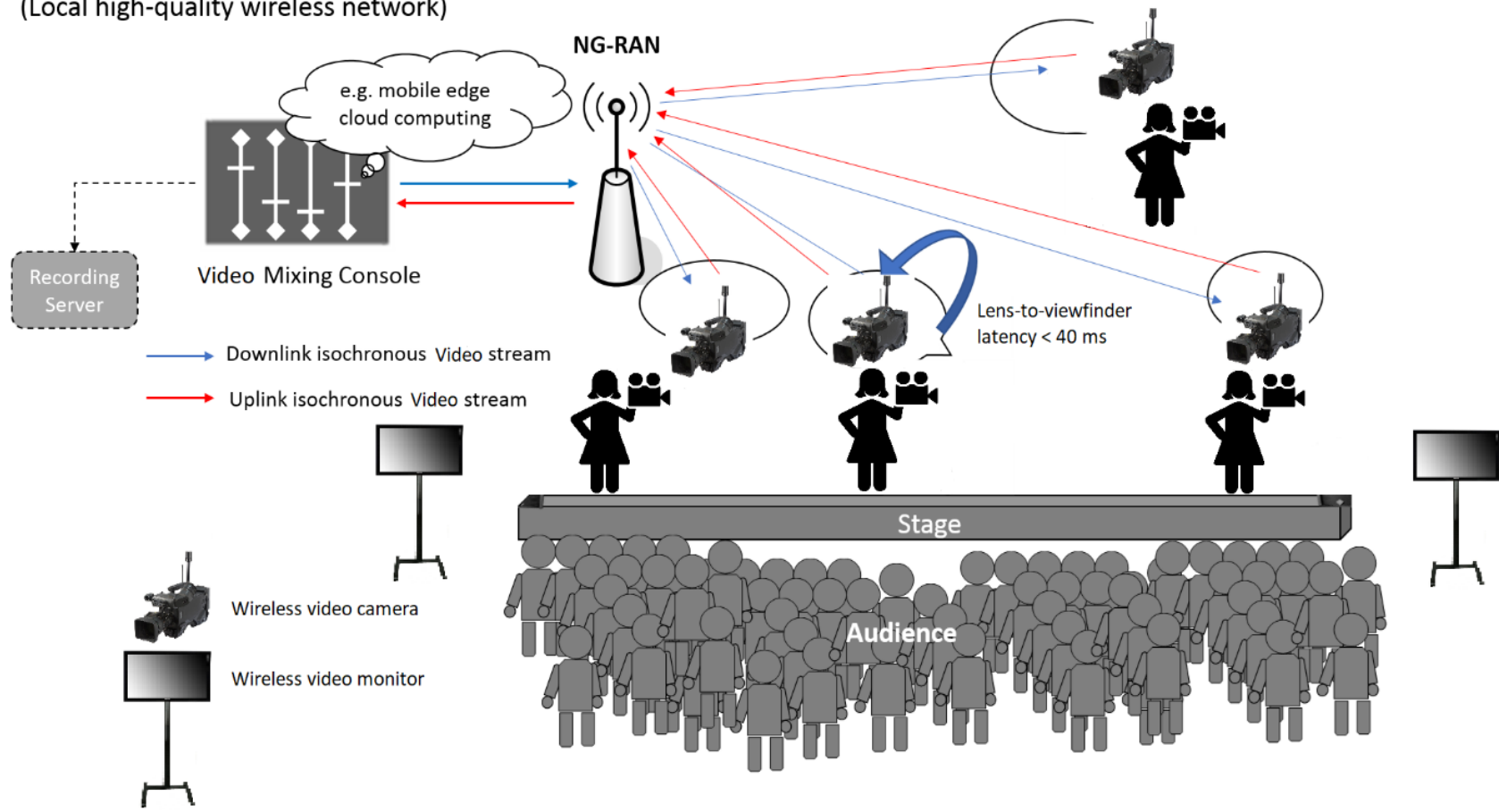






# Remote production – video requirements

**Live Content Production Network**  
(Local high-quality wireless network)

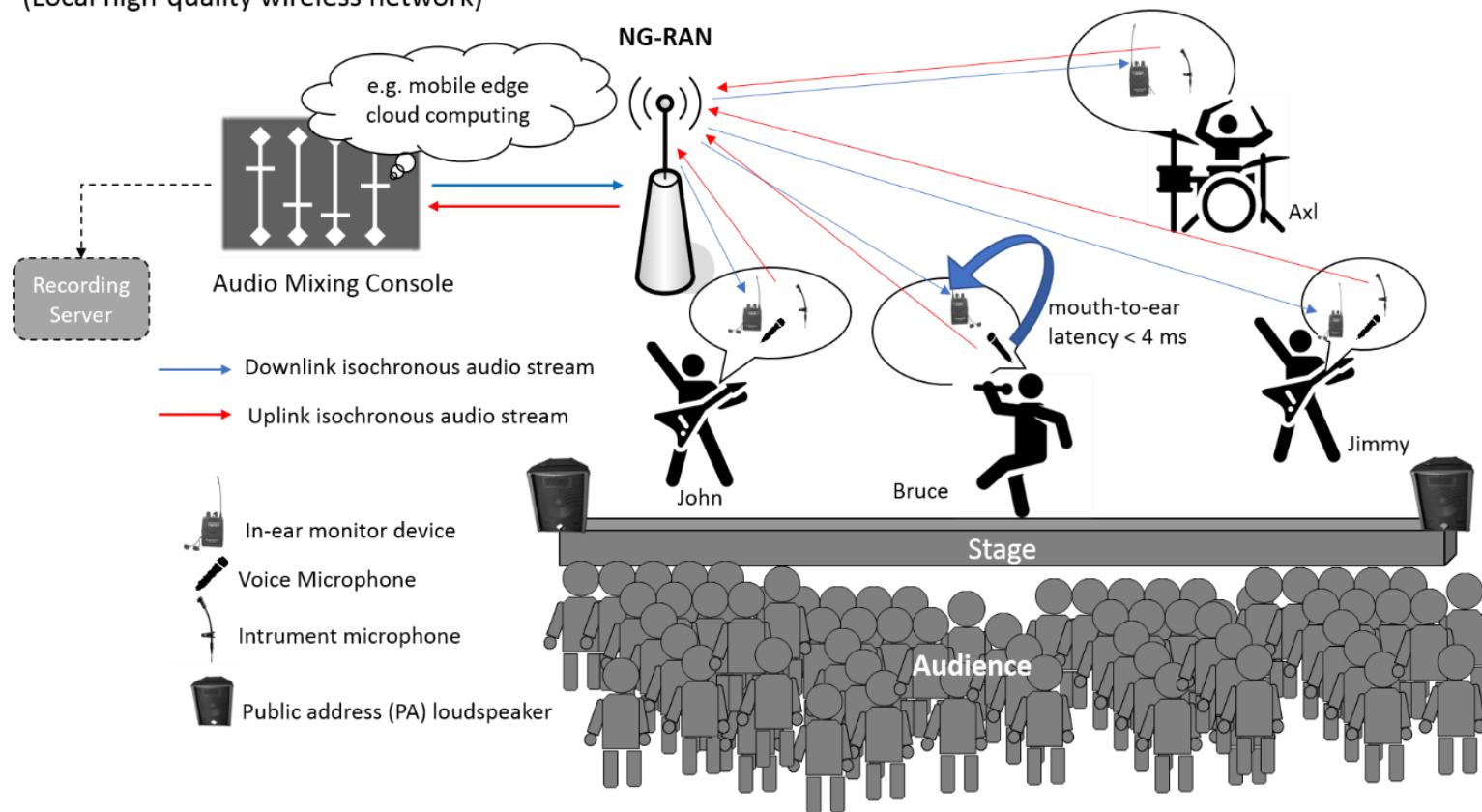


Latency:  
< 40 ms

9/26/2021

# Remote production – audio requirements

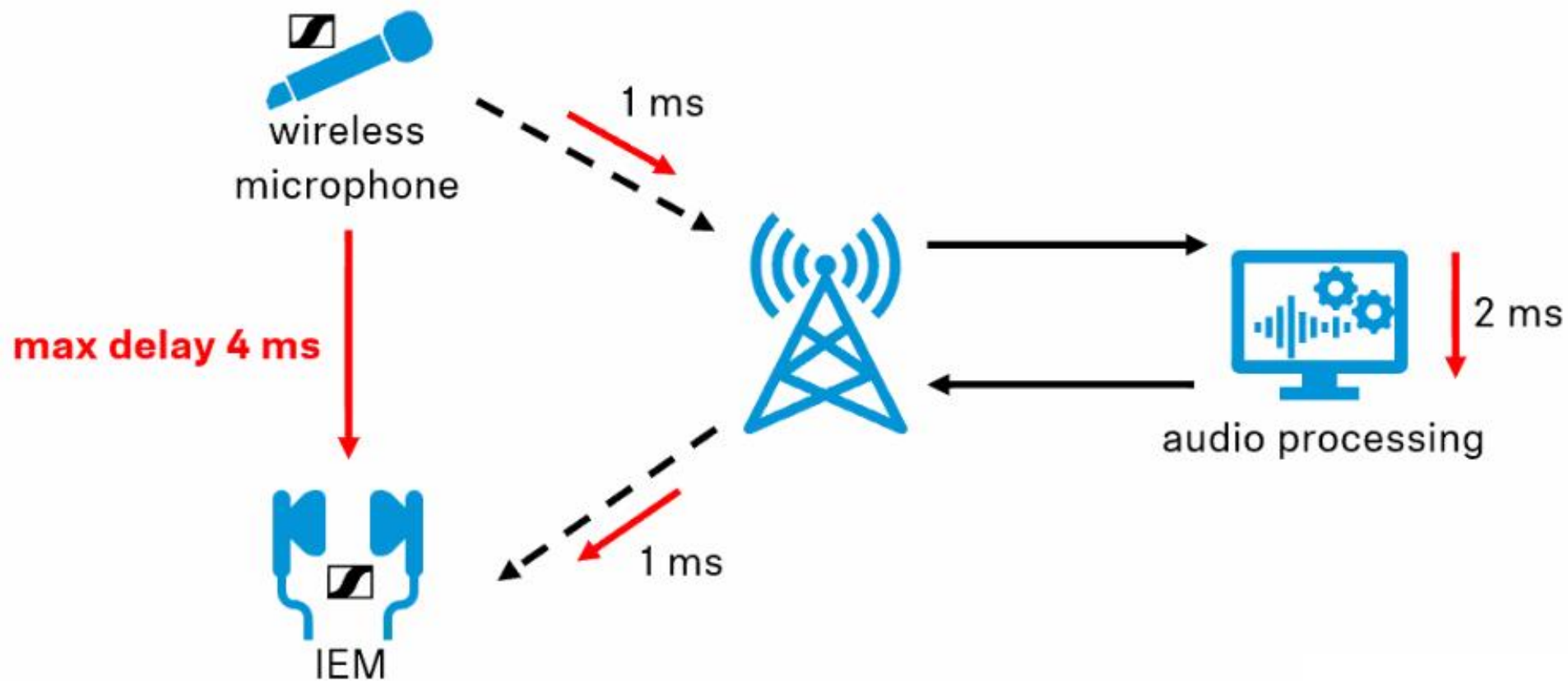
**Live Content Production Network**  
(Local high-quality wireless network)



Latency:  
< 4 ms!!!

9/26/2021

# Remote production – audio requirements



9/26/2021





trippel-m  
connected venues



Public  
mobile network



Public Network ID

NRK MCR

High quality & low latency feeds

VIDEO X LINK

WebRTC

Low latency preview

LIVEU

Backup PGM



Portable control panel  
(parallel/distributed workflows)

MNO Radio Access Network

MNO Core

Backup remote control and preview  
(low bitrate in case of backhaul failure)

Viz Vector Plus

aws

VIDEO X LINK

NDI

Standalone non-public  
mobile network

SNPN Radio Resources

VIDEO X LINK

Viz Vector Plus

NPN Radio Access Network

NPN Network Services

NPN Core

NPN Devices Database

WebRTC

Firewall

Internet

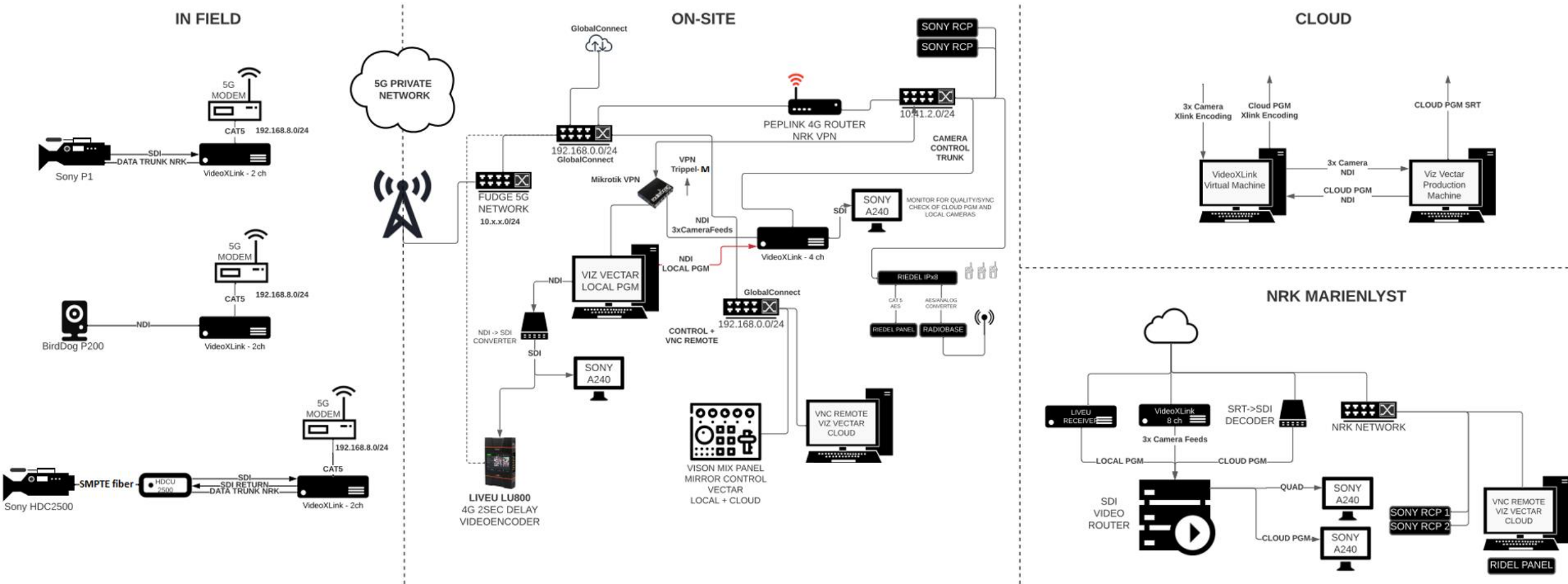
Internet

Backup program output  
(medium bitrate & long latency  
in case of backhaul failure)

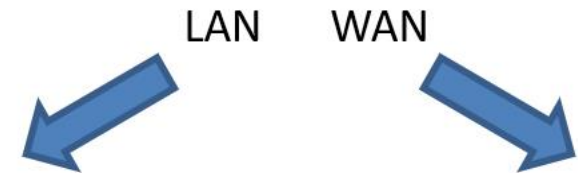
Backup path  
(Bonding of KA-band &  
public mobile networks)



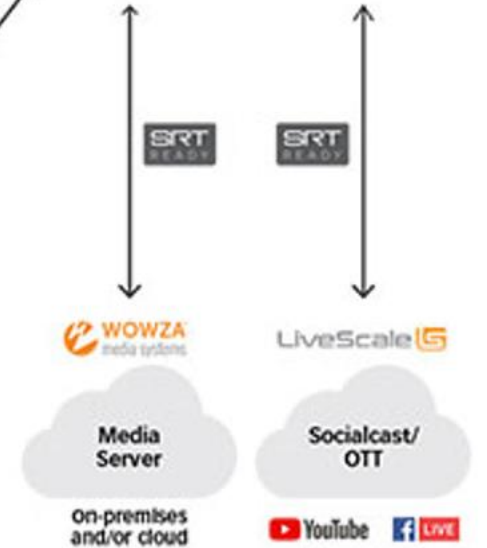
# Setup 5G Standalone NPN



# Live Low Latency Streaming



**SRT** SECURE RELIABLE TRANSPORT



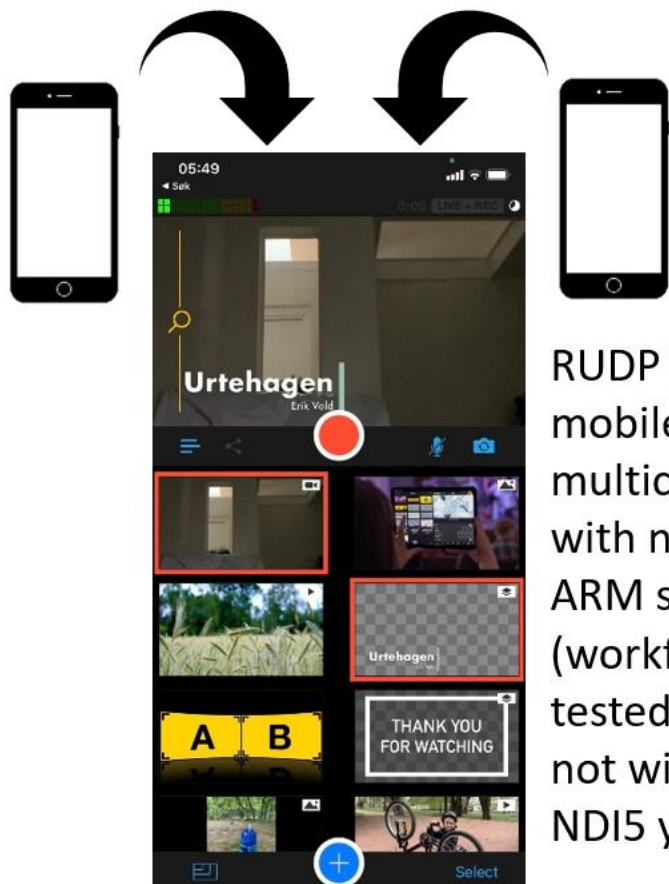
**VIDEOXLINK**

LATENCY = 0.1 sec



# Live Low Latency Streaming

Reliable UDP introduced in NDI 5 -> NDI possible to use on internet!



RUDP in mobile multicam with native ARM support (workflow tested – but not with NDI5 yet..)

# NDI<sup>®</sup> 5 MOVING VIDEO, MOVING THE WORLD

NDI<sup>®</sup> is the world's most powerful video-over-IP technology. No matter how you use NDI<sup>®</sup>; from using NDI<sup>®</sup> Tools to expand video opportunities across your network, to using the Software Development Kit to equip your own systems with NDI<sup>®</sup>, or even integrating NDI<sup>®</sup> into your devices, NDI<sup>®</sup> 5 harnesses more power than ever before.



#### Seamless Integration

new plug-ins for Adobe Creative Cloud and Final Cut Pro create a full postproduction workflow

#### NDI Bridge

securely share NDI<sup>®</sup> network sources anywhere in the world, using only a single network port

#### NDI|HX Camera App

turns any iOS or Android™ mobile device into an IP-ready live video source

#### Easier Everywhere

RUDP transfer makes WAN and WiFi connections more resilient with less configuration required.

#### NDI Remote

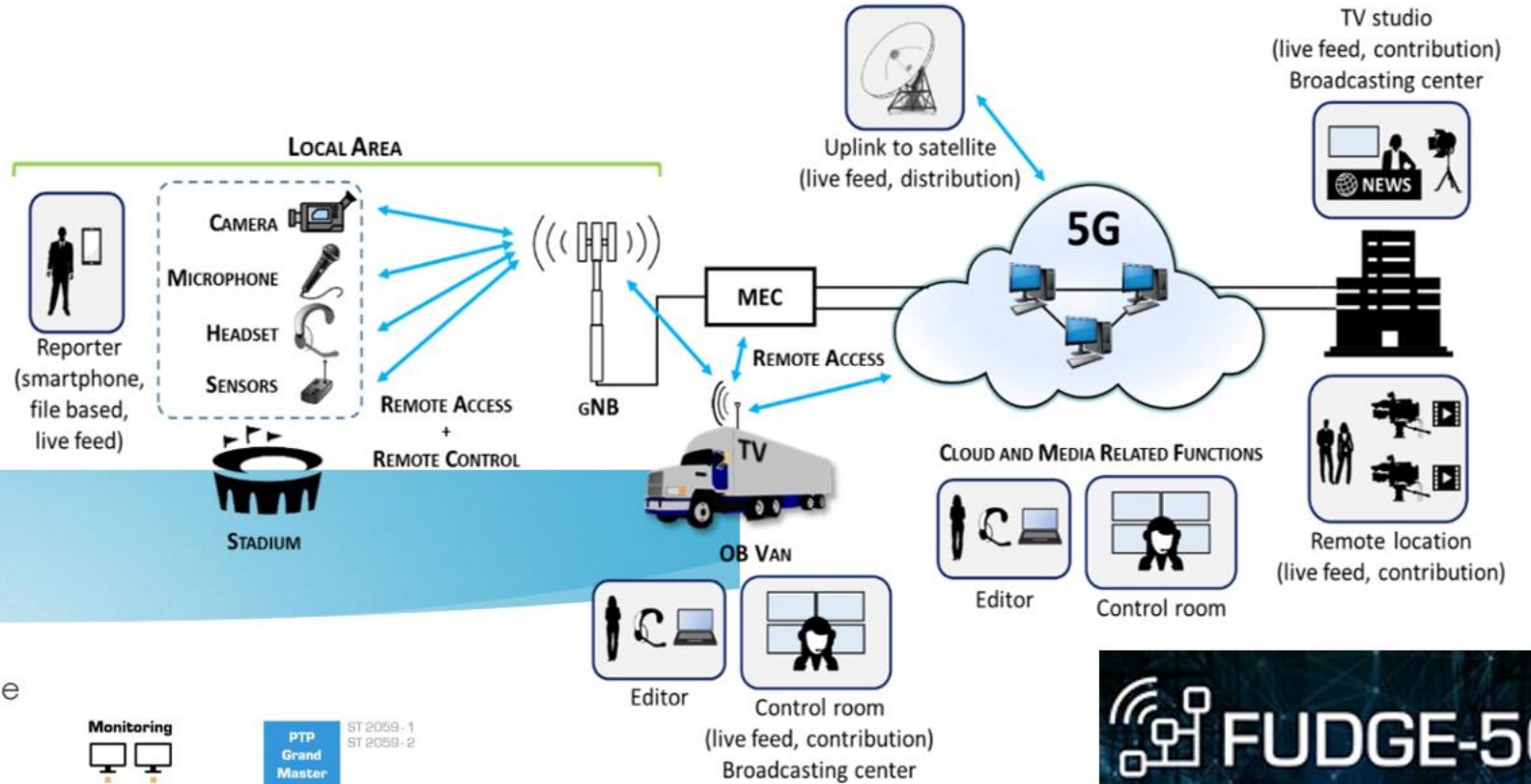
Share live video and audio using an internet connected NDI enabled device... just using a URL.

#### ARM Support

Billions of devices NDI<sup>®</sup> enabled through support for ARM

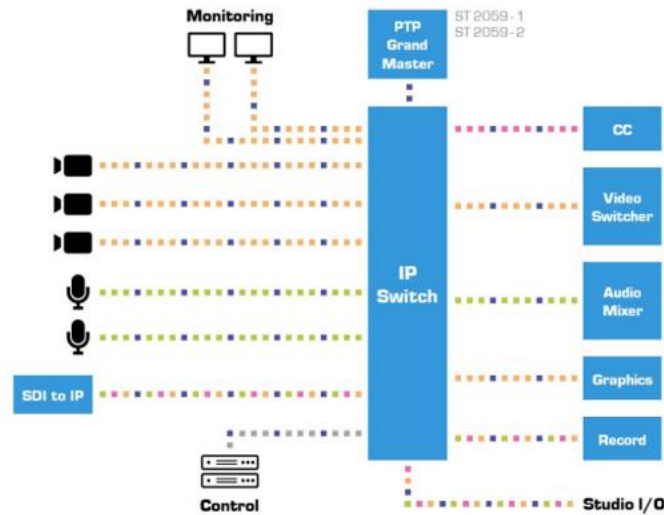
# Live Low Latency Streaming

## JPEG-XS, Coming to ST2110



The new Part -22 - Compressed video essence

- Video RTP Packet (Part 20/22)
- Audio RTP Packet (Part 30/31)
- Data RTP Packet (Part 40)
- PTP Sync Packet
- Control Packet



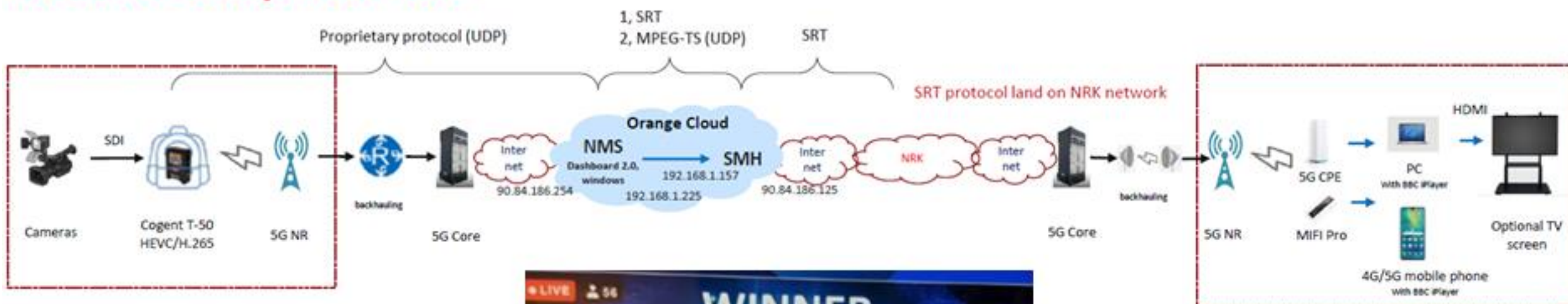
LATENCY = 0.02 sec!



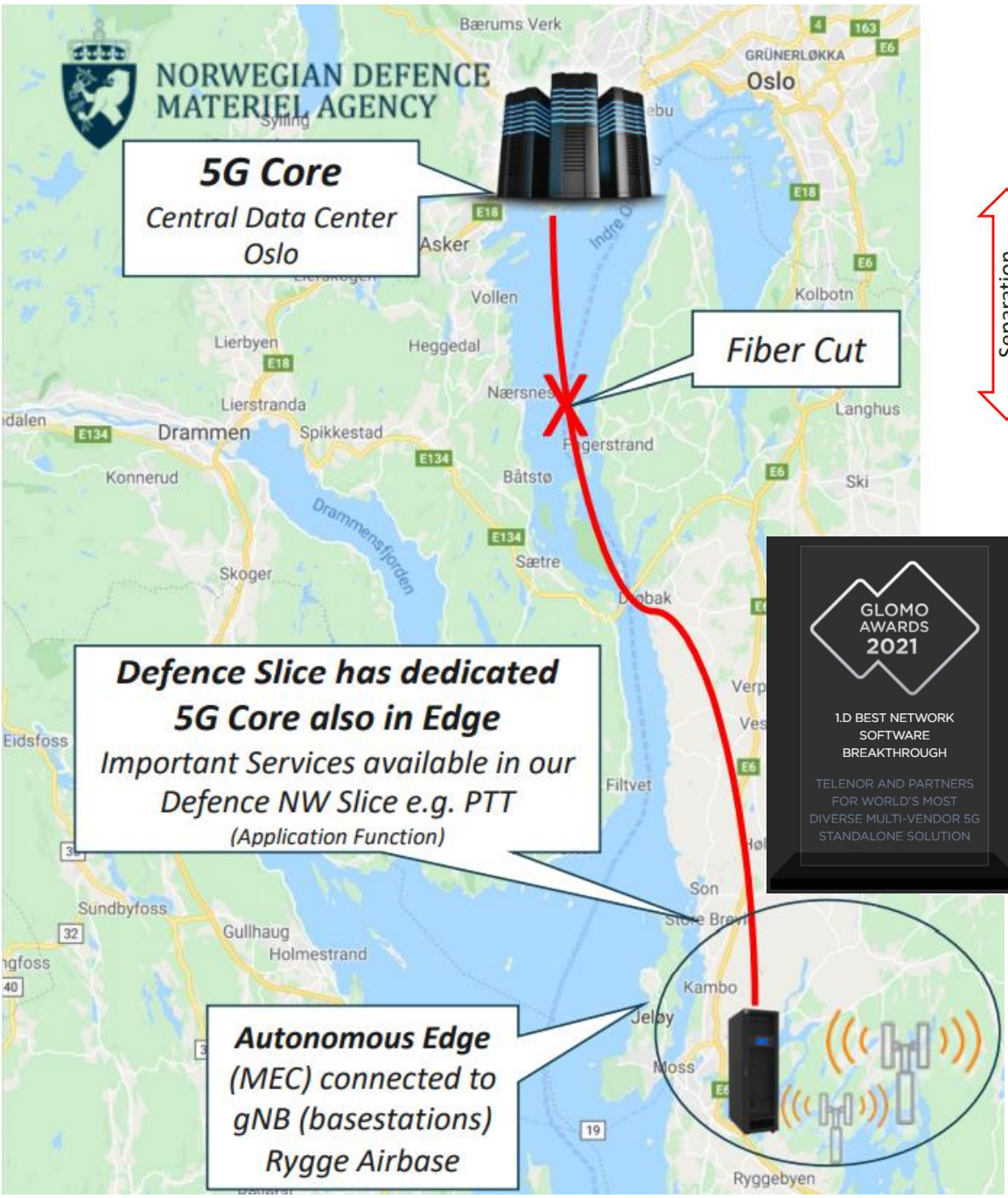


# 5G 4K news gathering demo at Telenor

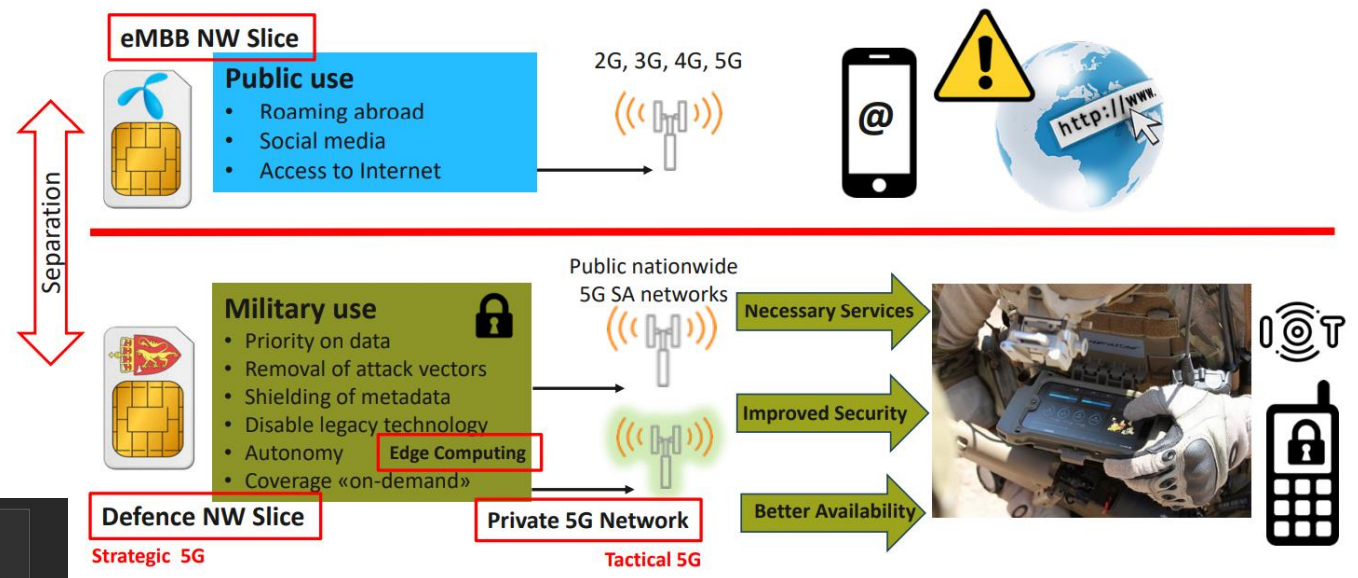
## Network Setup with NRK



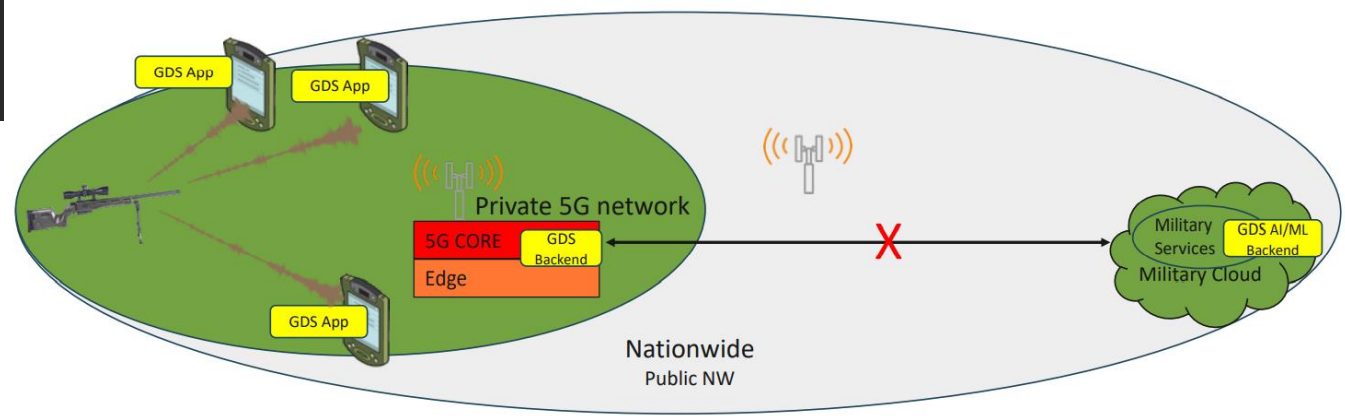




## Network Slicing to separate Public and Military traffic



## Edge Computing – The extended cloud





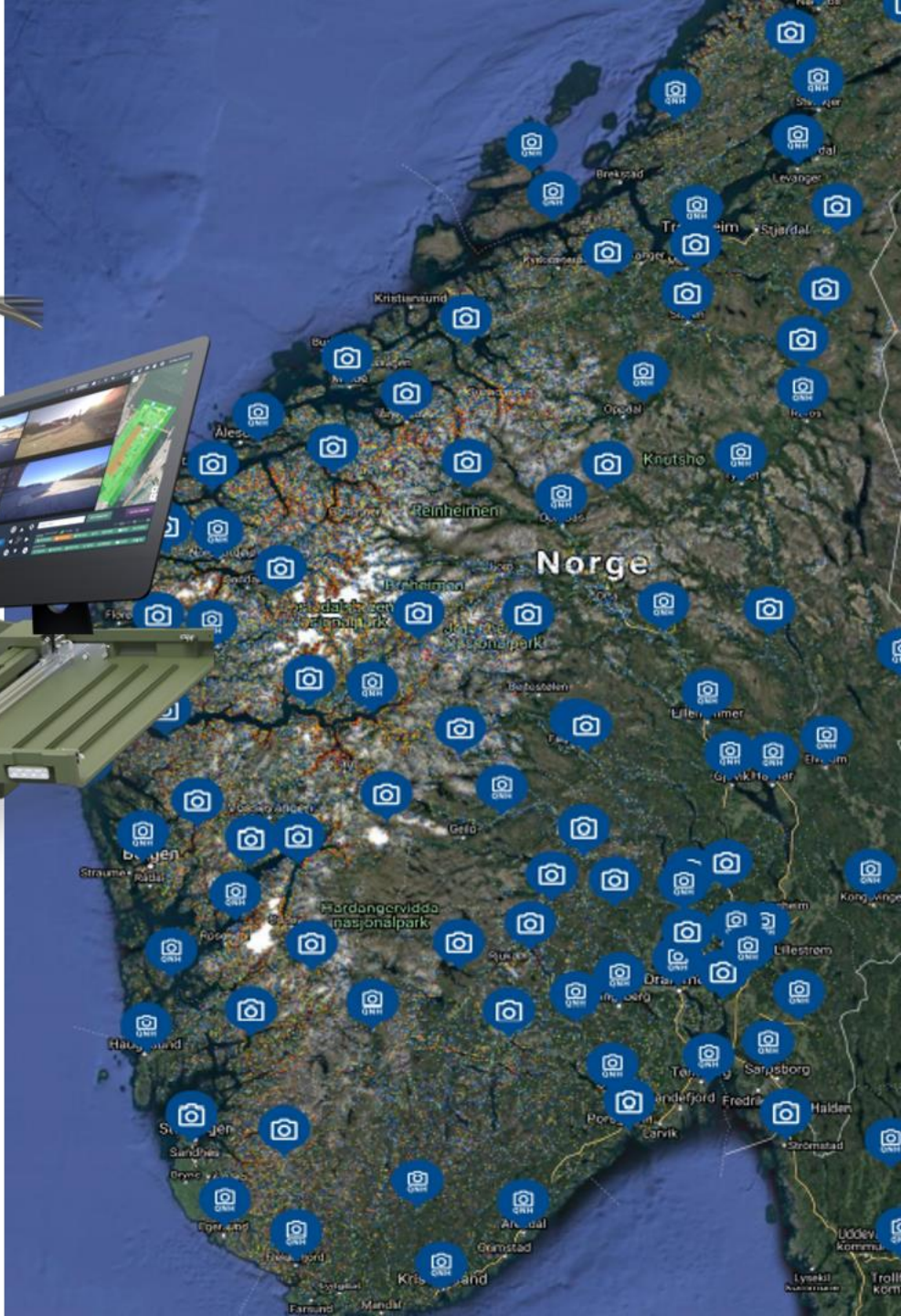
Rugge  
Surface  
Clean

▼ Communication System  
Number of Connections:  
Agent: 1 grp: 0  
Battery left percent  
ID 1 : 51.93

ID 1 : 23.32 (3.69)

ID 1 : 0.06 speed m/s

ID 1 : -0.12 climb m/s





**MPK**



**FORSVARET**

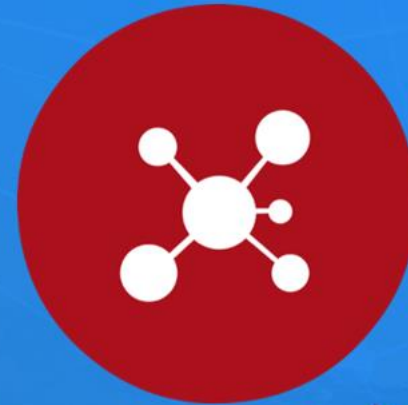


**5G-VINNI**



# 5G Standalone Non Public Network:

- Tarald Moe Bjølseth
- Magne Sivertsen
- Michel Gascoin
- Hans Petter Helsør
- Erik Steffensen
- Erik Vold
- Ivar Ekseth (Trippel M)
- Vegard Elgesem (Trippel M)
- Kennet Nomeland (Forsvarsmateriell)
- Emanuel Rygg (Forsvarets forskningsinstitutt)
- Magnus Monsen Nybroen (Hærens Combat Lab)
- Tore Sinding Bekkedal (Frikanalen)
- Kashif Mahmood (Telenor R&D)
- Robert Karström (VideoXlink)
- Venu Ba (Huawei)



trippel-m  
connected venues



FORSVARET



