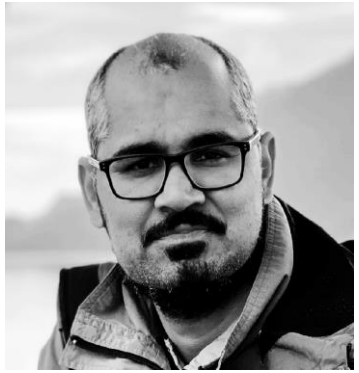
Learnings from cutting edge private 5G deployments



kashif.mahmood@telenor.com

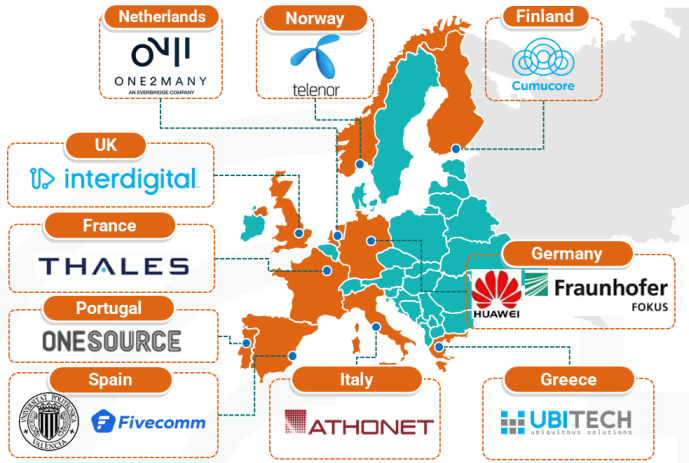
FUDGE-5G Introduction

FUlly **D**isinte**G**rated private n**E**tworks for 5G verticals

Build a platform enabling customization for private 5G networks

***x*12 Partners, *x*10 Countries**

Project coordination: UPV (Spain)
Technical coordination: Telenor Research (Norway)
Project duration: 30 months (Sep.2020 – Feb.2023)



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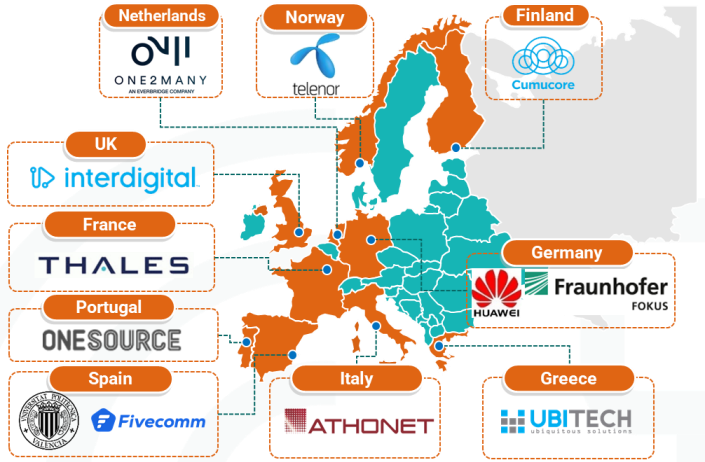

PPDR

Showcase customization and flexibility of all-in-one 5GC, as a standalone 5G bubbles.

Stakeholder

NORWEGIAN DEFENCE MATERIEL AGENCY

Concurrent Media Delivery

Deliver immersive Experience with multicast and remote news gathering

Stakeholder

NRK

5G Virtual Office

Unify devices and services inside hospital and make them accessible via 5G, ensuring data isolation.

Stakeholder

Oslo universitetssykehus

Industry 4.0

*Deploy 5G in a factory environment, providing **low latency** and **high precision clock synchronization***

Stakeholder

ABB

Interconnected NPNs

Provide privileged content and services across access networks

Stakeholder

telenor group
Fraunhofer FOKUS
UNIVERSITAT POLITÈCNICA DE VALÈNCIA

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UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Jun 3, 2020

December 30, 2020

Jun 3, 2020

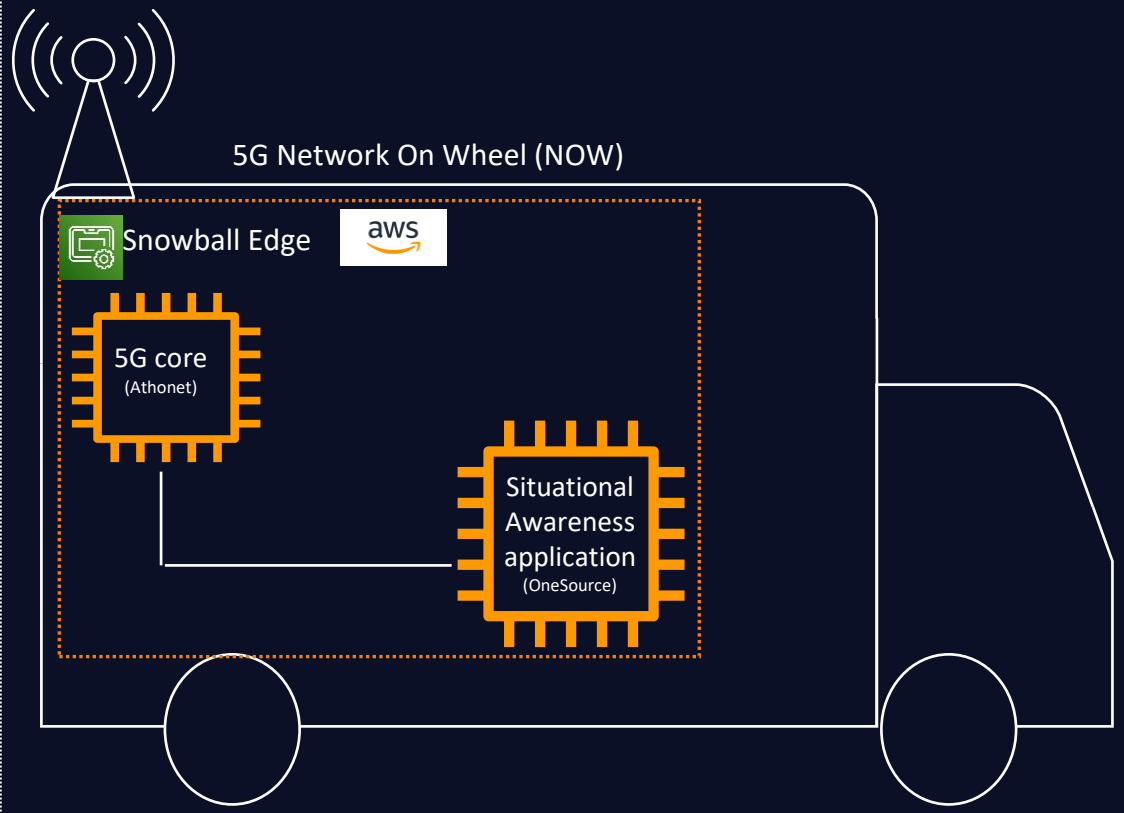
Alta Landslide

December 30, 2020

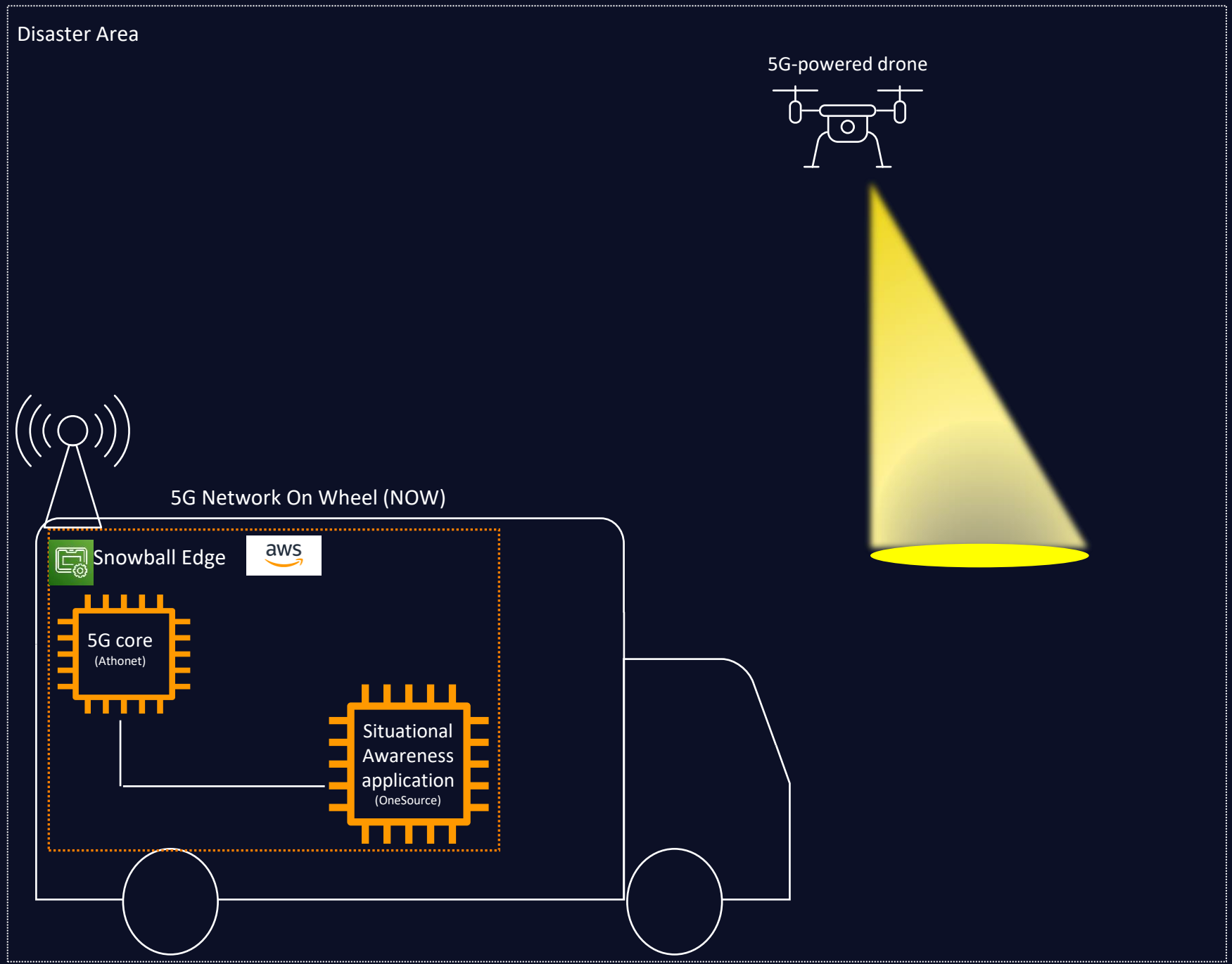
Gjerdrum Landslide

Disaster Area

Disaster Area



- Coverage on demand W/ guaranteed QoS
- Compute at the edge
- Fully autonomous
- Quick to deploy, Simple to operate
- Possibility to connect partner's edge
- Secure and ruggedized



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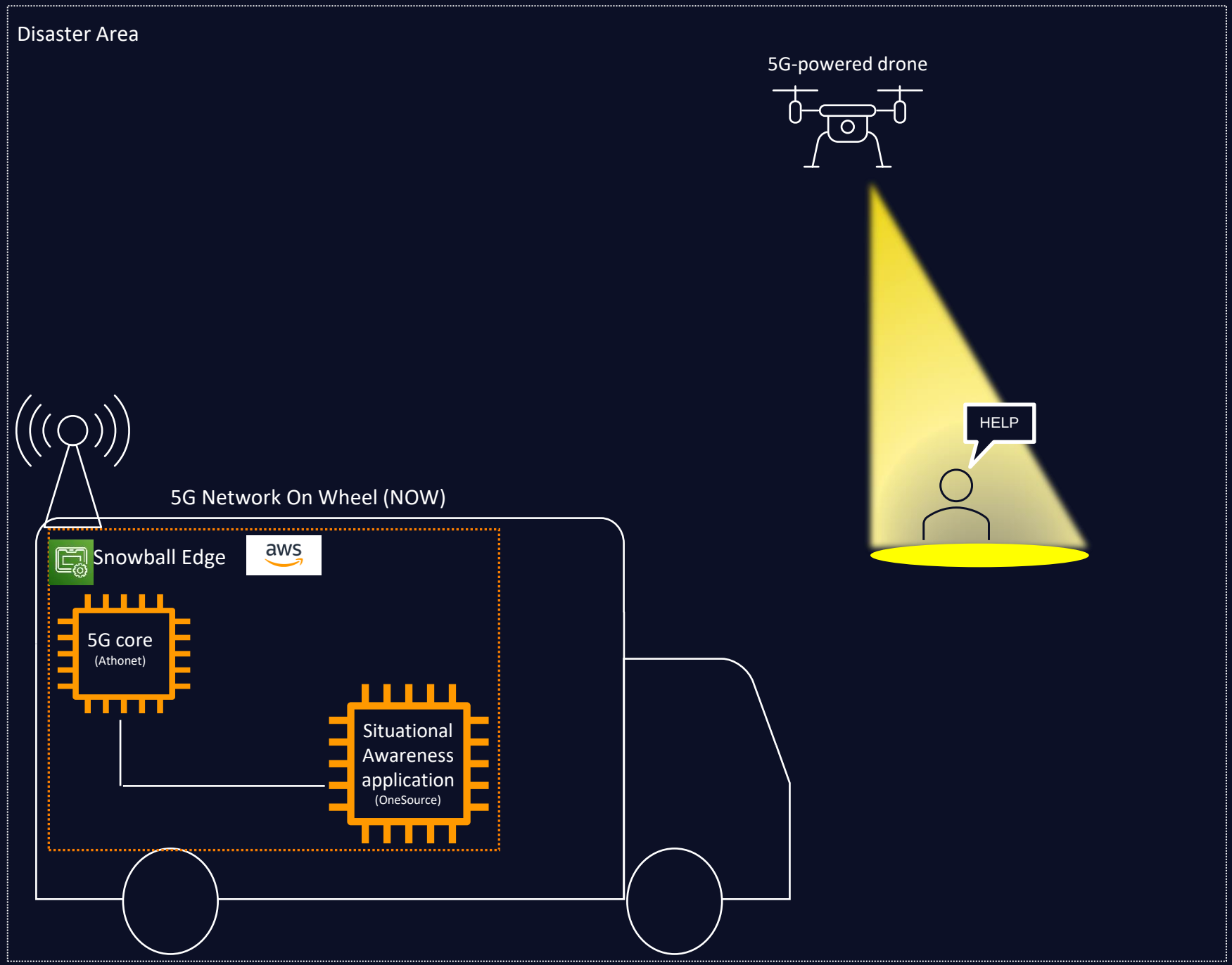

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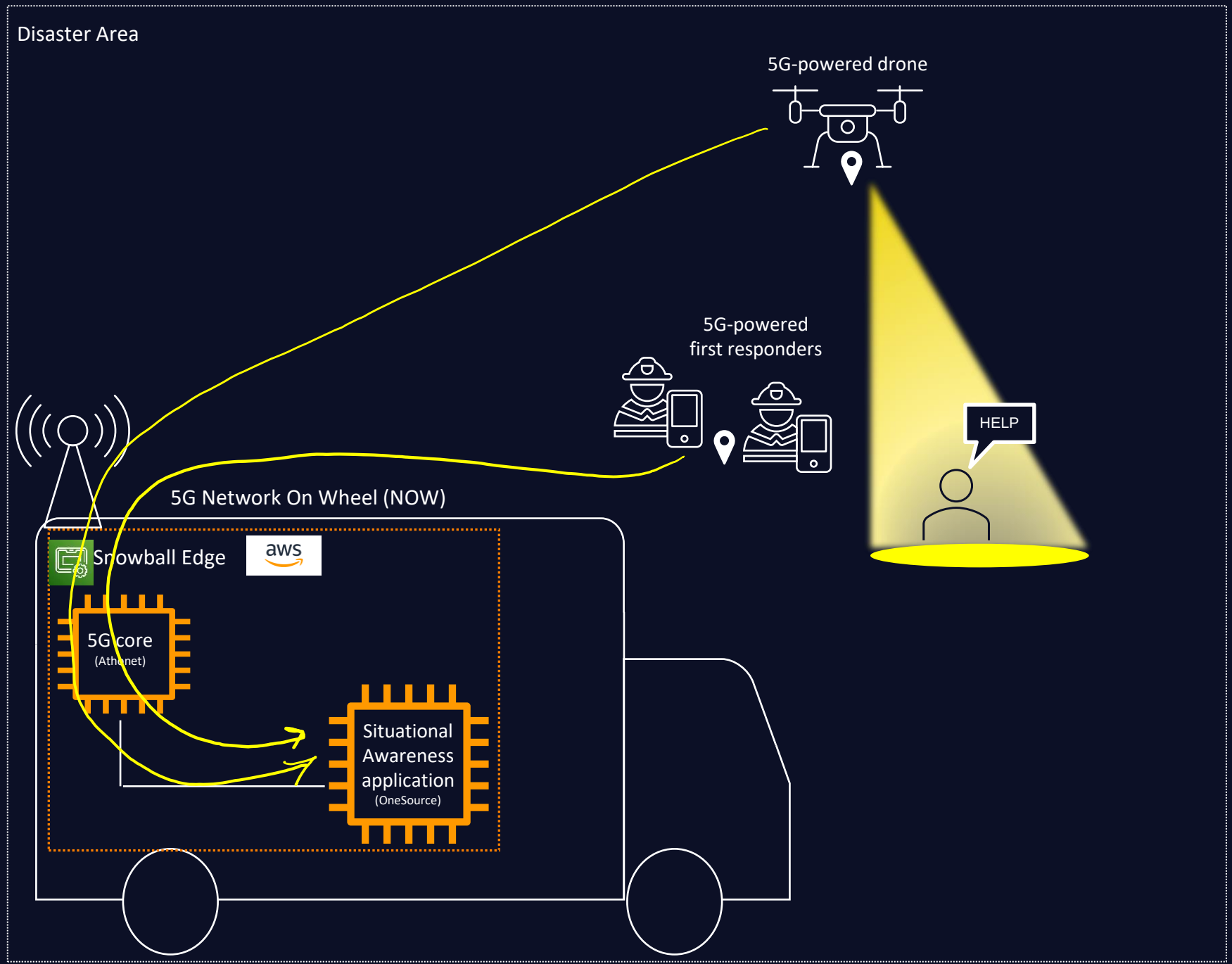

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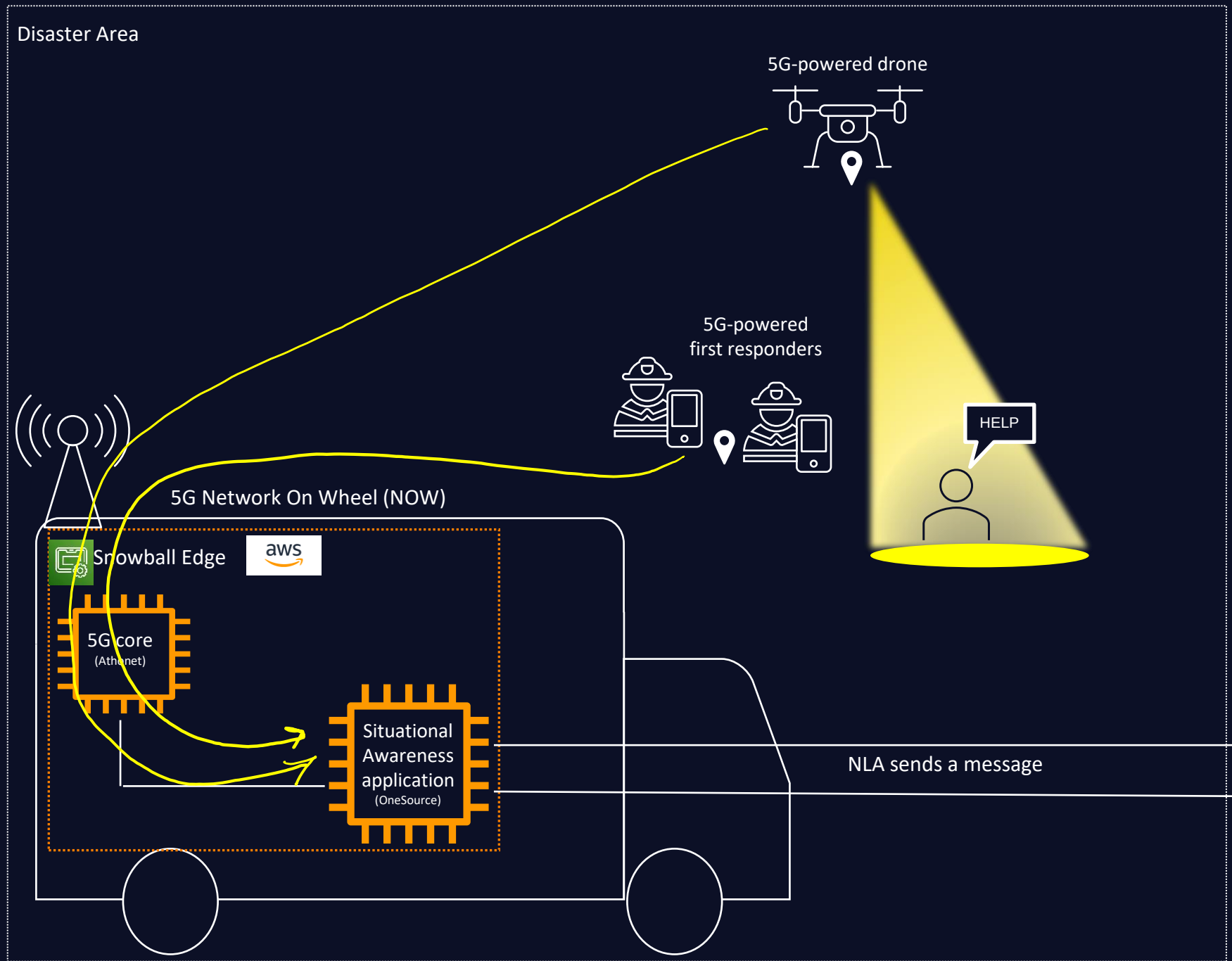

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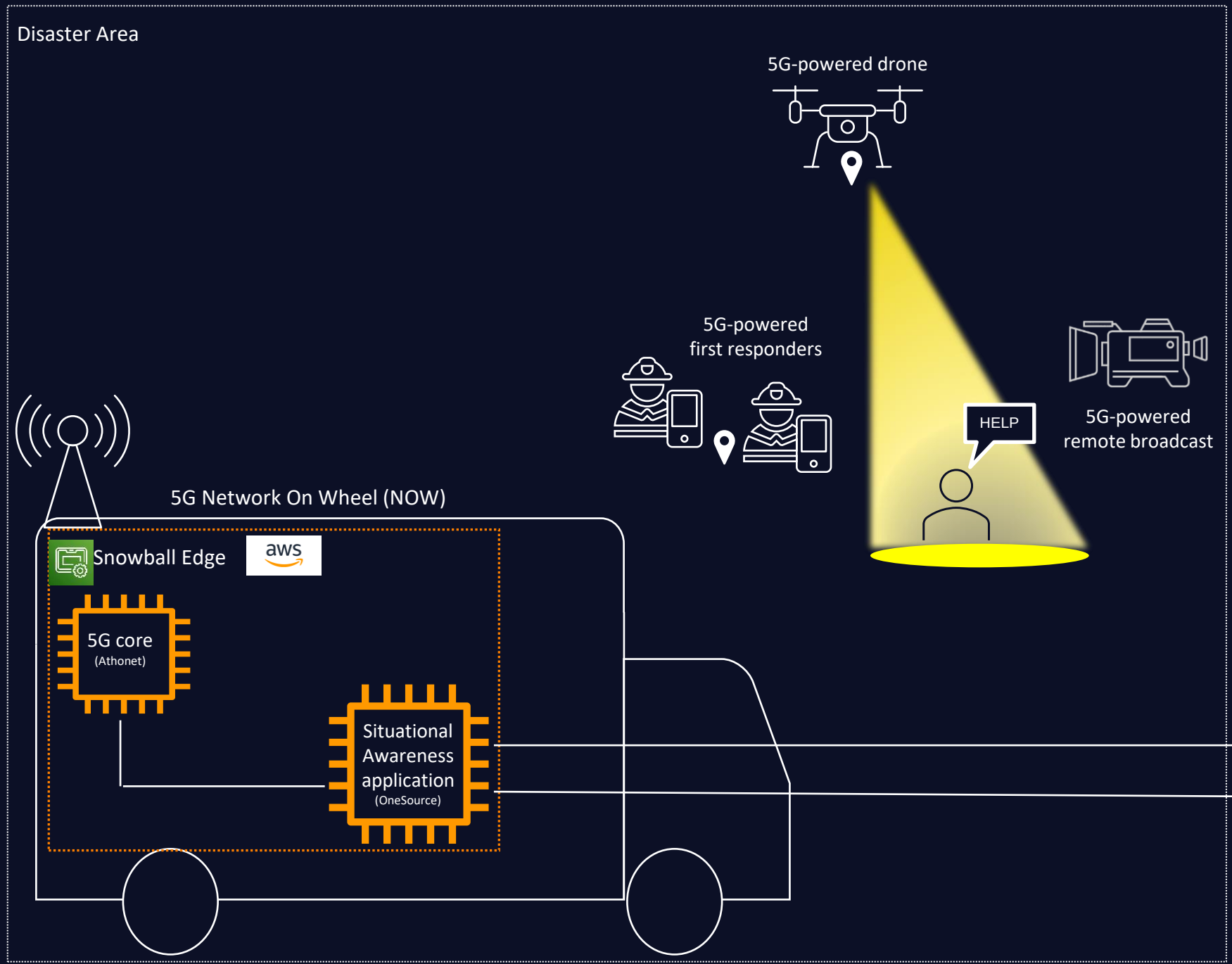

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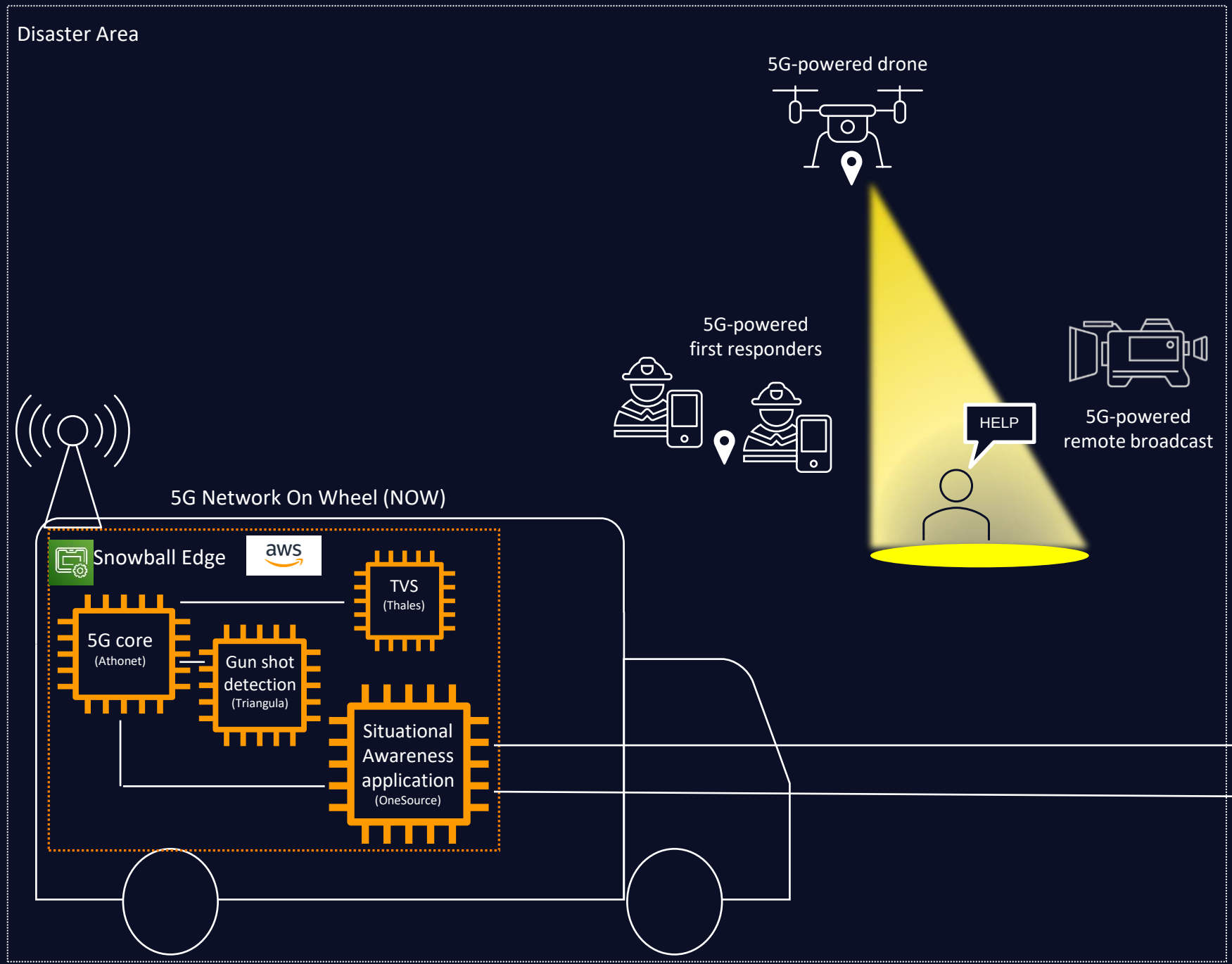

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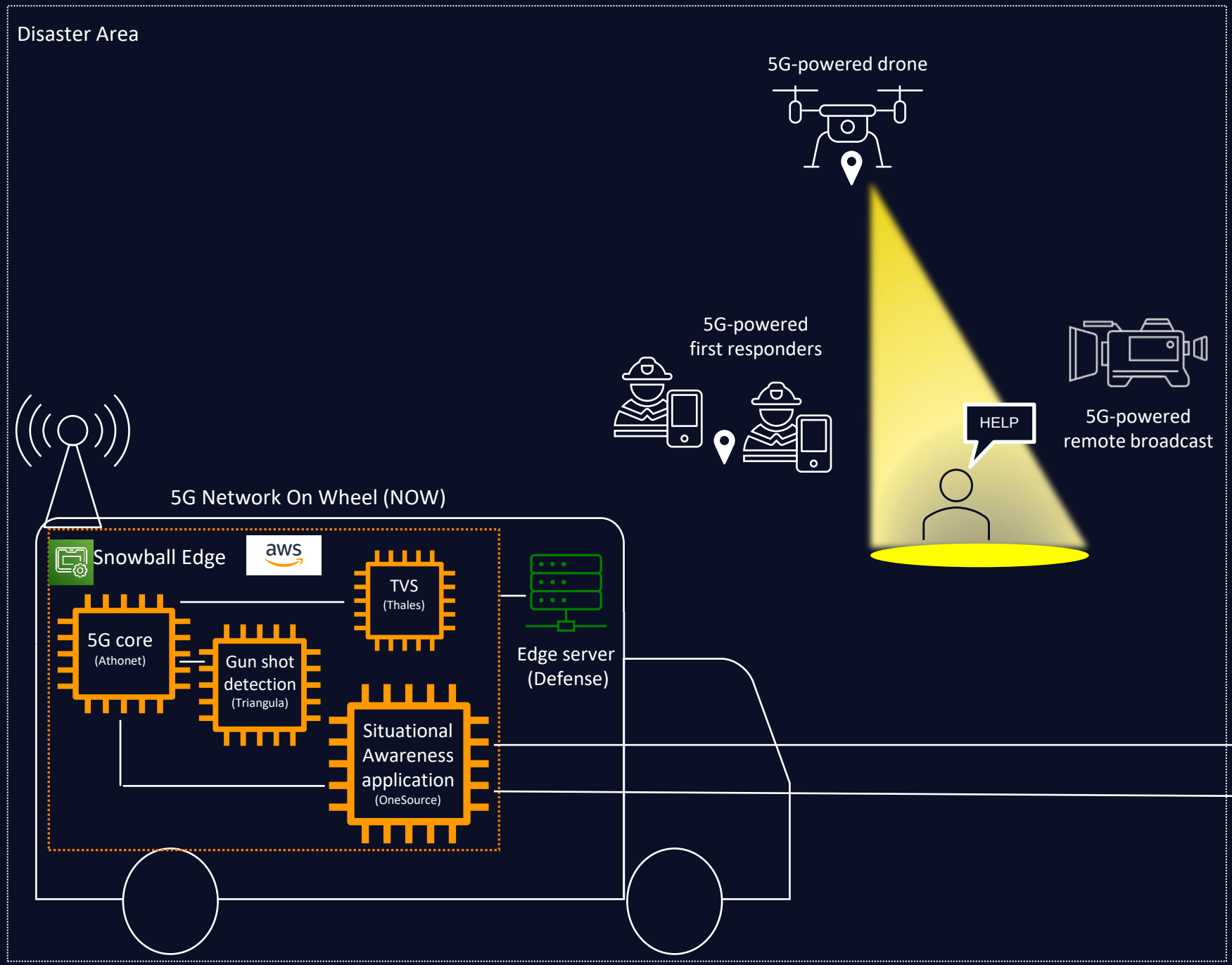

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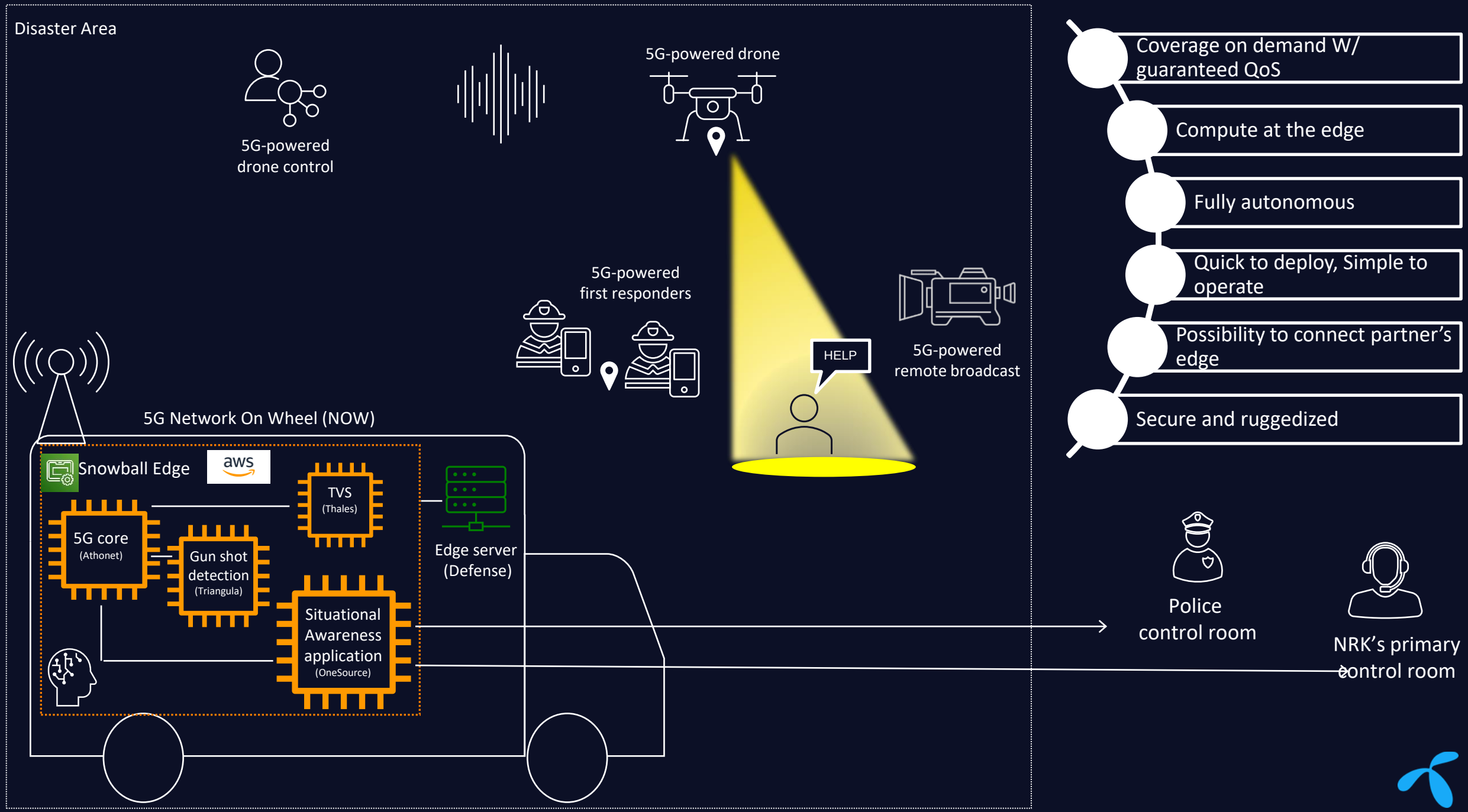
Disaster Area
5G-powered drone control
5G-powered drone
5G-powered first responders
HELP
5G-powered remote broadcast
5G Network On Wheel (NOW)
Snowball Edge
aws
TVS (Thales)
5G core (Athonet)
Gun shot detection (Triangula)
Situational Awareness application (OneSource)
Edge server (Defense)
Police control room
NRK's primary control room
Coverage on demand W/ guaranteed QoS
Compute at the edge
Fully autonomous
Quick to deploy, Simple to operate
Possibility to connect partner's edge
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“Currently, the 5GVINNI and FUDGE-5G trials in Norway would be considered the most advanced ongoing 5G trial projects in Europe."

5G Network on Wheels (NOW)

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PPDR

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telenor group

Fraunhofer FOKUS

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

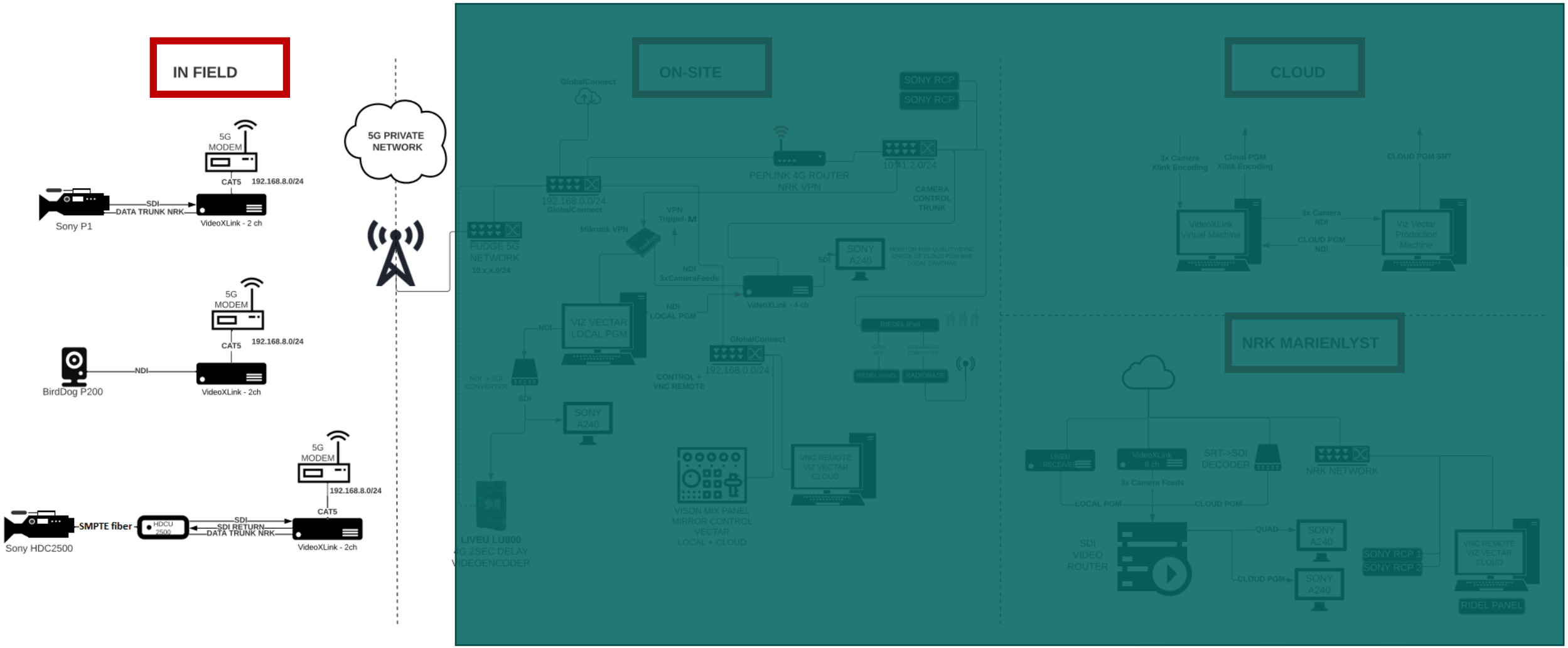

Flexible Remote Production
Using 5G

Wireless

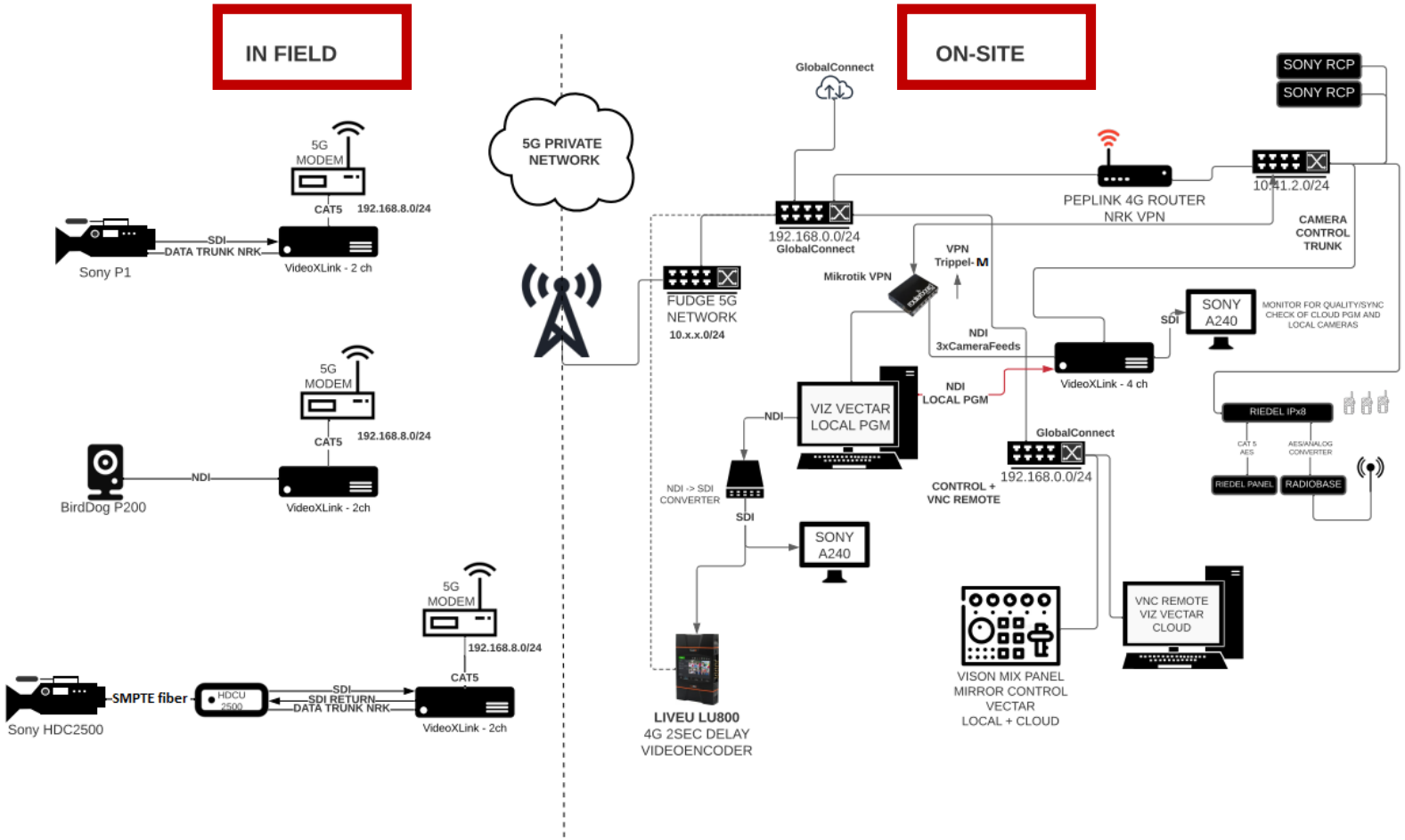
IP

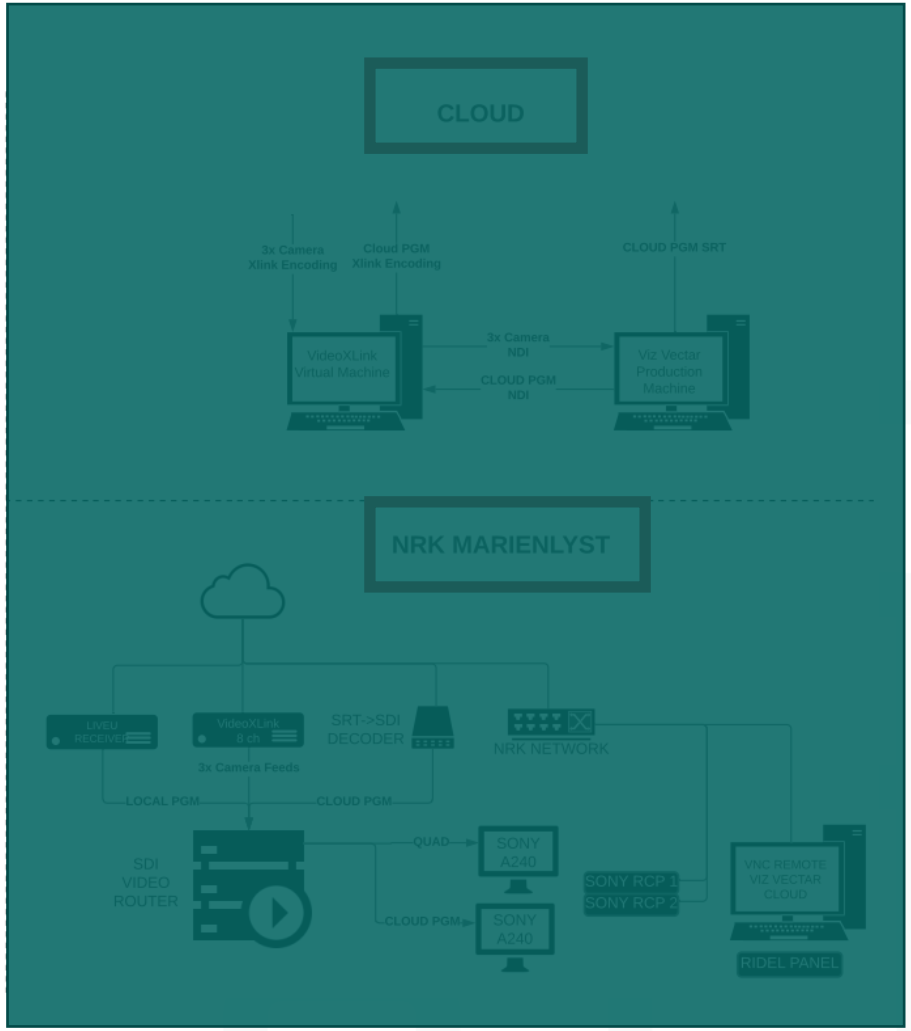
Slide from NRK

Flexible remote production setup



Flexible remote production setup





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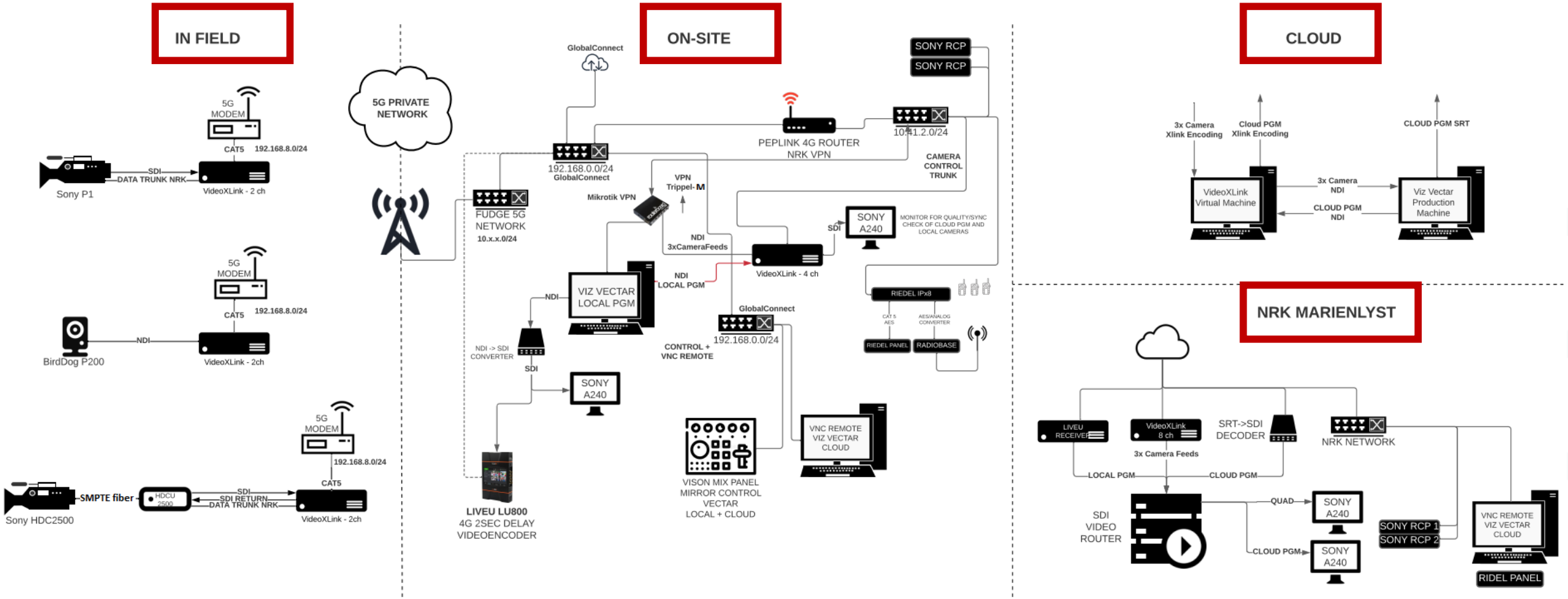

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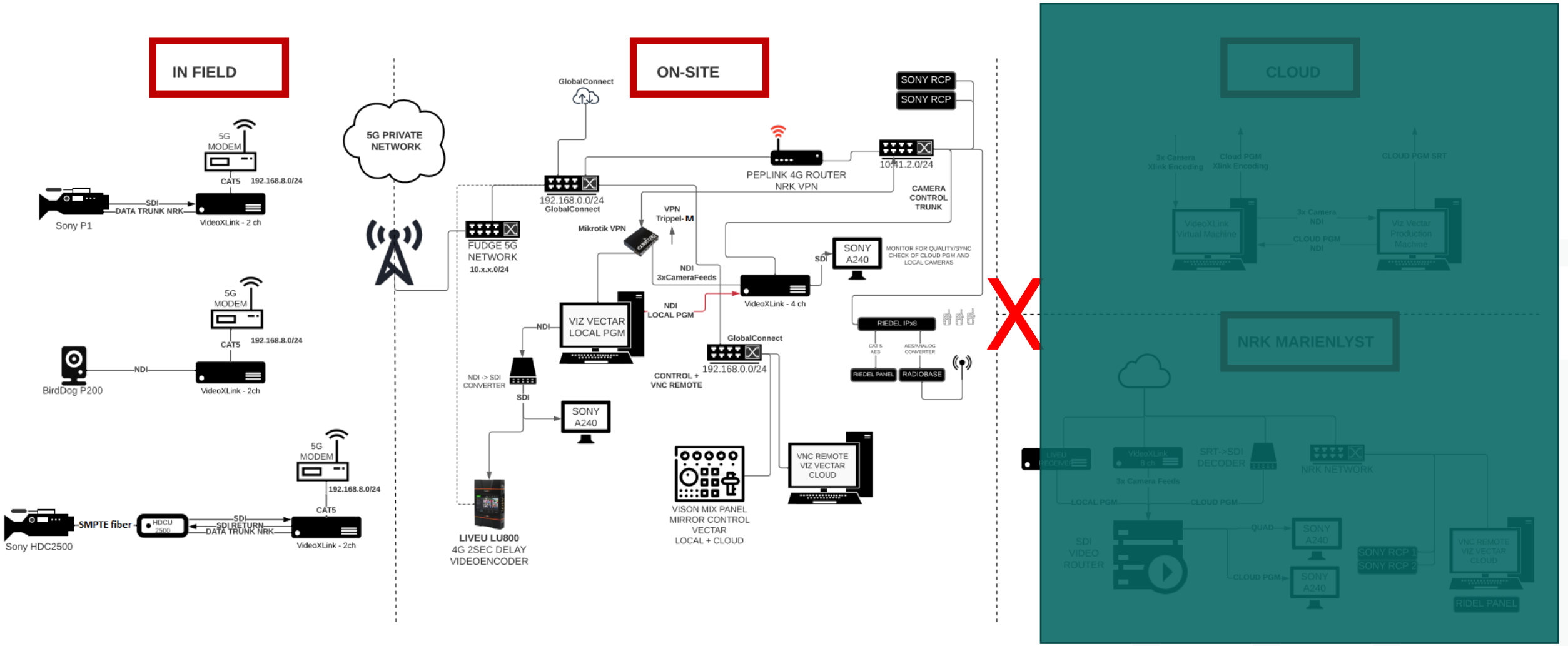
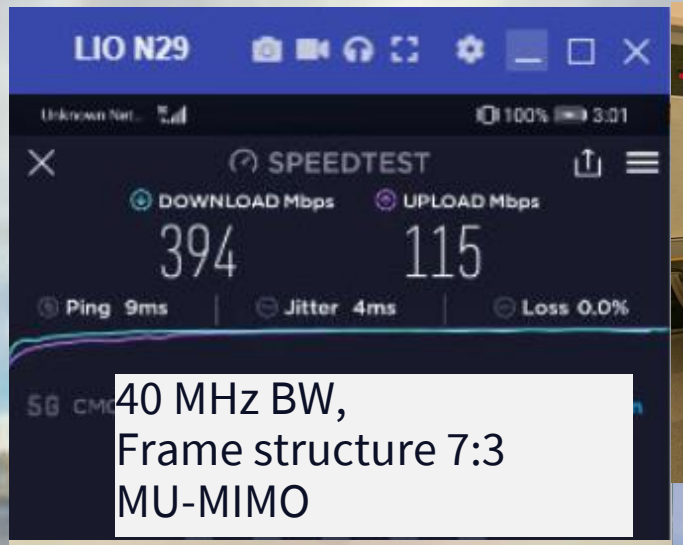
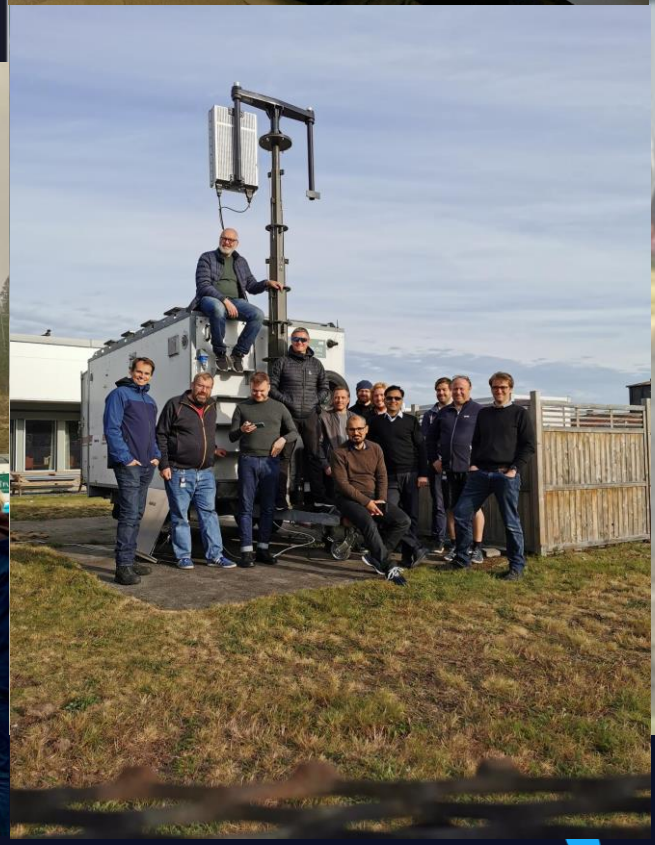


Standalone private network for flexible onsite production

- Coverage on demand W/ guaranteed QoS
- High Uplink throughput
- Stable latency
- Quick to deploy, Simple to operate
- Fully autonomous



40 MHz BW,
Frame structure 7:3
MU-MIMO



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Industrial Applications
Process Automation and Beyond

IoT APPLICATIONS

Identification

- Asset identification
- Access control

Tracking

- Personnel tracking
- Asset tracking

Connected Things

- Infrastructure monitoring
- Collaborative robots

Assisted Operations

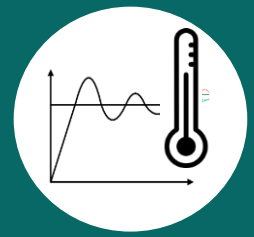
- Remote assistance
- AR/VR for site personnel

TYPICAL AUTOMATION APPLICATIONS

Monitoring

- Equipment monitoring
- Process monitoring

Control



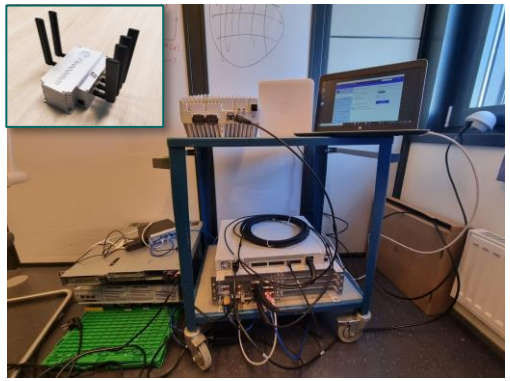
- Process control
- Supervisory control

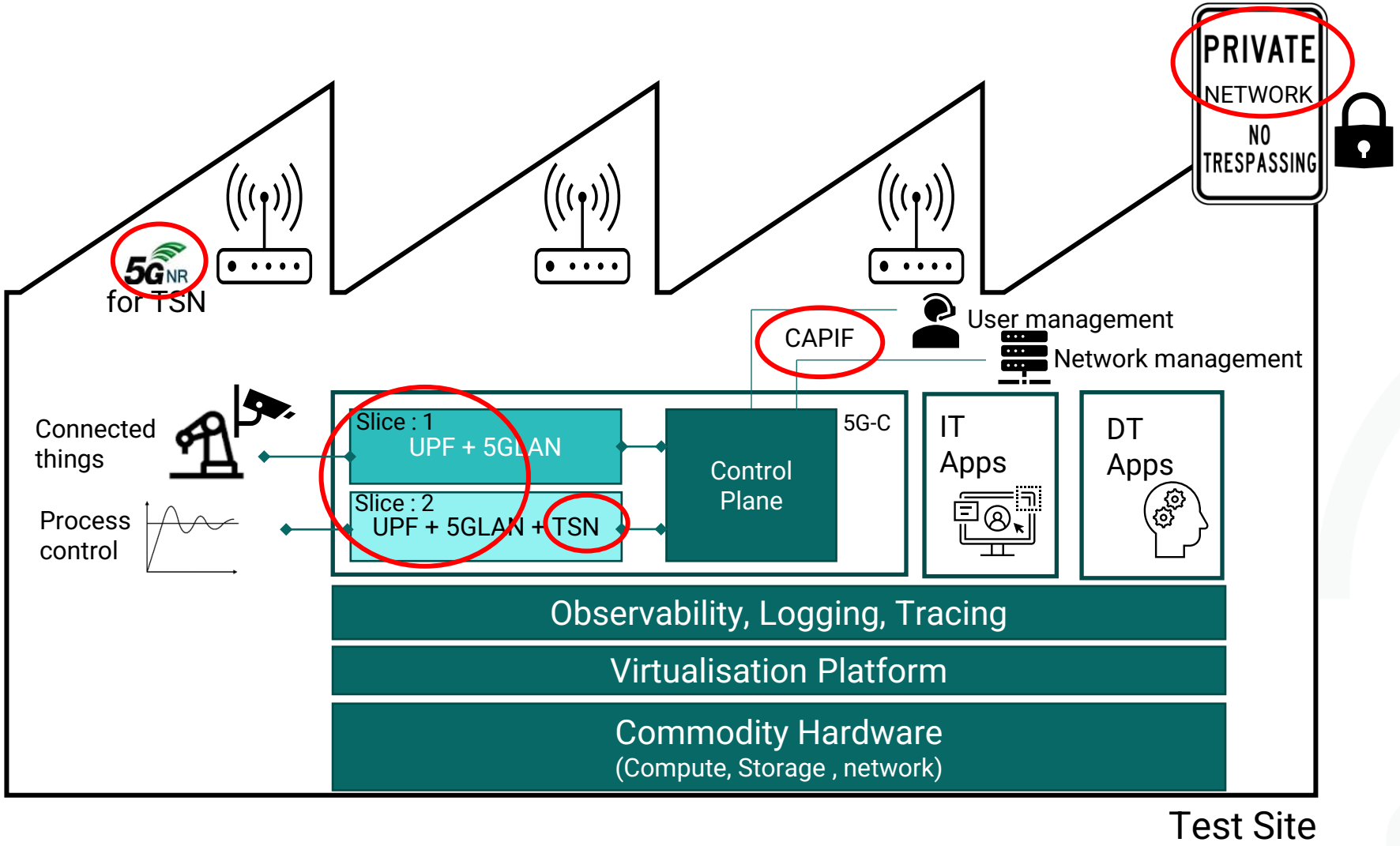
Safety

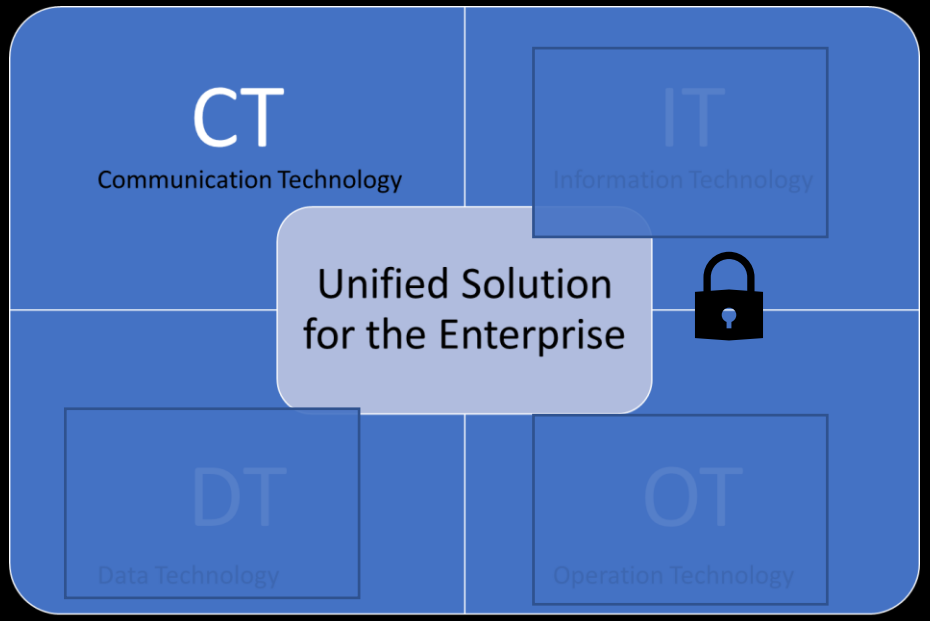
- Process safety
- Machine safety

*Slide from Waqas (ABB)

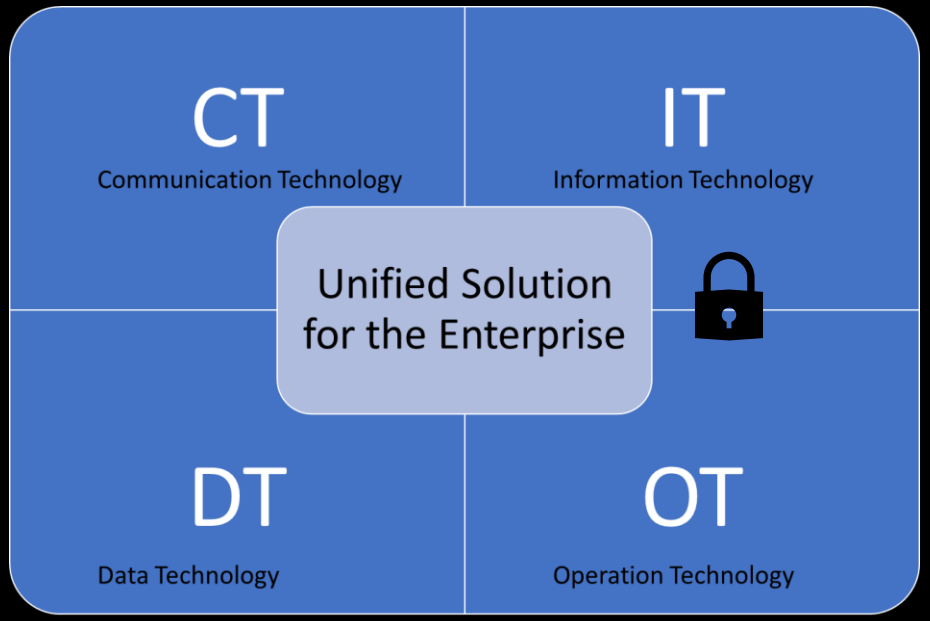
FUDGE-5G powered Industry 4.0







Private networks is a great opportunity to provide a customised, highly performant, secure, unified solution for the enterprise



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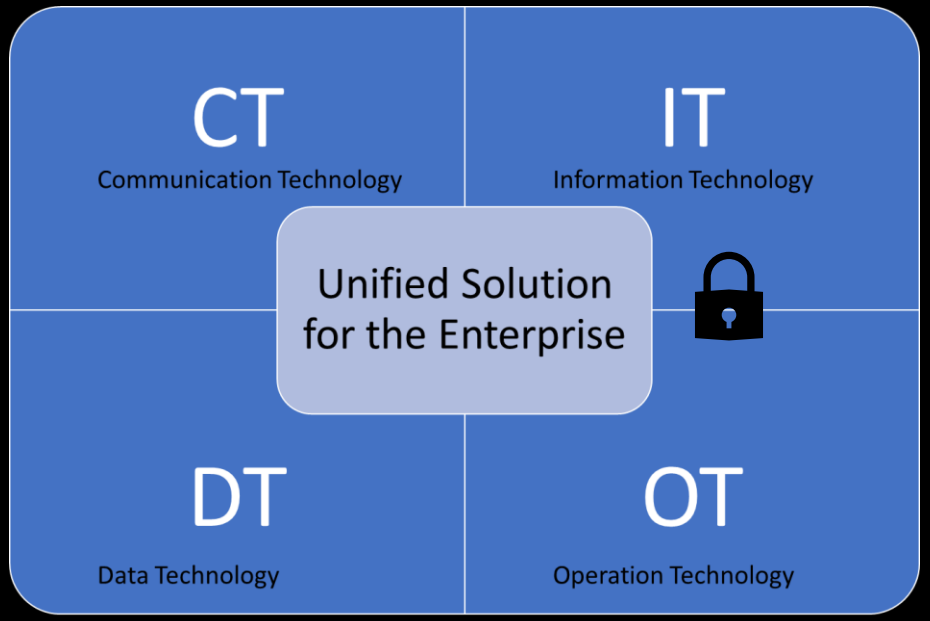

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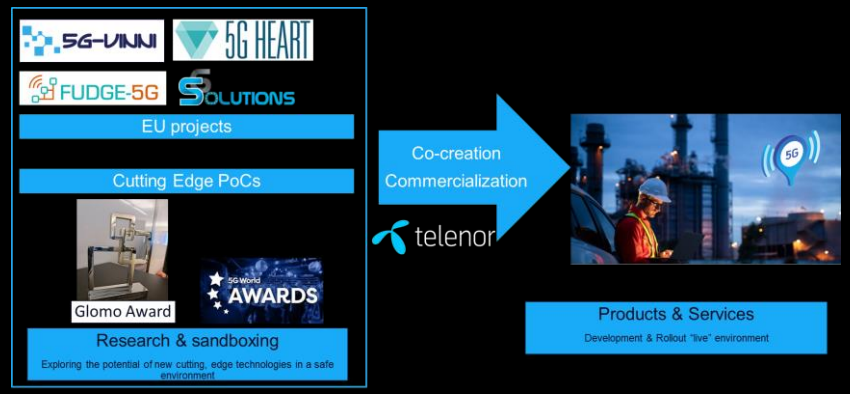
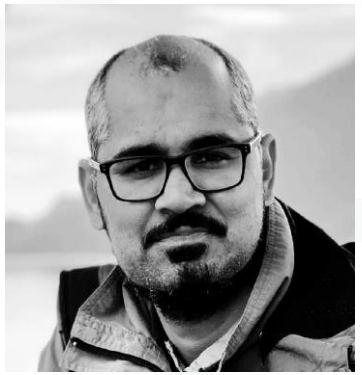


Sandboxing is essential to co-create with the verticals early on

FUDGE-5G

Thank you.



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957242