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Why wind farms need private cellular connectivity

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ERICSSON

BACKGROUND

- The US wind farm industry will need to scale to achieve 70% of all renewable energy produced in the coming decades that will help the US move to a more sustainable energy production.
- To achieve this, communications and connectivity will play a major role.
- However, current connectivity challenges for wind farms must be solved:
  - scaling the long distances between each wind turbine
  - the remote nature of where turbines are located
  - the efficient and safe monitoring and operations of the farm itself
  - multiple technologies used with multiple connectivity networks

Advanced connectivity will help bring offshore wind farm Levelized Cost of Energy down and help spur the required growth for the industry.

TOPICS DISCUSSED

1. What is a private cellular network? How is it different from other connectivity methods in use on wind farms?
2. What are potential use cases with cellular based networks? How could they benefit offshore wind farms?
3. What is the current status of offshore spectrum for cellular and what are next steps with the FCC?

WHAT IS A PRIVATE NETWORK?

Challenges of existing network:

- Short range connectivity, security, multiple and disparate networks, unreliable connections, low capacity, business case not working out.

What does it consist of:

- Radio notes, core system (EPC + Dual Core), typically 4-5 rack units, operational management system and SIM burner.

What does it mean for an IT system:

- Fully within the IT network and control. Sits behind the firewall. All data generated stays local to the IT infrastructure. Full 3GPP cellular capabilities, broad ecosystem of devices and options available—best-in-breed.
- Addresses challenges with secure encrypted connections, long-range reachability, high throughput, high density of devices on network, and edge/local data breakout for edge compute applications.

CONNECTIVITY USE CASES IN WIND FARMS

Construction phase:

- Vessels within the farm able to have data connections for both leisure and working operations, instead of having to rely on satellite connectivity.

Ongoing Operations and Maintenance:

- Drone surveillance for blade or perimeter inspection check.
- Security cameras, safety PPE cameras, perimeter or weather cameras to inspect surroundings. Potential to have these at every wind turbine in farm.
- Worker safety, wearables to collect biometrics, man-down status.
- Data and mobility for looking up documentation, taking down workflows, remote expert advice and communication.

STATUS OF OFFSHORE SPECTRUM AND FCC

FCC issued Notice of Inquiry (NOI) on June 8, 2022:

- Seeking comments on demand for offshore spectrum, use cases and market potential.
- How spectrum should be assigned, mechanism to use, rights models, which bands and frequencies?
- How are other countries doing it?

Ericsson response and feedback:

- Offshore applications have expanded that consist of users from consumer or public segments, commercial and government.
- 3GPP-based wireless systems will provide scalable, reliable, secure, and capable connectivity options, with rich ecosystems, that will enable wide variety of new use cases.
- Low-band and mid-band will both be required to address the coverage and capacity needs for various offshore architectures and applications.

Federal Communications Commission

WAYS TO MOVE FORWARD

- During the wind farm construction phase and operations phase, define 1-3 use cases each for each phase.
- Calculate the cost savings and efficiency gains that advanced connectivity is able to unlock.
- Conduct and RFI/RFP with private network solution vendors:
  - Get estimate on a full private network for your wind farm.
  - Look into a potential trial and deploy a minimum of two use cases.
- Build an ROI model from cost savings, efficiency gains and cost of private network solution.
- Carry out a small private network trial.
- Evaluate the small private network trial.
- Fine tune your business model.

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