Asset Tracking

VIRTUAL SUMMIT 2025

2nd EDITION

The event is starting soon...

Agenda

1:05 PM CET **8:05 AM EDT**	**Designing asset trackers that last: the battery budget playbook** With Ken Everett (Digital Matter)
1:40 PM CET **8:40 AM EDT**	**Field lessons that saved the fleet across land, indoors and sea** With Rikard Windh (Traxmate)
2:15 PM CET **9:15 AM EDT**	**Beyond GPS: AI positioning and the next era of asset tracking** With Rolf van de Velde (EnOcean)
2:50 PM CET **9:50 AM EDT**	**Asset tracking P&L: Pricing, payback and scale** With Siarhei Havarunou (Asset Track)
3:25 PM CET **10:25 AM EDT**	**3 questions to ask your connectivity provider** With Jacob Jagger (Onomondo)

Session 01

Designing asset trackers that last: the battery budget playbook

Speaker

Ken Everett

Founder & CTO
Digital Matter

Designing Asset Trackers That Last: The Battery Budget Playbook

Ken Everett
Founder and CTO
29 October 2025

Digital Matter

- 25 years at Digital Matter
- Established as a world leader in battery-powered tracking
- We supply devices to a reseller channel globally
- Australia, USA, EU, South Africa
- Target Audience: for anyone building or buying a battery-powered IoT device

Do Your Homework

“Attention to Detail” – a DM mantra

No matter what device you’re building or buying – spend the time in the detail

- Or buy our products! We’ve done it for you

Evaluating devices

- Not good enough that it works in ideal conditions
- Measure performance in all corner cases as well
- Don’t trust battery life claims – measure them!

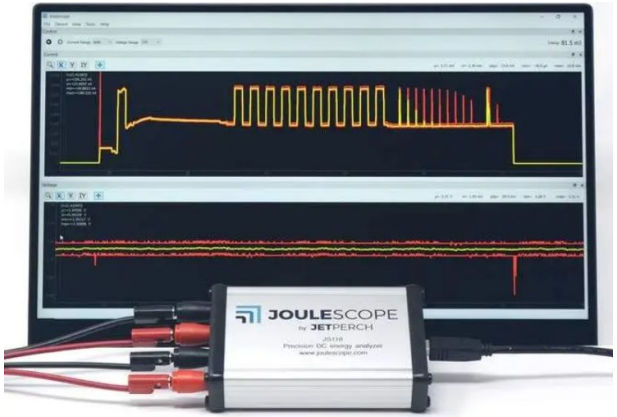
IoT is a team sport – needs Hardware, Firmware and Software to work together

- 75% of device work is Firmware
- Great hardware needs great firmware
- Great hardware and firmware needs great software
- Device Manager platform allows to really optimise and make it easy for you

The Right Tools

Get energy monitoring tools

- Nordic PPK2
- Otii
- Joulescope
- Others



Combine with debug outputs and modem traces if you can

DM Energy Tool

Asset Tracking – Every Drop Counts

Be a sloth – do as little as possible

Understand and measure every activity

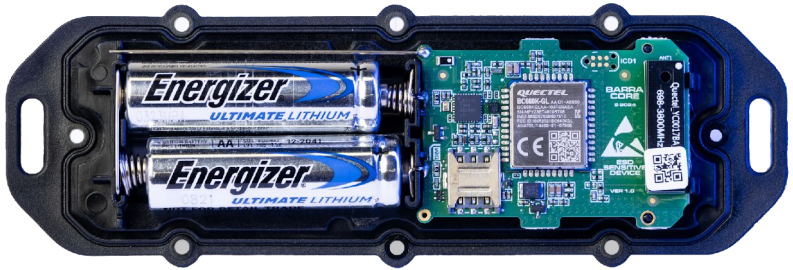
Be smart (firmware)

An asset tracker is typically doing a few things:

- Sleep
- Wakeup on RTC or event
- Get a location, sensor data
- Transmit the location
    - (occasional system updates)
- Sleep and repeat

Let’s Unpack a Few Things

- Turn Everything Off
- Batteries
- Device Size
- Determining Location
- Communication technology
- Cellular technology
- PSM
- Energy Saving Stack
- SIM cards
- RF Matching
- Switch everything off



Turn Everything Off – What's your Iq?

Turn off Modem, GNSS, other modules

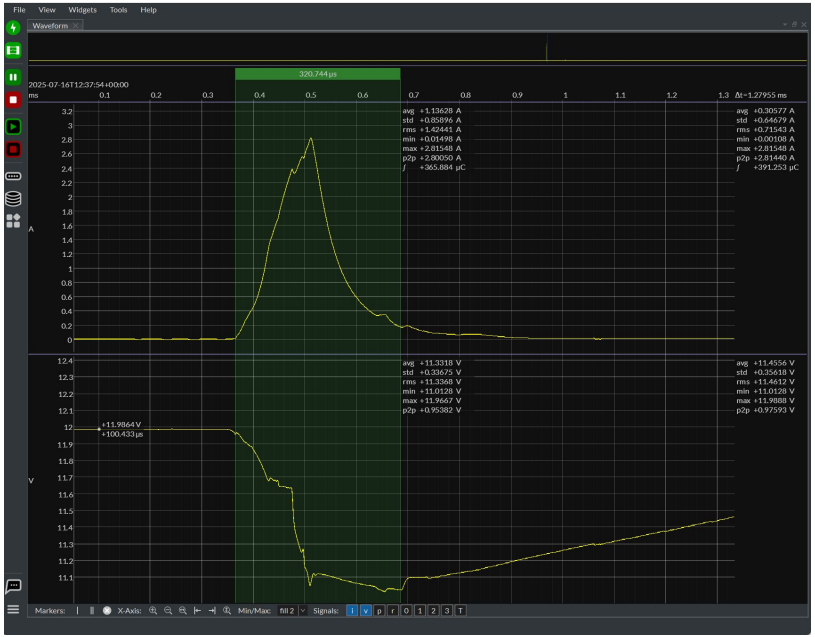
Iq = Quiescent current

Leakage current (capacitors and other)

Typically use a FET or load switch to control power

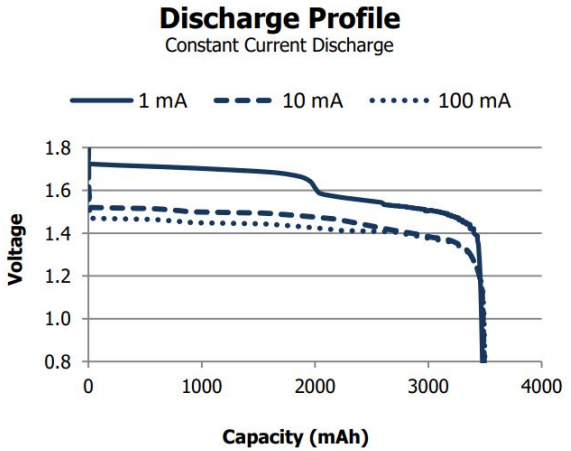
Beware "In-rush current" charging up caps

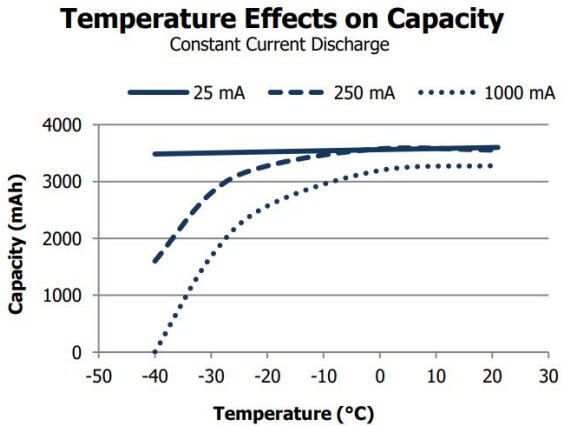
- EOL batteries have higher internal resistance
- Rail brown-outs



Batteries

- Capacity and resulting lifetime
- Ability to deliver peak currents
- Temperature profile
- Self discharge
- Primary versus rechargeable
- Shipping
- Lithium versus other
- Energizer L91 “Ultimate” LiFeSO2





Device Size

Always getting asked for smaller!

Laws of physics

Battery capacity

Fit everything in

Antenna performance

- Most IoT cellular bands are sub-GHz, ideally a 10cm+ ground plane
- Look at the datasheets in detail
- Not just cellular but GNSS and others as well

Determining Location - Easy, right?!

How much energy does a GNSS need to get a fix?

- Basement? Warehouse? In the boot of your car?

One-shot versus tracking?

Other methods

- Wi-Fi AP scanning
- Cell-ID and network data
- BLE Beacons

Be smart! Understand where the energy is being used

DM's "Edge" device range

- Device GPS scan, Wi-Fi scan
- Deterministic energy use
- Small payload
- Requires server-side processing (Location Engine)
- To work best requires Almanac file, time and location estimate

Communication Technology

Debate over Sigfox v LoRa v Cellular seems to be dying down

Technically good technologies, commercial models and restrictions are a challenge

We've done them all (no more Sigfox and limited LoRa). There are lots of others too.

Cellular for us is the clear winner

- Actual modem comms may not be the lowest power BUT
- Total power budget – eg GNSS aiding data
- Acknowledged upload
- Ability to update FOTA (modem and application)
- Networks are everywhere people are and more
- Roaming
- Data costs coming down all the time
- IoT satellite based on cellular standards (NTN rel 17)

Bluetooth is emerging for low cost and simple asset tracking

- Too much to unpack here – another session!?

Cellular Technology – things to know for IoT

- Standards governed by 3GPP
- Different bands (frequencies) depending on country / region
- LTE (4G) has different “categories” – started with Cat1 and now up to Cat20 on smartphones

3GPP Rel13 in June 2016 define some important IoT standards (RAT)

- LTE CatM1 and NB-IoT in Designed for IoT, lower power, better range, cheaper modems
  - Optional categories on the LTE network
  - Adopted into the 5G standard for longevity
  - Not all MNO’s have implemented
- LTE Cat1bis
  - Cat1 with single RX antenna
  - Simpler, cheaper chipsets and modules
  - Will work on any Cat1 network (regional vs global modems)

Not all cellular modems are the same (chipsets, RF, power supply and firmware) – evaluate!

What is your modem doing?

- A cellular modem is a sophisticated device with a complex modem stack
- How does the modem know which network to connect to?
- How does it find this network?
- What happens when the device goes out of coverage?
- What happens when a device moves between cellular towers?
- What happens when you have a roaming SIM card in the modem versus a “local” one?

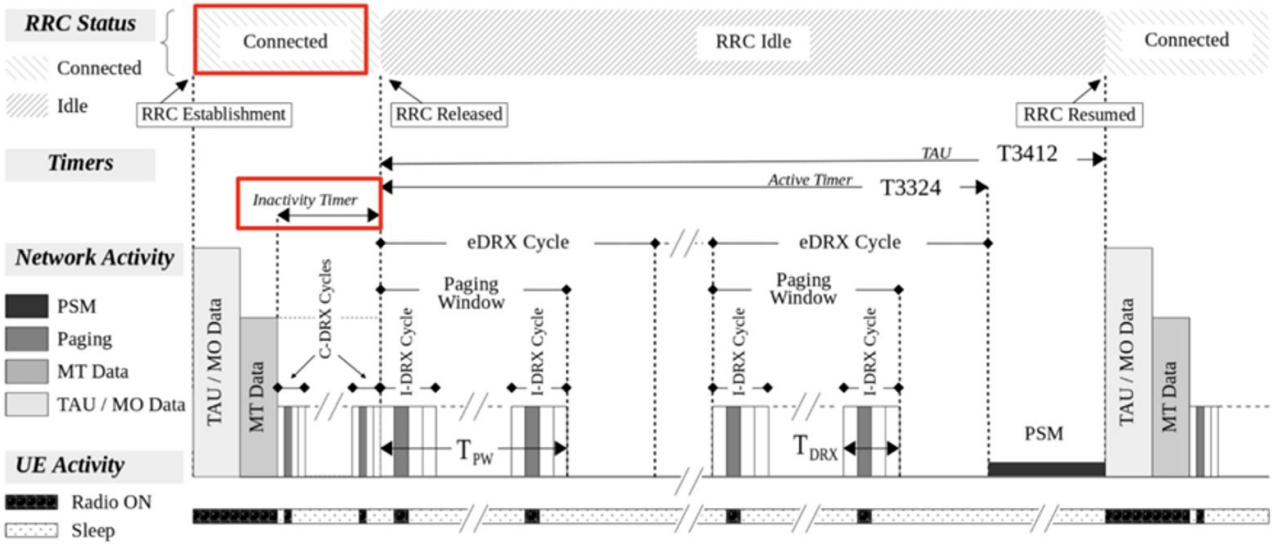
PSM – Power Save Mode

Sounds good, reality is quite complex

On/Off strategy versus PSM

It gets complex – another session maybe?

Understand the session states and transitions between them



PSM – Power Save Mode p2

In short, it depends on the network (test)

- Support for PSM
- Support for RAI (and type)
- Support for adjusting network timers

It depends on how good your modem is and what it supports

- On/Off – boot up time, registration time
- PSM – RAI, socket implementation 2

We take care of this with DM's new Energy Saving Stack (more on next slide)

Energy Saving Stack (ESS)

Digital Matter has released ESS for our Barra Edge device on Device Manager / Location Engine

- Porting to other devices

Uses PSM, RAI and hybrid protocol for minimal data transfer energy

- Get on air
- Send a single packet
- Get a response
- Go back into PSM

Depending on network and SIM then On/Off might be best strategy

energy saving stack

powered by **Device Manager**

SIM Cards

Easy to think that all SIMs are the same

Details Matter!

SIM power

softSIM
iSIM

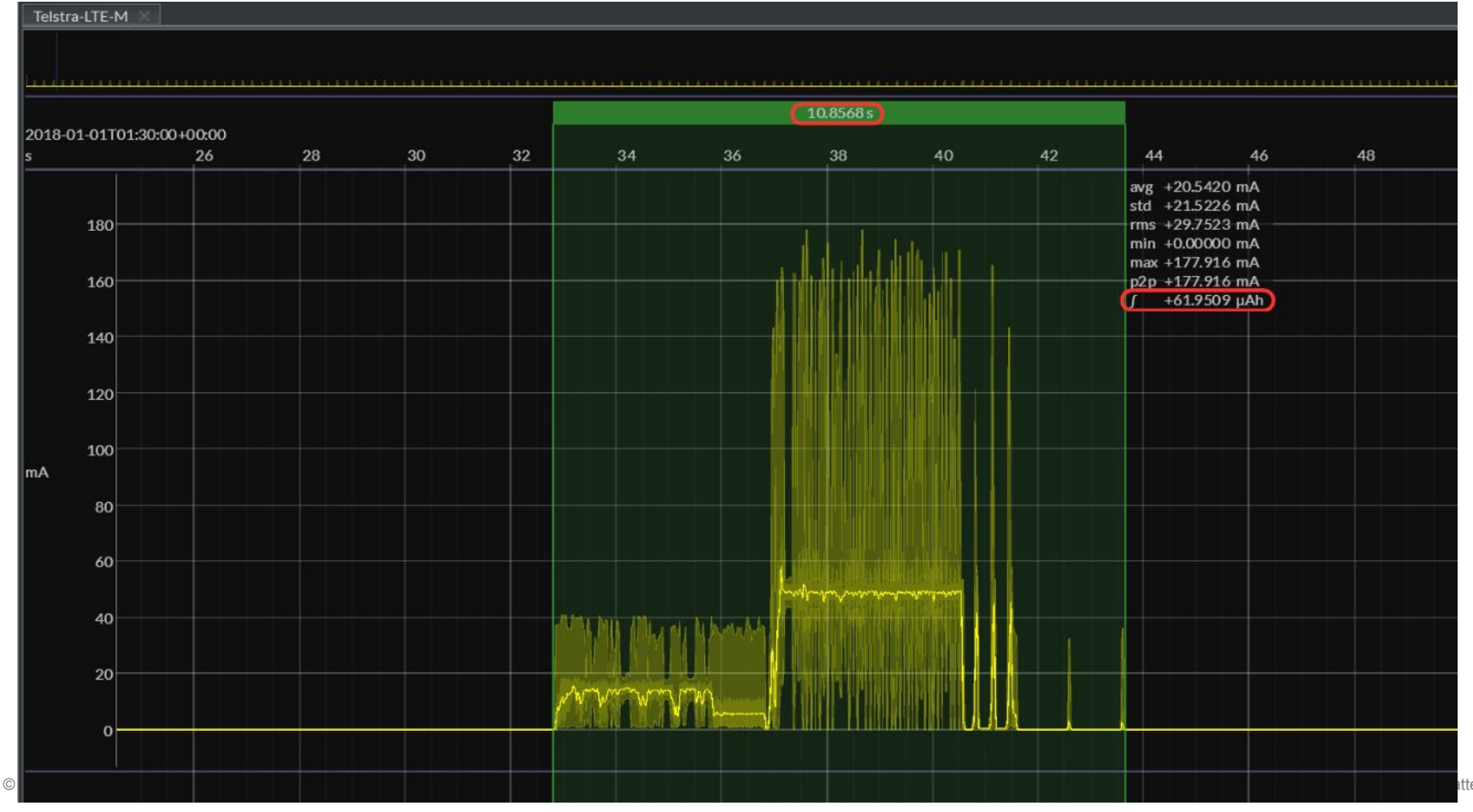
Roaming SIMs

Steered v non-steered
Energy used is very interesting
Example of a roaming SIM versus a “home” SIM

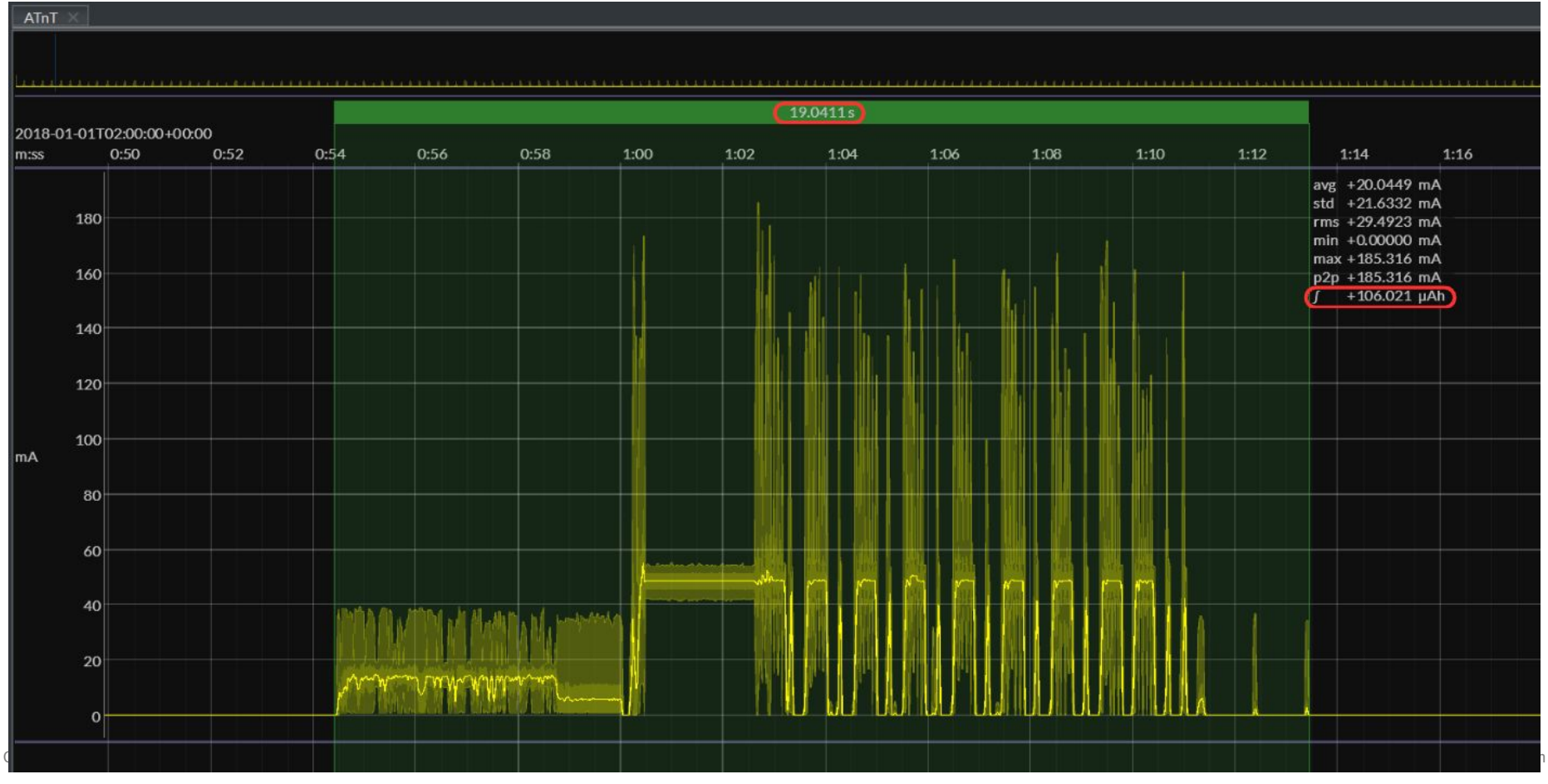
SIM Cards – some test results

- Done using DM Energy Tool, Barra Edge device, exact same configs
- Telstra LTE-M network in Australia
- Telstra SIM is the home SIM (12 mAh)
- <US network> roaming SIM uses (22 mAh)
- Onomondo SIM (16 mAh)

Connection profile – Telstra SIM on Telstra LTE-M (10.85s)



Connection profile – US SIM on Telstra LTE-M (19s)



Conclusion

Any engineer can put a GPS, modem and battery on a PCB and call it a tracker

Pay attention to the detail – there is a lot going on

Don’t guess or hope – measure and test!

To get the best performance a device needs great hardware, firmware and software

If you want the best, then try out Digital Matter’s range of devices

- With energy monitoring tools to accurately compare battery life

Thank you

THANK YOU

Q&A

Drop your questions in the chat!

Asset Tracking
VIRTUAL SUMMIT 2025

Session
02

Field lessons that saved the fleet across land, indoors and sea

Speaker

Rikard Windh

COO
Traxmate

traxmate
tracking everything everywhere

Field lessons that saved the fleet across land, indoors, and sea

Rikard Windh
COO at Traxmate
29 October 2025

Agenda

- Short Traxmate intro
- Why Asset Tracking Matters
- Use-cases
- Challenges and Lessons
- Questions

traxmate

traxmate

- Founded 2019
- Spin-out from Combain Mobile AB - Founded 2009
- Traxmate is a tracking platform, using various positioning solutions, including Combain global geolocation services
- Providing tracking services to 1st tier MNOs, device manufacturers, chipset manufacturers and enterprises around the world

Why Asset Tracking Matters

Personal Safety - Save Lives

Safety

- Personal Safety
- Save Lives

Security

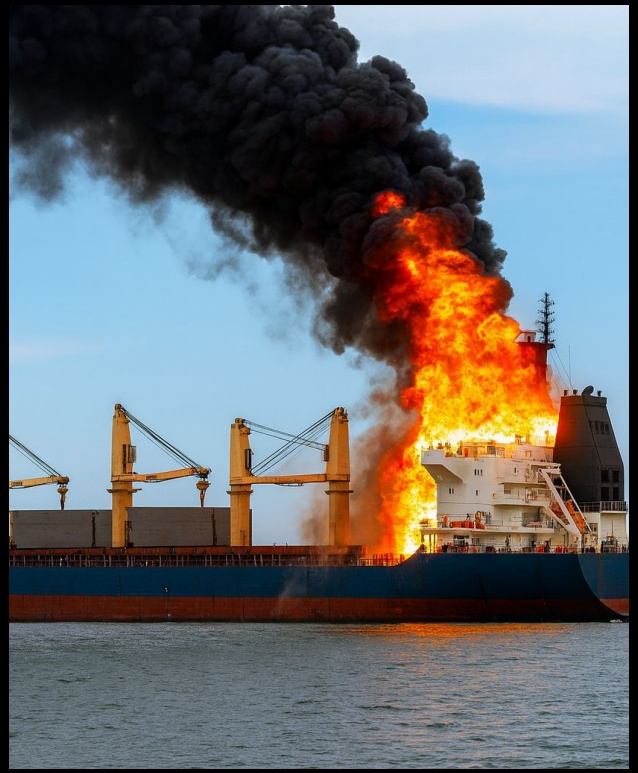
- Protects against loss and theft
- Save Money

Efficiency

- Work Smarter
- Save Man Hours and Money

Others / Mixed

- Real-time updates for easier decisions and peace of mind



Asset tracking for **safety**

Personal Safety

Use-case: Crew Safety onboard **Cargo Vessels**

- Locate crew members during accidents or fires, enabling faster rescue and emergency response
- Focus: hybrid mode, Wi-Fi scanning algorithms

Use-case 2: Staff Safety in **Correctional Facilities**

- Enables quick location of staff under duress, ensuring faster response and enhanced safety
- Focus: multi-site scaling and building templates

Asset tracking for **security**

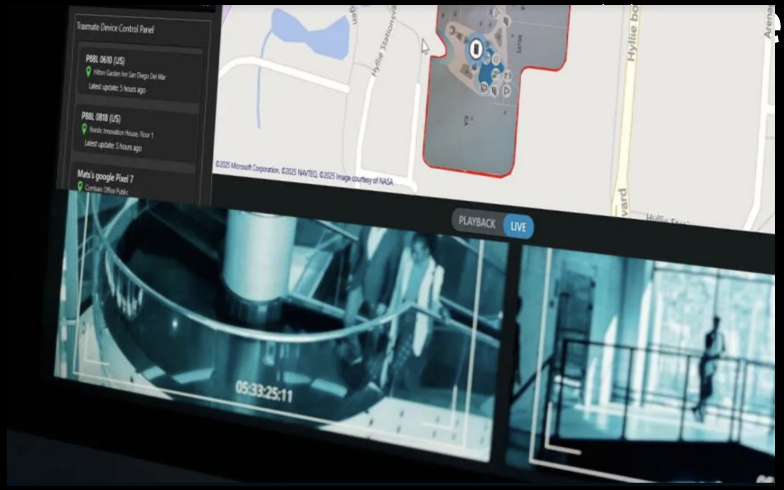
Protects against loss and theft

Use-case: Protect **valuable assets**

- Monitor real-time location and get alerts if leaving geo fenced areas
- Focus**:** GNSS spoofing & hybrid positioning techniques

Use-case: Safety for **security personnel**

- Real-time tracking using location enabled body worn cameras and panic buttons
- Focus**:** Wi-Fi scanning algorithms and Labour Union rules



Asset tracking for **efficiency**

Work Smarter - Save Man Hours and Money

Use-case: improve efficiency at large **trade show facilities**

- Reduce time spent finding working equipment (e.g.: cleaning carts, vacuum cleaners, lifts and forklifts)
- Focus: value of forklift finding & value of dashboards & apps

Use-case: improve efficiency at **airports and military airfields**

- Reduce time spent finding equipment, monitor vehicles
- Focus: handling of very large venues and its related data

Tracking at Ahoy together with Connexa IoT and Alpheios

traXmate

Asset tracking for **mixed use cases**

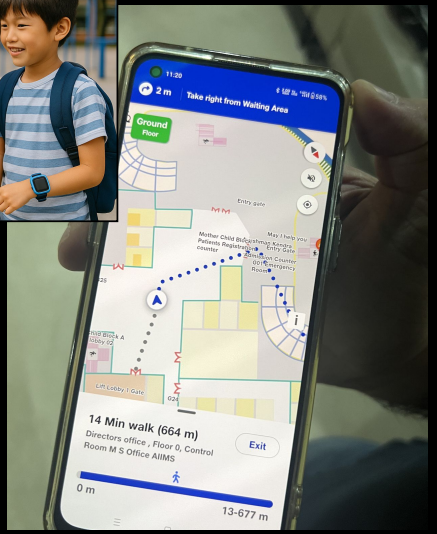
Real-time updates make for easier decisions and peace of mind

Use-case: Help parents to track the **location of their children**

- Enable tracking of kids watches and school buses
- Focus: parents accuracy requirements, power saving requirements

Use-case: Help patients to **navigate large hospital & campus areas**

- Provide indoor navigation apps to patents
- Focus: physical kiosk requirements



traXmate

Challenges & Lessons

Perform global asset tracking without draining the battery of the tracker

- Use low power positioning methods (cell tower/cell-id based positioning, ow power GNSS)

Achieve seamless indoor/outdoor positioning

- GNSS and/or cell-id outdoors
- Wi-Fi and/or cellular and/or bluetooth indoors.
- Optimised scanning algorithms.

Balance accuracy, coverage, and power efficiency

- Cost of accuracy, power and infrastructure
- How much accuracy does the use-case require?
- Balance the accuracy requirements to meet the ROI requirements

Q&A

Drop your questions in the chat!

Asset Tracking
VIRTUAL SUMMIT 2025

Session
03

Beyond GPS: AI positioning and the next era of asset tracking

Speaker

Rolf van de Velde

VP Partnerships & Services
EnOcean

Beyond GPS: AI positioning and the next era of asset tracking

Rolf van de Velde

VP Partnerships & Services

Q&A

Drop your questions in the chat!

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We'll be back after a short break...

2:50 PM CET
9:50 AM EDT

Asset tracking P&L: Pricing, payback and scale
With Siarhei Havarunou (Asset Track)

3:25 PM CET
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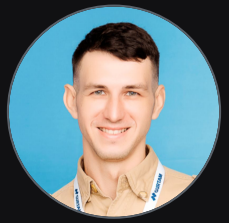
3 questions to ask your connectivity provider
With Jacob Jagger (Onomondo)

Session 04

Asset tracking P&L: Pricing, payback and scale

Speaker



Siarhei Havarunou

CEO
Asset Track

ASSET TRACK

ASSET TRACKING P&L: FINDING THE REAL SAVINGS IN IOT

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ASSET TRACK

AGENDA

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ASSET TRACK

COST DRIVERS

/ OPERATIONS

CONNECTIVITY

HARDWARE

SOFTWARE

ASSET TRACK

CONNECTIVITY

/ COST DRIVERS

- Pricing model
- Roaming vs local
- Pooled Data
- API integration

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HARDWARE

/ COST DRIVERS

- Purchase price
- Delivery costs
- Pre-configuration
- Maintenance
- Volume discounts

ASSET TRACK

SOFTWARE

/ COST DRIVERS

- SaaS model
- Learning curve
- Integration
- Extra support

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OPERATIONS

/ COST DRIVERS

- Product teams
- Online support
- Field/onsite teams

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FINDING THE REAL SAVINGS

/ OPTIMIZE

OPTIMIZE CONNECTIVITY

OPTIMIZE HARDWARE

OPTIMIZE SOFTWARE

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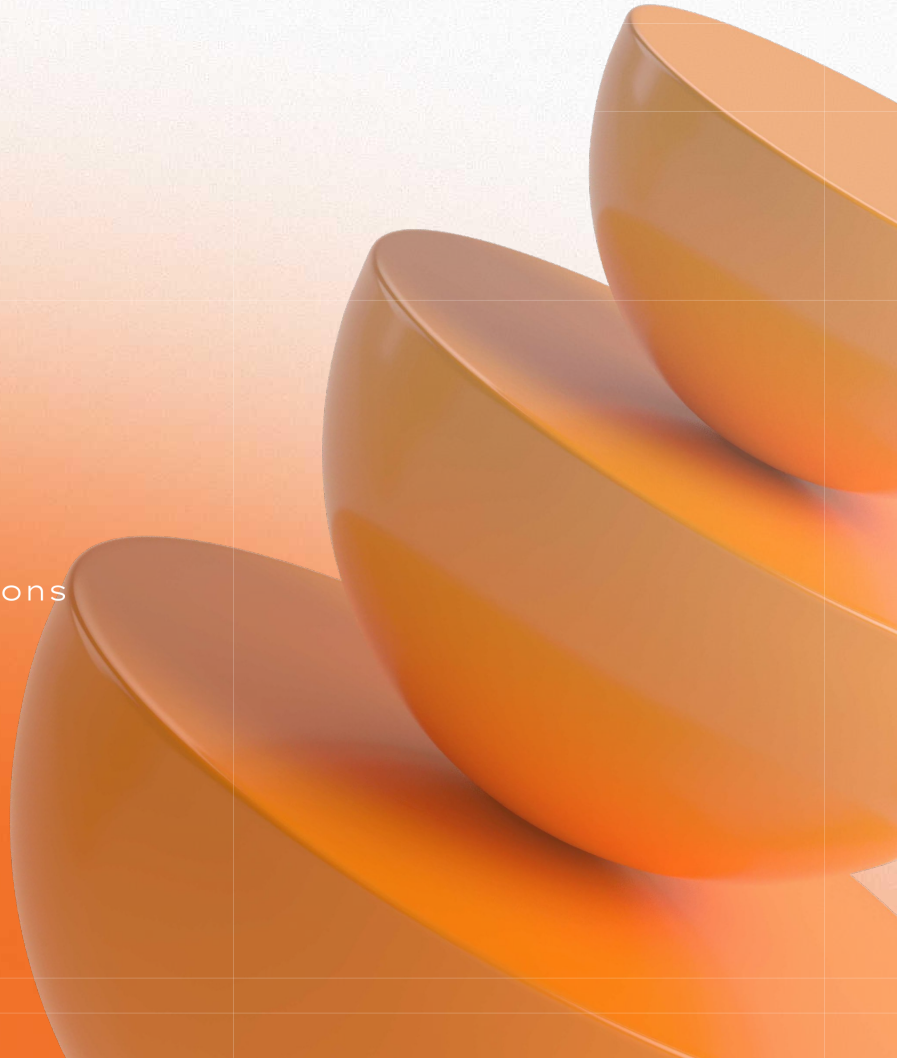
CONNECTIVITY

/ OPTIMIZATION

- Match SIM strategy to deployment geography
- Align data plans with actual usage patterns
- Review roaming vs. local based on device locations



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ASSET TRACK

HARDWARE

/ OPTIMIZATION

- Leverage volume purchasing
- Standardize device types where possible
- Plan delivery logistics efficiently

ASSET TRACK

SOFTWARE

/ OPTIMIZATION

- Features management
- Unit deactivation
- Scripts and templates
- Data visualization
- Build custom solution

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ASSET TRACK

OPERATIONS

/ OPTIMIZATION

- Efficient team structure
- Document processes and create SOPs
- Build self-service customer tools
- Track cost per device
- Monitor support hours per customer

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ASSET TRACK

COMPETITIVE EDGE

/ OPTIMIZE

OPTIMIZE CONNECTIVITY

OPTIMIZE HARDWARE

OPTIMIZE SOFTWARE

ASSET TRACK

CONNECTIVITY

/ OPTIMIZATION

- Match SIM strategy to deployment geography
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HARDWARE

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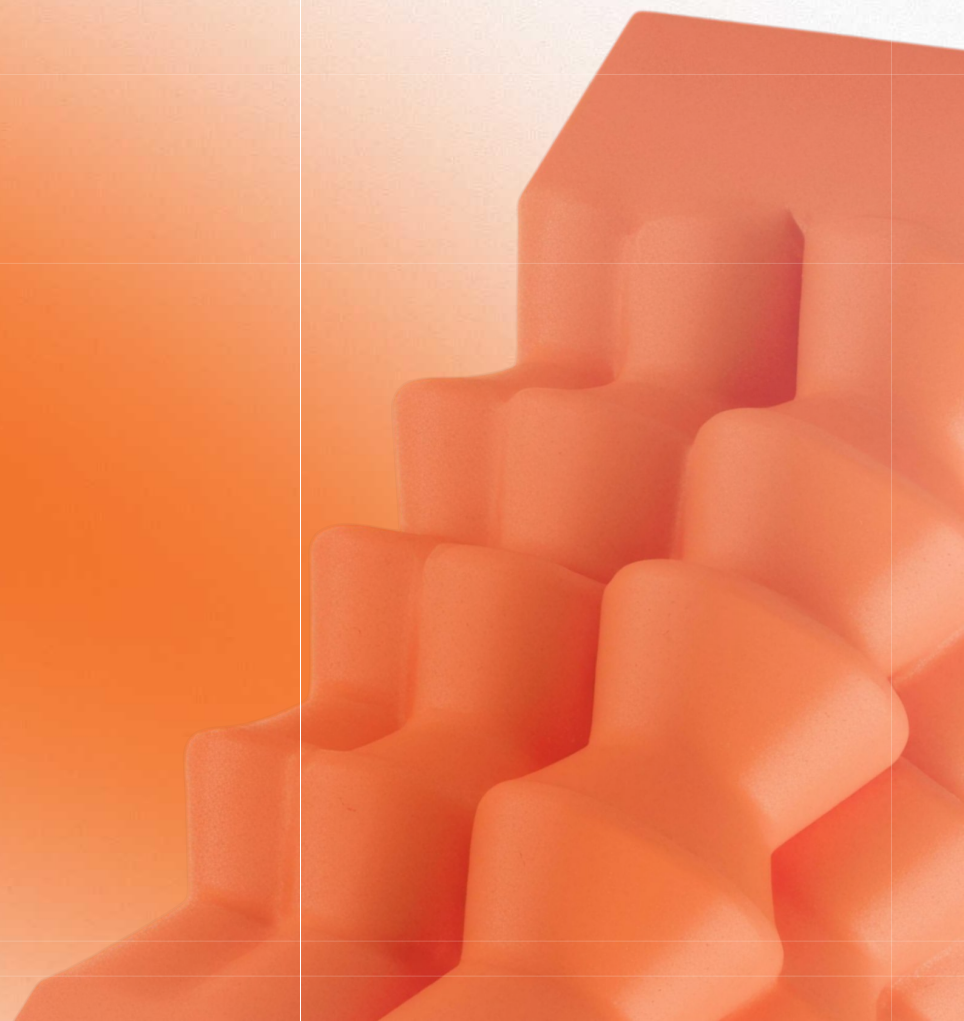

ASSET TRACK

SOFTWARE

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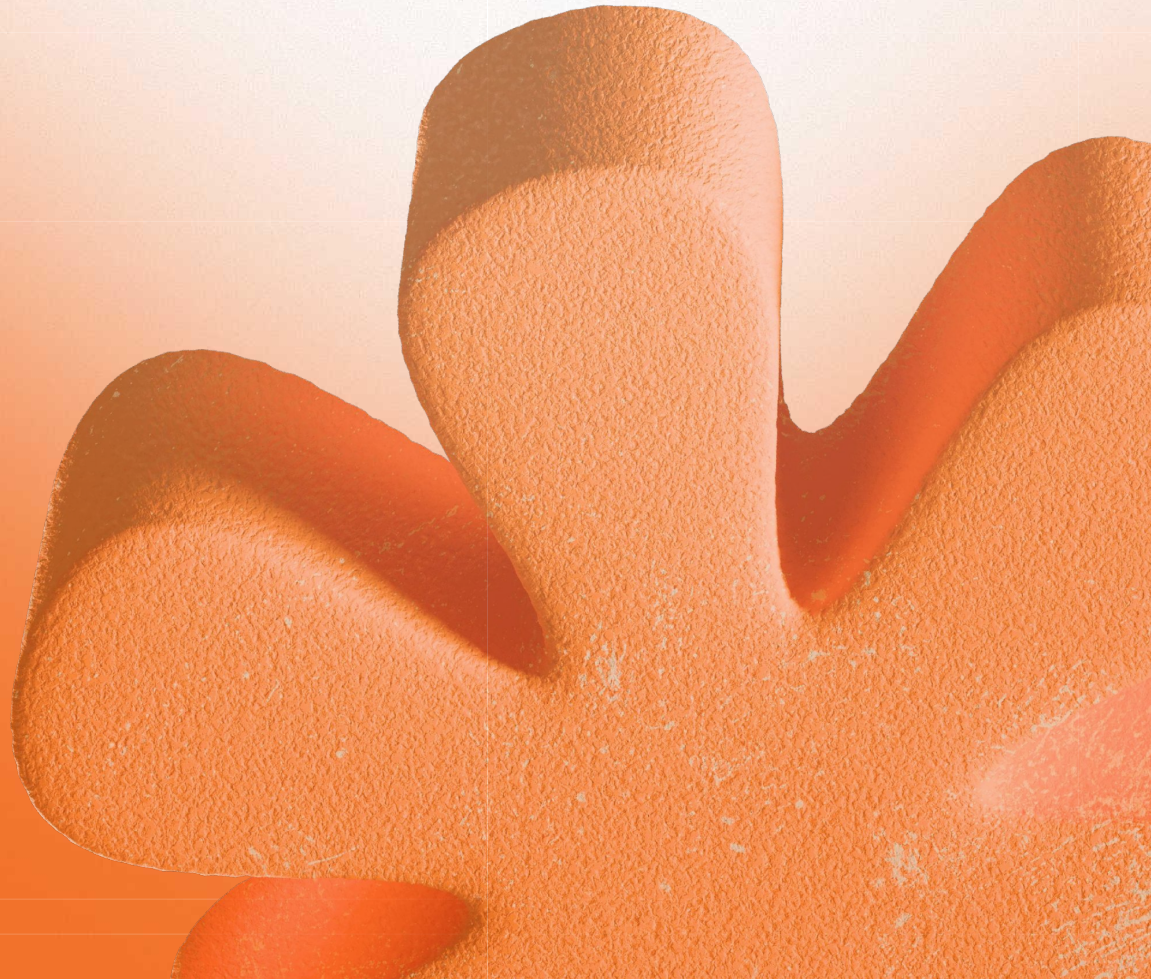

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OPERATIONS

/ OPTIMIZATION

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- Monitor support hours per customer

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ASSET TRACK

COMPETITIVE EDGE

CONTINUOUS IMPROVEMENT

SOLUTIONS

- CONFIGURATION FILES AND TEMPLATES
- SOP DOCUMENTATION
- MARKETING MATERIAL, USE CASES

PROCESSES

- REDEFINE PROBLEM BASED ON METRICS
- IMPROVE SOLUTION
- SHARE EXPERIENCE WITH COMMUNITY

TEAMS

- REVIEW RESULTS AND ADJUST
- SCALE TO FULL FLEET OR OTHER FLEETS

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COST-EFFECTIVE SOLUTIONS

/ COMPETITIVE EDGE

- Transparent pricing models
- In-house development reduces costs and speedsfixes
- Direct supplier relationships (no middlemen)

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EFFICIENT PROCESSES

/ COMPETITIVE EDGE

- Documented workflows and knowledge base
- Fast online support response times
- Local installation partners in key markets

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SALES & MARKETING

/ COMPETITIVE EDGE

- Build library of real customer use cases
- Industry-specific solutions (fleet, logistics, construction, etc.)
- Partner referral programs

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CONTINUOUS IMPROVEMENT

/ COMPETITIVE EDGE

- Add new hardware/connectivity options regularly
- Automate repetitive support tasks
- Listen to customer feedback for product roadmap

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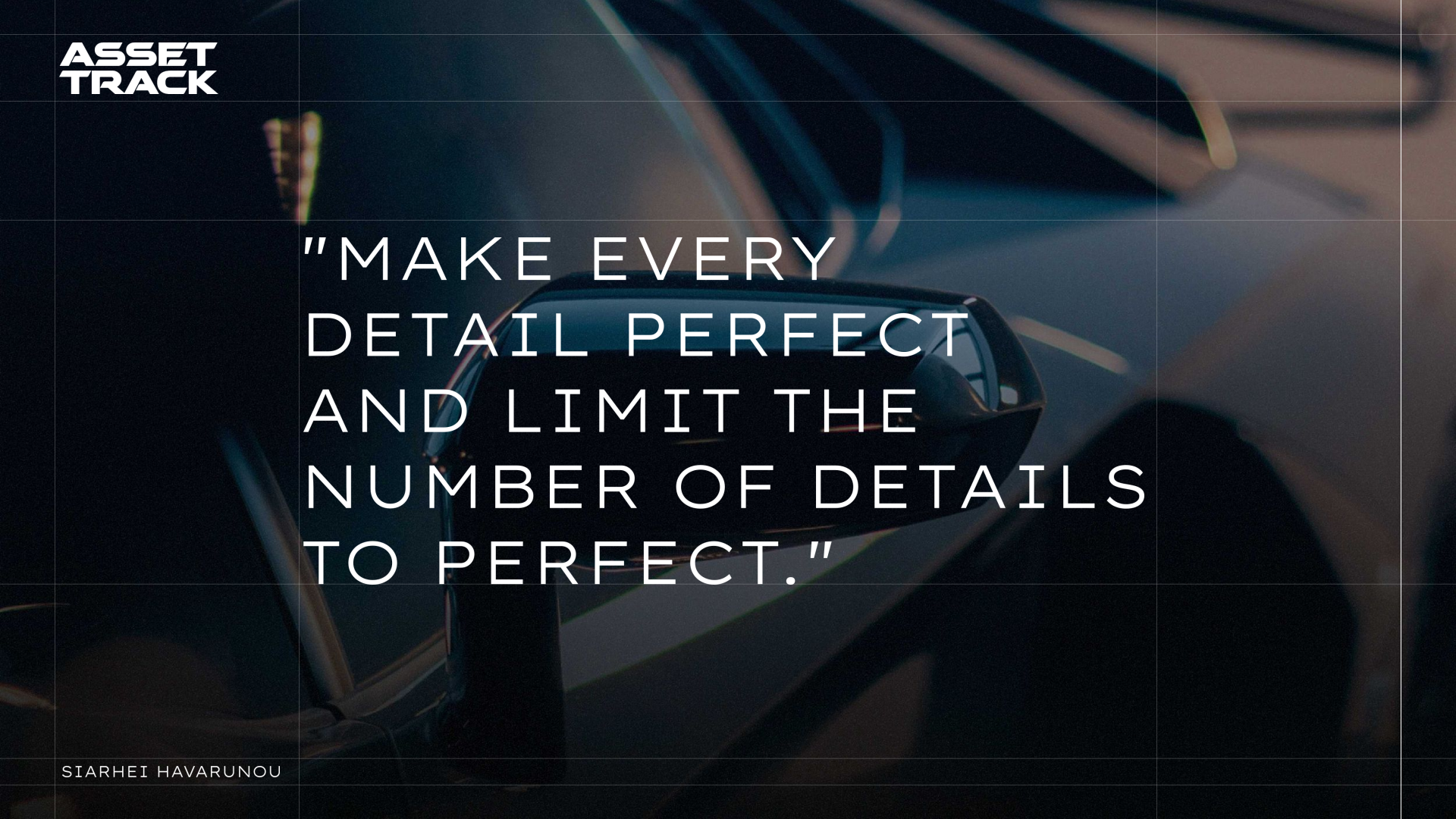

ASSET
TRACK
"MAKE EVERY DETAIL PERFECT AND LIMIT THE NUMBER OF DETAILS TO PERFECT."
SIARHEI HAVARUNOU

Q&A

Drop your questions in the chat!

Asset Tracking
VIRTUAL SUMMIT 2025

Session 05

3 questions to ask your connectivity provider

Speaker

Jacob Jagger

Head of Information Security
Onomondo

3 questions to ask your connectivity provider

Ask more from your network

Asset tracking is changing

So should the network

What’s driving change in asset tracking?

Always-on coverage

Keeping assets connected anywhere.

Hardware & tech advancements

eSIM/SoftSIM, compact modules and multi-purpose sensors

Real-time fleet insights

Digital twins, Cloud + AI optimized routing, safety and maintenance

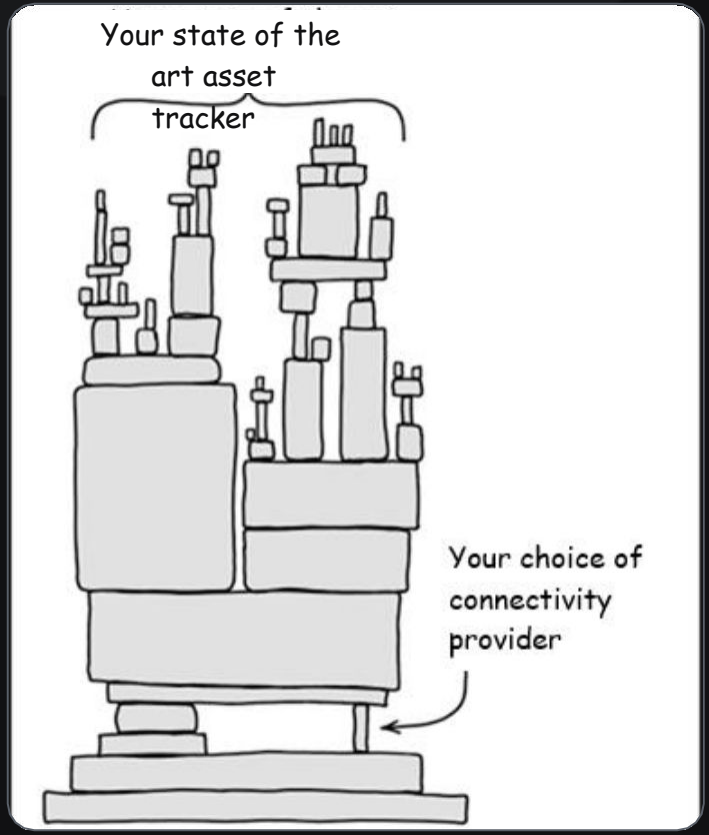
Performance

Lower costs, greener operations, and cross-boarder logistics.

Compliance

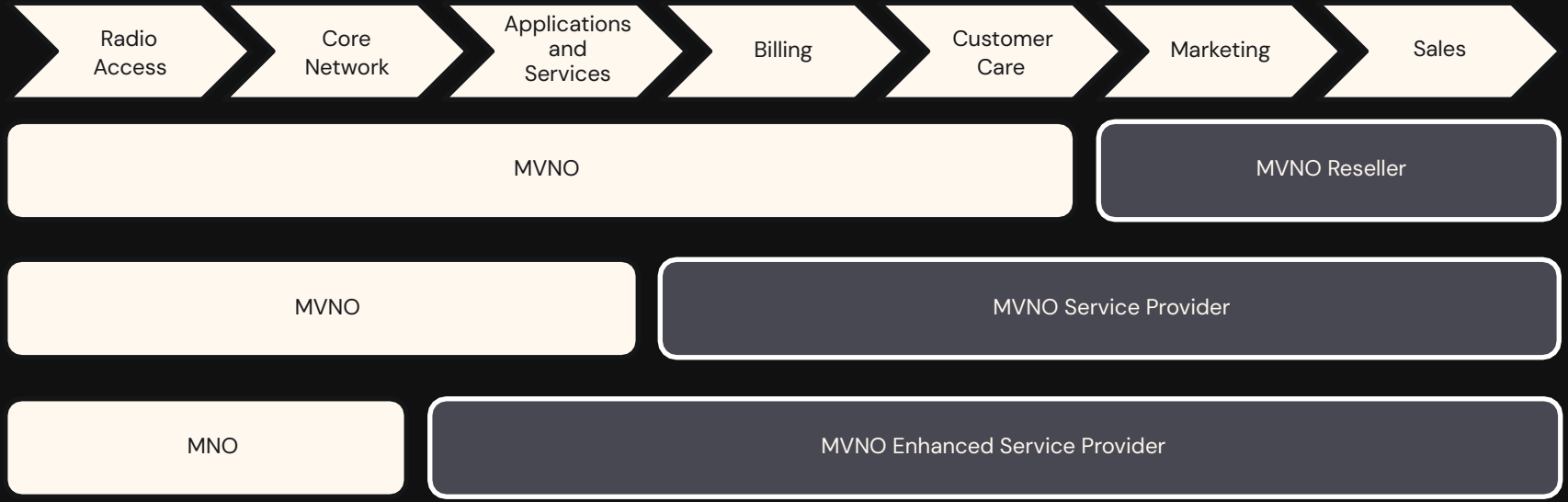
The traditional connectivity problem

Why most deployments fall short

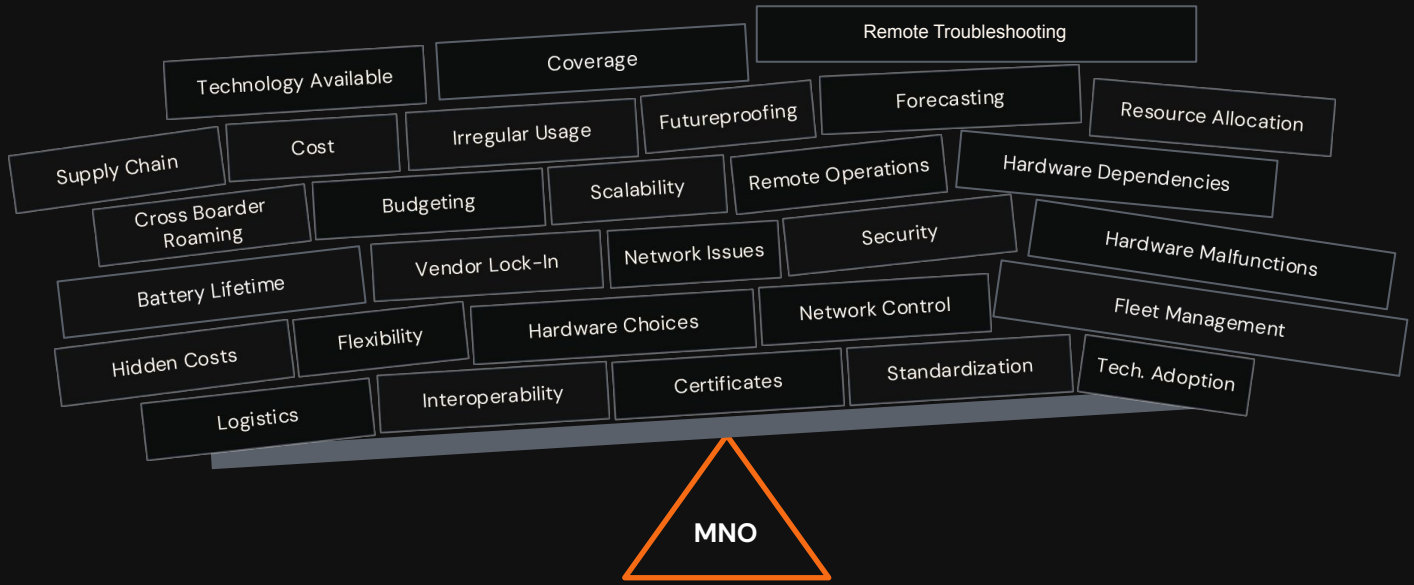


Business models and dependencies in telecommunications

A more holistic overview of the interplay between providers



This is your responsibility



3 questions you need to ask yourself before choosing a connectivity partner

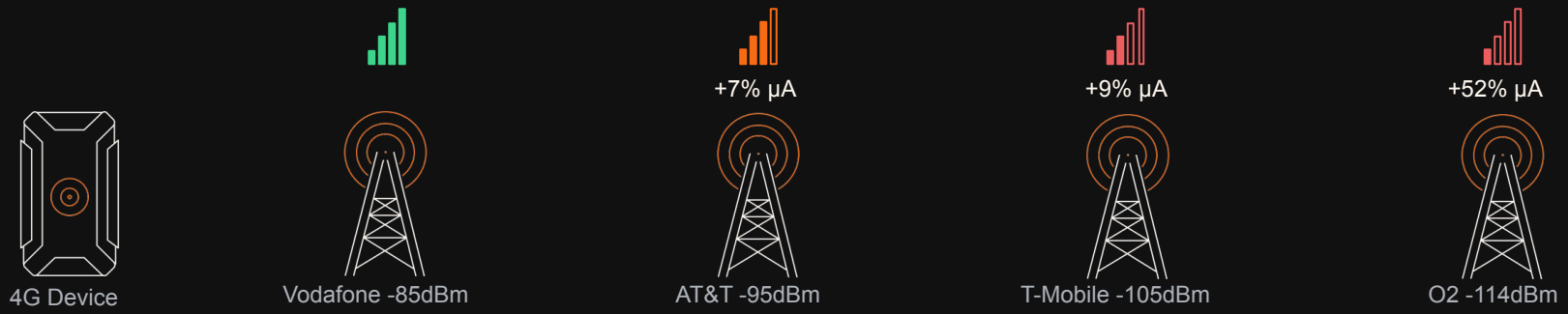
Question 1

Are your devices guaranteed the best possible signal?

SIM steering helps the operator, not your device.

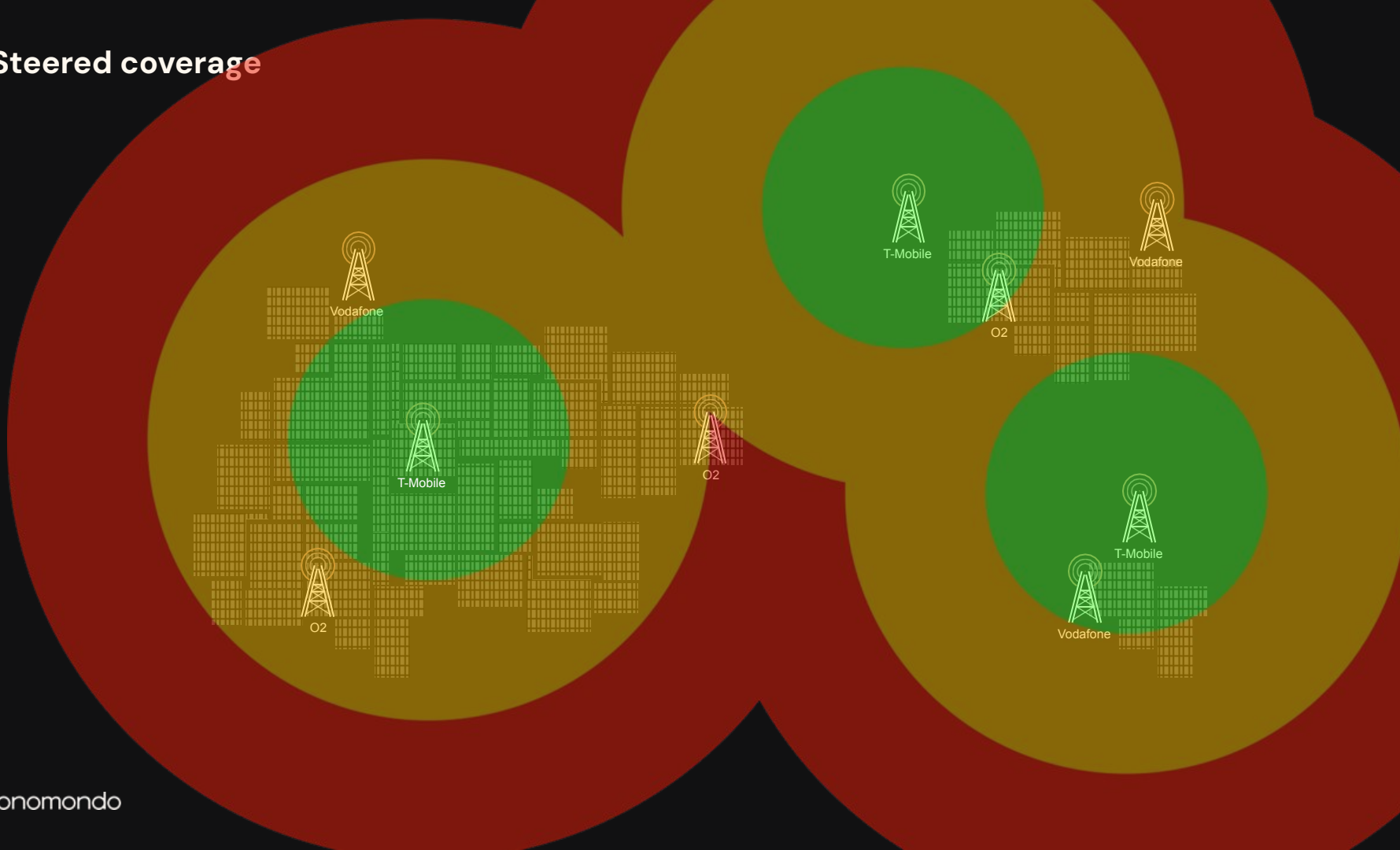
PLMN Priority List *(example only)*

1. T-Mobile
2. O2
3. Vodafone
4. AT&T



*Research from the University of Michigan and AT&T Labs, 2013

Steered coverage



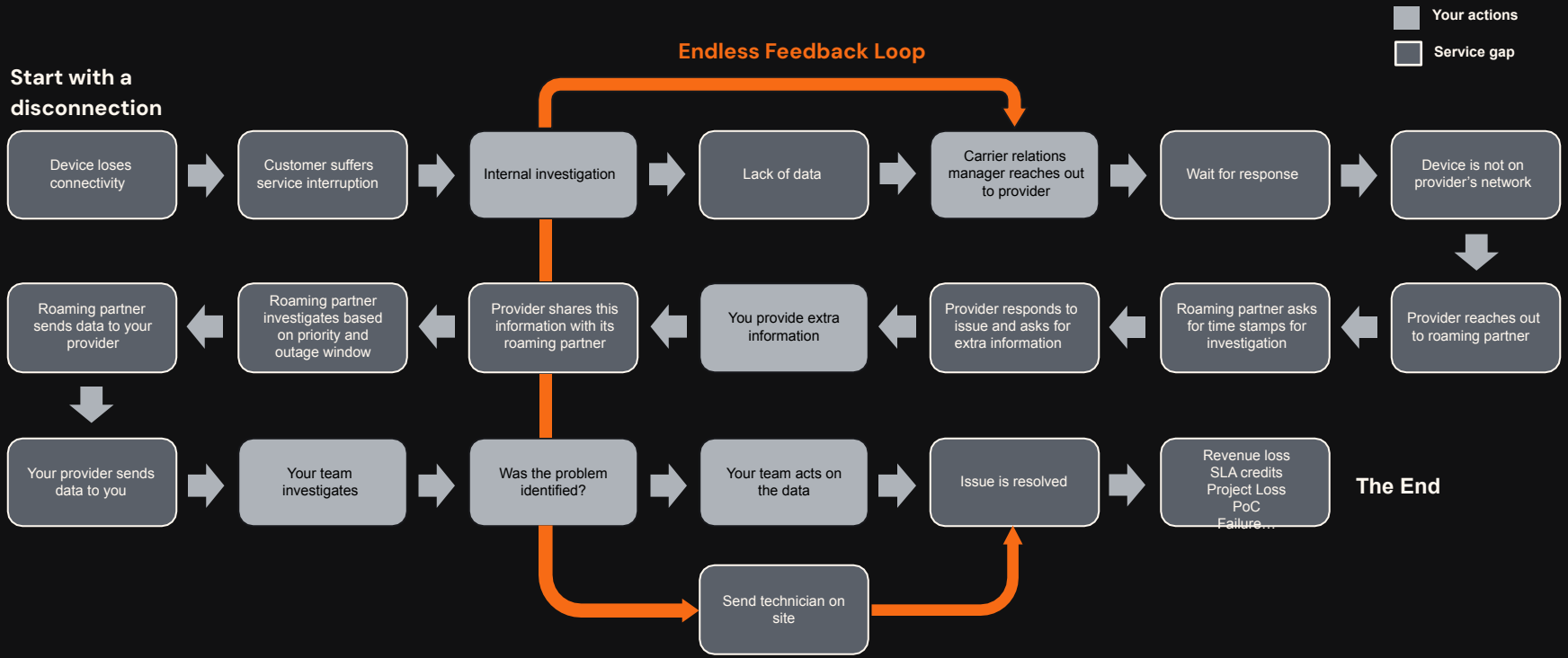
Non-steered coverage

Question 2

What do you do when your device goes offline?

Unplanned losses of connectivity

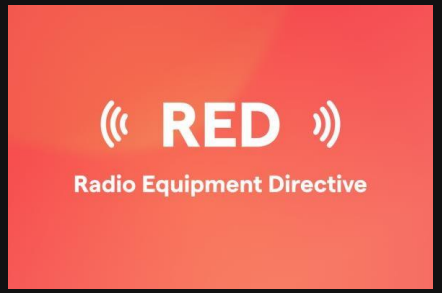
A long and costly process



Question 3

Are you meeting all the compliance requirements?

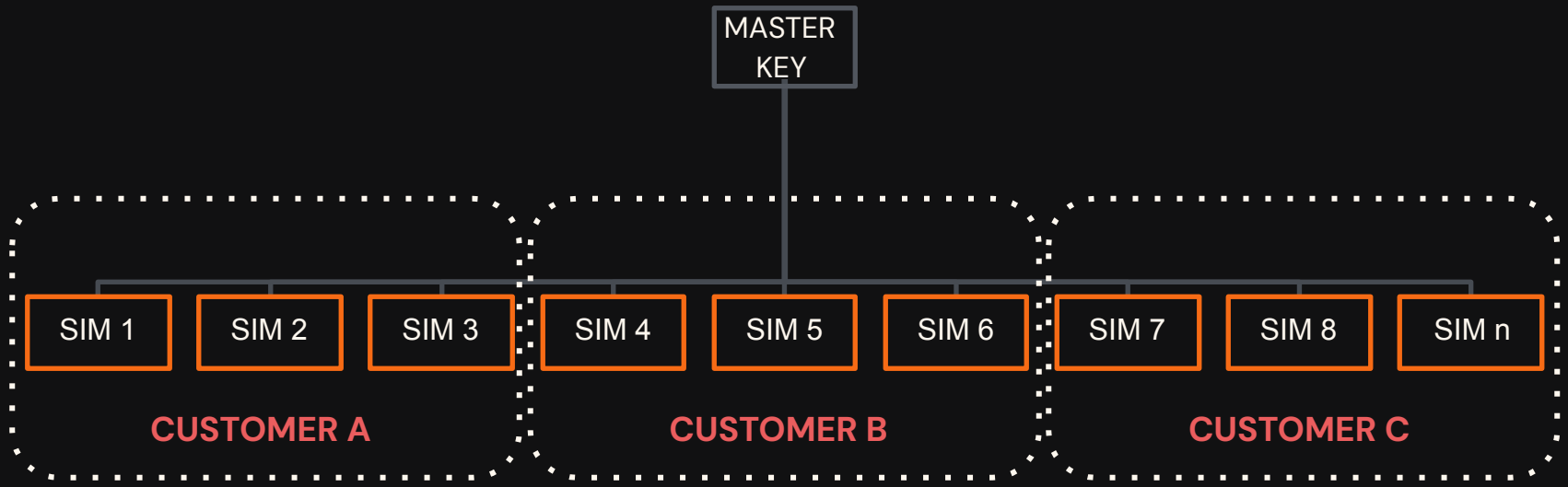
We could talk about these...



...or we could talk about SIMs

How most MNOs manage SIM keys today

What if your cloud provider did the same?



We asked how we can solve:

What if you asked more from your network?

Roaming: Context and challenges

A.P. Møller Maersk

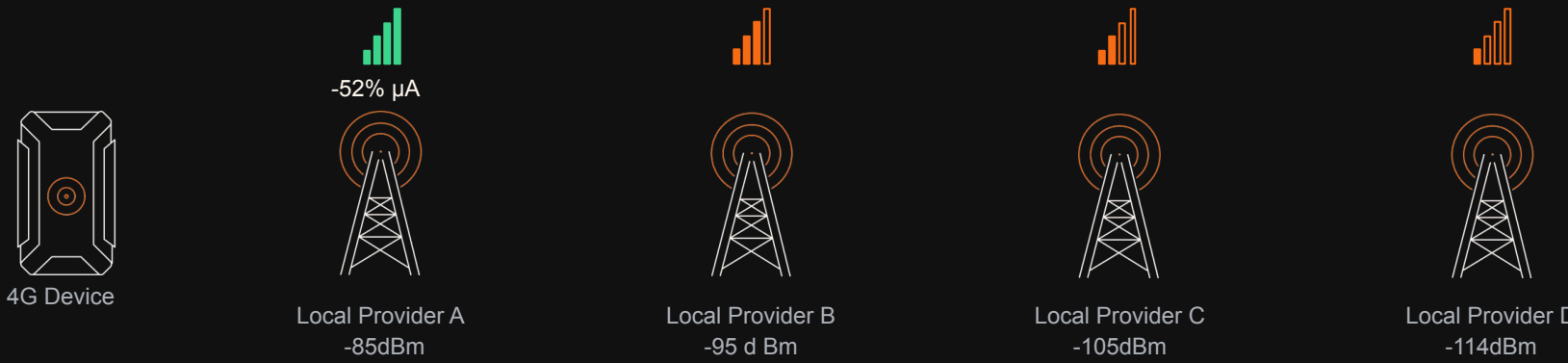
The challenge: Reliable and frictionless connectivity for a fleet of 700+ vessels with over 3 million containers

- Limited Support for devices outside of their “Home Country”
- Physical loss of devices due to cross-roaming opacity
- Complex SIM management across multiple connectivity providers
- Troubleshooting processes and ticketing up to 4 weeks
- Lack of transparency and flexibility on commercial agreements
- High security risk due to outdated security posture

Non-steered SIMs focus on connectivity efficiency instead of commercial agreements.

The main impact of non-steered SIMs:

- Reduced energy consumption = extended battery lifetime
- Improved coverage
- Ultimately positive impact on ROI



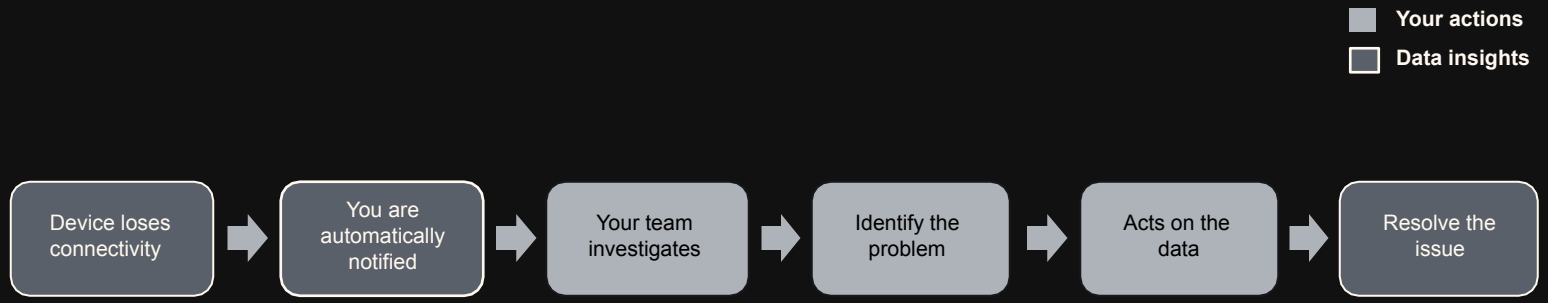
Full control of the debugging process thanks to real-time data

What you get

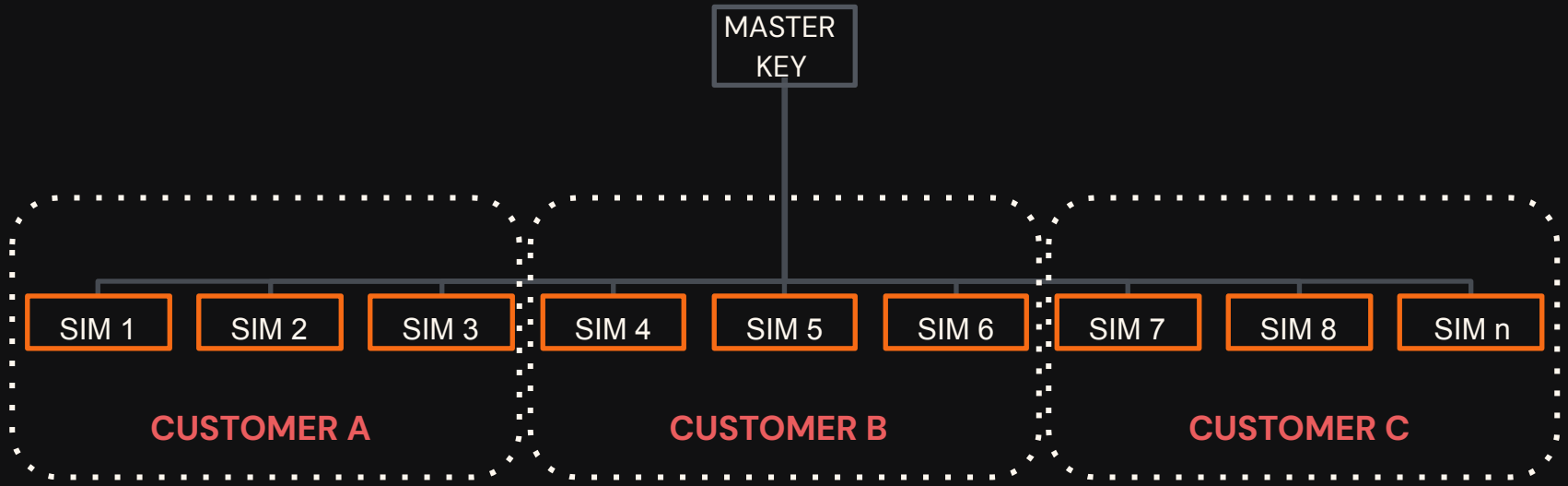
- Top-to-bottom network insights (PCAP)
- Real-time information on device behavior
- Detailed signaling logs and traffic monitoring

A quicker debugging process

Removing service gaps through data insights

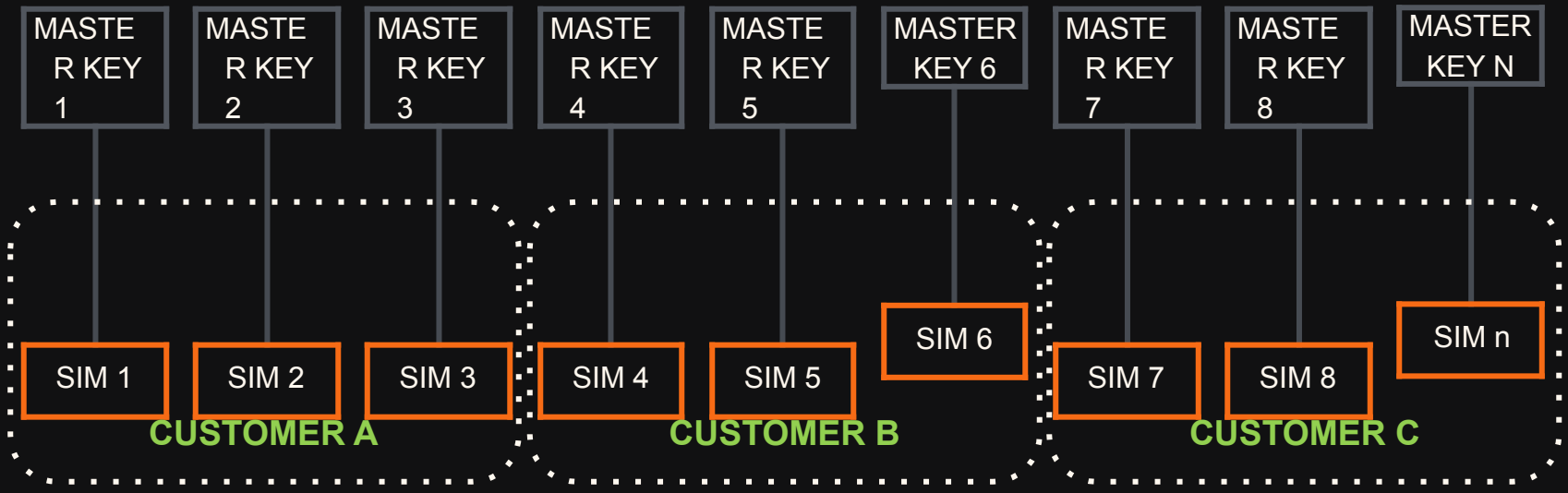


Remember those SIM keys?


MASTER KEY
SIM 1
SIM 2
SIM 3
SIM 4
SIM 5
SIM 6
SIM 7
SIM 8
SIM n
CUSTOMER A
CUSTOMER B
CUSTOMER C

SIM security first

Individualised SIM security at scale



In summary

What changed?

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- Single global connectivity provider
- Single, APN, single IMSI non-steered solution
- Redundancy of multiple networks in each country
- Enhanced connection time across borders
- Real-time monitoring and troubleshooting
- Reduction of data overheads
- Full control and transparency of billing process
- End-to-end military-grade security

Questions to ask your connectivity provider

- Are your devices guaranteed the best possible signal?
- What do you do when your device goes offline?
- Are you meeting all the compliance requirements?
- How do you move your SIMs to another provider?
- Is your provider helping you deploy faster?

Q&A

Drop your questions in the chat!

Asset Tracking
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Thank you

See you next time.

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