

工業技術研究院

Industrial Technology
Research Institute

Core Session- Taiwan 850MHz Trial Report Trial Overview

AHPC/CIAT/Wi-Fi Alliance
2026/06/04



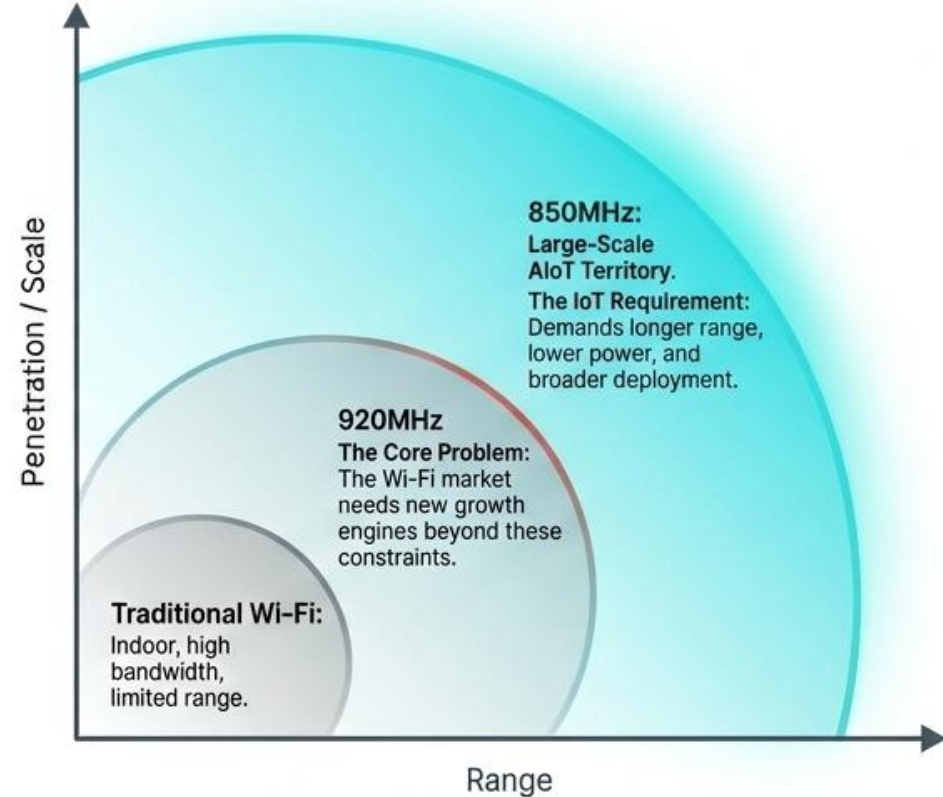
Agenda

- 920MHz VS 850MHz
- The 850 Alliance
- 850MHz Validation Roadmap
- Deployment Sites and Test Scenarios : Phase 1 and Phase 2
- Overall Results & Next Steps



Overcoming the constraints of legacy sub-GHz band

850MHz - The Solution	920MHz - The Constraint
<p>✓ Duty Cycle: Unrestricted operation.</p>	<p>✗ Duty Cycle: Strictly limited. Transmission capped at 10% per hour.</p>
<p>✓ Transmission Power: Up to 200mW (20dBm + 3dBi antenna gain). Unrestricted by restrictive regulations.</p>	<p>✗ Transmission Power: Limited to 40mW (13dBm + 3dBi antenna gain).</p>
<p>✓ Bandwidth/Throughput: Up to 30Mbps. Fully capable of continuous 4K video transmission and remote OTA software updates.</p>	<p>✗ Bandwidth/Throughput: Vulnerable to interference (LoRa, RFID overlap), Cannot support continuous video; OTA updates must be done on-site.</p>
<p>✓ Range: Theoretical Line of Sight (LOS) reaches 3–3.5km.</p>	<p>✗ Range: Theoretical Line of Sight (LOS) limited to 1.3–1.5km.</p>



The strategic alliance driving 850MHz commercialization



Leveraging Taiwan's IC design and system integration expertise to build an empirical reference model for Japanese frequency allocation and global AIoT deployments.

Taiwan-Japan 850MHz Wi-Fi HaLow Validation Roadmap

From Baseline Validation to Future AIoT Deployment

PHASE 1



Baseline & Reference Validation

Establish performance benchmarks and deployment models



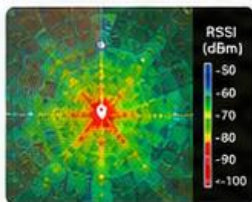
Reference Site Establishment



Campus Validation



Urban NLOS Testing



Coverage Mapping



Performance Benchmarking

RSSI · SNR · Throughput

OUTCOME

Establish performance benchmarks and deployment models



STATUS
COMPLETED

PHASE 2



Real-World Scenario Validation

Validate deployment feasibility in real-world environments



Coastal Fishery AIoT
AI Camera · Monitoring



Agricultural Connectivity
Open Field · Smart Farming



Long-Range Coverage
Single Gateway Deployment



AI Camera Validation
Streaming · Remote Monitoring

OUTCOME

Validate deployment feasibility in real-world environments



STATUS
COMPLETED

PHASE 3



Application & Interoperability Validation

Demonstrate commercial AIoT readiness and ecosystem interoperability



Multi-Vendor Ecosystem Interoperability



AI Cameras Intelligent Surveillance



Environmental Sensors Monitoring



Smart Agriculture Precision Farming



Smart Fishery Aquaculture Management



Drone Connectivity BVLOS · Inspection



Industrial Automation Smart Operations



Smart City Solutions Future Ready

OUTCOME

Demonstrate commercial AIoT readiness and ecosystem interoperability



STATUS
IN PROGRESS



TARGET SHOWCASE
COMPUTEX 2027



Performance Validation



Reference Site



Urban Testing



Coverage Mapping



Real-World Deployment



Fishery AIoT



Agricultural Connectivity



Long-Range Coverage



Future Ecosystem



Interoperability



AIoT Applications



Commercial Readiness

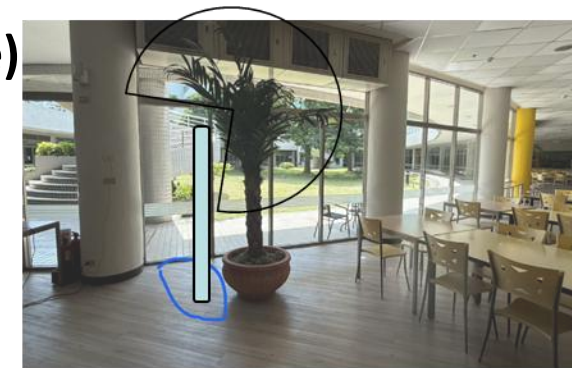
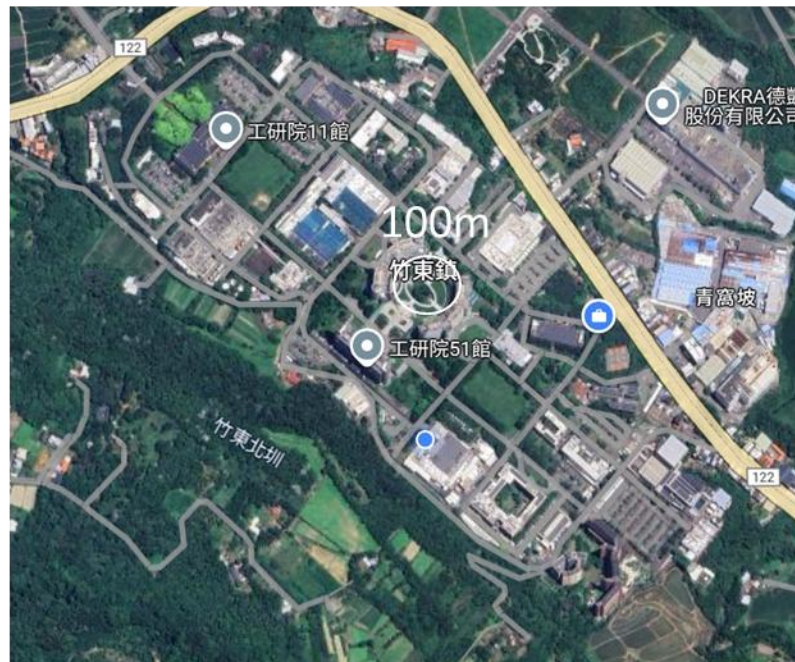
From Connectivity Validation to Real-World AIoT Deployment

Building the foundation for scalable 850MHz Wi-Fi HaLow ecosystems across Taiwan, Japan, and future global markets.

Phase 1

Baseline & Reference Validation

ITRI Campus (In-building, Reference Site)



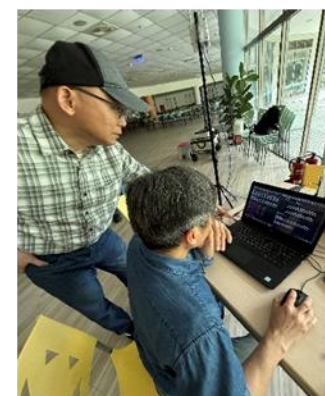
Location 1. Inside building 52/53 B1F (Business Area)



View of Business Area



Handheld spectrum For background noise inspection

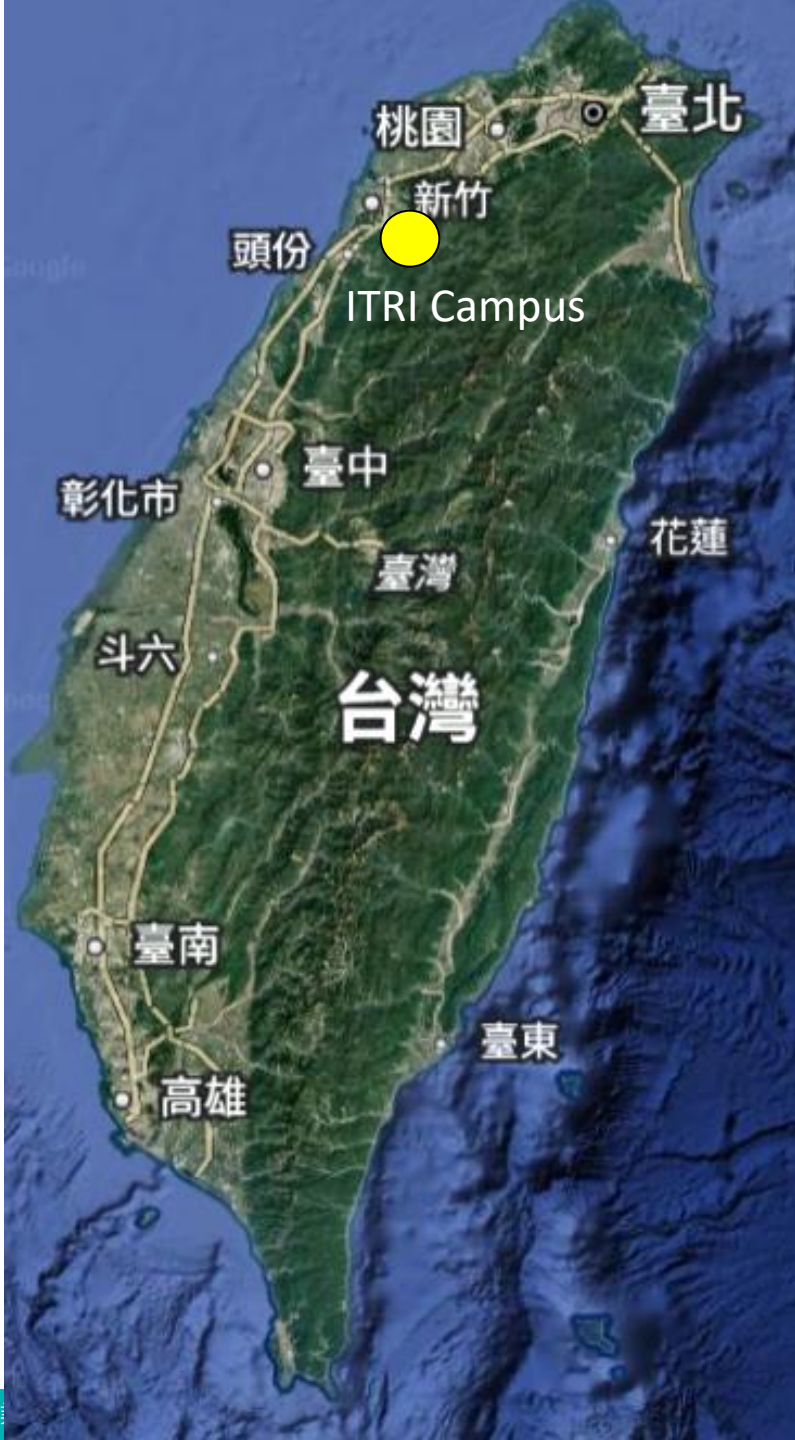


Testing with all efforts (IC/Device Vendor+AHPC)



Notification Board



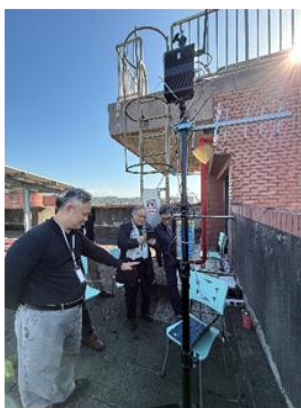


ITRI Campus (Outside-building, Reference Site)

- 89 Building (about 50m high)
- 52 Building (on the ground)
- 11 Building (about 15m high)



52 Building with setup 11 Building with setup



Testing with all efforts (IC/Deviice Vendor+AHPC)



Building 52 and Building 11 are obstacle by the bushes

ITRI Campus (Outside-building, 25 Points)



AP location



STA 1 location



STA 13 location (NLOS)



STA 19 location (NLOS)

Phase 2

Real-World Scenario Validation

SMART FISHERIES × SUSTAINABLE FUTURE

Empowering Fishing Communities Through Technology

The Value Journey of a Single Grey Mullet

By integrating smart technologies to monitor aquaculture environments and fish health, we can improve production efficiency and product quality, create new value for fishing communities, and achieve a more sustainable fisheries future.

CHALLENGES FACING FISHING COMMUNITIES



Aging Population

- Aging workforce in fishing villages
- Younger generations leaving rural areas
- Difficulties in passing down traditional knowledge



Labor Shortage

- Seasonal and physically demanding work
- Insufficient workforce availability
- Increasing recruitment challenges



Lack of Smart Management

- Heavy reliance on manual experience
- Limited real-time monitoring capabilities
- Lack of predictive alerts and decision support systems



Water Temp. 28.7°C
pH Value 7.8
Dissolved O₂ 5.6 mg/L
Alert
Notification

MULLET ROE PRODUCTION PROCESS

1 Net Harvesting



Fishermen work together in the ponds to harvest mature grey mullet.

2 Surround Net Capture



Fish are gathered and captured using surrounding nets.

3 Electrical Stunning



Fish activity is reduced through electrical stunning to minimize stress.

4 Blood Removal



Blood is drained to improve product quality.

5 Fish Sorting



Fish are graded according to size and maturity.

6 Roe Extraction



Mullet roe is carefully removed and inspected.



The roe is cleaned, salted, and shaped for processing.



Natural sun-drying creates premium golden mullet roe.

SMART TECHNOLOGIES TRANSFORM FISHING COMMUNITIES

- ✓ Reduce labor shortages
- ✓ Improve aquaculture management efficiency
- ✓ Enhance product quality and market value
- ✓ Promote sustainable development of fishing communities

THE FIVE KEY VALUES OF GREY MULLET

1 Mullet Meat

- Fine texture and rich flavor
- High-quality protein source
- Rich in Omega-3 fatty acids
- Suitable for grilling, steaming, and various culinary applications

2 Mullet Head

- Rich in collagen and protein
- Frequently used in traditional soups and local cuisine
- Popular ingredient in Taiwanese seafood dishes

3 Mullet Milt (Male Fish Milt)

- Delicate texture with a creamy taste
- Premium seasonal delicacy
- Rich in nutrients and protein
- Commonly used in Japanese and Taiwanese cuisine

4 Mullet Roe (Female Roe)

- Premium seafood delicacy
- Produced through salting, pressing, and sun-drying
- Distinctive umami flavor and firm texture
- One of Taiwan's most iconic fishery products

5 Fish Maw (Fish Bladder)

- Rich in collagen and protein
- Can be processed into fish maw products
- High nutritional and commercial value



SMART TECHNOLOGIES FOR EFFICIENT AQUACULTURE

Wi-Fi HaLow Wide-Area Connectivity

- Long-range wireless communication (up to 1 km or more)
- Excellent penetration capability
- Low power consumption for IoT deployment



Video Surveillance

- Real-time video monitoring
- 24/7 farm security management
- AI-assisted anomaly detection



Electronic Geofencing

- Define virtual farm boundaries
- Unauthorized access alerts
- Enhanced farm security



Water Quality Monitoring

- Real-time monitoring of:
- Water Temperature
 - Dissolved Oxygen
 - pH Value
 - Water Quality Indicators
- Automatic alerts support proactive management decisions.



FISHING VILLAGE × SEAFOOD EDUCATION

Through on-site guided tours, fisherman-led experiences, fish processing demonstrations, and seafood education programs, visitors can better understand:

"Behind every piece of mullet roe lies the story of a fishing community, its culture, and its industry."



Guided Interpretation
Understanding local fisheries and aquaculture



Student Learning
Exploring grey mullet ecology and aquaculture practices



Interactive Experience
Hands-on processing and seafood activities



Cultural Heritage
Passing down fisheries knowledge and traditions

ALIGNMENT WITH UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS (SDGs)

2 ZERO HUNGER



Ensuring food security through sustainable aquaculture

4 QUALITY EDUCATION



Promoting seafood education and fisheries literacy

8 DECENT WORK AND ECONOMIC GROWTH



Creating employment opportunities and increasing fishery value

11 SUSTAINABLE CITIES AND COMMUNITIES



Supporting the sustainable development of fishing villages

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Maximizing resource utilization through whole-fish value creation

14 LIFE BELOW WATER



Protecting marine resources and promoting sustainable fisheries

17 PARTNERSHIPS FOR THE GOALS



Building collaboration across industry, academia, and government

TECHNOLOGY EMPOWERS FISHING COMMUNITIES DATA DRIVES THE FUTURE

Smart Technology × Traditional Knowledge
= Better Quality × Higher Value × More Sustainable Fisheries



Zhubei Coastal Fish Farm



The AP location



The STA 1 location (LOS)



Discussing with the fisherman



The STA 2 location (NLOS)



SMART AGRICULTURE × CIRCULAR ECONOMY

Technology Empowers Rural Communities for a Sustainable Future

Using WiFi HaLow and smart sensing technologies to build low-power, long-range agricultural networks, enabling real-time field monitoring, precise resource management, and circular use of agricultural resources for a more productive and sustainable future.

CHALLENGES FACING AGRICULTURE

<p>Aging Population</p> <ul style="list-style-type: none"> • Aging farming population • Low interest of youth in farming • Gap in experience and knowledge transfer 	<p>Labor Shortage</p> <ul style="list-style-type: none"> • Severe seasonal labor shortage • Rising labor costs • Time-consuming manual field work 	<p>Climate Change Risks</p> <ul style="list-style-type: none"> • More frequent extreme weather • Difficult water management • Higher risks of pests and diseases 	<p>Lack of Real-time Data</p> <ul style="list-style-type: none"> • Management relies on experience • Unable to grasp field conditions in real time • Lack of early warning and decision support
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SMART AGRICULTURE MANAGEMENT

<p>Soil Monitoring</p> <p>Monitoring:</p> <ul style="list-style-type: none"> • Soil Moisture • Soil Temperature • EC • pH <p>Benefits:</p> <ul style="list-style-type: none"> • Precision irrigation • Save water • Improve yield 	<p>Water Level Control</p> <p>Monitoring:</p> <ul style="list-style-type: none"> • Water Level • Flow Rate <p>Benefits:</p> <ul style="list-style-type: none"> • Auto irrigation • Auto drainage • Improve water use efficiency 	<p>Micro Weather Station</p> <p>Monitoring:</p> <ul style="list-style-type: none"> • Temperature • Humidity • Rainfall • Wind Speed • Sunlight <p>Benefits:</p> <ul style="list-style-type: none"> • Pest & disease prediction • Disaster risk alert 	<p>AI Decision Platform</p> <p>Functions:</p> <ul style="list-style-type: none"> • Alerts & Alarms • Irrigation Advice • Crop Growth Analysis • Yield Prediction <p>Benefits:</p> <ul style="list-style-type: none"> • Increase yield • Reduce risk • Lower cost
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FARM EDUCATION & COMMUNITY ENGAGEMENT

<p>Farm Tours</p> <p>Learn about smart agriculture and sustainable farming</p>	<p>Student Learning</p> <p>Understand sensors, data, and crop growth</p>	<p>Hands-on Experience</p> <p>Experience smart irrigation and field monitoring</p>	<p>Agricultural Culture</p> <p>Discover local farming culture and rural lifestyles</p>
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“Behind every grain of rice is the story of a community, technology, and a sustainable future.”

WiFi HaLow SMART FIELD NETWORK



Why WiFi HaLow?

- Wide Coverage**
Covers large agricultural areas with a single gateway
- Strong Penetration**
Works well in trees, orchards, and hilly terrains
- Ultra-Low Power**
Battery can last for years
- Massive Connectivity**
Supports a large number of sensors and devices
- Cost-Effective**
Lower deployment and maintenance costs

AGRICULTURAL CIRCULAR ECONOMY VALUE CHAIN



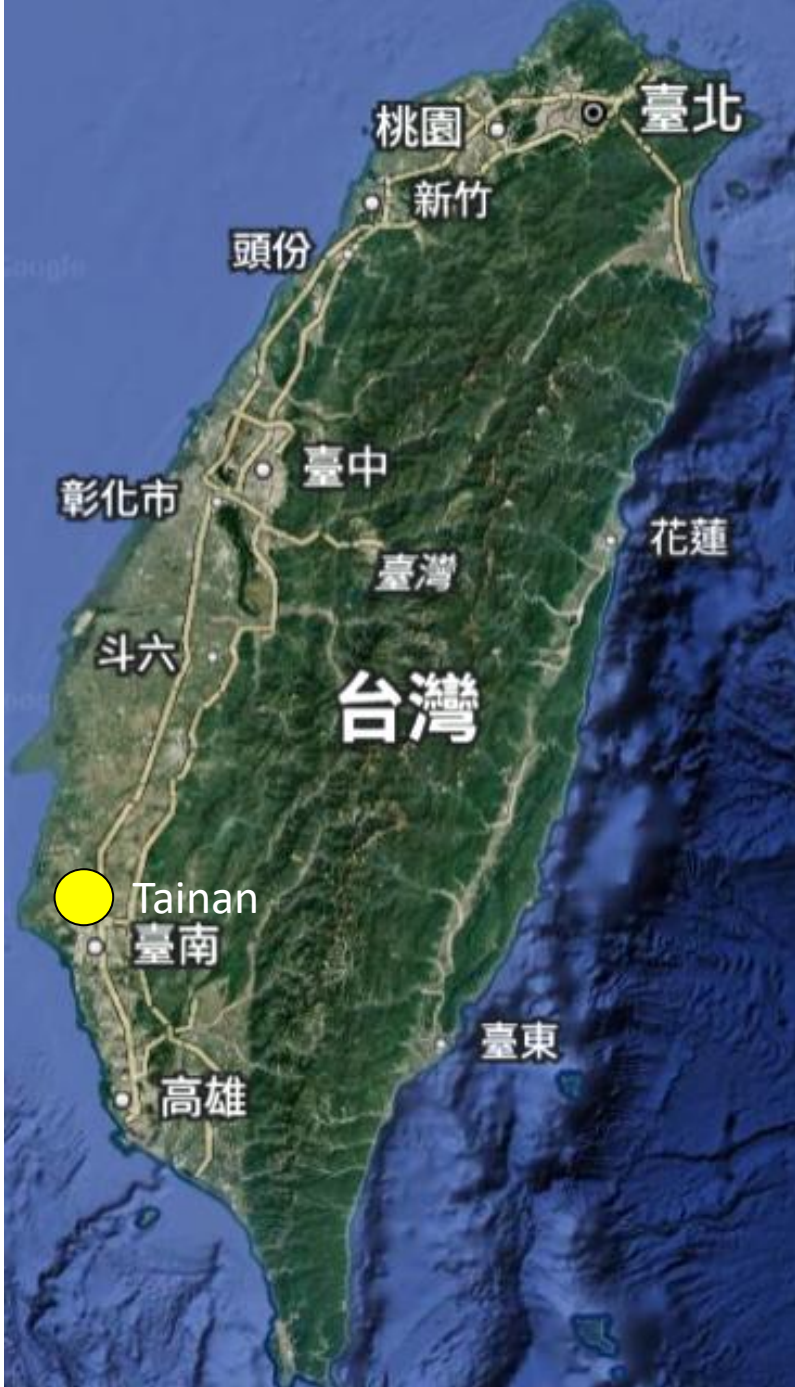
CONTRIBUTING TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS(SDGs)

<p>2 ZERO HUNGER</p> <p>Improve food production efficiency and food security</p>	<p>4 QUALITY EDUCATION</p> <p>Promote agricultural education and lifelong learning</p>	<p>6 CLEAN WATER AND SANITATION</p> <p>Improve water use efficiency in agriculture</p>	<p>8 DECENT WORK AND ECONOMIC GROWTH</p> <p>Increase productivity and rural income opportunities</p>	<p>11 SUSTAINABLE CITIES AND COMMUNITIES</p> <p>Promote sustainable rural development and innovation</p>	<p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p> <p>Build circular economy and reduce waste and pollution</p>	<p>13 CLIMATE ACTION</p> <p>Enhance climate resilience and reduce greenhouse gases</p>	<p>15 LIFE ON LAND</p> <p>Protect ecosystems and reduce chemical use in agriculture</p>	<p>17 PARTNERSHIPS FOR THE GOALS</p> <p>Strengthen partnerships among government, industry, and communities</p>
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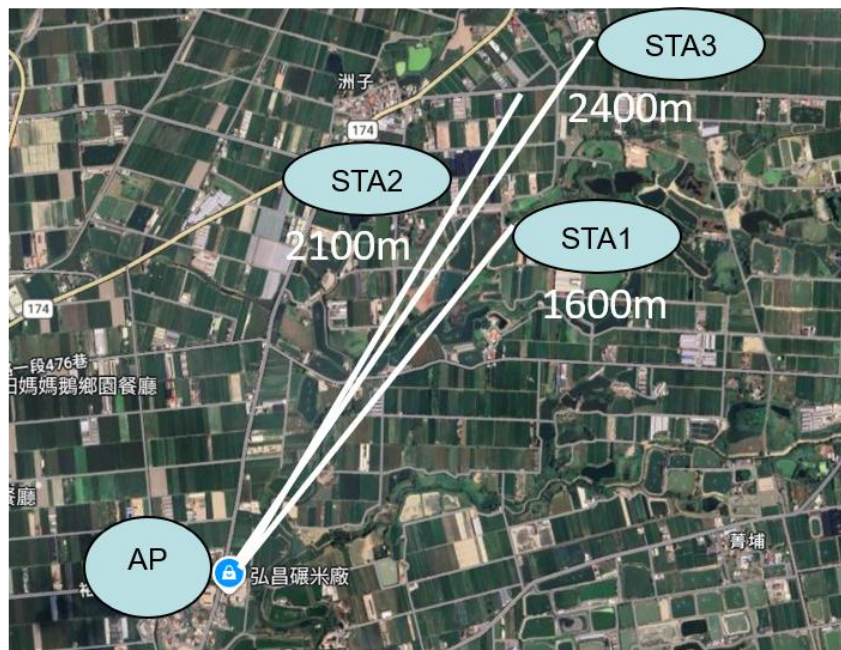
TECHNOLOGY EMPOWERS AGRICULTURE
DATA DRIVES CIRCULAR FUTURE

WiFi HaLow × Smart Sensing × Circular Economy
Higher Efficiency × Lower Waste × Greater Resilience × More Sustainable Agriculture





Tainan Open Farmlands



The STA 1 location (LOS)



The STA 2 location (NLOS)



The AP location with goose farm and drone operation around



The STA 3 location (NLOS)

Overall Results

>1 km

Stable, consistent connectivity.

Proven building-to-building practicality in high-density areas.

~2.4 km

Maximum range achieved in open fields.

High cross-vendor deployment potential verified.

The 850MHz band successfully bridges the gap between traditional Wi-Fi, low-bandwidth IoT, and costly 5G private networks. The Taiwan-Japan ecosystem is fully prepared to support immediate commercial integration and spectrum allocation.

Conclusion & Next Steps: Scaling the Ecosystem

This trial is not the end of validation. It is the beginning of a new global Wi-Fi HaLow ecosystem.



2026: Refinement & Interoperability

- Finalize Phase 3 application testing.
- Produce Golden Samples.
- Conduct multi-vendor Interoperability Events.

2027: Pre-Commercialization

- Launch Japan pre-commercial pilots based on validated data.
- Deploy integrated Vertical Solutions (Fishery/Agri).

2028: Global Expansion

- Scale the Taiwan-Japan model into broader ASEAN and global sub-GHz Wi-Fi markets.