Global Messenger's IoB Initiative: Supporting an Asian Bird Migration Monitoring Network

To advance migratory bird research and international conservation collaboration across Asia, Hunan Global Messenger Technology Co., Ltd. (Global Messenger) plans to donate 50 Internet of Biology (IoB) monitoring base stations and 1,000 accompanying devices through an initiative presented at the Third Asian Ornithological Conference (AOC 2026).

The donation will comprise 500 VHF tracking tags and 500 electronic bird-banding tags, with each base station accompanied by 10 units of each type. Global Messenger will also provide technical support for system deployment and operation.

This initiative aims to support the development of a regional monitoring network across important Asian migratory flyways and key habitats. By enabling automated, long-term monitoring at multiple sites, the network will contribute to migration ecology research, the identification of critical habitats, and collaborative bird conservation efforts across national boundaries.

VHF tags:



IoB base stations:



About the Internet of Biology (IoB) System

Developed by Global Messenger, the Internet of Biology (IoB) is a network-based wildlife monitoring system integrating radio communication, Time Difference of Arrival (TDOA) positioning, Global Navigation Satellite System (GNSS) technology, and cloud-based data management.

The system comprises ultra-lightweight electronic tags and trackers, intelligent communication base stations, and a centralized cloud data platform.

It offers three key technological capabilities:

1. Smart Banding — Automated Identification and Detection

Weighing as little as 0.45 g, ultra-lightweight electronic tags enable automatic identification and detection of marked individuals as they enter the reception area of an IoB base station.

Depending on environmental and deployment conditions, detection ranges can reach approximately 5 – 30 km. Each detection generates a time-stamped record associated with an individual tag ID, enabling automated, non-invasive monitoring without the need for manual observation or recapture.

Smart Banding complements conventional bird ringing by providing continuous opportunities for electronic detection and long-term individual encounter records.

2. High-Throughput TDOA Positioning — High-Frequency Tracking with Low Power Consumption

Using Time Difference of Arrival (TDOA) technology, the IoB system estimates animal positions from differences in signal arrival times across multiple synchronized base stations, without requiring continuous onboard GNSS positioning.

With three or more appropriately positioned base stations, the system can support positioning at intervals as short as one second, with typical communication ranges of 3 – 5 km. Under optimized conditions, positioning accuracy can reach approximately 5 – 10 m.

This approach reduces energy requirements for animal-borne devices while enabling high-temporal-resolution movement data collection, supporting detailed investigations of space use, movement patterns, and fine-scale animal behavior.

3. Wireless Data Retrieval — Recovering Tracking Data Without Recapture

The IoB system supports tracking solutions combining GNSS positioning with VHF or Bluetooth communication, including selected ultra-lightweight trackers weighing as little as 0.75 g.

When a tagged animal enters the reception range of a base station, previously recorded tracking data can be downloaded automatically and transmitted to the cloud platform.

Depending on tracker configuration and environmental conditions, wireless data retrieval is possible over approximately 1 – 5 km, eliminating the need to recapture animals solely to retrieve stored data.

A single base station can independently perform automated detection, identification, and wireless data collection. Networks of multiple base stations additionally enable high-frequency positioning and coordinated monitoring across larger study areas.

Research and Conservation Applications

1. Fine-Scale Space Use and Habitat Ecology

Suitable for wetlands, protected areas, islands, and other defined study sites, the IoB system supports investigations of home ranges, habitat selection, spatial behavior, and daily activity patterns through network-based positioning or GNSS tracking.

2. Monitoring Key Sites Along Migratory Flyways

Base stations deployed at breeding grounds, migratory stopover sites, and wintering areas can automatically detect tagged individuals, generating records of site visitation and supporting estimates of migration timing, stopover duration, and connectivity among important habitats.

3. Monitoring Small-Bodied Animals

Ultra-lightweight tags enable monitoring of small birds, bats, and selected small mammals, facilitating long-term, multi-individual studies while minimizing the weight of animal-borne equipment.

4. Electronic Bird Ringing and Long-Term Encounter Monitoring

By combining conventional individual marking with automated electronic detection, IoB networks can generate repeated encounter records across sites and years. These data can support studies of site fidelity, migratory connectivity, survival, and long-term population dynamics.

Building a Collaborative Monitoring Network Across Asia

Through this donation initiative, Global Messenger seeks to collaborate with research institutions, bird ringing stations, protected areas, and conservation organizations across Asia to establish IoB monitoring stations at strategically important locations.

By connecting monitoring efforts across regions and promoting the accumulation and integration of long-term movement data, we aim to contribute to a more coordinated and effective approach to migratory bird research and conservation.

Connecting monitoring sites. Advancing migration research. Supporting bird conservation across Asia.