

# NB-NTN MODULE APPLICATION FROM MODULE SUPPLIER PERSPECTIVE (IOT/AUTOMOTIVE)

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**ROHDE & SCHWARZ**

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# NB-NTN module application from module supplier perspective (IoT/Automotive)

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- Corporate
- Profile





# Murata Profile

## Our Business

We are worldwide leaders in the design, manufacture and supply of electronic components and solutions.

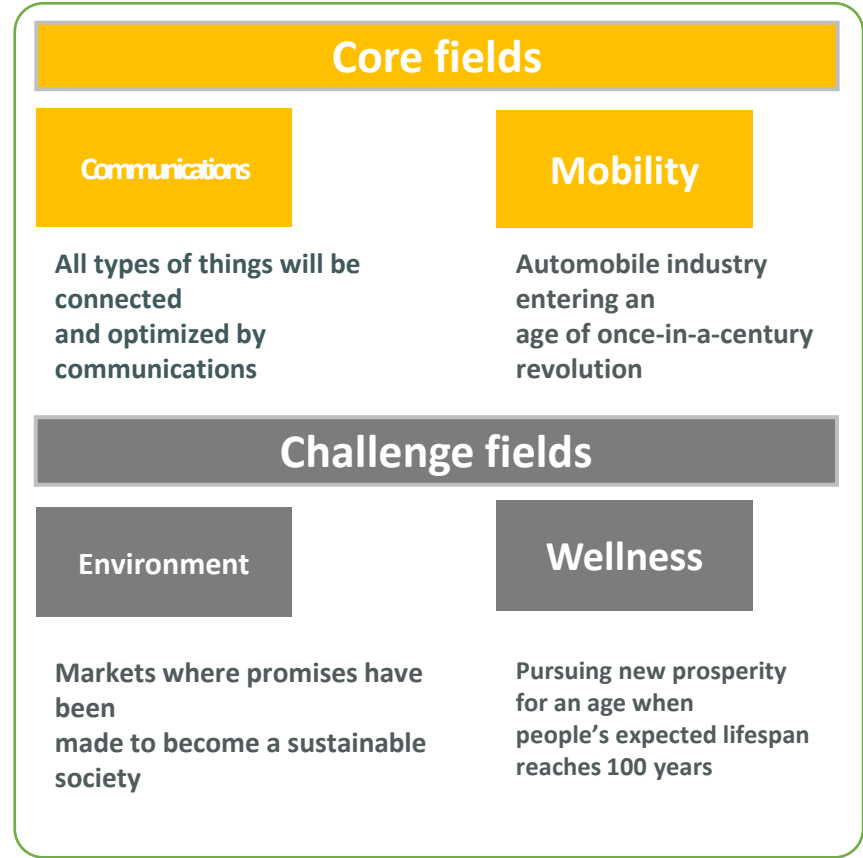
We are Innovators in Electronics.



Date of Establishment	October 1944
Date of Incorporation	December 23, 1950
Net Sales	10,085 million EUR*
Number of Subsidiaries	84** (30 in Japan, 54 overseas)
Number of Employees	73,165*

\*as of March 31, 2024

\*\*Murata Manufacturing Co., Ltd. is not included in the number of subsidiaries.



Connectivity Module



EI Product



Sensor




Timing Device



Power/Battery



RF components

A nighttime cityscape with a network of white icons and lines overlaid. The icons include a location pin, a speech bubble, a cloud, a person, an envelope, a globe, an airplane, an @ symbol, and a Wi-Fi symbol. The background shows a city with illuminated buildings and a river.

- Murata  
Module  
Portfolio



# Murata Connectivity Products

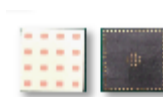
## Mobile Market

Smartphone/Tablet/Wearable etc.

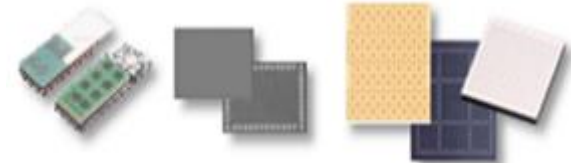
Unique Smallest Package  
High Performance RF



**Wi-Fi Module**  
Wi-Fi 6E  
UWB



**mm Wave Module**  
-5G(for smartphone/BTS)  
-WiGig(for smartphone/Backhaul/VR)



## Automotive Market

Automotive Quality  
IATF16949  
Software / Certification



**BT/Wi-Fi  
Module & Software**



**V2X-11p, C-V2X, GNSS  
Software, Onboard Security**



**LTE module**

## IOT Market

Software Embedded Module

Connectivity Software Expert  
Cloud ~ Mobile application  
New Software



**Bluetooth Low Energy Wi-Fi LPWA, UWB  
802.15.4 ISM communications**



**Driver Soft / Middleware stack**



**Various Wireless Standards Support**



**Asset Tracking**

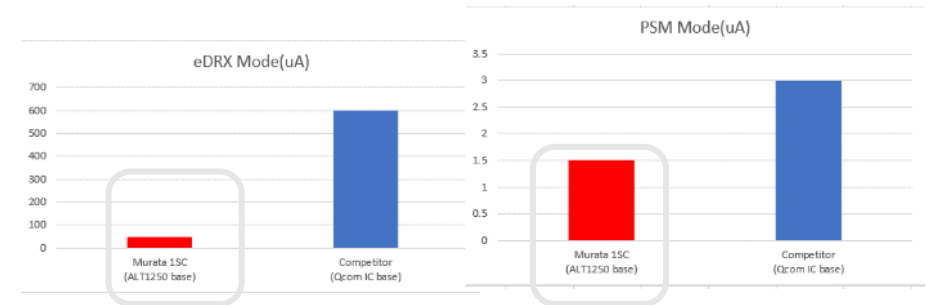
# Murata Type 1SC Module



- Sony/Altair ALT1250 based module (Cat.M1/NB-IoT)
- Small Size, Resin Mold
- Low Power Consumption
- Global Support
- High Quality
- Extra Features (NTN, iSIM, iGNSS, Cloud Connection, FOTA, etc)



- - Ultra Small Size (11.1 x 11.4mm)
- - Resin Mold



**Low Power Consumption**

# Never Lose Coverage = Murata CloT/ NTN module

Murata is the only company to support all these features.

## Combine Murata Type 1SC CloT module with Skylo NTN network service

- Smallest sized LTE Cat M1/NB2 dual mode module
- 3GPP Non-Terrestrial Network (NTN) compatible
- Existing customers can adopt this new feature without hardware change
- Low power consumption
- Integrated SIM (iSIM)
- Built-in GNSS





# GLOMO Award at MWC 2024



## Introducing the winners of the 2024 GLOMO Awards Mobile Tech

GSMA Foundry Innovation Award: *Sony for NTN using Murata's 1SC Module and Skylo's Network*

Murata x Sony x Skylo are global leaders for NB-NTN

- NTN  
Application





# Use Cases of NTN

- **Service Continuity:**  
 Areas No Terrestrial Networks  
 (e.g., maritime or remote locations).
- **Service Ubiquity:**  
 Terrestrial networks are unavailable due to disasters, trouble.

NTN is Sub-Communication path.  
 Cellular communication is the main path.



# Target Applications

## Tracker / Monitoring Device

- Human
- Container
- Pet / Livestock
- Vehicle / Ships
- Agriculture

## Wearable Device

- Sports Watch
- Emergency Call Device





# GPS Beacon for Sports Events

- Sports application
  - Trail
    - Walking/Running
    - Biking/Motor cycling
  - Skiing/Desert racing/Sailing
  - Emergency alert/Health monitoring
- Replacing from Kineis Satellite



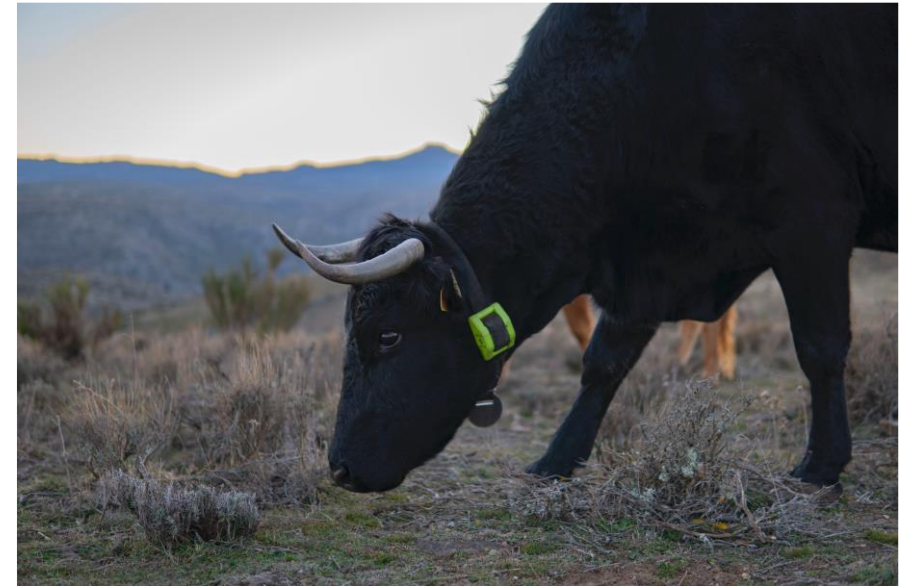
	Kineis	NB-NTN
Technology	Proprietary, UHF	3GPP Rel. 17, NB-NTN
Frequency	400MHz	700MHz, 2GHz (Band 255, 256, 23)
Satellite type	LEO w/ 20 ground stations	GEO*
Data rate	200bps – 4.8kbps	~250kbps
Output power	20 - 33dBm	23dBm

\* With Murata Type1SC



# Tracking Device for Animal Monitoring

- Livestock monitoring
  - Cow/Sheep/Goat/Rain Deer
  - Geofencing/Location tracking/Activity&Health monitoring
- Pet tracker
  - Pigeon racing/Falconry
  - Collection of lost birds
- Replacing from LoRa



	LoRa	LoRa-NTN	NB-NTN
Technology	LoRa, CSS	LR-FHSS	3GPP Rel. 17, NB-NTN
Frequency	800-900MHz	2.1GHz (S-Band)	700MHz, 2GHz (Band 255, 256, 23)
Satellite type	N/A (need GW)	GEO	GEO*
Data rate	~50kbps	~10kbps	~250kbps
Output power	14/20dBm	~22dBm	23dBm

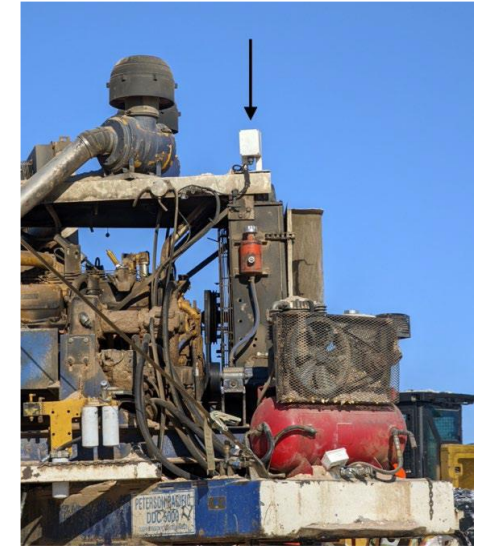


\* With Murata Type1SC



# Communication Units for Industrial Pumps

- Industry Monitoring
  - Large Pump Equipment / Mining
  - Historical data for diagnosis (preventive maintenance)
- Reduce SKUs
  - NTN for some places, TN for the other places
- Replacing from LTE/Iridium



	Iridium	NTN
Technology	Proprietary, TDMA	3GPP Rel. 17, NB-NTN
Frequency	1600MHz	700MHz, 2GHz (Band 255, 256, 23)
Satellite type	LEO	GEO*
Data rate	~10kbps	~250kbps
Output power	30dBm	23dBm



\* With Murata Type1SC

# Fleet Management and Emergency Alert for Truck

- Emergency Alert with Vehicle's Condition and Position
- Remote Operation for Safe Stop
- Redundant Design
  - 2 x Communication Unit (GPS+5G+NTN+WiFi)
- Backup connectivity



	Starlink	NB-NTN
Technology	Proprietary	3GPP Rel. 17, NB-NTN
Frequency	Ku Band: Uplink: 14GHz, Downlink: 11GHz Ka Band: Uplink: 30GHz, Downlink: 20GHz	700MHz, 2GHz (Band 255, 256, 23)
Satellite type	LEO	GEO*
Data rate	100Mbps~	~250kbps
Output power	30-33dBm	23dBm

\* With Murata Type1SC



- Partnershi  
p



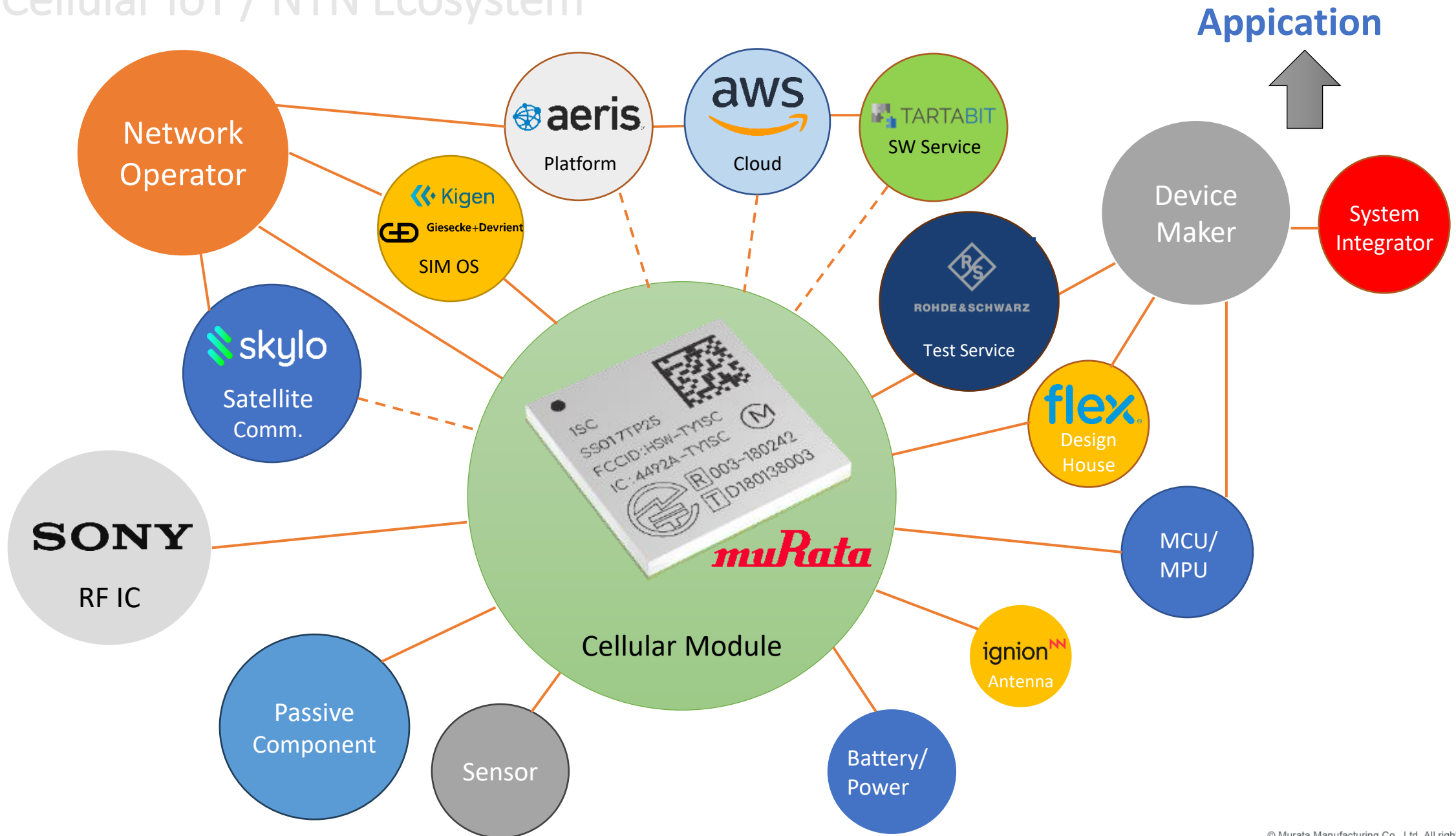
# NTN Partnership with MNO/MVNO

MNO/MVNO	Activity
DT	Evk is ready NTN network connection verified
Monogoto	
Emnify	
Soracom	NTN network connection verified
Others (Vodafone, AT&T, BICS, floLive, Viasat, etc)	On going Discussion





# Cellular IoT / NTN Ecosystem



***muRata***

**INNOVATOR IN ELECTRONICS**



Test. Measure. Innovate

THANK YOU  
VERY MUCH

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# Appendix



Type 1SC (MP)	Type 2SC (Sample)	Type 2GD (Sample)
<p><b>PN: LBAD0XX1SC-151</b> Altair ALT1250 11.4 x 11.1 x 1.5mm</p>	<p><b>PN: LBAD0XX2SC-001SMP</b> Altair ALT1250 11.4 x 11.1 x 1.5mm</p> <p><u>Japan production capable</u></p>	<p><b>PN: LBAD0ZZ2GD-001SMP</b> Altair ALT1350 10.8 x 11 x 1.35mm</p> <p><u>Lower power consumption</u></p>
 <p>FCC/IC/CE/Japan Certified</p> 		

# Why Murata Cellular IoT Module?



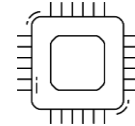
**Small size**



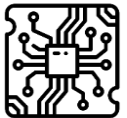
**Regulatory certification**



**Low power consumption**



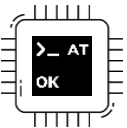
**Worldwide performance & carrier certification**



**Simple PCB Design**



**Antenna design support**



**AT commands MODEM**



**Worldwide sales channels**



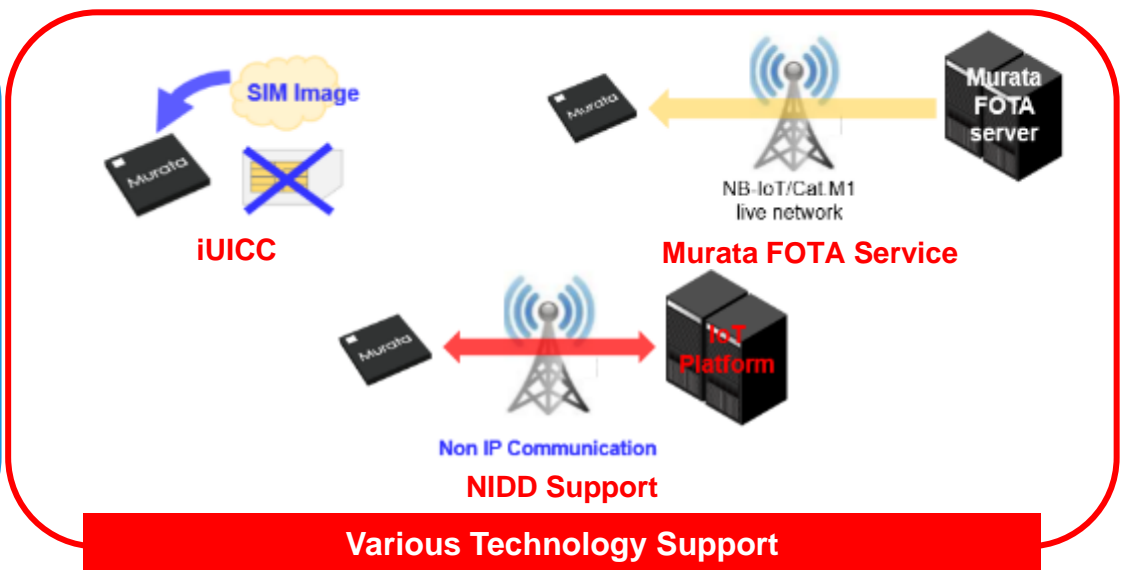
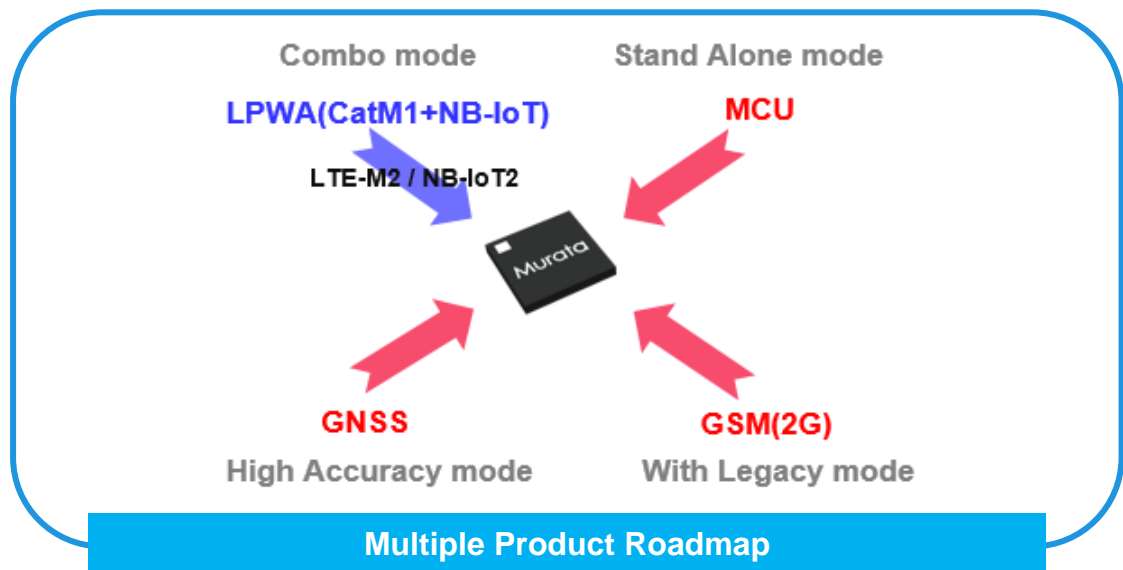
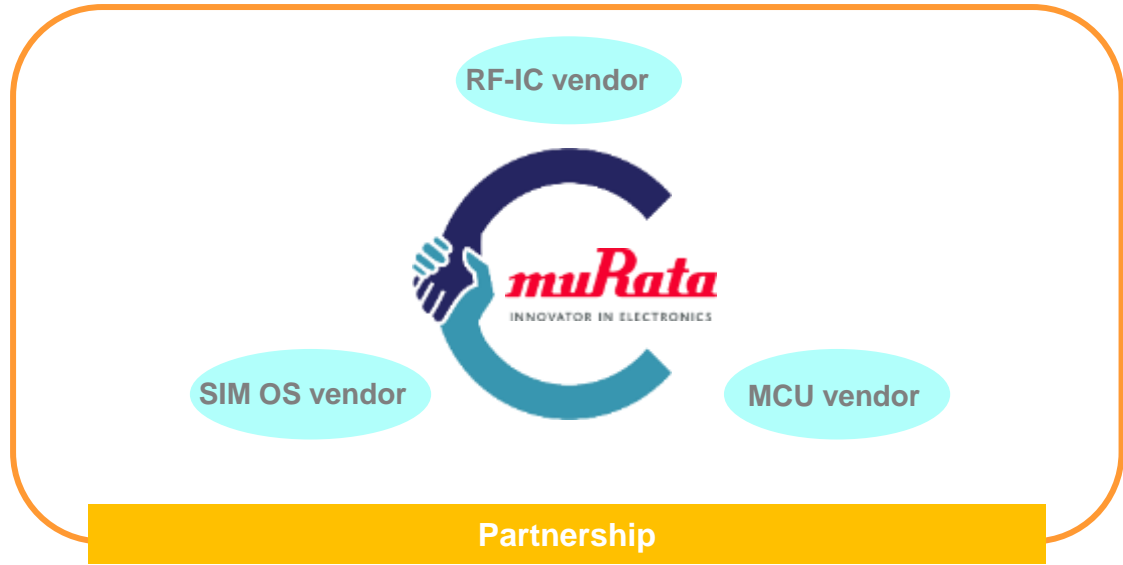
**Competitive price package**



**Quality**



# Value of Murata Cellular IoT Module



# Cellular IoT Ecosystem Partnership



**Operator - MNO**  
 AT&T(ZTP)  
 TMO (Tracker, DevEdge)  
 DT(nuSIM, NTN)  
 Vodafone (iSIM)  
 Softbank (NIDD, Platform, Reference)  
 KDDI (Vending Machine, Smart Meter)  
 KT (Platform, Reference)

**IC Vendor**  
 Sony (Business, New Technology Reference (iSIM, NTN), ALT1350)

**Operator - MVNO**  
 1NCE, Soracom, Monogoto, Emnify, Aeris, floLive, Onomondo, Truphone, iBasis, etc  
 Mainly for Broader Business, iSIM/NTN support

**Cloud Platform**  
 Ericson/Aeris, AWS, Microsoft Azure, AVSystem

**IoT Platform**  
 ST Micro, Flextronics / iENBL, RasPi

**New Technology**  
 Kigen, G+D (iSIM)  
 Skylo, Inmarsat, Ligado (NTN)

# Cellular IoT Module certification status



\*Type 1SC only



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# What is ZENCROSS™ Alliance ?

## Shaping the Future of Cellular IoT Together



ZENCROSS™ Alliance is an initiative, enabled by a strong consortium of world leading IoT players dedicated to remove the complexity and technical barriers associated with cellular IoT management, helping to accelerate deployments with a simple single unified solution.

### Our Mission

In order for our customers to relax and focus on what truly matters, we provide a seamless integration of hardware and software solutions, tailored to meet their diverse needs through close collaboration with our ecosystem stakeholders.

### Our Vision

To create the world where anyone can create whatever they want.



We emphasize collaboration and solution optimization to the market by coordinating an ecosystem of trusted suppliers delivering IoT developers a predefined set of products and services that overcome many existing technical and business challenges.



## All-in-One Cellular IoT Platform by ZENCROSS™ Alliance

- A Single SKU Cat.M1/NB-IoT module that has single FW for global deployment
  - 3GPP rel.14 compliant
  - certified with multiple CSPs
- Unified core network with multiple CSPs for global coverage
  - Major Connectivity Service Providers
- SIM card or eSIM with preloaded Multiple profiles
- Connectivity management platform to manage SIM cards
- Pre integrated zero touch cloud connection for simplifying certification process and reducing data consumption



# ZENCROSS™ Alliance Members and offerings



Single Core network for MNO



Cat1bis Module Hardware for EU & NA region



Cloud service for customer Application



Cellular connectivity in Singapore / ASIA with Global roaming



Cellular connectivity in ASIA / ASEAN region with Global roaming



Cloud connector to connect core network payload to the Application cloud



CatM1/NB Module hardware for worldwide region



Cellular connectivity in Europe with Global roaming



Cellular connectivity in Middle East region with Global roaming



eSIM Solutions



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# ZENCROSS™ Service/Product table

Service/product	Description	Supplier	Supplier's supplier
Cat.M1/NB module, <b>Type1SC/2SC</b>	Ultra small Cat.M1/NB-IoT module certified by CSPs and passed regulatory	Murata	
SIM/eSIM	SIM(2FF/3FF/3FF) and eSIM(MFF2) could be provided. Multiple profiles could be loaded	Telenor(EU/NA) Singtel(APAC) Ooredoo(MEA)	Thales
Connectivity service	Local CSPs offer competitive services by deployment area	Telenor(EU/NA) Singtel(APAC) Ooredoo(MEA)	
Device management platform, <b>IoT Accelerator</b>	Simplify management of globally distributed cellular connected IoT assets with a single pane of glass experience, regardless of their regional location and CSP.	Telenor(EU/NA) Singtel(APAC) Ooredoo(MEA)	Aeris
Devices connection service to cloud, <b>IoT Core</b>	The world's most comprehensive and broadly adopted cloud infrastructure and services for IoT	AWS	
Zero touch cloud connection service, <b>IoT Bridge</b>	Secure and efficient connection to Hyperscaler cloud, which simplifies the connection process as zero-touch	Aeris	Tartabit
And more..			

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