
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

HYB206

AWS: A great way to run 5G networks

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Customer challenges

NETWORKS CLOUDIFIED

Telco challenges

Building a dedicated Telco cloud

5G requires a cloud platform, but the complexity and cost of building and operating private cloud negates the value

Need for Edge cloud

Low latency requirements, Traffic Increase and Distribution for 5GCore, & implementing virtualized RAN require Edge cloud

Orchestration and automation complexity

Across VNFs/CNFs, domains and locations

Day 2 operations & assurance complexity

Across different stacks at each node of the network

5G monetization

Need for new revenue streams (Enterprises, Public Sector, URLLC) with short Time to Market

Enterprise challenges

Security and data residency

Keep devices and data secure

Connectivity

Operate at top performance with local mobility, even in remote locations

Integration and support

Common Cloud for Private Wireless & use case Application/s

Cost of devices and seamless mobility

Need for the turnkey solution which address the competency and cost

Faster time to market

Need for the turnkey solution which address the competency and cost

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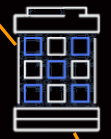
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AWS cloud-to-edge continuum

DELIVERING AWS WHERE YOU NEED IT



AWS regions



On premises

AWS Outposts
AWS Storage Gateway



Metro centers

AWS local zones



5G networks

AWS Wavelength



IoT / robotics

AWS IoT Greengrass
AWS RoboMaker





Rugged, Mobile DDIL* edge

AWS Snowball Edge
AWS Snowcone



For most use cases

For low latency, data residency

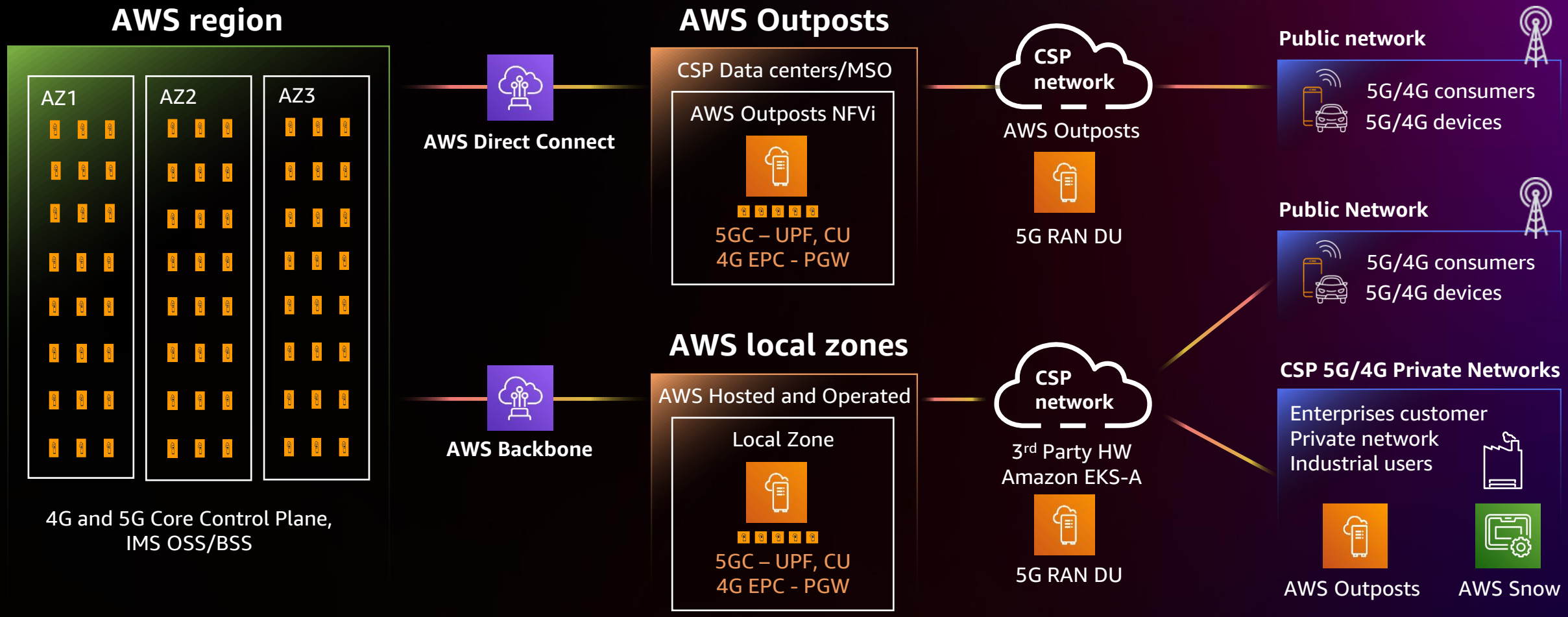
For local compute, rugged, DDIL* edge

** Denied, disrupted, intermittent, limited*

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5G/4G Networks on AWS

FLEXIBLE DEPLOYMENT OPTIONS (MIX AND MATCH)



Single pane of glass, consistent experience and unified orchestration across deployment options

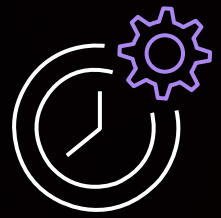
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CSPs and ISVs want common architecture tools

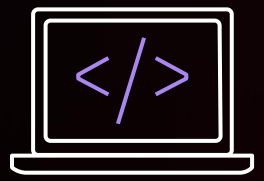
ACROSS ON PREMISES, THE EDGE, AND THE CLOUD



Reliable, secure, and high-performance infrastructure



Same ownership model and operational consistency



Same APIs for supported services



Same tools for automation, deployments, and security controls



Same pace of innovation as in the cloud

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Why BSS/OSS on AWS?

Automation across the network, faster time to market


Rapid development & provisioning


Increased automation


Focus on business

Intelligent, resilient & proven operation


Resilience & reliability


Scalable & secure; innovate


Expertise

Cloud economics & new business models


Grow (or shrink) on demand


New business models


Low cost of entry

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Why 5G Core on AWS?



Cost savings (TCO)

Infrastructure build out and deployment savings leveraging existing AWS footprint (Region, LZ, OP and Snow)

50% reduction in TCO



Automation and productivity

Ubiquitous automation model across cloud continuum (Region, Local Zone, Outpost)

Reduction in Opex (FTE's)



Operational resilience

Improved SLAs , reducing unplanned outages, leveraging a proven, secure infrastructure

Increased service availability/redundancy



Business agility

Accelerate deployment of new features & applications providing agile business models to customers on demand

4-6X faster Time To Market

← **Cost impact**

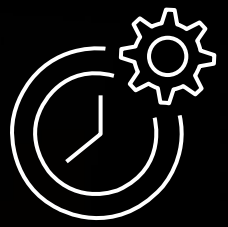
Value impact →

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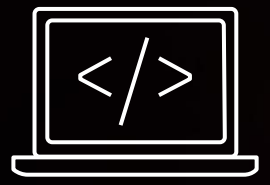
Why RAN on AWS?

TIME TO MARKET



Tightly integrated cloud hardware infrastructure and services, and pre-validated with RAN ISV solution

OPERATIONAL SIMPLICITY



Common cloud services for RAN DU/CU and 5GC

AWS Console & APIs for service management

OPERATIONAL RESILIENCY



Infrastructure software lifecycle management

AWS Cloudwatch for Infra & container services monitoring

PERFORMANCE & TCO BENEFIT



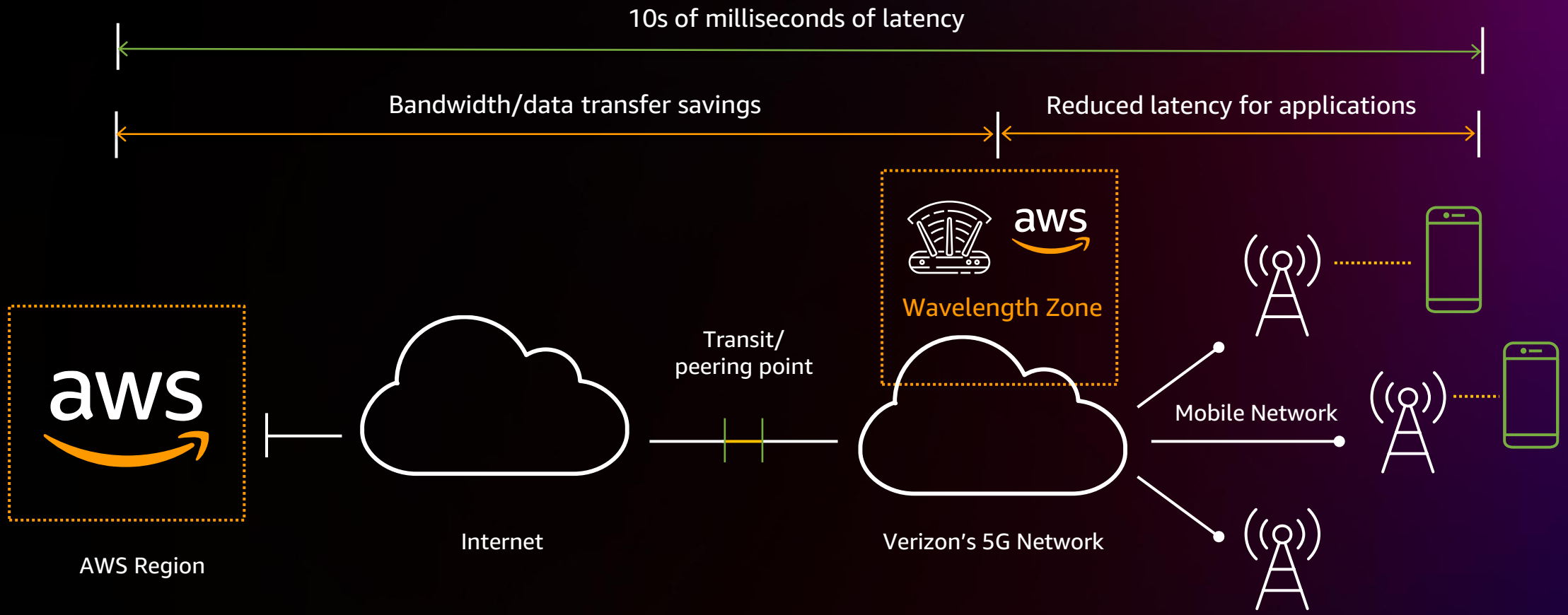
AWS Nitro system and Graviton CPU

Proactive hardware monitoring, remediation and replacement

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AWS Wavelength in a 5G network



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Market segment opportunities for 5G

Microcontrollers & IoT devices



Networked environments



5G telco networks



Rugged edge



On premises



Metro centers



PoPs & Regions (AWS Cloud)

25
Regions

81
Availability Zones

275+
PoPs

265+
Edge locations

Two ways of building private networks on AWS

AWS Private 5G



AWS Managed Services

An end-to-end private network solution for SMBs, that enables deployment in days instead of months

Partner solutions



Multiple AWS services

Pre-integrated private network solutions, from AWS, Partners, and CSPs, for tailor-made deployments and operations

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Private 5G with AWS

AWS partner driven



AWS Snow service

Deploy Private 5G solutions built by Edge ISV partners and operators

Managed service



AWS Private 5G

Deploy, operate, and scale a private cellular network at an on-premise facility in days instead of months

CSP driven Private 5G



Multiple AWS services

CSP managed private 5G solutions for Enterprises

Can operate disconnected from AWS region

Requires connectivity to AWS region

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AWS success stories

swisscom

5G network transformation leveraging E/// and AWS

telenor

Private 5G deployment at DTAC Thailand, Network on wheels

dish

Covering over 20% of the US population with cloud-native 5G on AWS

JMA

Showcase full 5G RAN and 5GC Network in a box solution on Snowball Edge

Spark

Plan to provide 5G coverage to 90% of New Zealand population

Telefónica

Completed successful pilots of 5G core on AWS outposts

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Driving our journey from Telco to Techco

Mark Düsener
Executive Vice President Mobile Network and Services
Swisscom

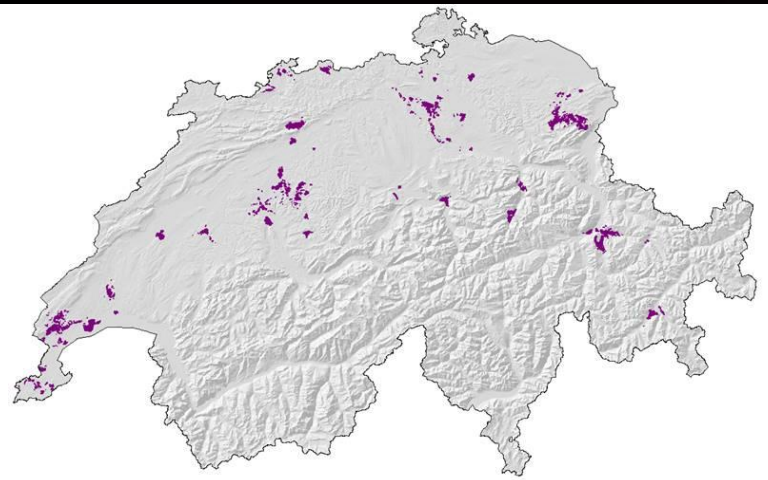
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The start of our 5G Journey – driven by speed and capacity first…

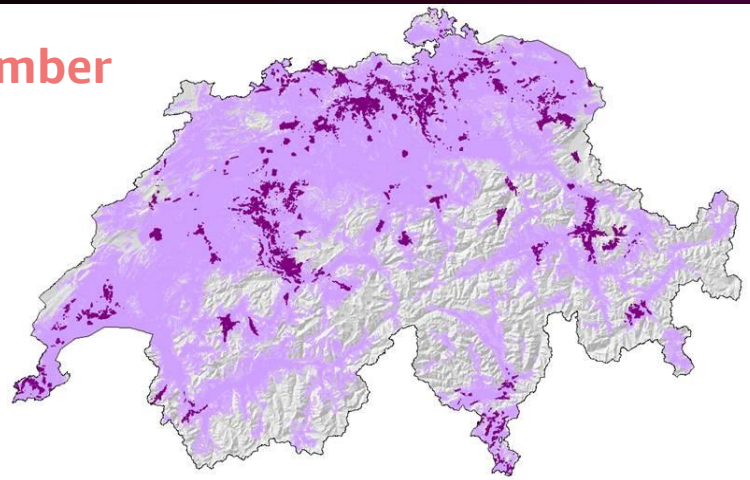
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5G – after rapidly kick-starting 5G for Switzerland, we are now rolling out 5G fast…

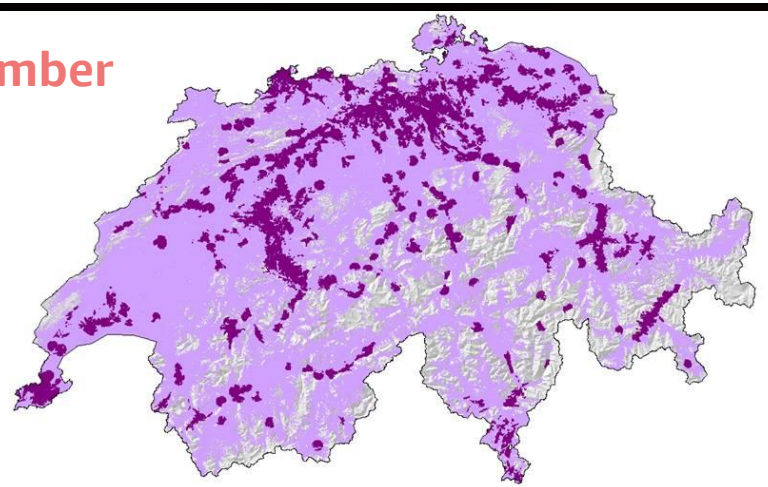
April 2019



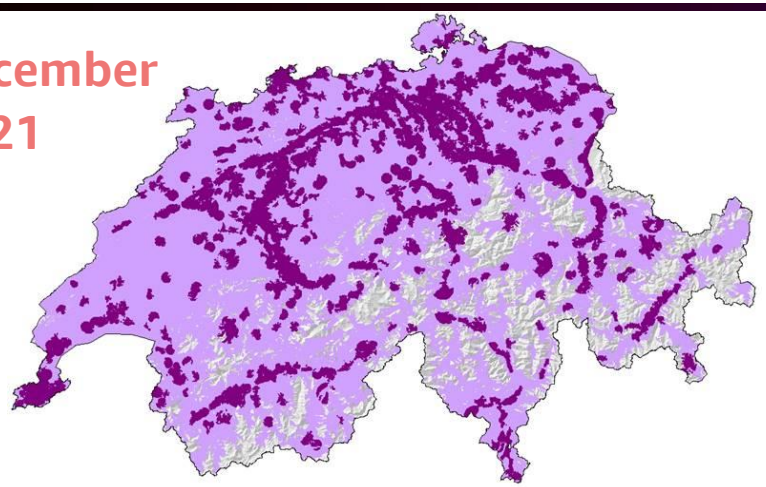
December 2019



December 2020



December 2021



5G Fast
5G Wide

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swisscom

… but the real transformation just started

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Telco to TechCo - embracing the revolution under the hood

- Simplification
- Cloud nativeness
- Automation
- Our people and culture



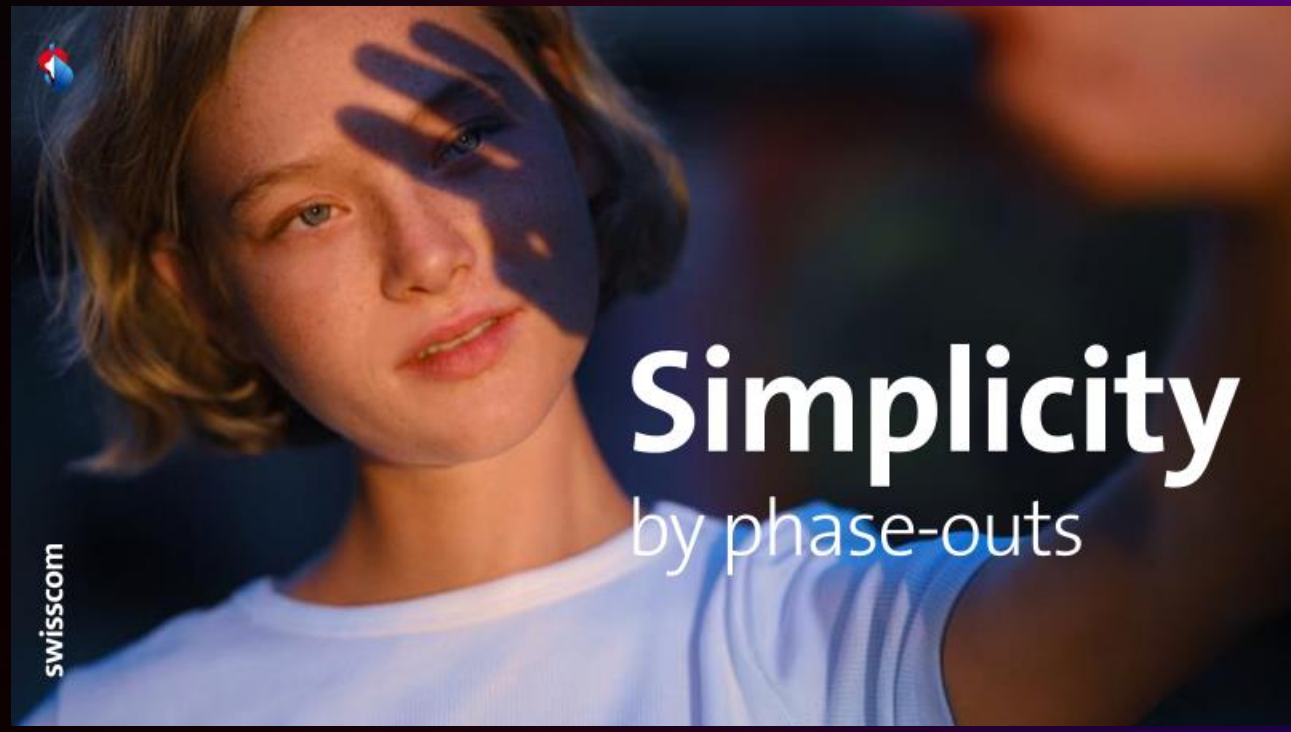


Connect Conferenz 2022

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This is why we celebrate phase-outs

- Optimal use of our scarcest resources – frequencies and power due to Swiss regulations
- Reduction of cost in order to invest in innovation
- Focus for the teams to create space fostering innovation
- Simplicity is simpler



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Getting rid of boxes

- Achieving true cloud nativeness is not about religion – its about substantial operational benefits
- Pet vs cattle – no boxes anymore
- Test in production – no Lab anymore
- "Everything that can fail will fail" – no five nines anymore
- True elasticity – once we integrate into AWS
- Fundamental cloud-native principles are still missing – we are driving the change



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Quality and innovation – different sides of the same coin

- We will increase the number of releases of cores from 1 per year to 1 per month or week – on hybrid clouds
- We have already implemented this in RAN
- It’s about processes, way of working and culture
- "Everything as code"
- Service Reliability Engineering (SRE) shall bring us scale



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It is about People making this transformation happen!

- Everyone will become a software engineer – somehow
- People journey's – you are starting your journey
- The battle of age and the war for talents – diversity becoming a key differentiator to re-build the teams
- Technology is changing team culture – and vice versa



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Network transformation with AWS

Cloud continuum for 5G Core

Cloud native 5G Core on AWS Region
to benefit from:

- managed infrastructure & services
- elasticity
- security
- innovation

Uniform architecture across:

- Region (Availability Zones)
- Swisscom Data Centres (Outposts)
- Edge locations (AWS Edge)

and extendable for

- Mobile Private Networks



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Enabling Private 5G on AWS Snow services

Nits Jeganathan

Sr Product Manager

AWS

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The AWS Snow family key value propositions



AWS services and capabilities at the edge

Snow brings the core AWS services like EC2, EKS, EBS, S3, and IAM and AWS AI/ML capabilities like Greengrass, Lambda and more to the edge



Edge computing and data movement

Snow devices provide both edge computing and data movement capabilities



Cloud compatibility

Use the same AWS service APIs that you use in the cloud



Scalable

Add or remove Snow devices based on your needs



Secure

Snowball Edge devices use tamper-evident enclosures, 256-bit encryption, and industry-standard Trusted Platform Modules (TPM)



Run partially or fully disconnected

Snow devices and capabilities are fully operable without network connection

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AWS Snowball Edge for rugged and tactical Edge

BRINGS AWS TO DDIL RUGGED EDGE AND LOCATIONS WITH NO OR LIMITED NETWORK CONNECTIVTY



Edge Compute and Edge Storage use cases:
32 - 104 vCPU, 208 - 416 GB RAM
28 - 210 TB NVMe storage
Up to 100G Networking

Operates on unconditioned power and in non-datacenter environments (0° to 45°C)

Data secured with 256-bit encryption

Designed to be operated by non-technical personnel

Weighs 49 lbs, can be handled by a single person

Tamper-resistant
Tamper-evident

- Handles up to**200G impact**
- Airdrop-able
- MIL-S-901D
- Meets FISMA High, FedRAMP ITAR, CJIS, and DoD SRG Impact Level 6 requirements

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Direct Network interface on Snow Family



Direct Network Interfaces (DNI)

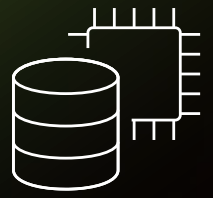
- Mutlicast streams
- Multiple DNIs per VM
- VLAN tags
- Routing
- Use multiple network ports
- Configure route tables

172.16.0.0
172.16.1.0
172.16.2.0

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Private 5G – Snow deployment options

Private 5G core and MEC deployments



Deploy Private 5G Core UPF, MEC for disconnected use

Private 5G RAN, 5G core and MEC deployments



Fully integrated

5G RAN +5G Core + MEC on Snow

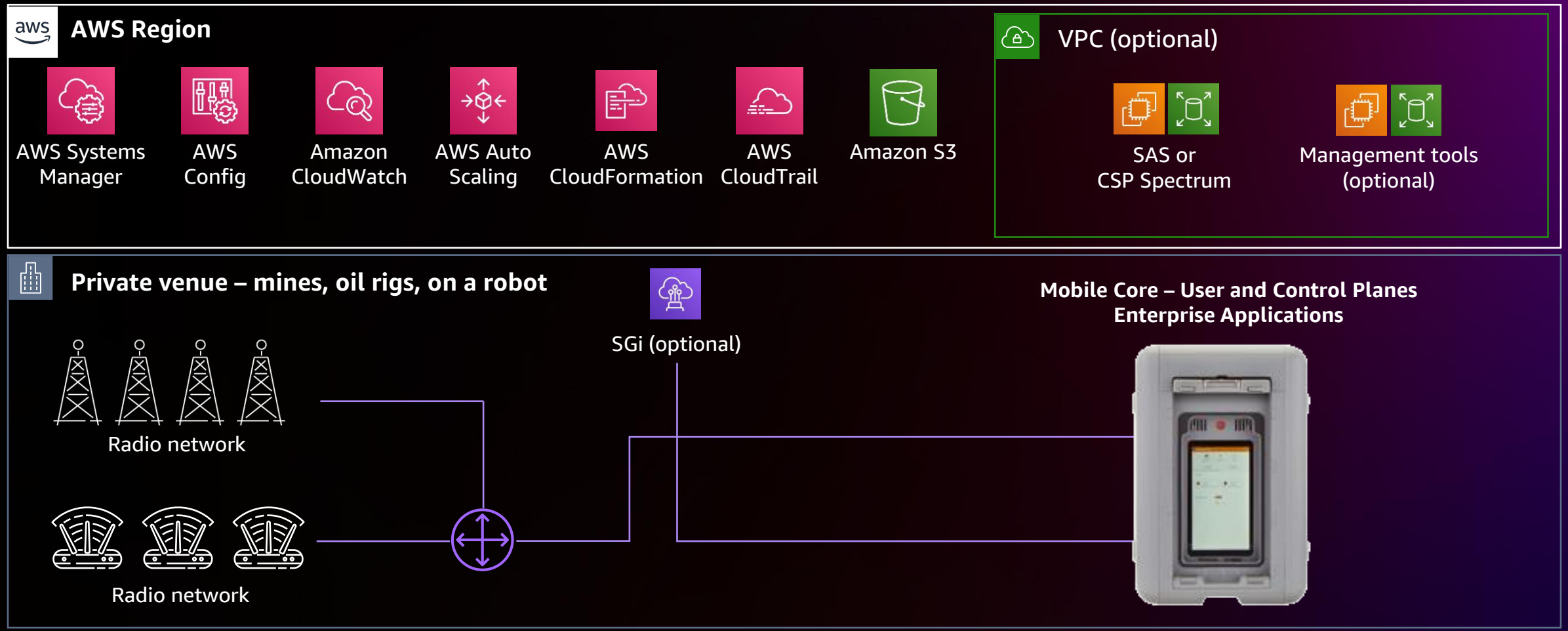
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Private LTE / 5G networks with Snowball

IDEAL FOR DISCONNECTED LOCATIONS

Option 2 – disconnected to Cloud mode



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AI/ML at the Edge with Private 5G

Dedicated private 5G edge

Spark leverages containerized 5G core solution by Mavenir running on EKS Anywhere on Snowball Edge devices

Low-latency mec

Hazard detection system running on Snowball Edge for EnvironNZ with a combination of AI-powered computer vision from Qrious.

Industrial use case

EnviroNZ sites are made safer by anticipating and reacting immediately if someone bypasses their safety controls.



Spark MAVENIR Qrious

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Private 5G – Network in a Box (5G RAN + 5GC)

Complete Private 5G Network in a box

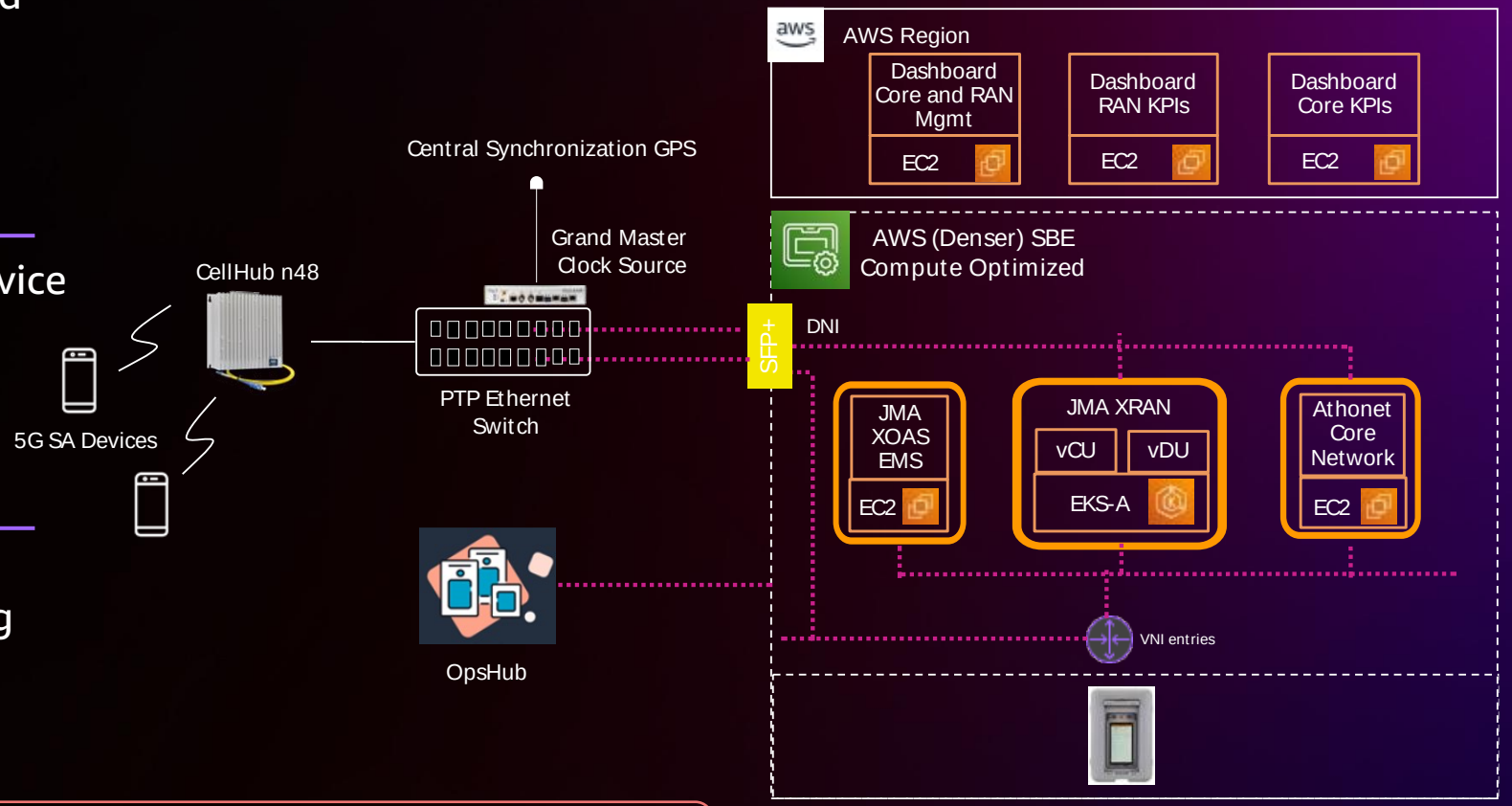
JMA Wireless delivering 5G RAN, 5G Core and MEC applications on a single Snowball Edge device.

Single device deployment

Running 5G Core and 5G RAN on a single device reduces cost and operational overhead of managing 2 systems.

Enterprise enablement

JMA Wireless looking to bring Private 5G to Higher Education, Hospitality, Manufacturing domains.



Checkout the demo at AWS industry showcase at Caesar's palace

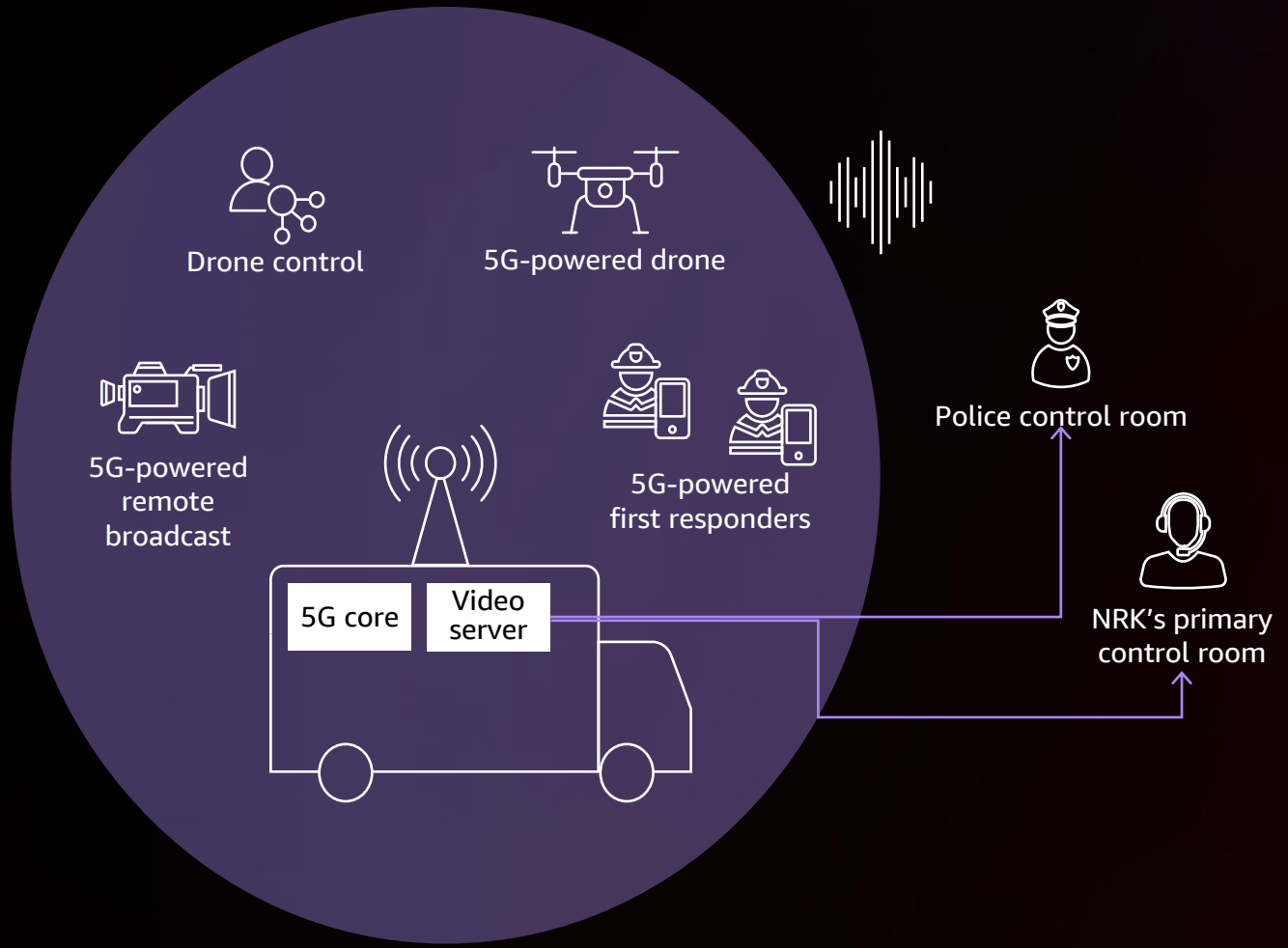
Note: JMA XRAN can be deployed on EC2 or EKS-A

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Private 5G network on wheels

Norwegian Army and disaster recovery

telenor group

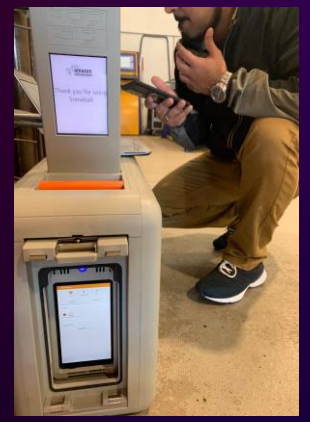


Private 5G Network on Snow

- Rugged edge operation
- Disconnected from AWS Cloud
- Edge Compute on Snow
- Secure communications



5G Network on Wheels (NOW)

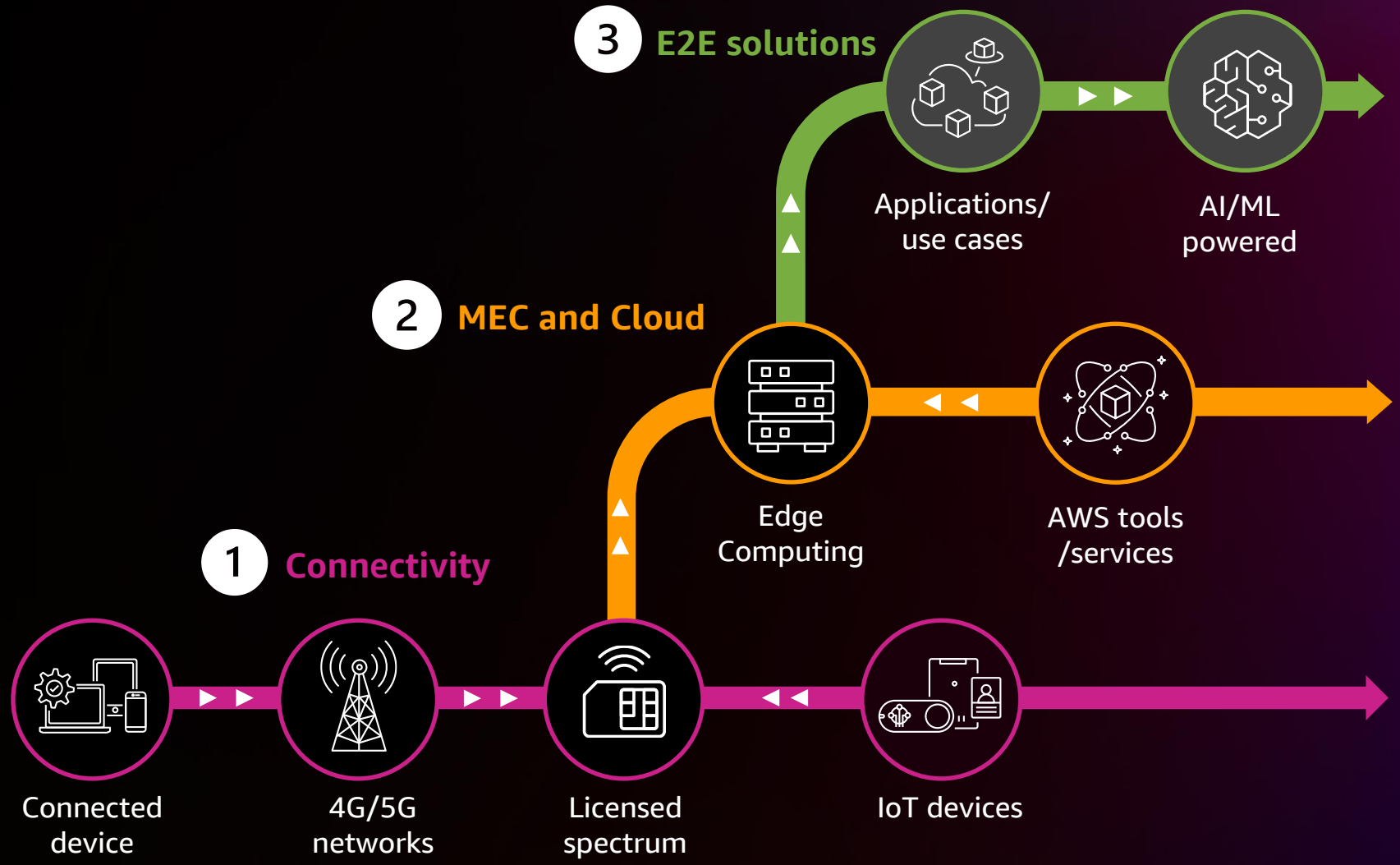


AWS Snowball Edge

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How it all comes together



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