

# LESSONS LEARNED FROM LORAWAN DEPLOYMENTS IN HARSH AND EXTREME CONDITIONS

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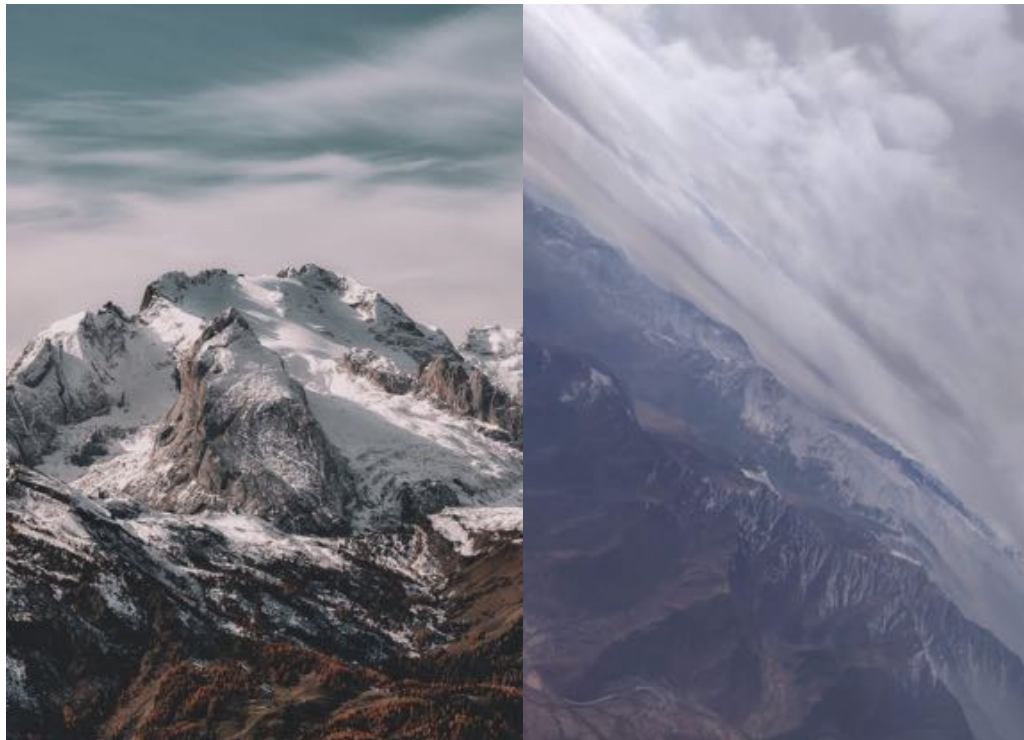
#IncitingIncident

# The Challenge

# The Problem Statement

## Asset Tracking solution

- To track mobile assets
- Geographical remoteness
- Need for range of minimum 30 kms
- Most important: Need complete control of the data



# Choosing the right technology for the problem

## Figuring the technology fit



### Cellular connectivity

- Scarce or nonexistent
- Power hungry
- Third party infrastructure



### Wi-Fi, Bluetooth, ZigBee..

- Shorter coverage ranges
- Pairing and connection establishment

## Figuring the technology fit



### Satellite connectivity

- Not apt for foliage terrain
- Cost and infrastructure intensive
- Need for large terminal antennas to avoid path loss



### Traditional RF (Point to point links)

- Not feasible for moving assets

# LPWANs sounded more apt!

## Low-Power Wide-Area Networks



Long range



Low power  
consumption



Low data rate

## Arriving at a right fit among LPWANs

### NB-IoT

- Firstly, non-existent cellular connectivity
- High Opex, Third-party infrastructure
- Operates in licensed spectrum
- Data privacy concern

### Sigfox

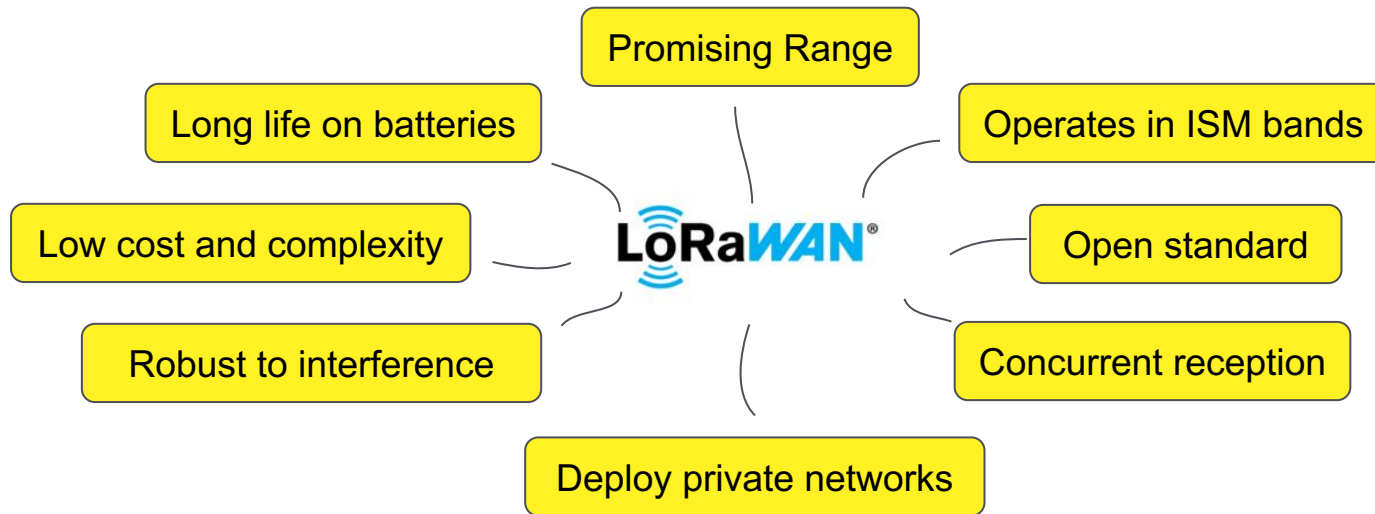
- Operates in ISM bands (we got excited!)
- Proprietary infrastructure and solutions
- Data privacy concern



#itstime

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# LoRaWAN® - The Perfect Fit



#Challenge

# Achieving the Range

## Approach at Gateway level

- Optimal Gateway placement
  - Analyse RF patterns using 3D data
  - Higher altitude positioning
  - Ensure LoS
- Low-noise amplifiers
- Low RF power loss cables

## Approach at End Node level

- Analyse RF patterns and avoid blank spots
- Using flexible antenna
- Employing power amplification

#Challenge

# Geographical remoteness and accessibility

## Robust Network Coverage and Diagnosis

- Fallback mechanisms
  - Remote reset / Automatic timely Reset
  - Remote management and control
- Local storage when network is intermittent
- Network/Gateway densification
- On-board data loggers for end-nodes

#Challenge

# Extreme Weather



## Ensuring robustness of Gateways

- Use IP68 ruggedized enclosures
- Lightning and surge protection for the equipment
- Tamper detection mechanism
- Weather proof taping for cables
- Solar Powered Gateways

#Challenge

# Security and Privacy

#Climax

# Restricted Entry

# Best part! Our on-ground deployments



#TheEnd

**Thank You!**