



On- Vessel Networks for Container Tracking and Monitoring

- IoT Networks & Services for Digital Transformation (Vessel 4.0)

Introduction

Net Feasa is a fully licenced and trusted wireless service provider, specialising in the design and deployment of on-vessel network for container tracking and monitoring. The shipping industry is presently IoT enabling their vessel fleets to meet the contiguous connectivity demands of their clients and offer revenue generating and service differentiating opportunities.

The team at Net Feasa has decades of experience designing and deploying wireless communication systems in a variety of challenging environment across the globe, and in particular the deployment of IoT networks on-board sea vessels, and in ports.

Net Feasa is supporting the shipping industry to digitalize their vessels from the ground-up, providing the local on-board and global connectivity (to the cloud) needed to provide real-time asset and IoT visibility combined with data analytics and machine learning. This will allow transportation and logistics companies to make extensive cost reductions through the exploitation of this valuable data and asset visibility. It will drive further logistical efficiency and realize revenue growth opportunities via the delivery of new value-added digital service offerings to the transportation and logistics ecosystem.

Providing Specialist IoT Networks for Vessel4.0

Our key solution for on-Vessel IoT container tracking includes:

Cellular and LoRa Wireless Access

- Cellular (2G) and Low Power Wireless Access Networks (4G/5G and LoRa) compliant to DCSA standards
- NB-IoT and LTE -M
- LoRa multi-region ISM band automatic switching



Global Connectivity on Land and Sea

- Extra-territorial IoT mobile operator licence with dedicated MSISDN and IMSI range
- SIM based global roaming in partnership with tier 1 mobile operators
- LoRa based global roaming in partnership with the Things network
- Least Cost Connectivity feature (LCC) automatically selecting cellular or LoRa.

IoT Platform Designed for Vessel 4.0 connectivity

- Device and SIM provisioning and management
- Cellular and LoRa network interworking
- Alarms and reports rendered on-deck or on-shore
- Remote device monitoring (e.g. temperature, humidity, location)
- Remote device settings change (e.g. temperature, humidity, reporting frequency)
- Web based GUI and API support
- On-vessel or on-shore (cloud) based instantiation
- Virtualized (NFV) software architecture

EvenKeel™ can support Cellular (2G) and LPWAN (Low Powered Wide Area Network) technologies such as LTE/5G(NB-IoT, LTE-M) and LoRaWAN.

LPWAN technologies are best suited for on-vessel asset monitoring as they are designed for IoT use cases, supporting excellent coverage, signal penetration and low power RF interfaces that can extend device battery life for multiple years, when compared to traditional (2G/3G) cellular technologies. Net Feasa's low cost IoT platform, EvenKeel™ can support a variety of on-vessel IoT applications and can be configured to provide LTE coverage, LoRaWAN coverage or both, as required -see Figure 1..

The on-vessel network can be a completely self-contained RAN and Core, or alternatively the Core network can be virtually instantiated in the cloud on-shore. In both scenarios Net Feasa's IoT management platform EvenKeel™ provides a unique coordination layer between LTE and LoRaWAN, enabling feature such as LCC (least-cost-routing) of monitored container device data.

Key container cargo data including temperature, humidity and alarms, is collected in EvenKeel™ and where required can be forward via APIs (Application Programming Interfaces) to third party enterprise platforms. Two-way communication is also supported enabling users on the vessel or



at the land-based operations to securely change the container’s temperature set points and other parameters as needed.

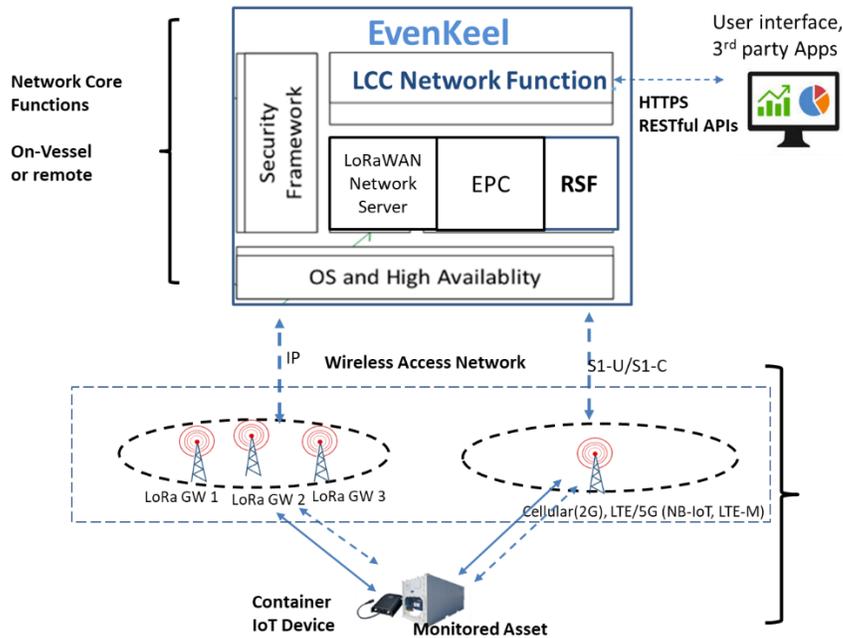


Figure 1. EvenKeel™ Cellular (2G), LTE/5G and LoRa Network Control and Coordination

The EvenKeel™ server, LoRaWAN gateways or Cellular Base Stations are designed to be installed in a maritime environment. At a minimum the Net Feasa LoRaWAN gateways and Cellular Base Stations meet IP66 requirements, which provides complete protection from dust, oil, and other non-corrosive materials and is water resistant against powerful jets. All above deck antennas are protected with Lightning Arrestors and connectivity between the LoRaWAN gateways or Cellular Base Stations is over fiber optic cable to optically isolate the gateways/base stations from other electrical equipment and interference.

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