



Lansitec NTN

Livestock Tracking Tag

Datasheet

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Released Note

Version	Date	Revised by	Description
V1.0	2026-08-01	Apus Su	Initial release

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1. Product Overview

The Lansitec NTN Livestock Tracking Tag is a solar-assisted monitoring device designed for cattle, sheep, and goats across farms, open rangeland, and remote areas. LoRaWAN and satellite NTN connectivity help maintain reporting where terrestrial network coverage is limited or unavailable.

Multi-constellation GNSS provides position information, while Bluetooth beacon scanning supports nearby beacon and location awareness. The integrated accelerometer distinguishes movement from inactivity and accumulates movement time during each reporting cycle. Local electronic geo-fence evaluation, low-battery monitoring, abnormal-inactivity detection, and high-intensity motion detection support livestock safety and management workflows.

Flexible periodic and autonomous reporting helps balance information timeliness with energy use. Hybrid operation uses LoRaWAN as the preferred low-power connection and extends coverage through NTN when required; an NTN-only option supports deployments outside LoRaWAN coverage.

The lightweight, rugged, and animal-friendly IP68 ear-tag enclosure is designed for harsh outdoor environments. A solar-assisted rechargeable battery reduces routine maintenance and supports long-term field deployment.



Figure 1. Product Appearance

2. Typical Applications



Livestock Location & Activity Monitoring

Monitor livestock position, movement time, inactivity, and abnormal activity across grazing areas.



Remote Pasture & Geo-fence Monitoring

Extend reporting across remote pastures and receive local geo-fence breach and abnormal-activity events.

3. Product Features

Hardware & Energy

- Compact IP68 ear-tag enclosure
 - Integrated 3-axis accelerometer
 - Solar-assisted rechargeable battery
 - Low-power operating modes
-

Connectivity & Maintenance

- LoRaWAN-first operation with NTN fallback
 - NTN-only operating profile
 - Local Bluetooth configuration
 - Firmware update over Bluetooth
-

Positioning & Activity

- Multi-constellation GNSS positioning
 - BLE beacon scanning
 - Movement and inactivity recognition
 - Movement-duration reporting
 - Local electronic geo-fence evaluation
-

Alarm & Reporting

- Periodic and autonomous reporting
 - LoRaWAN on-demand position request
 - Low Battery Alarm
 - Geo-fence Breach Alarm
 - Abnormal Inactivity Alarm
 - High-Intensity Motion Alarm
-

4. Product Specifications

LoRaWAN	
Protocol	Version 1.0.2B, Class A
Activation Mode	OTAA or ABP
LoRa Frequency	US915, AU915, EU868, EU433, AS923, RU864, KR920, IN865, CN470
LoRa TX power	0 to 20 dBm
LoRa Sensitivity	-137 dBm @ SF12, BW 125 kHz, 868 MHz/915 MHz
Encryption	AES-128

NTN Connectivity

Item	Specification
Radio standard	3GPP Release 17 NB-IoT NTN
Network service	Skylo NTN
Transport	UDP
Wire payload	Fixed 21-byte NTN Status Report
eSIM	Embedded SIM (eSIM), MFF2 surface-mount package (5.0 mm × 6.0 mm)
Server	Configurable host name or IP address and UDP port
Device identity	4-byte Device ID derived from the low-order 32 bits of the LoRaWAN DevEUI
Application downlink	Not supported by this product over NTN; downlink configuration and commands are LoRaWAN
Availability	Depends on satellite visibility, operator coverage

Skylo Network

Skylo provides a standards-based 3GPP Release 17 NB-IoT NTN service for direct-to-device satellite connectivity. It extends reporting to ranches, open rangeland, and other areas where terrestrial coverage is unavailable or unreliable without requiring an on-site satellite gateway. The service is optimized for low-bandwidth sensor data, periodic reporting, alerts, and short messages.

The following table lists Skylo's publicly documented deployment bands. These are network deployment bands, not a promise that every band or region is enabled for every order.

Band	Duplex	UE Uplink	UE Downlink	Public Deployment
B23	FDD	2000-2020 MHz	2180-2200 MHz	North America
B255	FDD	1626.5-1660.5 MHz	1525-1559 MHz	Global L-band deployment
B256	FDD	1980-2010 MHz	2170-2200 MHz	Europe

The UE downlink frequencies in this table are used for radio access and network control. They do not indicate support for application downlink messages during NTN operation. Actual coverage and band availability depend on the country or region, regulatory authorization, satellite beam coverage, the provisioned eSIM profile and service plan, and a sufficiently clear view of the sky. Service must not be interpreted as continuously available in every location worldwide.

Data Traffic and Packet Budget

The NTN application sends one fixed 21-byte Status Report containing a 4-byte Device ID, position, battery level, movement time, and alarm flags. With a standard 20-byte IPv4 header and an 8-byte UDP header, one unfragmented report produces a 49-byte IPv4 packet before lower-layer cellular and satellite signaling.

Item	Bytes	Notes
NTN UDP application payload	21	One fixed Status Report
UDP header	8	Standard UDP header
IPv4 header	20	Base IPv4 header without options
IPv4 packet per report	49	21-byte application payload plus 28 bytes of UDP/IPv4 overhead
Skylo public minimum billable size	50	Public network parameter; actual charging follows the ordered operator or service-provider plan

Under Skylo's public 50-byte minimum-billable rule, one 21-byte Status Report produces a 49-byte IPv4 packet but is budgeted as at least 50 billable bytes. Therefore, 1,000 reports represent at least 50,000 billable bytes (approximately 50 kB, decimal). This estimate excludes additional application retry transmissions, provider-specific rounding, roaming terms, taxes, and other plan conditions.

Skylo publicly describes approximately two messages per device per minute and recommends keeping successive packets more than 30 seconds apart. A 50-byte packet has a published typical latency of approximately 5-15 seconds; application processing should tolerate one-way latency of up to approximately 30 seconds. These are network guidance values rather than guaranteed product response times. This product does not accept application downlinks over NTN.

RRC/NAS signaling, coverage-enhancement repetitions, radio retransmissions, and satellite-link overhead are variable and are not included as fixed byte counts in the application packet budget. They can materially affect power consumption, airtime, and network capacity.

NOTE: Network availability, billing, packet limits, and latency are subject to the activated eSIM profile and the ordered operator or service-provider plan. Confirm the commercial terms and regional service before deployment.

Bluetooth	5.0, iBeacon
TX Power	-20, -16, -12, -8, -4, 0, 4 dBm
Sensitivity	-96 dBm
FOTA Over Bluetooth	Support

GNSS	BDS/GPS/GLONASS
Accuracy	2.5 m CEP
Cold Start Duration	26 s*
Warm Start Duration	5 s*

Battery	Li-Po (150 mAh)
Peak Current:	≤ 450 mA
Standby Current	~ 10 μA
Charging Method	Solar power
Solar Charging Power	0.28 W max.

Physical Parameters	
Dimension	60 × 45 × 12 mm
Housing Material	ABS+PC
Ingress Protection Rating	IP68
Switch	Magnet or Button
Operating Temperature	-20°C ~ +60°C
Storage Temperature	-40°C ~ +85°C

NOTE: The 26 s cold-start and 5 s warm-start values are typical performance under open-sky conditions with multi-constellation GNSS enabled and a passive antenna.

5. Product Functions

5.1 Connectivity and Reporting

- Hybrid operation uses LoRaWAN as the preferred low-power reporting path and switches to NTN after the configured LoRaWAN availability and retry criteria are met.
- NTN-only operation supports deployments outside LoRaWAN coverage.
- Periodic reporting provides status at configured intervals, while autonomous reporting can adapt positioning and reporting behavior using detected movement.
- Supported LoRaWAN commands can request an on-demand position report. NTN is uplink-only and does not accept application commands or configuration downlinks.
- Local Bluetooth access supports commissioning and maintenance without depending on network availability.

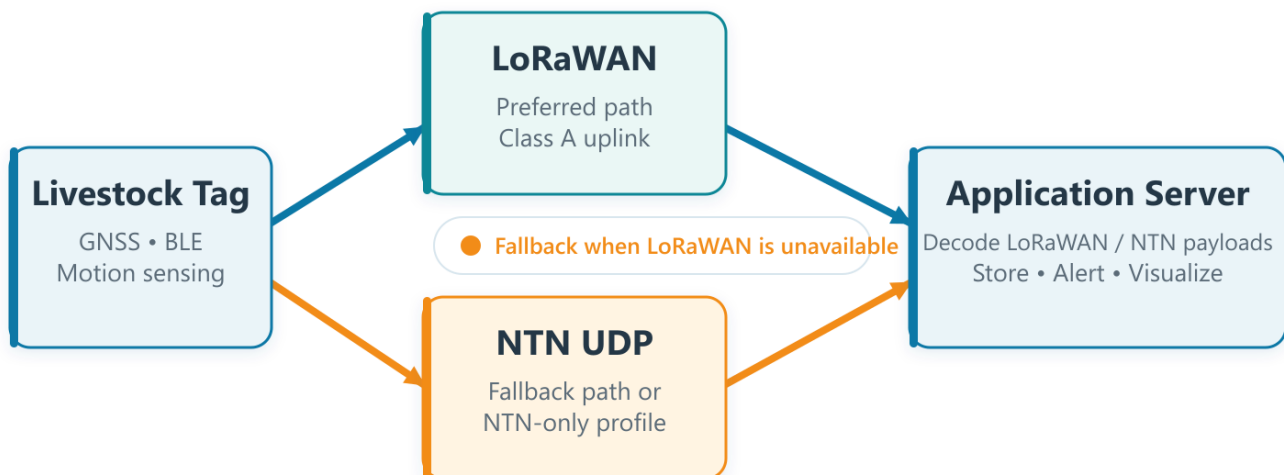


Figure 2. LoRaWAN and NTN Reporting Paths

5.2 Positioning and Electronic Geo-fence

Multi-constellation GNSS provides periodic outdoor position reports. Positioning availability and acquisition time depend on satellite visibility, antenna orientation, weather, and the surrounding environment.

Configured electronic geo-fence boundaries are evaluated locally by the device. When a valid position is outside an enabled boundary, the device records an electronic geo-fence breach event for reporting. The number and geometry of supported boundaries depend on the approved firmware configuration.

5.3 Motion and Activity Monitoring

The accelerometer distinguishes movement from inactivity and accumulates movement time, in seconds, during each heartbeat period. The reported movement-duration data can be used by the application platform for activity-trend analysis; it does not itself constitute a health assessment.

The device also evaluates prolonged inactivity and high-intensity motion. A high-intensity motion alarm uses multi-event confirmation: at least 10 independent over-threshold motion events within a 10-second validation window are required to suppress false triggers from isolated vibration or impact.

5.4 Alarm and Event Management

Alarm	Trigger condition	Reported information
Low Battery Alarm	Battery level is below the configured low-battery threshold.	Battery level and alarm status
Geo-fence Breach Alarm	A valid local position is outside an enabled electronic geo-fence boundary.	Position and fence status
Abnormal Inactivity Alarm	Inactivity duration exceeds the configured threshold.	Movement duration and alarm status
High-Intensity Motion Alarm	At least 10 independent over-threshold motion events are detected within a 10-second validation window.	Movement duration and alarm status

5.5 Bluetooth and Local Maintenance

- BLE beacon scanning for nearby iBeacon-compatible positioning beacons
- Local configuration and device control
- Firmware update over Bluetooth
- Factory reset through the supported local BLE maintenance function

5.6 Power and Energy Management

- Solar-assisted charging reduces routine battery maintenance.
- Low-power protection and low-battery sleep help protect the rechargeable battery.
- Automatic wake-up resumes operation when the configured recovery condition is met.
- Shorter reporting intervals, long GNSS searches, and frequent NTN use increase energy consumption.

6. Power consumption & Battery Life

Power Consumption	
Standby Current	10 μ A
BLE Scanning	~ 0.012 mAh per scan
LoRaWAN Data Transmission	~ 0.01 mAh per transmission
GNSS Positioning	~ 0.24 mAh per positioning event
NTN Data Transmission	~ 1 mAh per transmission

Battery	
Battery Capacity	150 mAh
Battery Type	Li-Po
Battery Voltage	3.7 V

Battery Life	Without solar-assisted charging
GNSS Positioning Report	~ 290 times
Bluetooth Scanning Report	~ 6000 times
Typical Usage *	~ 24 days

- Note: The typical-usage estimate is based on four GNSS reports and 24 Bluetooth scans per day with LoRaWAN as the primary uplink and without solar charging. Frequent NTN fallback or NTN-only operation increases energy consumption. Actual battery life depends on reporting interval, satellite visibility, LoRaWAN availability, network registration time, ambient temperature, and solar exposure.

7. Solar power

Table 2: Solar Charging

Solar Charging		
Incidence angle	Relative irradiance	Technical description
0°	100%	When sunlight is perpendicular to the solar panel (normal incidence), charging conditions are optimal.
30°	~87%	With slight tilt, charging efficiency remains high.
45°	~71%	With moderate tilt, effective charging is still achievable.
60°	~50%	When irradiance is reduced by half, charging capability decreases significantly.
75°	~26%	When sunlight approaches a grazing angle, charging effectiveness becomes very weak.
90°	0	When sunlight is parallel to the panel surface, charging is nearly impossible.

Solar output varies with sun incident angle and follows the cosine law; typical effective power is 30-70% of peak value under field conditions.

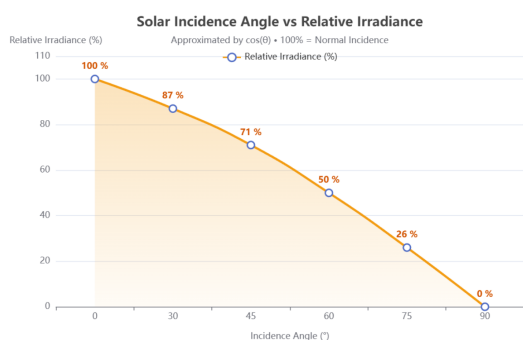


Figure 3. Solar Incidence Angle vs. Relative Irradiance Efficiency

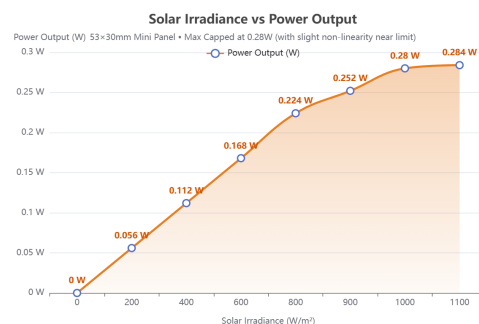


Figure 4. Solar Irradiance vs. Output Power

Real-world Performance & Sustainability

Energy Balance in Field Deployments The 0.28 W value is the panel's maximum rated output under favorable test conditions. Daily harvested energy depends on solar irradiance, panel orientation, dirt, shading, temperature, latitude, season, and animal behavior. Validate the complete energy budget using the selected reporting profile and expected NTN usage before deployment.

Weather & Seasonal Resilience

Low-Solar Periods: The rechargeable battery supports operation when solar input is limited, but autonomy is not guaranteed by a single published duration. Frequent NTN registration, long GNSS searches, cold temperatures, and short reporting intervals reduce operating time.

Winter and High-Latitude Operation: Short daylight hours, low sun angles, snow, and persistent cloud can reduce charging substantially. Increase reporting intervals and validate the energy budget for the deployment location.

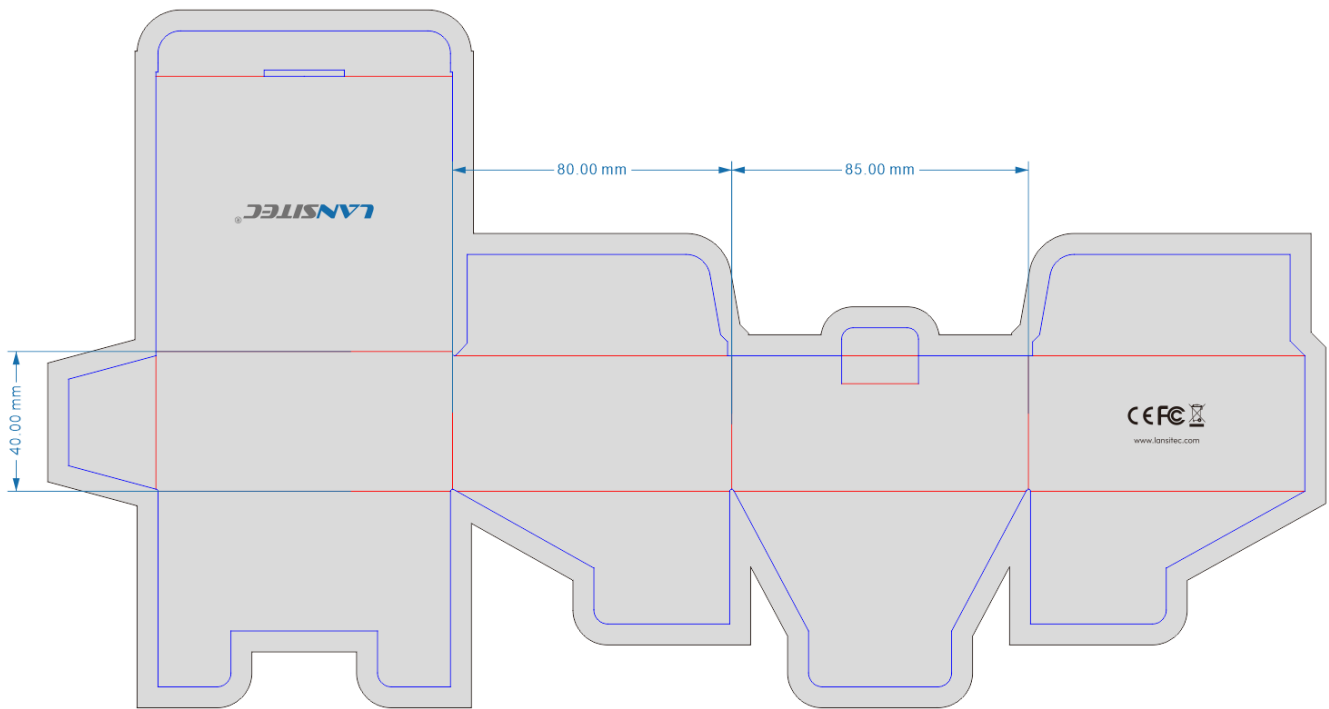
Low-Temperature Performance: Battery capacity, GNSS acquisition time, and NTN registration time can degrade near the lower operating-temperature limit. Verify the required reporting service level under the expected field temperature.

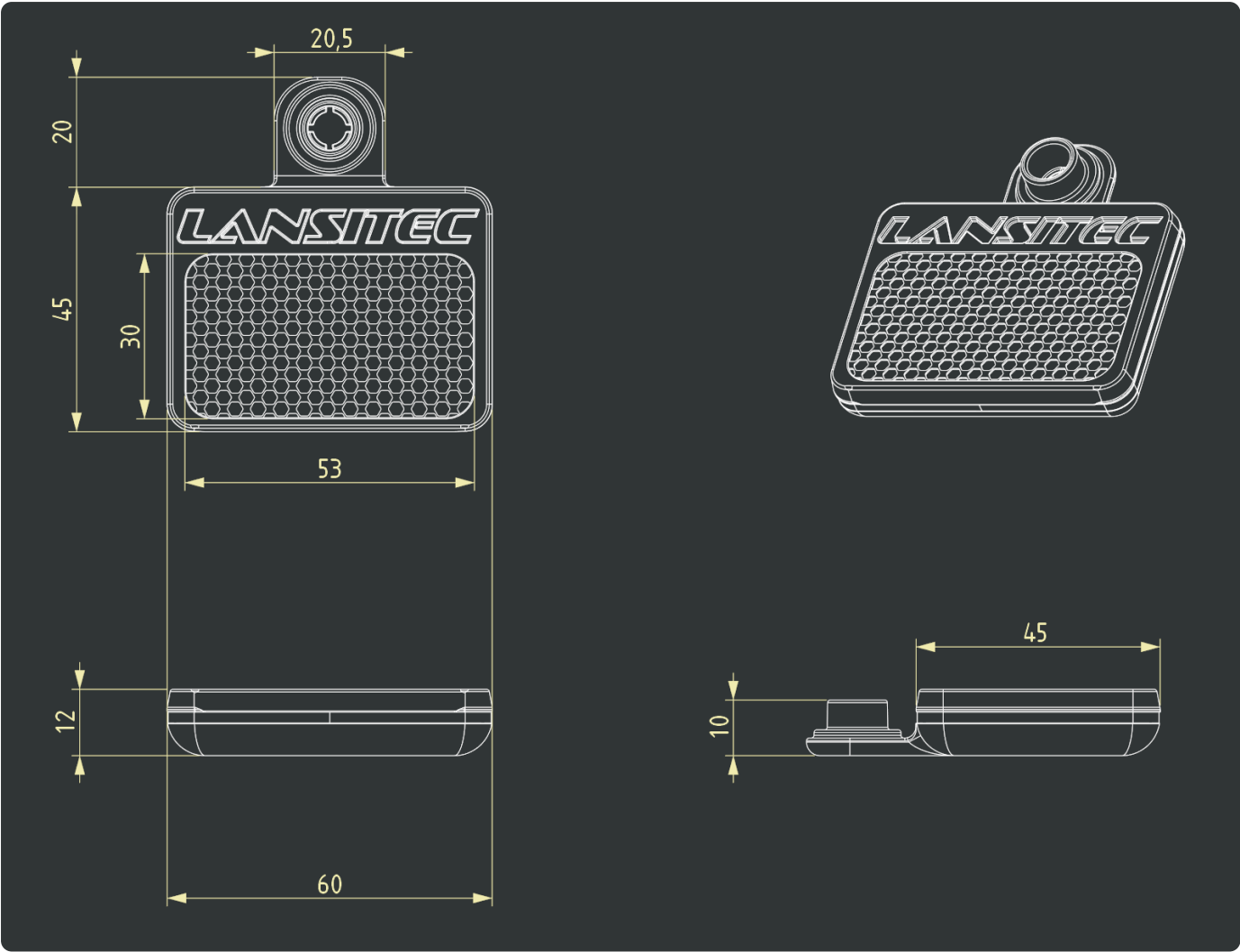
8. Environmental & Mechanical

Environmental	
Operating Temperature Range	-20°C ~ +60°C
Storage Temperature	-40°C ~ +85°C
Ingress Protection Rating	IP68
Operating Humidity	5% to 95% RH

Mechanical	
Housing Material	ABS+PC
Dimensions	60 × 45 × 12 mm
Weight	32 g
Mounting Methods	Ear-piercing installation with a compatible livestock ear-tag applicator
Solar Panel Power	0.28 W
Solar Panel size	53 × 30 mm

9. Packaging





Packaging item	Description
Standard content	One livestock tracking tag assembly and product documentation
Installation tool	Compatible ear-tag applicator; supplied only when included in the order
eSIM provisioning	Factory-soldered and profile-provisioned according to the ordered NTN configuration
Carton data	Packing quantity, carton dimensions, and gross weight are order-specific

10. Ordering Information

Description	PN
Livestock Tracking Tag, LoRaWAN + NTN, BLE 5.0, GNSS, 150 mAh	100-00LT3

Appendix

Reference Documents

Reference	Identifier
Lansitec NTN Livestock Tracking Tag Datasheet	990-01212
Lansitec NTN Livestock Tracking Tag User Manual	990-01213
Lansitec NTN Livestock Tracking Tag Protocol Specification	990-01214

Abbreviations

Abbreviations	Description
BDS	BeiDou Navigation Satellite System
BLE	Bluetooth Low Energy
CEP	Circular Error Probable
DFU	Device Firmware Update
FOTA	Firmware Over-The-Air
FDD	Frequency Division Duplex
IP	Ingress Protection (enclosure rating)
IPv4	Internet Protocol version 4
GNSS	Global Navigation Satellite System
LoRaWAN	Long Range Wide Area Network
MTU	Maximum Transmission Unit
NAS	Non-Access Stratum
NB-IoT	Narrowband Internet of Things
OTA	Over-The-Air
PN	Part Number
RSSI	Received Signal Strength Indicator
RRC	Radio Resource Control
NTN	Non-Terrestrial Network
eSIM	Embedded SIM (MFF2 surface-mount form factor)
UDP	User Datagram Protocol