

Why Private Cellular Networks



21st Century Connected Digital Oilfields
June 22nd, 2023

This is Ericsson

Leading provider of mobile connectivity solutions

Global 5G leader &
Trusted Partner

Enabling communication:
145 years of Innovation



Employees worldwide

105,529

27,739 dedicated to R&D

R&D budget

\$4B

60,000 granted patents

2022 sales

\$26B

more than 180 countries

Agenda



Challenges in
Connectivity

What are Private
Networks, and
subsequent Use Cases.



A look into a
few references and
holistic ROI

Go forward plan
and Q&A

What are the some of common oil and gas connectivity challenges today?



Coverage

- Remote places can have lack of coverage or not adequate.
- Some industrial places are hard to cover with technologies like Wi-Fi or too expensive, too time-consuming and too many resources needed.

Applications

- Low device density support
- Low throughput
- Low reliability

Edge / Local Breakout / Security

- Need industrialized encryption and security
- Need edge compute and local break-out

Business

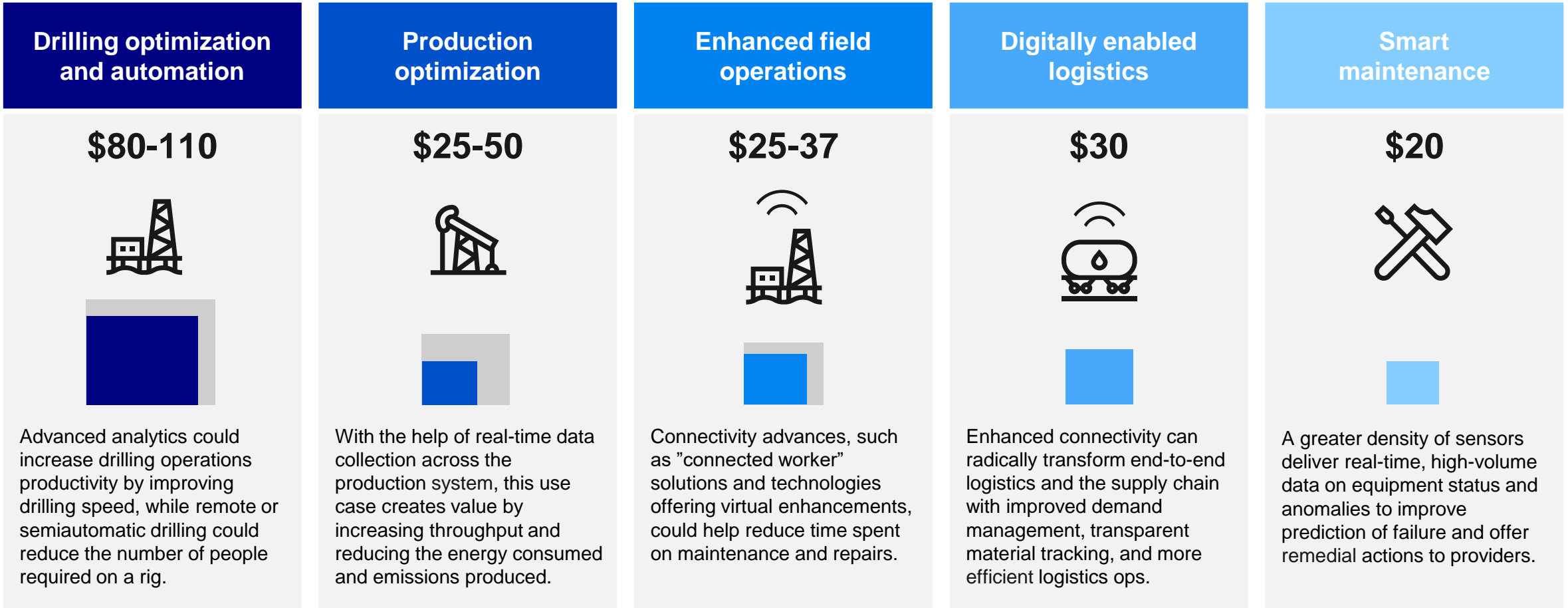
- Too many different networks to maintain
- SIM subscription counts and data overages getting pricey on public network
- Not future-proof solution



Connectivity improvement in oil and gas



Five broad types of connectivity-fueled oil and gas use cases could contribute up to 250 USD billion in incremental value to global GDP by 2030



Source: <https://www.mckinsey.com/industries/oil-and-gas/our-insights/how-tapping-connectivity-in-oil-and-gas-can-fuel-higher-performance>

Oil and gas industry's path towards digitalization



The Three Pillars:

Efficiency



- Accurately predicting problems, timely interventions monitoring: prevent downtime and waste.
- Advanced wearable tools, connecting personnel to experts: workers operate more efficiently.
- Unmanned assets: avoid expensive and time demanding logistics

Safety



- Fatality rate 7x greater than other industries
- Rise in security threats, sabotage of national infrastructure
- Equipment outdated (15–25y).
Brownfield 65% of world's production

Decarbonization



- Cut one-third of emissions by 2050 but must transform faster to be sustainable.
- Electrification of offshore platforms, extending life costly instrumentation
- Green pivot, major investing in wind, hydro, solar also needing connectivity

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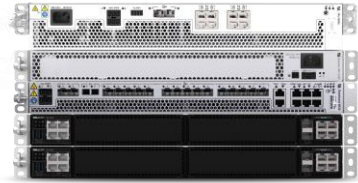


Example of a Private Network System:

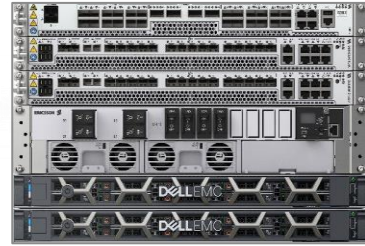
Needs to be: Sized for the industry. Fast to deploy. Easy to operate.



Network Core



Small – Dell VEP4600



Large – Dell R640

Medium and X-Large in future

Radio System



Baseband



Macro radio



Micro radio



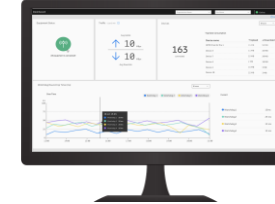
Radio dot



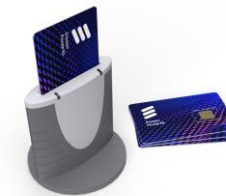
AIR



Cloud-based management



Enterprise-friendly management



SIM-card provisioning



Performance monitoring

Benefits of cellular

Predictable latency and guaranteed prioritization



Seamless mobility

- Cellular has standardized mobility features reducing outage time close to zero ms in Rel-16
- Cellular provides better mobility because of more sophisticated link adaptation within base station coverage area

QoS support and performance

- Cellular networks have sophisticated traffic shaping and QoS capabilities where packet delay budgets, error rates, and guaranteed bit rates can be configured
- The mechanisms are designed to work at high load through admission control and pre-emption

Predictable latency for IoT

- Cellular provides low and predictable latency and is robust to varying network loads
- Cellular technologies provide adequate support for industrial IoT, such as Time Sensitive Networking

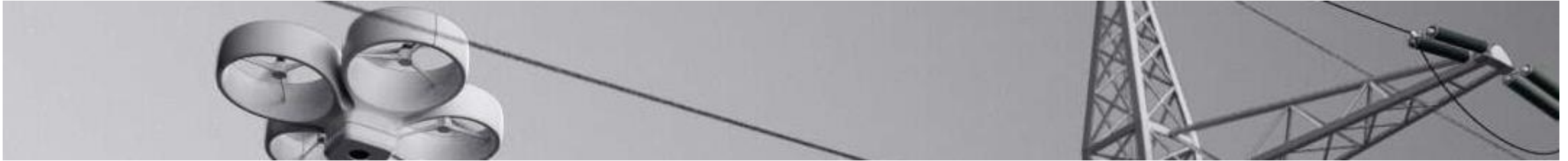
Trustworthy ecosystem

- Cellular products undergo extensive testing for most standardized functionality, including performance
- Cellular provides a full security stack, encryption, and access control per device

Spectrum and efficiency

- Cellular technologies use licensed spectrum
- Cellular technology has higher spectral efficiency yielding high capacity

Cellular brings a new dimension of mobility



4G/5G

- Built for mobility
- Built-in security from start
- High and predictable performance under load
- Low latency
- High reliability

Land mobile radio

- Voice + data + video
- 9.6K data
- Systems getting old with high costs to operate
- Device ecosystem not as developed

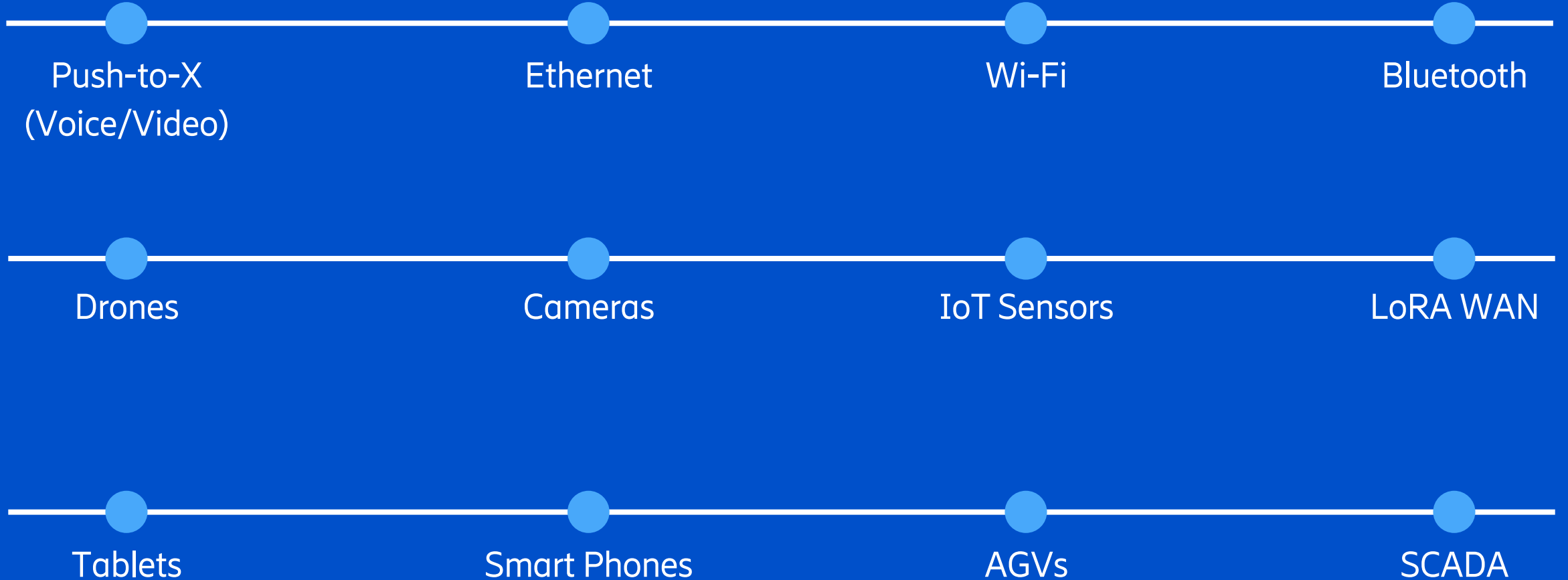
Cables

- High speed and predictability
- Less flexibility when you need to do changes in your operations
- No mobility for moving devices, for example, combined indoor and outdoor use cases
- Breakages or erosion can occur
- Harder to scale and to deploy devices that were not planned for
- Some places are hard to reach for cables

Wi-Fi/Wi-Fi 6

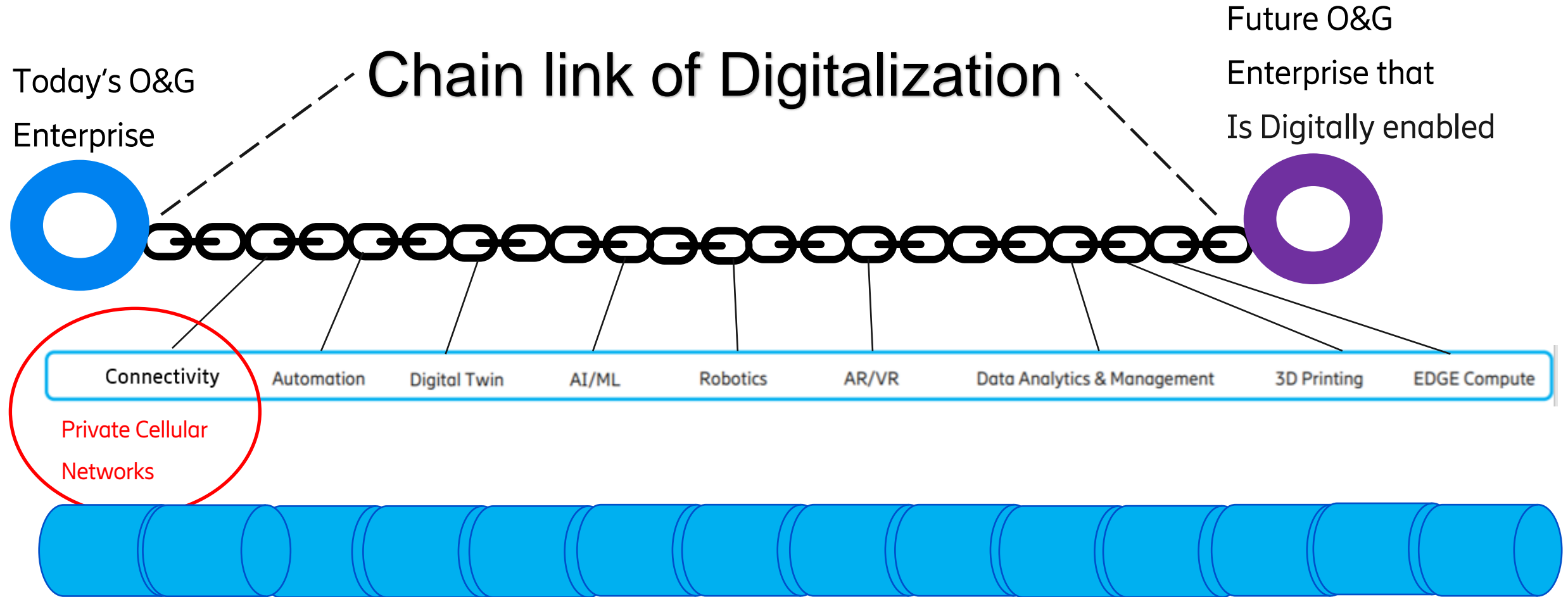
- Less stable performance and latency under load
- Unlicensed spectrum only
- Not so good in combined indoor/outdoor use cases
- Harder to build good outdoor coverage

Private networks: There is a gateway for that!










Value of Digitalization to modernization of industry.

Connectivity a link in that chain.



Numerous Use Cases for the 3 segments of Oil & Gas industry

	Upstream		Midstream			Downstream	
	 Exploration	 Production	 Storage	 Pipelines	 Transport	 Refining	 Distribution
Real-time sensor communication	✓	✓	✓	✓	✓	✓	✓
Asset condition monitoring	✓	✓	✓	✓	✓	✓	✓
Digitally enabled workforce	✓	✓	✓	✓	✓	✓	✓
Workforce recognition	✓	✓	✓	✓		✓	
Digital trainings	✓	✓	✓	✓		✓	
Remote site inspections	✓	✓	✓	✓		✓	
Leakage detection and prevention	✓	✓	✓	✓		✓	
Autonomous equipment handling	✓	✓	✓			✓	
Remote platform control	✓	✓					
Sensor-based tank monitoring			✓				
Assembly line automation		✓					

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Addressing Oil & Gas challenges downstream



PCK Refinery
Germany



Ops efficiency

- Asset condition management
- Remote operation

BASF Lighthouse
Germany



Ops efficiency & Safety

- Asset condition management
- Remote operations
- Connected worker

Centrica Storage - UK



Ops efficiency & Safety

- Connected, safe worker
- IoT Asset Monitoring
- Drone Detection aaS
- Push To Talk

Izmit, Tupras Refinery
Turkey



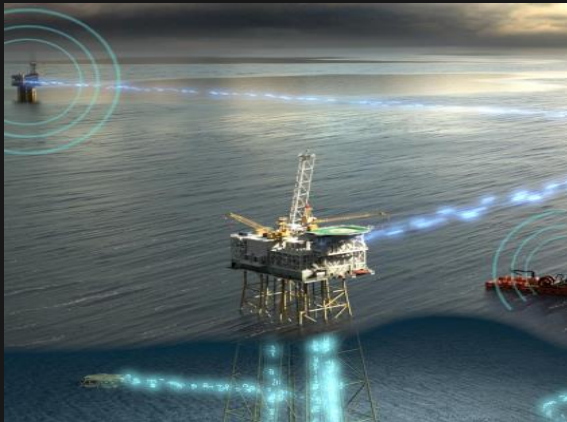
Communication & Safety

- Push to talk solution
- Camera surveillance for safety

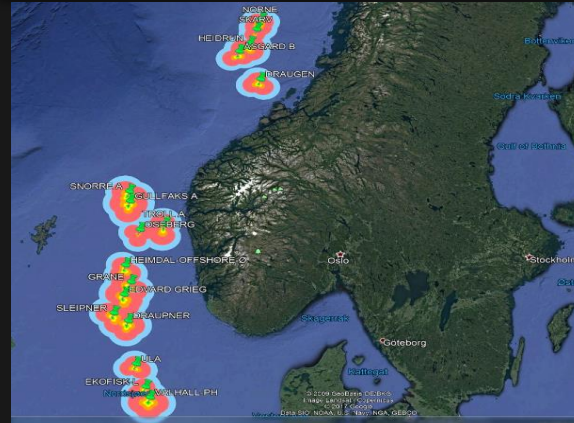
Addressing Oil & Gas challenges upstream / offshore



Gulf of Mexico - USA



Telenor Maritime - Norway



ExxonMobil
Guyana



Offshore in
Southeast Asia



Safety & Surveillance

- Workers & visitors tracking
- Drone border monitoring
- Push To Talk

Ops efficiency & Safety

- Asset condition management
- Connected worker
- Push To Talk

Welfare & Safety

- Communication local/global
- Connected worker

Operational efficiency

- Video and Voice Application
- Workforce Management and Safety
- Connected Worker

The use cases totals to a yearly steady state value of USD 4.8 million



Yearly steady state value



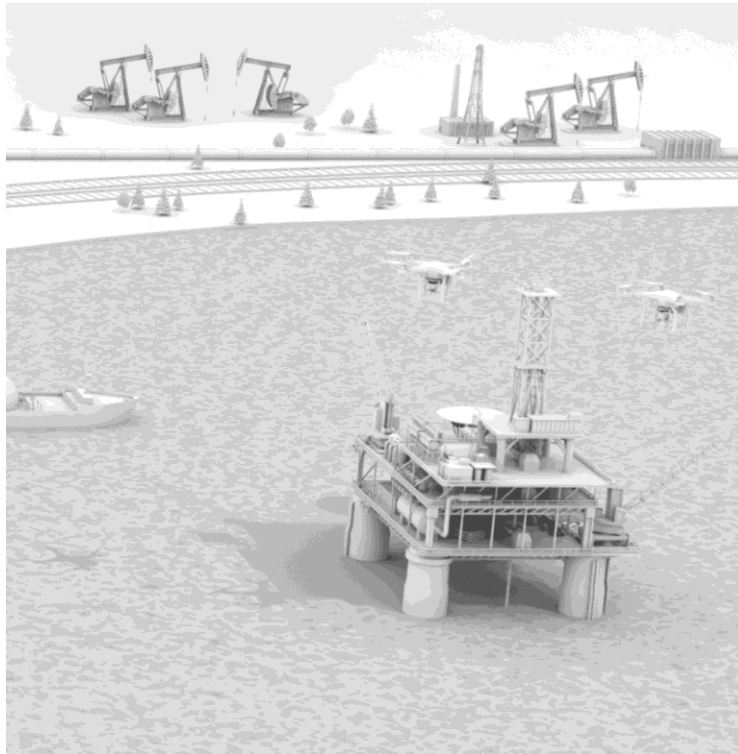
Offshore oil rig



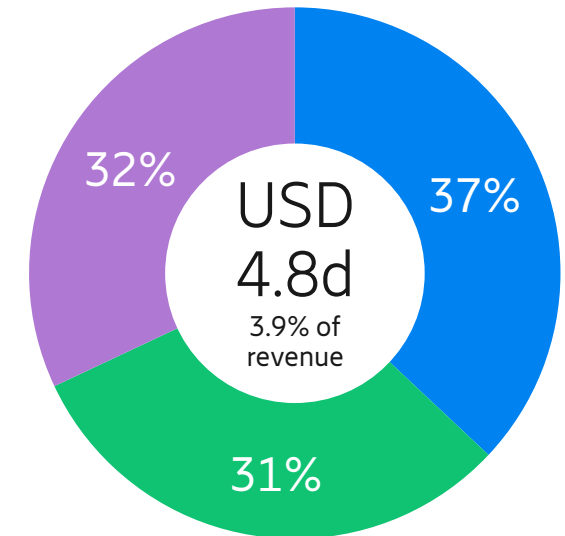
Five platforms



Revenue: USD 122 million
Annual production:
2.64 mill. Sm³ o.e.



Yearly steady state value



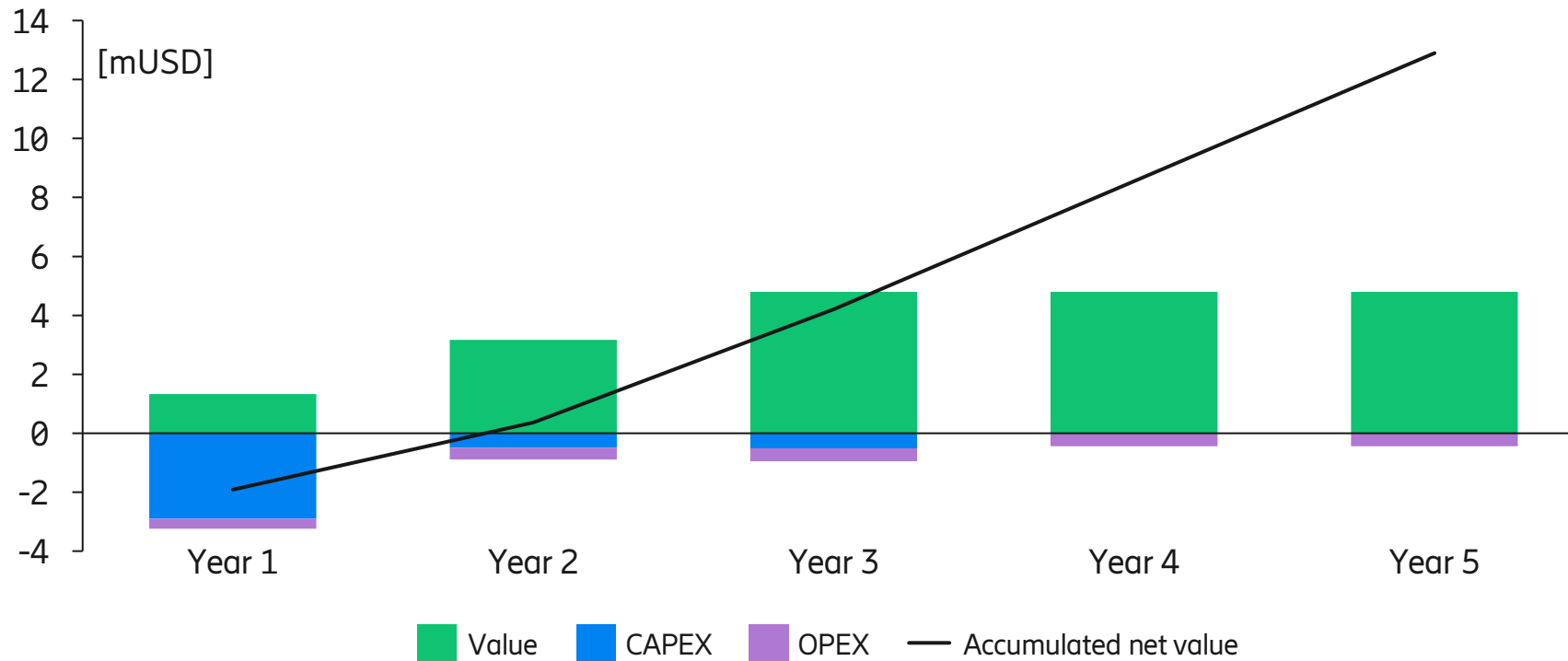
- Asset condition monitoring
- Digitally enabled workforce
- Remote site inspections

Source: Ericsson, Arthur D. Little

Full rig implementation has a ~two-year payback and USD 12.8m in cumulative net value by end of Year 5



Baseline oil rig, full implementation of all use cases



USD 4.8d
3.9% of revenue
Yearly steady state net value

12.8 MUSD
Acc. Net value
Year 5

Source: Ericsson, Arthur D. Little

Note: Value represents the total monetary value of the use case benefits combined capex includes use case-specific one-offs (e.g., hardware, integration) and common rig one-offs (e.g., network deployment). Opex represents use case-specific operational costs (e.g., licenses and incremental operating costs) as well as common rig operational costs (e.g., network operating costs, cloud services).

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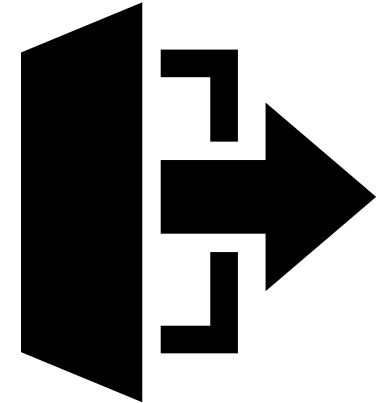
Go Forward Plan / How do you start:



→ Demos and Trials

→ Talk to your peers

→ Consultant Study to go over exact challenges and use cases.





ericsson.com/oil-and-gas