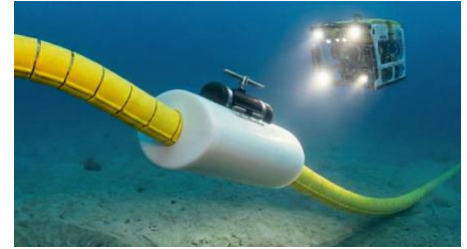




**Lattice Link™ Free Span Monitoring System (Lattice FMS)** provides wireless monitoring of subsea cable free spans, pipeline free spans and mooring lines to reduce fatigue uncertainty.

The system detects vibration and cyclic motion associated with VIV and wave action, and tracks changes in inclination and orientation. For mooring lines, it also captures bending, temperature trend, twist and shock events to indicate evolving boundary conditions including seabed interaction, bedding-in, rotation, shifting contact points and tide-related movement.

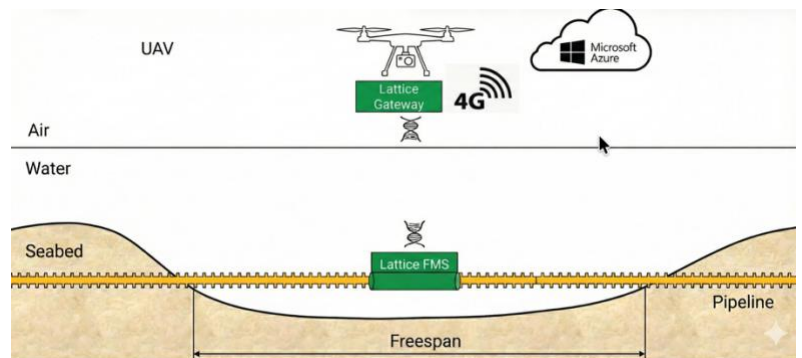
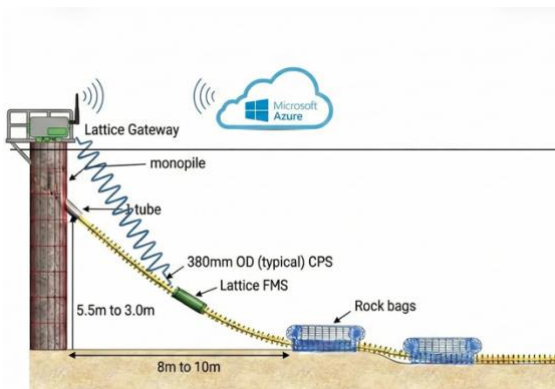


Lattice provides resilient wireless communications through water-air boundary, up to 50 m through seawater in the magnetic domain, extendable to full water depth via acoustic repeater. Hot-swap battery packs enable cost-efficient operation in deep water.

Lattice FMS is designed for rapid deployment and recovery by light work class ROV.

## Features

- ROV-deployable clamp
- 6-axis inertial sensing (accelerometer and gyroscope) for vibration, motion and orientation
- Detection of bending, curvature and cyclic motion associated with VIV and wave action
- Optional pressure and temperature sensing for environmental correlation and compensation
- Correlation of pressure (tide) with inclination and orientation to detect tide-related movement
- Edge processing to identify fatigue motion and dynamic events
- Detection of shock events and abnormal dynamic response
- Wireless communications through water-air boundary without repeater to Lattice Gateway
- Low power operation supporting multi-year deployments (up to 5 years typical)
- Stand-alone, re-deployable architecture with hot-swap battery modules



Lattice FMS deployment on (a) subsea electrical cable (b) subsea pipeline



Lattice FMS monitors cable, pipeline and mooring line motion. Outputs include vibration amplitude, frequency content and directional response, supporting identification of VIV, wave-driven motion and changes over time.

Inclination and orientation are tracked to identify rotation or twist, changes in curvature and angle, and touchdown behaviour.

For mooring lines, the system provides indicators of bending severity, cyclic motion and torsional behaviour from inertial measurements. Longer-term trends in inclination, orientation and motion may indicate creep or effective length change. Temperature and pressure support interpretation of the response against expected behaviour from design models.

Pressure and temperature are used for sensor compensation and long-term trend monitoring. Data is reduced onboard to key motion and trend outputs for efficient recovery.

## Architecture



## Specifications

Parameter	Specification
IMU	6-axis IMU (3-axis accelerometer, 3-axis gyroscope); $\pm 2$ g standard (optional $\pm 4$ g, $\pm 8$ g); inclination accuracy $\pm 0.2^\circ$ , resolution $0.01^\circ$
Sampling frequency	Standard: 10 Hz; configurable up to 400 Hz
Pressure (optional)	External hydrostatic pressure; accuracy $\pm 0.01$ FS; ranges 0–10 bar / 0–300 bar
Temperature (optional)	Ambient seawater $\pm 0.5^\circ\text{C}$ typical; Internal temp (installation dependent) $\pm 2^\circ\text{C}$ typical
Motion outputs	Vibration amplitude, frequency, direction, motion stability; VIV and wave-driven motion
Orientation/geometry	Inclination and orientation; rotation/twist; curvature and angle change; touchdown behaviour
Mooring line indicators	Bending, cyclic motion, torsion; long-term trends indicating creep and effective length change
Wireless transfer	Up to 60 m to gateway (typical: 40 m seawater + 20 m air)
Wireless download	Typical < 2 minutes for one year of stored data
Acoustic modem (optional)	Low-bandwidth subsea telemetry for direct or relay communications; typical range 100–1000 m depending on environment
Battery	Primary-cell battery; optional subsea energy pack (~1.5 kWh delivered) with wireless power transfer, ROV-deployable and replaceable, refurbished and re-celled for reuse
Depth rating	Standard: 100 m / 1500 m; custom up to 3000 m
Clamp	Mechanical or magnetic, tailored to pipe, cable, CPS or mooring configuration
Weight	Device: ~3–5 kg in air (clamp dependent); ~0.5–1 kg in water
Operating temperature	Operating $4^\circ\text{C}$ to $+50^\circ\text{C}$ ; storage $-10^\circ\text{C}$ to $+60^\circ\text{C}$
Working environment	Subsea or topside