NEWRACOM

A New Era of Hybrid Connectivity - WiFi HaLow

June 6th 2024
Frank Lin
VP of Global Sales & Marketing

Key Messages

- NEWRACOM Corporate History
- 802.11ah HaLow Standard
- Technology Utilization & Value Proposition
- NRC7394 SoC Solution – Proven Performance
- Commercialized / Market Proven Applications

Corporate Timeline

NEWRACOM

2014
Wi-Fi Team Spun off from ETRI

Established NEWRACOM in California, US

2016
Established leadership in IEEE 802.11 (Wi-Fi) Standardization

World's-first successful 802.11ah field test

2019
Received 802.11n WFA Certificate

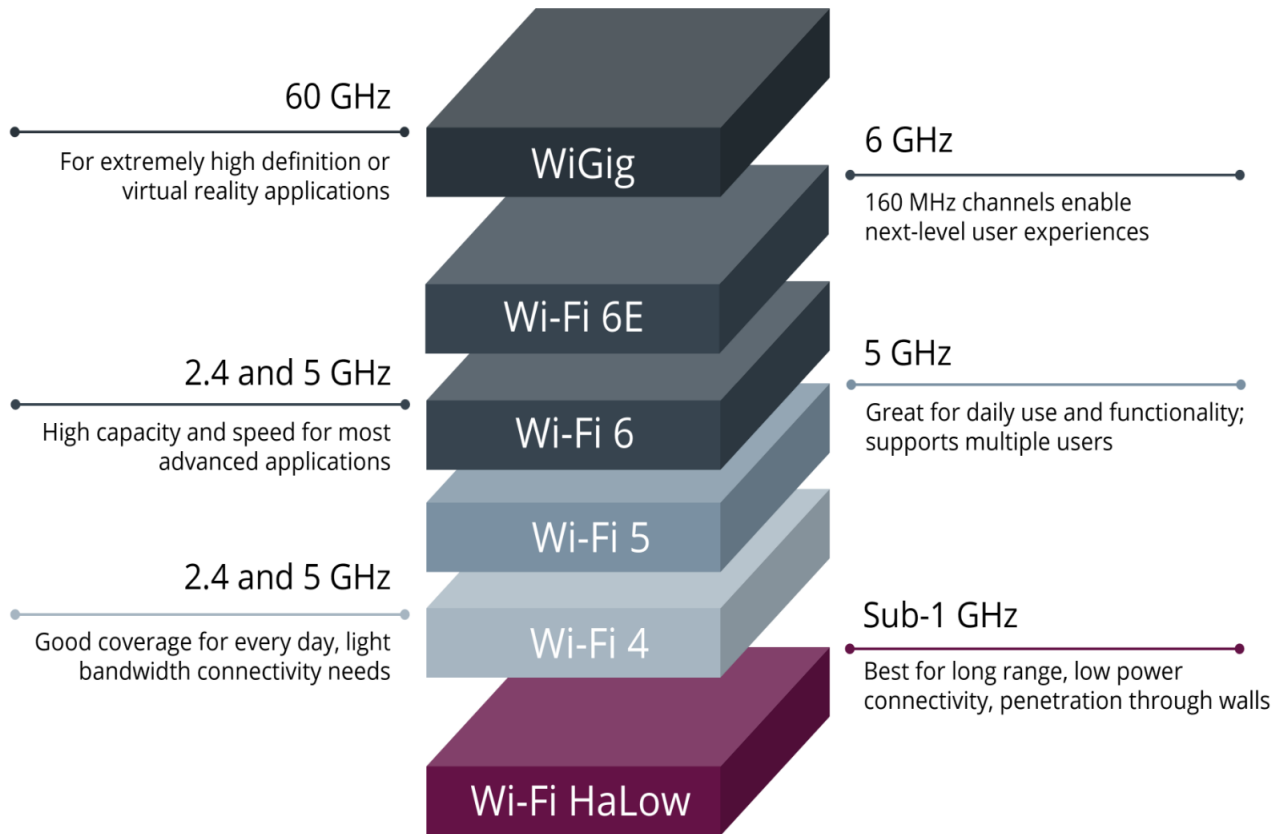Introduced world-first production 802.11ah SoC NRC7292
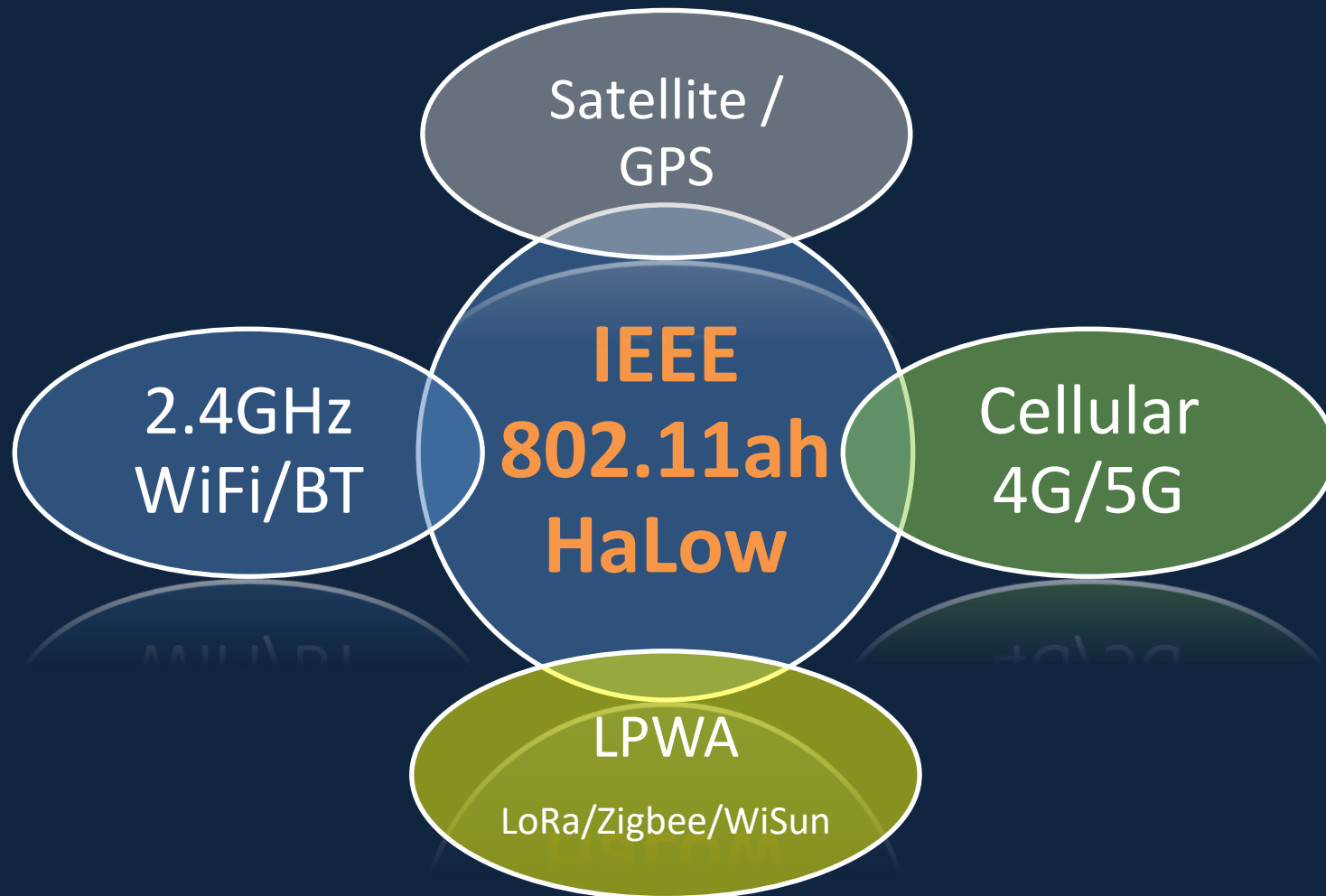
2021
First 802.11ah commercial products launched

Introduced world's first FCC certified solution

Newracom Corp. URL: Newracom - 802.11ah Wi-Fi HaLow System-On-a-Chip Manufacturer

3

Will WiFi HaLow makes a difference?

- 60 GHz — For extremely high definition or virtual reality applications
- 6 GHz — 160 MHz channels enable next-level user experiences
- 2.4 and 5 GHz — High capacity and speed for most advanced applications
- 5 GHz — Great for daily use and functionality; supports multiple users
- 2.4 and 5 GHz — Good coverage for every day, light bandwidth connectivity needs
- Sub-1 GHz — Best for long range, low power connectivity, penetration through walls

WiGig / Wi-Fi 6E / Wi-Fi 6 / Wi-Fi 5 / Wi-Fi 4 / Wi-Fi HaLow

- ○ **Complementary** to existing WiFi network
- ○ **Cost and power sufficient** for MASS-DEPLOYMENT
- ○ **Full IEEE global compliance**
- ○ **Time to Market**
- ○ **Increase usage ratio**

WFA URL: Wi-Fi CERTIFIED HaLow | Wi-Fi Alliance

Seamless Connectivity (Value Proposition)

Satellite / GPS

2.4GHz WiFi/BT

IEEE 802.11ah HaLow

Cellular 4G/5G

LPWA

LoRa/Zigbee/WiSun

Cellular:
Alternative **cost effective** network coverage expansion (SIM-less). Increase ARPU & applications

WiFi/BT:
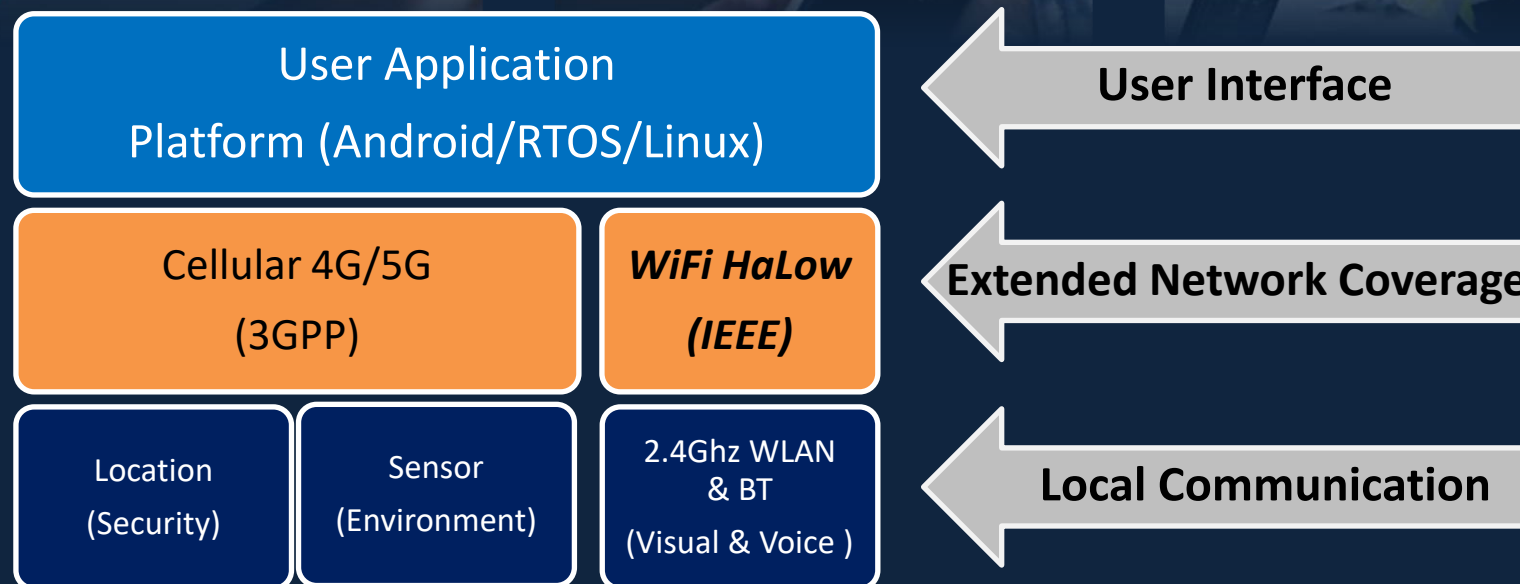**Improve** signal penetration under noisy & weak signal environments – remote data access

LPWA:
**Increase throughput & data capacity** with real-time notification

Satellite & GPS:
Location **sharing** in rural areas ground level local wireless network with mobility

5

Seamless Connectivity (User Scenario)

User Application
Platform (Android/RTOS/Linux)

⟵ **User Interface**

Cellular 4G/5G (3GPP)	*WiFi HaLow (IEEE)*

⟵ **Extended Network Coverage**

Location (Security)	Sensor (Environment)	2.4Ghz WLAN & BT (Visual & Voice)

⟵ **Local Communication**

- Paradigm shift to **"IoT for Individual"**
- Work, leisure or on the move!
- Always connected – **Anywhere Anytime**
- **Ultra low power & small size** are two essential factors
- *Powered by NEWRACOM NRC7394*

Key Challenges for "Mass IoT Deployment"
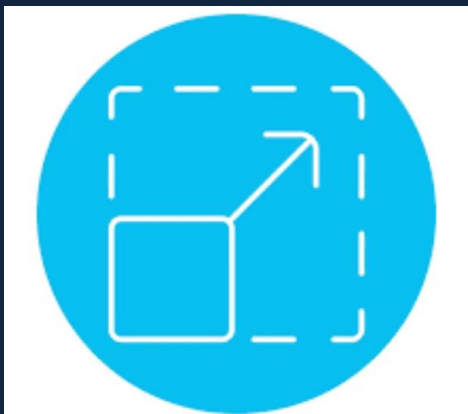
Scalability
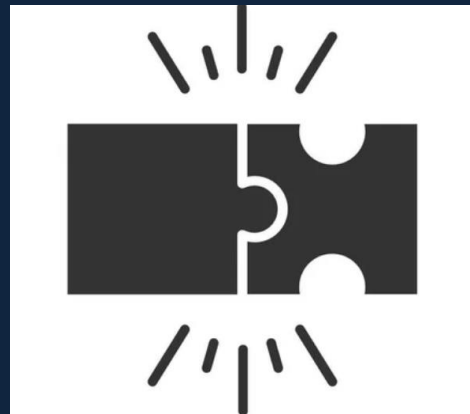
Compatibility

Implementation

Usability

- 3GPP compliance required operator network infrastructure support.
- Complicated product development and commercialization.
- Lack of global unified standard for Mass-market adaption.
- Lack of personal IOT applications and user scenarios.
- Technical limitations on data rate and low utilization – limited applications
- Low usage rate = low profitability.

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World Smallest Production SoC (since 2018) and SoM (System on Module)
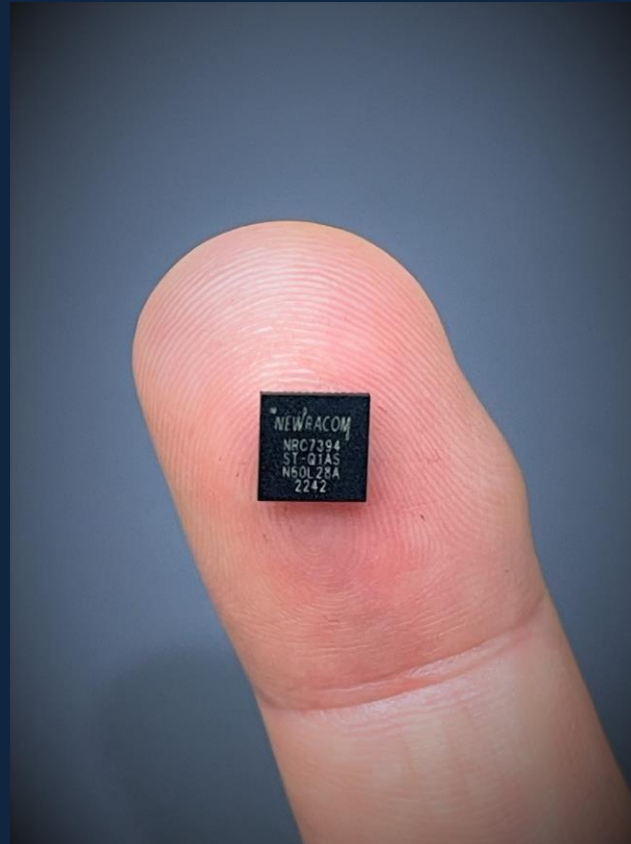
arm Cortex-3

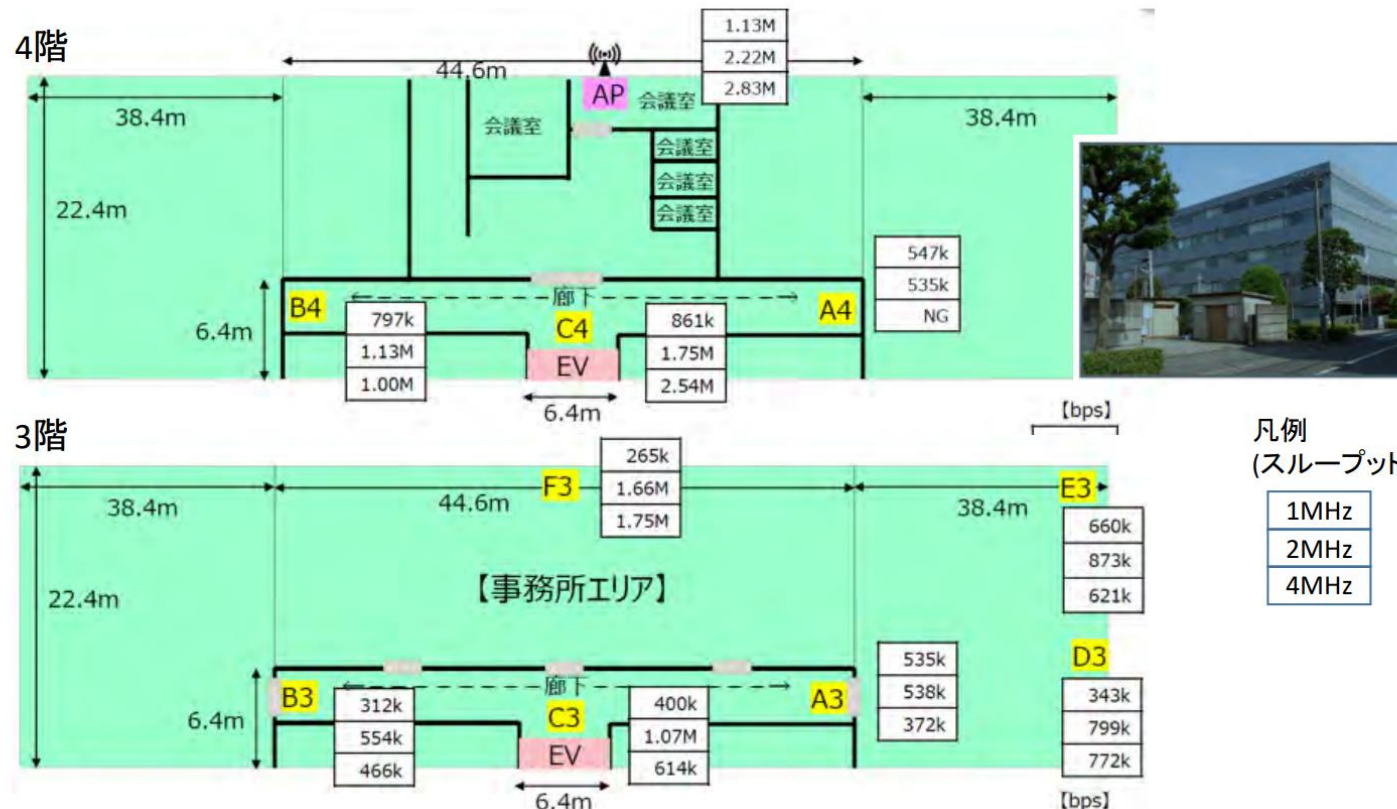Linux and RTOS support

Device or AP Mode (software)

Global-version

17dBm – Power amplifier

6x6mm QFN - TSMC 40nm

3rd Generation SoC

Multi-path and Interference Challenge


① 屋内・オフィス環境での伝送特性

1台のAPで複数のフロアをカバー

- o **In-building signal penetration**

- o **Real user environment verifying multi-path and signal interference**

- o **Device mobility and signal stability test**

Underground Parking Test Challenge - Taipei

o Left to right indoor/underground image/video test (AP inside 1st floor meeting room)
o Superior signal and data penetration in underground parking.
o Building walk-around test & external wall signal penetration.
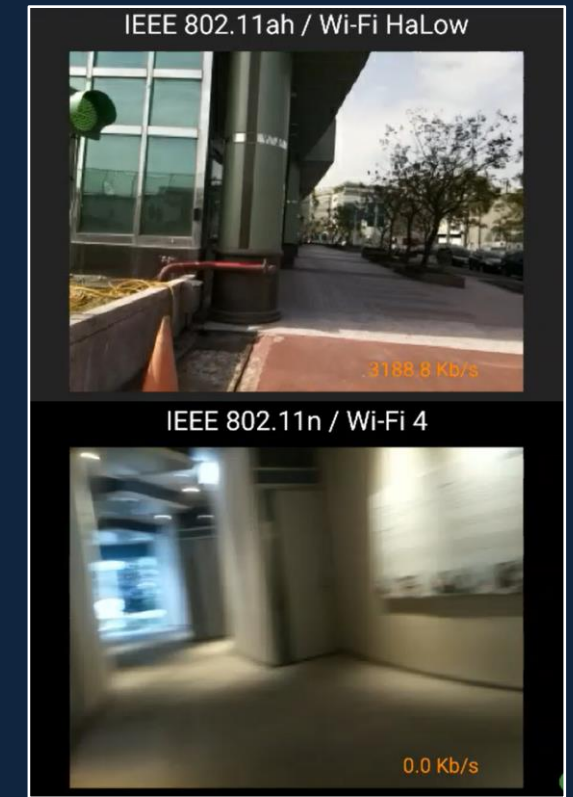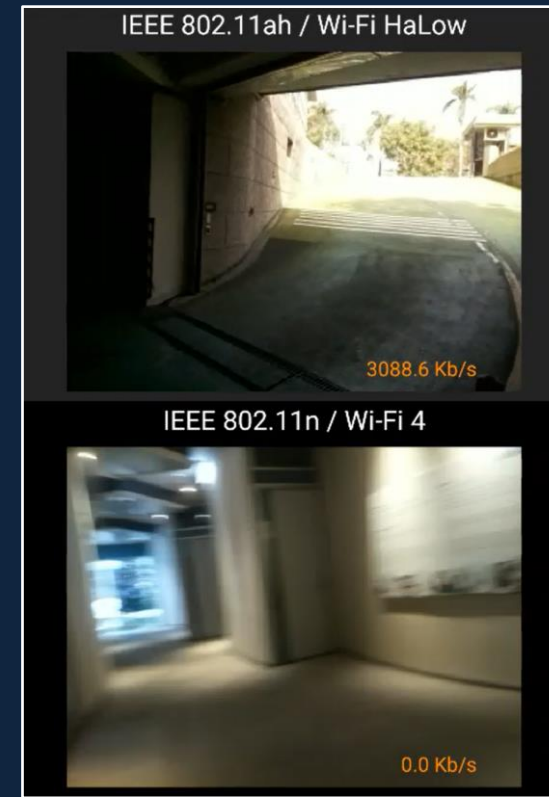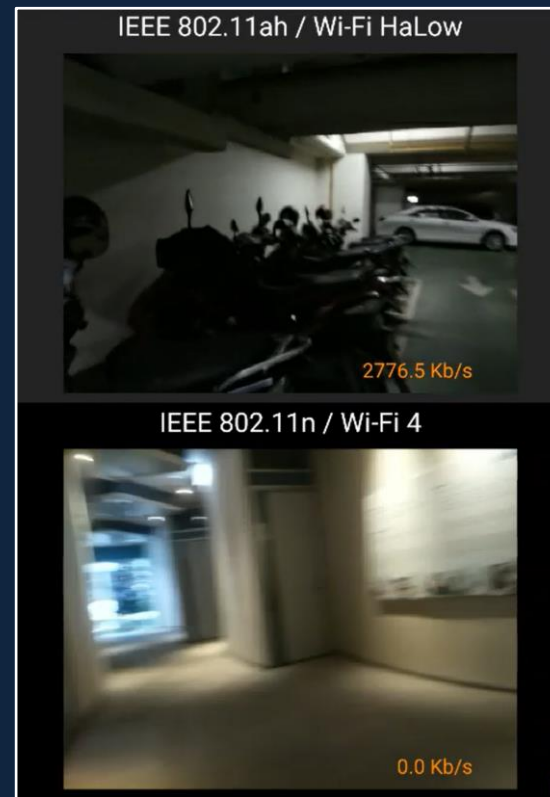
Highspeed & In-Vehicle Test Challenge - Taiwan

o Live field test in Taiwan both highway and local traffic condition
o Image/video transmission under harsh environments- Multipath, vibration and wind and static noise
o Velocity test under high-speed and dynamic environments.
o Signal penetration and stability validation.

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③屋外ルーラルの測定結果： 海面反射波の影響

■ 海面反射のある沿岸部において、既存の2波モデルをベースとした伝搬モデルによって伝搬損失が推定できることを確認
■ 2.5km離れた場所でも、**2MHz伝送で1.3Mbps、4MHz伝送で約2Mbps**のスループットを確認

船@2.5kmポイント→灯台

スループット [kbps]

	1MHz	2MHz	4MHz
	786	1320	1950

2.53km

灯台

調査船
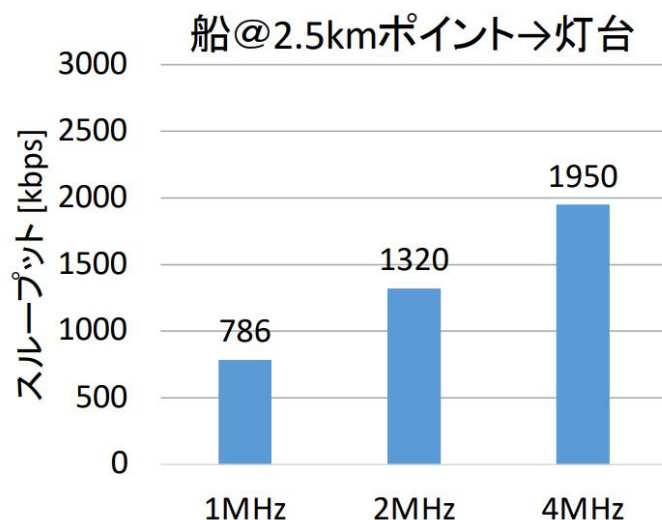
調査船位置: N 35 12.990, E 139 8.785

20

o Maximum line of sight distance over 2.5km and close to 2Mbps.
o Lowest cost local area network for emergency communication & remote data access.
o Drone/UAV, UGV and other smart transportation data management network.

SUNMI Hyper WiFi Business-IoT Solution

- ○ Common problems for retailer, factory/building automation and large arenas
- ○ Poor and no cellular coverage. Short-range wireless connection is unusable and traditional LPWA solutions with very limited data capacity, i.e. real-time notification for security monitoring applications

Poor wall penetration.

Slow speeds in crowded areas.

Roaming and unstable connection in large warehouses.

13

SUNMI Hyper WiFi Business-IoT Solution

DESIGN AWARD 2024

Smart Mobile Terminal
SUNMI V3 MIX
MIX, the all-in-one enterprise tablet.

SUNMI Hyper Wi-Fi Module
Compatible with SUNMI HYPER WI-FI

o Seamless Wireless Connectivity
o Multi-radio Hybrid Network Solution
o World First All-band 802.11ah Total Solution
o *Powered by* **NEWRACOM NRC7394 SoC**

SUNMI 80mm Kitchen Cloud Printer
One printer for online and offline orders.
Compatible with SUNMI HYPER WI-FI

SUNMI MINI AP
Mini in size, powerful in communication.
Powered by SUNMI HYPER WI-FI
Plug and play to get Hyper Wi-Fi ready for use.
No need to change how your device is connected.

14

SUNMI Hyper WiFi Business-IoT Solution

- Significant network cost saving
- Increase Productivity
- Sufficient data capacity and real-time notification

10X+	1km	90%↓
The Distance Other Wi-Fi Can Travel	Maximum Range	Roaming Times
Better Wall Penetration		Prevent Devices From Being Stuck, Latency and Disconnection

15

SUNMI Hyper WiFi Business-IoT Solution

SUNMI Home (Xiaomi ecosystem chain focuses in the field of smart business)

It is located on the 3rd floor of Taipei Sanchuang Living Park. "Sunmi Home" is a shared experience space operated by Sunmi Technology, which provides experience in application scenarios created by different industries, as well as a variety of Android smart retail solutions. Introducing the advantages of the Internet into the chain franchise industry Merchants, such as the self-service check-in machine of the hotel system, only need to check in through facial recognition when checking into the hotel, and the payment system can directly complete the purchase through facial recognition. A variety of application scenarios are displayed on site to experience POS machines and demonstrate the catering industry.
In the store, consumers can pay directly and quickly through facial recognition.

16

AcSiP Logistic / Automation Display

On March 1st 2024, AcSiP and NEWRACOM signed a global strategic agreement (MoU) to jointly develop new application 802.11ah markets. AcSiP's latest NRC7394 system module with industry leading ultra-low power and small footprint for battery powered devices.

- **arm** **Cortex M3**

- **Integrated PA**
- **12 x 12mm SoM**
- **Eink Partnership**
- **World-First WiFi HaLow Logistic Tag**
- **Solution available Q3 2024**

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SONY

SPRESENSE用 WiFi Halow 拡張ボード(VIZMONET)

VIZMO
FREEDOM FROM WIRES

ahSP1

Contact **Headquarters**
Web: www.vizmonet.com Vizmonet Pte Ltd
Email: enquiry@vizmonet.com 21, Woodlands Close
#03-01, Primz Biz Hub
Singapore 737 854

IEEE 820.11 ah
High-Performance, World's first WiFi-HaLow module available for SONY SPRESENCE

Sub GHz ISM Band
902 MHz to 928 MHz operating Frequency in license-free Band, 1/2/4 MHz Channel Bandwidths

Industrial grade
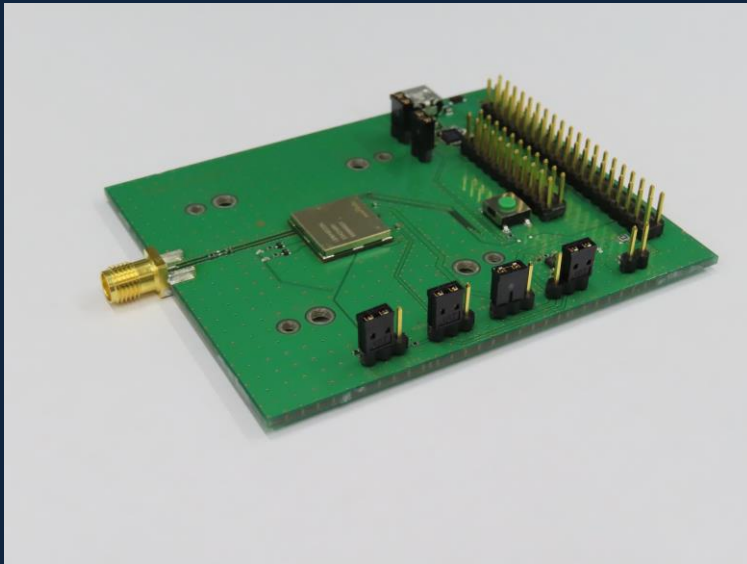-40 deg C to +85 deg C operation temperature

Transportation

Society 5.0

Industr4.0

Smart Farming

Murata Type 2HL Module – Smart Energy & Automation
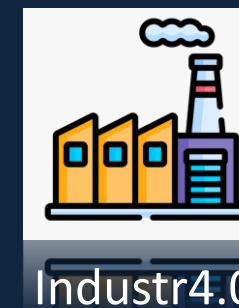
Murata's first 802.11ah HaLow System on Module
Powered by **NEWRACOM NRC7394 SoC**
Global Strategic Partnership for World-wide promotion
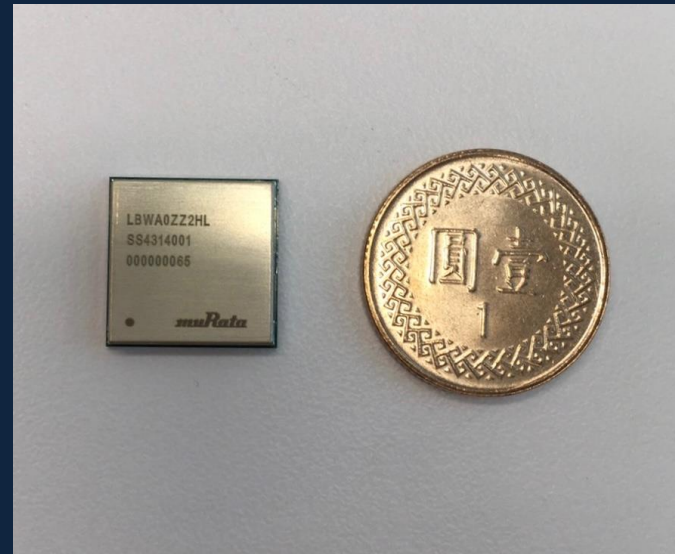
arm **Cortex-M3**

Linux and RTOS support

Client or AP Mode (software)

Support 850 to 950MHz

13 x 13mm SoM

LBWA0ZZ2HL
SS4314001
000000065

"参考出展" 製品化未定につき予告なく製品化中止になる可能性があります
"Reference exhibit." Commercialization is undecided and may be discontinued without notice.

19

o Joint development with Tier-1 automotive system solution
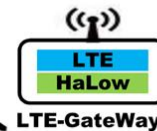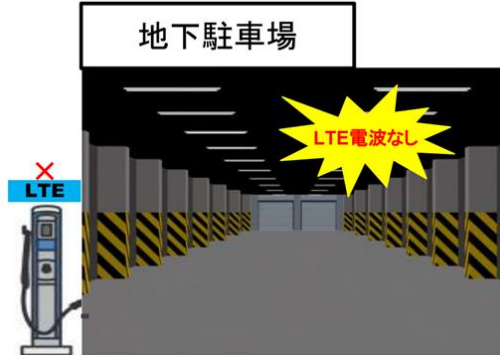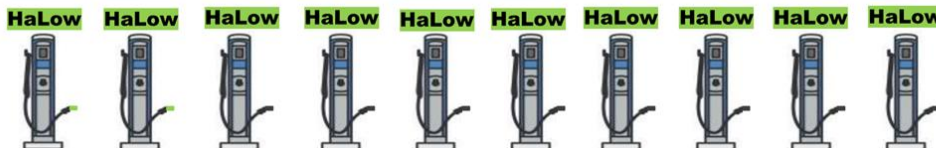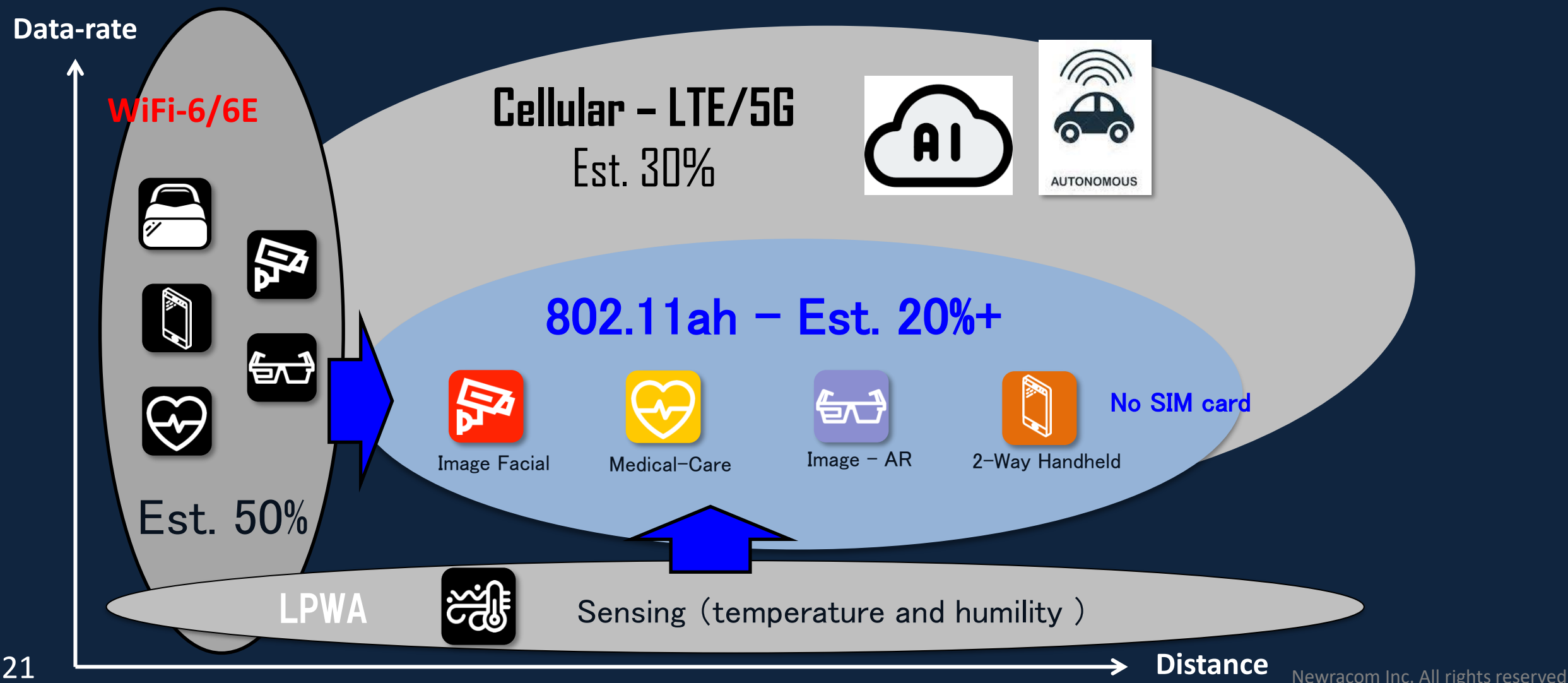o Seamless network expansion and reduce operating cost by 75%

Key Scenarios:

o V2V (Vehicle-to-Vehicle) safety and collision prevention
o V2I (Vehicle-to-Infrastructure)
o Vehicle smart & connected diagnostic
o Smart transportation networking
o Vehicle remote access & automation
o Route guidance and fleet management
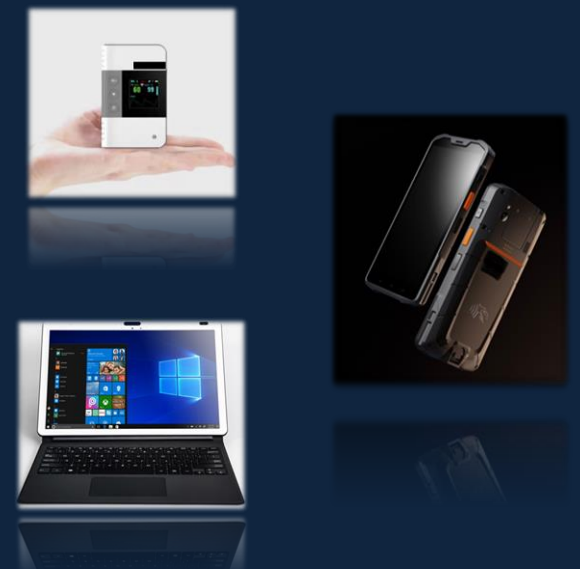
Market Size and User Penetration

Data-rate

WiFi-6/6E

Cellular – LTE/5G
Est. 30%

AI

AUTONOMOUS

802.11ah – Est. 20%+

Image Facial   Medical–Care   Image – AR   2–Way Handheld   No SIM card

Est. 50%

LPWA   Sensing（temperature and humility）

21   Distance

Global Eco-system Partners

Client Device

Network Infrastructure

Hybrid Solution

NEWRACOM

Thank You

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