Product Introduction

Debut® MINI (LoRa)

Debut MINI (LoRa) is a GPS-Solar-ACC tracker designed for attachment on back. Enabled by INTELINK, it can transmit data both via LoRa to professional gateways developed by Druid, or via INTELINK to your smart phone.

BASIC SPECIFICATIONS

MODEL	MINI (LoRa)	
	Standard version	M1 version
Appearance		
Housing	PC injection molding	Nylon 3D-printed
Color	Light brown	White
Weight	5.8±0.1g	5.2±0.1g
Dimensions (LWD, antenna excluded)	20.6 mm × 20.6 mm × 11.5 mm	20.5mm x 18mm x 10.5mm
Antenna	External, titanium alloy with protective coating	
Battery	30mAh lithium polymer rechargeable battery, with under-and-over-charging protection	
Battery Life	Over 300 GPS positions under optimal GPS satellite view at 5-minute interval	
Solar Type	GaAs solar unit (30% efficiency) with good performance under weak light	
GPS Module	Precision: CEP (50%) 5m Maximum update rate: 10 Hz	
Data Type	GPS: longitude, latitude, altitude, geoid height, course, satellite quantity ENV: voltage, light intensity, temperature BHV: ODBA (overall dynamic body acceleration) ACC: x/y/z acceleration data (upon request)	
Data Storage	- Flash memory: 16 MB - Regular data storage: 460 days at default setting (1h GPS+1h ENV+10 min BHV) - BOOST data storage: 280,000 pieces - ACC data storage: 28,700 pieces	
Working Temperature	-10°C~60°C (good for cold winter as close to animal body)	
Waterproof	IP 68	
Firmware Upgrade	OTA via INTELINK	
Working Schedule	Configurable via INTELINK	

DATA COLLECTION

■ **Regular Mode**

- GPS interval: 5 min ~1 day
- ENV interval: 5 min ~1 day
- ODBA interval: 10 min/30 min
- ACC interval: 25 Hz, 3 seconds in every 10 min (by default)

(Contact us if other settings are required.)

■ **INTELLIGENT FREQUENCY OPTIMIZATION & FLIGHT DETECTION (BOOST)**

The BOOST function intelligently increases data collection & transmission frequency when the charging condition is good or the bird is flying. The default setting is as below:

- Frequency Optimization: every 10 min/1 min
- Flight Detection: every 20 sec

With BOOST, the device portrays detailed movement tracks without manual intervention and avoids the possibility of battery drain due to radical settings in bad weather.

■ **Sleep Mode**

This mode is to deactivate the recording of certain data types for:

- a certain period (from minutes to months)
- a regular period each day (up to 16 hours)

DATA TRANSMISSION

■ **Transmission Module**

| Specifications	LoRa	INTELINK
Frequency Bands	150~960 MHz	2.4 GHz
Maximum Output Power	22 dbm	8 dBm
Maximum Data Rate	62.5 kbps	1 Mbps
Maximum Transmission Distance	5 km	50 m

■ **Transmission Strategy**

MINI (LoRa) use either LoRa or INTELINK to transmit data.

When it falls into the range of both LoRa and INTELINK communication, the choice will be

made based on the signal searching duty ratio preset for LoRa and INTELINK, respectively. By default, the duty ratio for LoRa is set lower than INTELINK in consideration of the high power consumption. This enhances the data transmission efficiency while takes better care of the energy balance.

HUB FOR MINI LORA

MINI (LoRa) can transmit data to HUB (LoRa). The transmission distance is typically 4-5 km via LoRa, and 50 m via INTELINK, in the field without barriers in between.

| MINI (LoRa) | Gateway | Cloud Server | Webpage / App |
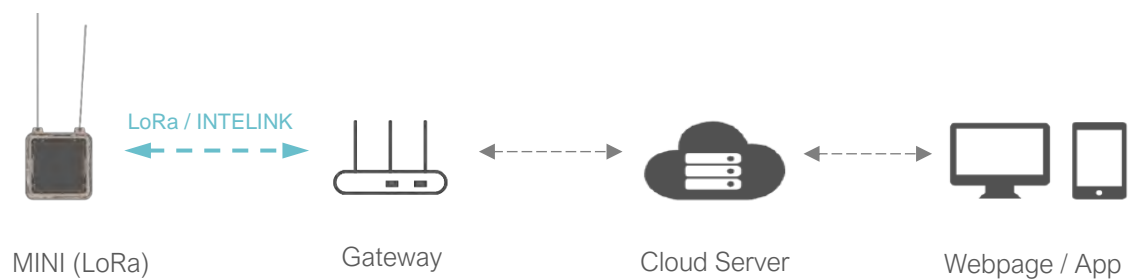
Once the HUB has received data from MINI (LoRa), it will automatically upload data to cloud server via its own network connection. If there's no network coverage, you can manually download the data from HUB.

You can deploy a HUB at a fixed spot in the field to scan for MINI (LoRa) continuously and unattended.

EXTRA FUNCTIONS brought by INTELINK®

Apart from providing an alternative and energy-economic way to download data, INTELINK® technology enables remote connection to your MINI (LoRa) devices to perform various operations and thus realizes many amazing functions.

To establish such connection, you only need an ordinary smart phone or/and a Debut series gateway device.

Debut gateways could be a HUB, TAG or QUEST. The connection distance is 30~50 m depending on environment. For more information about the gateways, please contact Druid or your local distributor.

■ Tracker Recovery

With ECOTOPIA App, a device and a mobile phone will automatically function as a beacon system. The mobile phone will ring if the device is detected nearby. The closer they are, the louder the ringing sound will be. This provides a convenient way to find lost devices.

■ Firmware Upgrade & Setting Modification

You can easily upgrade the firmware or change settings for a MINI (LoRa) device nearby using Ecotopia App.

■ Data Downloading

If the bird wearing MINI (LoRa) device flies to somewhere near a Debut gateway*, the data stored in the device memory can be automatically downloaded and sent to the cloud server via network connection of the HUB. Then, the researcher can see the data in their accounts.

■ Raw Acceleration Data Collecting

Raw x/y/x acceleration data could be very useful for behavioral research, especially when the data can be combined with timestamps, GPS, environmental data, and the bird's activity rhythm. However, continuous raw data can seldom be obtained due to its large size.

With INTELINK, you can not only download the raw data from memory, but also obtain real-time raw acceleration data by connecting a mobile phone to a MINI (LoRa) device.

■ In-situ Modeling

During the process of obtaining real-time raw data described as above, you can also mark the data with behavior tags. Ecotopia App provides comprehensive tools for In-situ modeling, which includes real-time x/y/z acceleration visualization and data downloading, video shooting, and behavior tagging. All these data will be combined under the timestamps and saved for later verification and analysis.

With the help of Druid's AniAct® behavior algorithm platform, you will be able to generate acceleration-based behavior algorithm for different species.

Furthermore, such algorithm can be loaded into the tracker and be conducted on board. Then, the tracker will be able to send back computed result of behavior tags continuously, instead of discontinuous raw data. This will expand the data dimensions and bring breakthrough on bird research and ecology conservation.