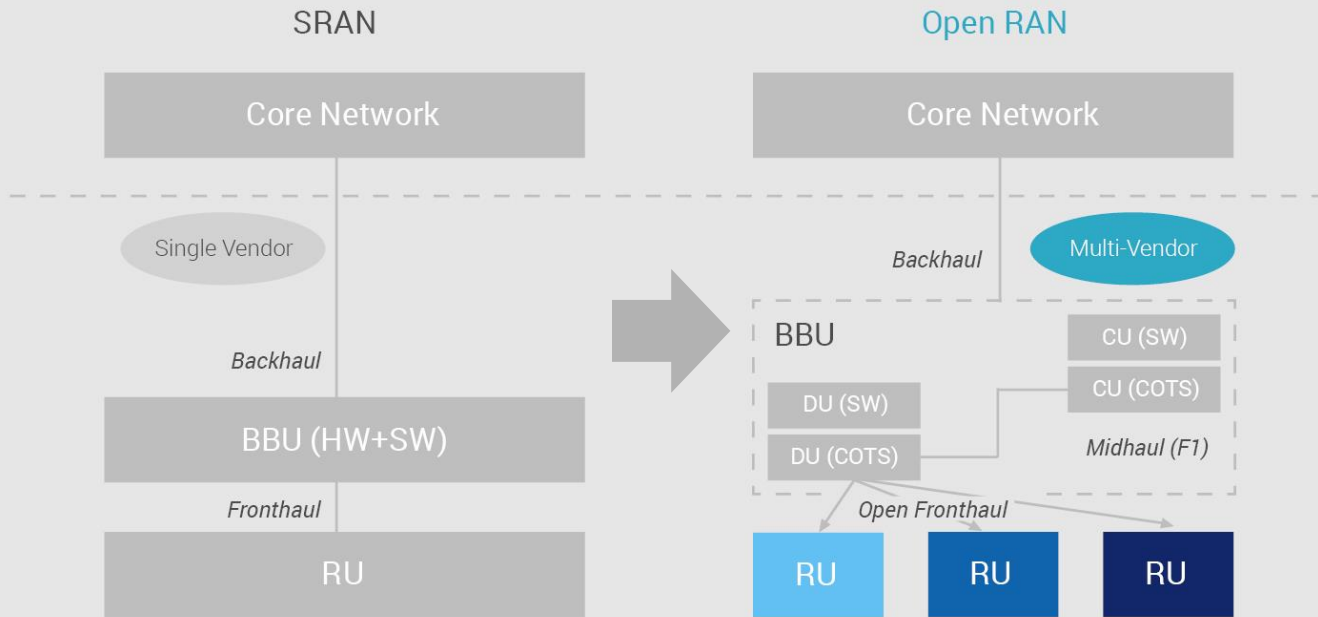


Pegatron 5G O-RAN 邁進智慧製造及數位韌性 賦能者之路

Mar. 2023

5G BU/BG6





Deconstruction

Multiple Vendors

Open Ecosystem

BBU = baseband unit; RU = radio unit; DU=distributed unit (baseband); CU = centralized unit

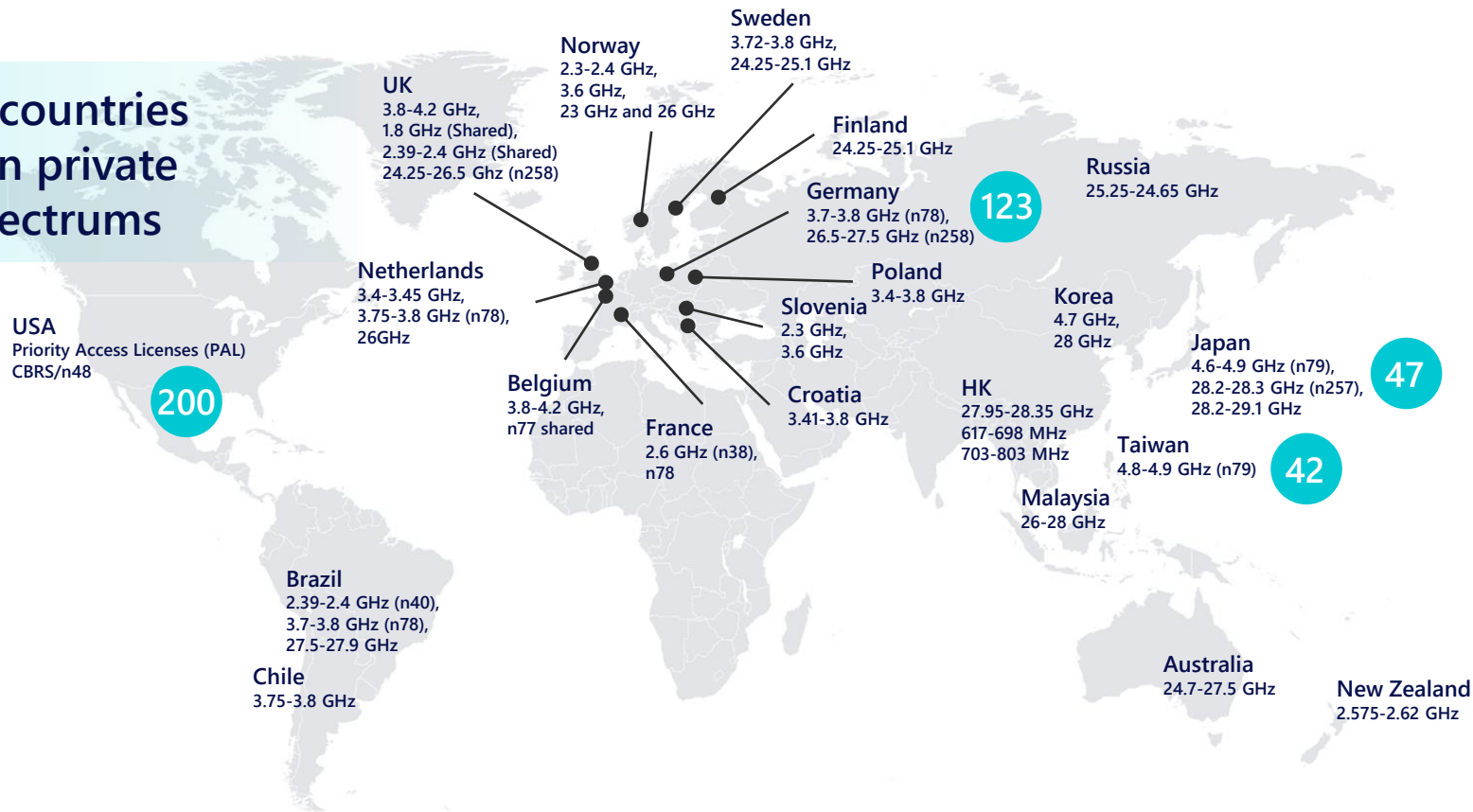
Source: O-RAN Alliance

- O-RAN is capable of reducing network CAPEX and OPEX
- O-RAN is capable of improving network efficiency and performance
- O-RAN is capable of importing new capability with great agility

More than 35 Open RAN trials and deployments
From 29 operators,
across 20+ countries

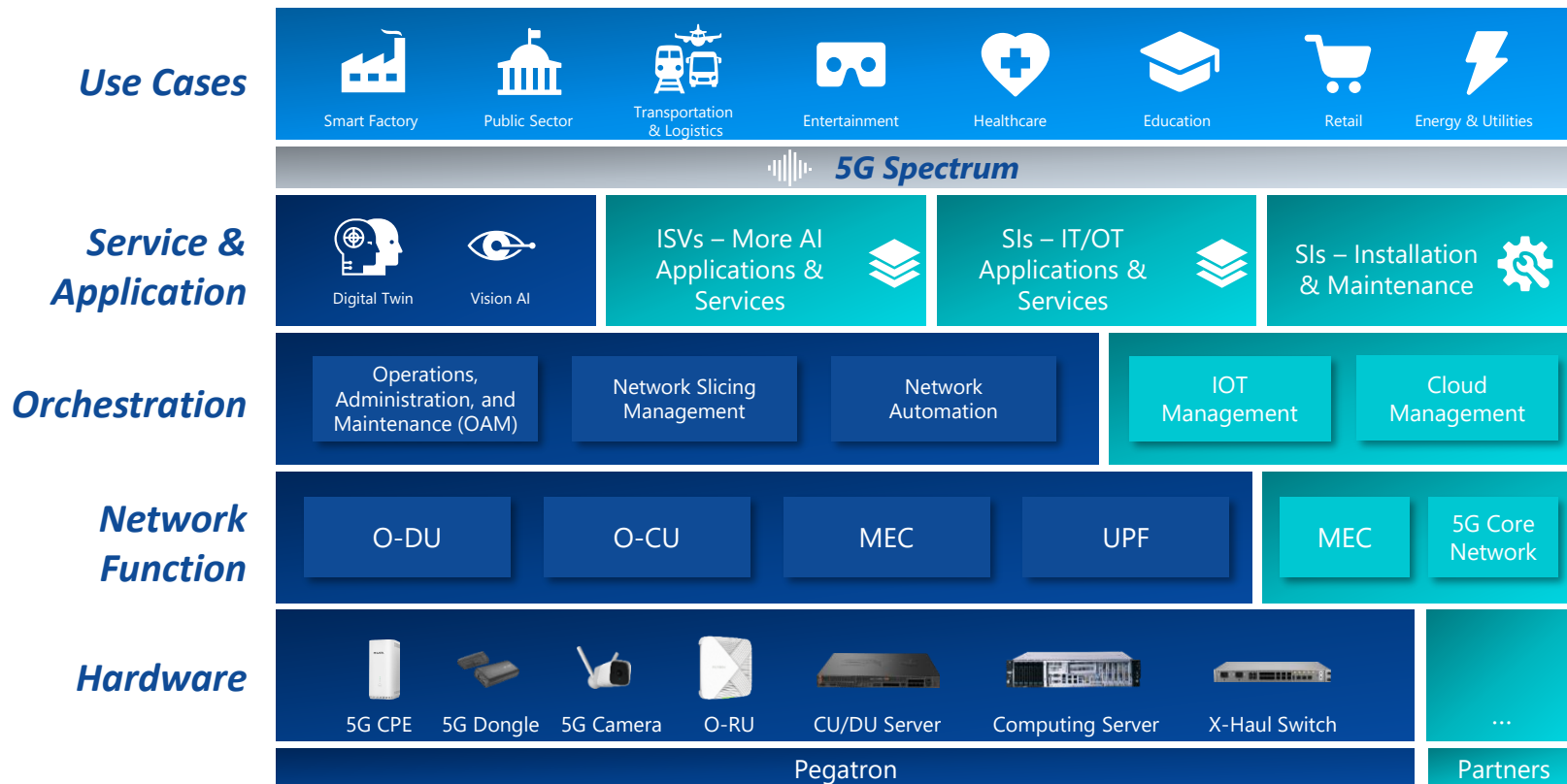


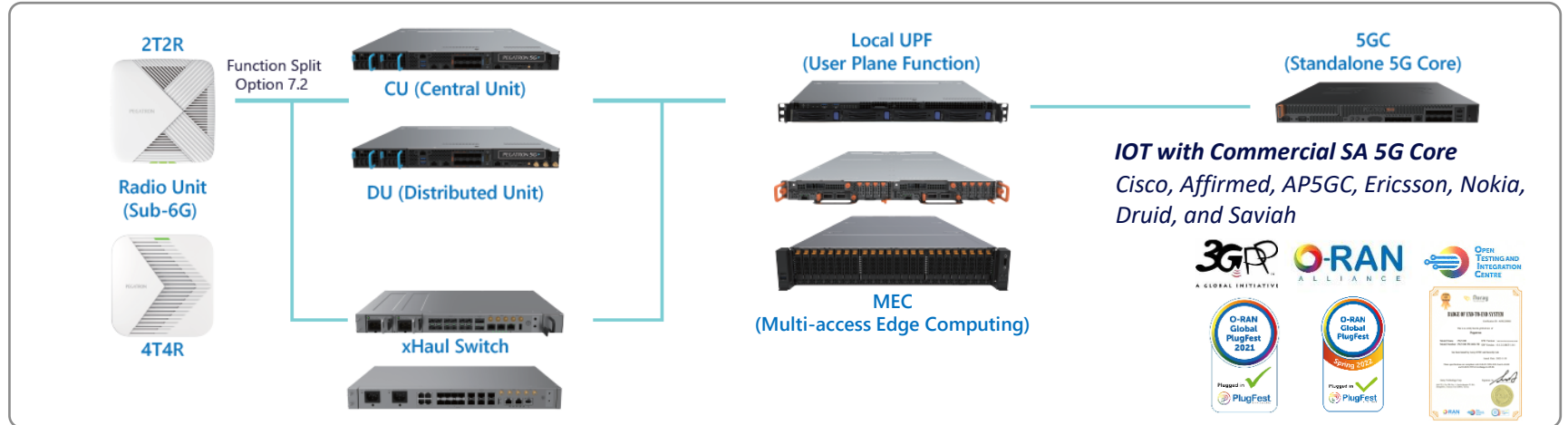
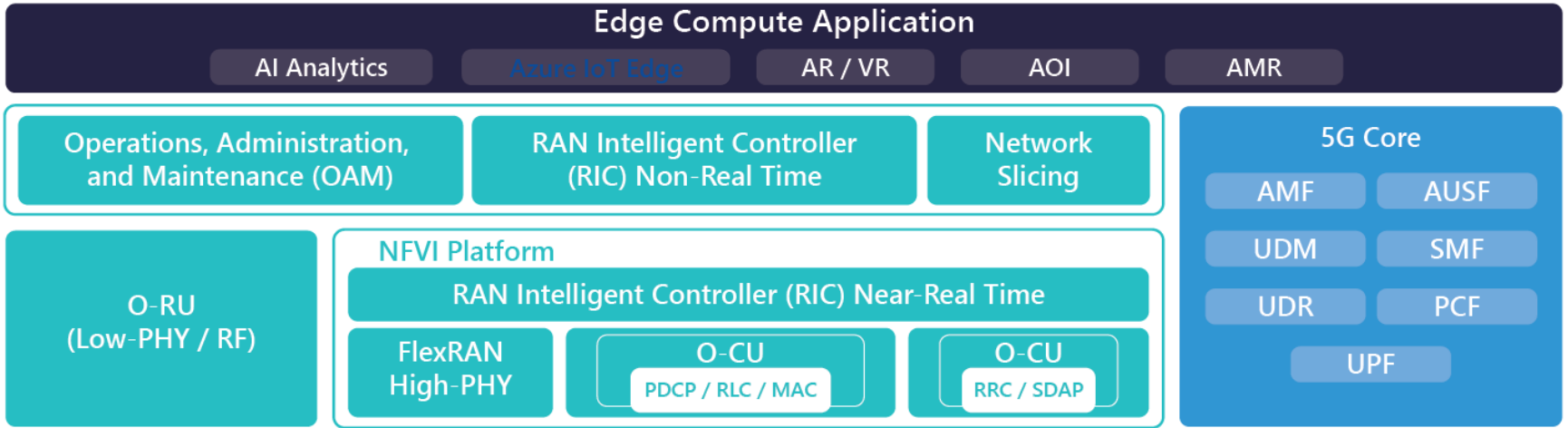
At least 22 countries have or plan private network spectrums



Accelerating adoption – provide End-to-End Private 5G solutions

Multiple companies have roles to play: CSP, CoSP, SIs, Technology partners, ISVs.







Portable

Premium

Portable 2

Scalable

Q3, 2023

Q3, 2023

One Box 5G Base Station

- 5G O-RAN CU, DU
- RAN Management System
- FR1: n78, n79, n48
- Up to 4 O-RU

Optional 5G Core

- Druid, Saviah
- Microsoft AP5GC with ASE

5G & Edge AI Solution

- 5G O-RAN CU, DU
- RAN Management System
- FR1: n78, n79, n48
- Up to 4 O-RU
- GPU Inside – RTX3090 or A100
- Support Kubernetes

Optional 5G Core

- Druid, Saviah
- Microsoft AP5GC with ASE

Optimized 5G Solution Wide temperature for Edge

- 5G O-RAN CU, DU
- RAN Management System
- FR1: n78, n79, n48
- Up to 4 O-RU
- Operation Temperature: -5°C ~ 55°C

Optional 5G Core

- Druid, Saviah, Microsoft AP5GC

Scalable Deployment

- 5G O-RAN CU, DU
- RAN Management System
- FR1: n78, n79, n48
- Operation Temperature: -5°C ~ 55°C
- Support UPF to connect cloud 5G Core

5G CPE



PAX54-5G



PAX36-5G

5G USB Dongle



Hololens 2
Compatible

5G 4K Camera



Microsoft

Azure
Certified
Device

- 5G

3GPP Rel. 16, NSA & SA Sub-6 GHz
n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38/n40/n41/n48/n66/n71/n77/n78/n79

- Wi-Fi

Wi-Fi 6 support – IEEE802.11(a/b/g/n/ac/ax)
Dual band 2.4GHz (2x2) & 5GHz (4x4) AX5400

- 5G

3GPP Rel. 15, NSA & SA Sub-6 GHz
n1/n3/n5/n7/n8/n20/n28/n38/n40/n41/n77/n78/n79

- Wi-Fi

Wi-Fi 6 support – IEEE802.11(a/b/g/n/ac/ax)
Dual band 2.4GHz (2x2) & 5GHz (4x4) AX3600

- 5G

3GPP Rel. 16, NSA & SA Sub-6 GHz
Network Slicing
NA: n2/n5/n12/n14/n25/n30/n41/n48/n66/n70/n71/n77
APAC: n78/n79
EU*: n1/n3/n5/n7/n8/n20/n28/n38/n40/n41/n77/n78
* Under planning

- Interfaces

Dual USB Type C Ports
USB Power Pass Through

- 5G & Wi-Fi

3GPP Rel. 15, NSA & SA Sub-6 GHz
n1/n2/n3/n5/n12/n20/n28/n41/n66/n71/n77/n78/n79
Wi-Fi 802.11 a/b/g/n Dual Band

- Camera

4K HDR
Night Vision
2-way Audio

May 11, 2022

intel.
VISION

In Intel Vision 2022 Keynote, CEO Pat Gelsinger introduced Pegatron 5G ORAN portable solution for Digital Resilience as the blueprint of next generation communication

intel. PEGATRON



https://www.youtube.com/watch?v=9_06GnxOeHU

SCF Small Cell Awards

May 2022

PEGATRON



Outstanding software and services technology for small cells, in commercial use

WINNER:

ITRI and PEGATRON – 5G Energy-Saving O-RAN System

<https://www.smallcellforum.org/awards/scf-small-cell-awards-the-winners/>

<https://www.prnewswire.com/news-releases/itri-and-pegatron-exhibit-taiwans-first-5g-o-ran-energy-saving-private-network-solution-at-mwc-2022-301491196.html>



Smart City Innovative Application Award 2023



Dec 2022

PEGATRON

Microsoft Azure

新竹市政府
HSINCHU CITY GOVERNMENT

A highly reliable movable orbital satellite 5G disaster relief network system

https://smartcity.org.tw/news_release1.php?id=803

<https://news.microsoft.com/zh-tw/5g-microsoft-pegatron/>

<https://azure.microsoft.com/zh-tw/blog/new-azure-space-products-enable-digital-resiliency-and-empower-the-industry/>





Global Operation Sites
To improve operating and manufacturing efficiency for digital transforming
- 5G, AI and Edge Computing

5G factory in Taiwan

4 Millions+ Inference Everyday in Pegatron worldwide operation sites

Smart Dispatcher

- Reduce OP attrition rate



Smart Attrition Rate Predictor

- Predict DL weekly attrition rate precisely



Smart Recipe

Material	Machine	Quantity	Unit	Machine	Quantity	Unit
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS
1000000000	1000000000	1000	PCS	1000000000	1000	PCS

- Machine & Material abnormal tracking
- Mechanical Better Matching



Smart Reader

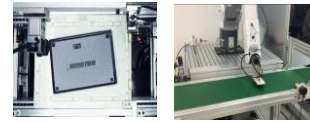


OCR
(text recognition)

Auto Barcode
(barcode reading)



Smart Localizer



Guiding Auto. Equipment

Pick & Place on the fly

Optical based accurate object localization



Stick Form



Smart Voice Control



Voice Recognition

Noise Reduction

- MFG ENV noise reduction
- Voice wakeup
- Voice command for equipment

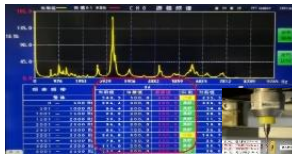


iPLAS / M2M

- Production line based visualization
- Yield Rate/Downtime Analysis /OEE
- Machine OEE, Health monitor



Equipment Intelligent



- Milling cutter consuming monitor
- Screwdriver lifetime management



Smart AOI



Cosmetic AOI

SMT AOI

Component AOI

Insider Inspection

Label Inspection



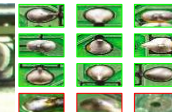
SMT Re-Inspection



Keyboard



Connector Inspection



Soldering Inspection



Smart Energy



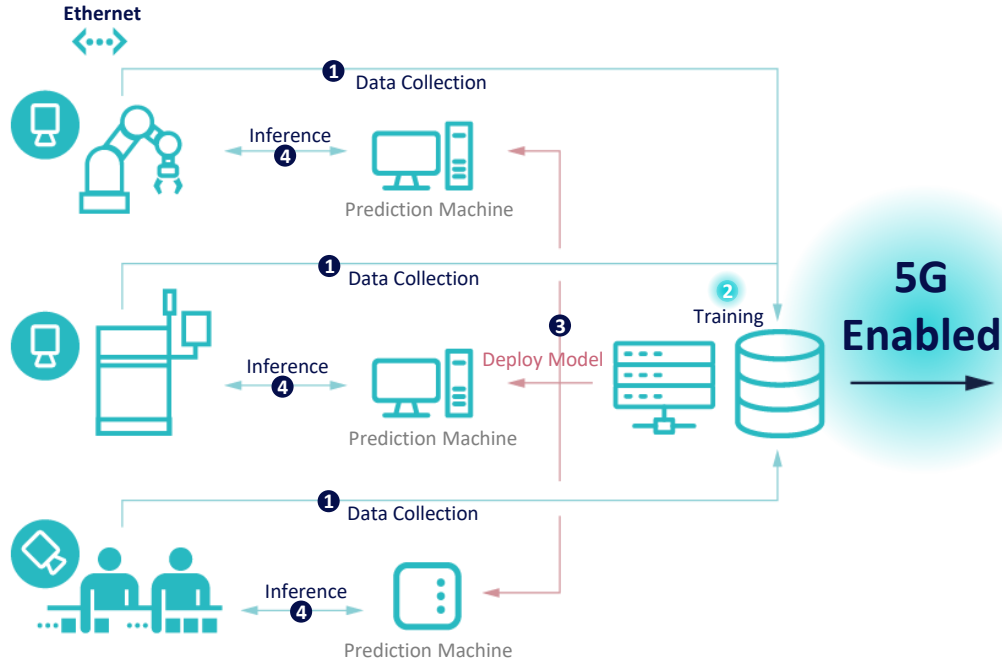
- Data collection and visualization
- Ice Storage / Air conditioner Intelligent Control



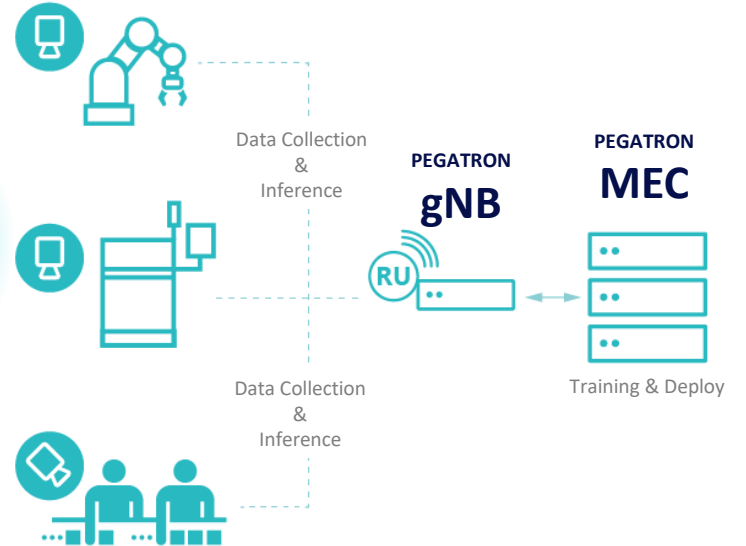
Big Data Analysis

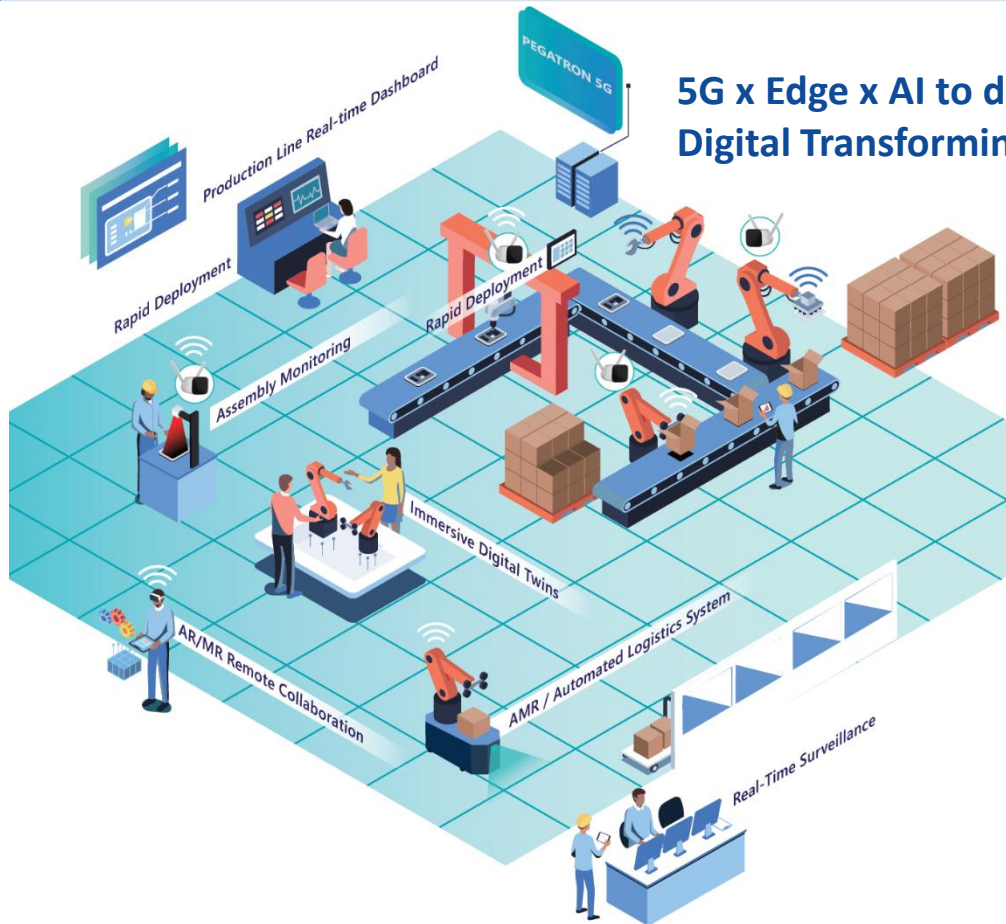
Vision AI

Millions+ Inference Everyday in Pegatron worldwide operation sites

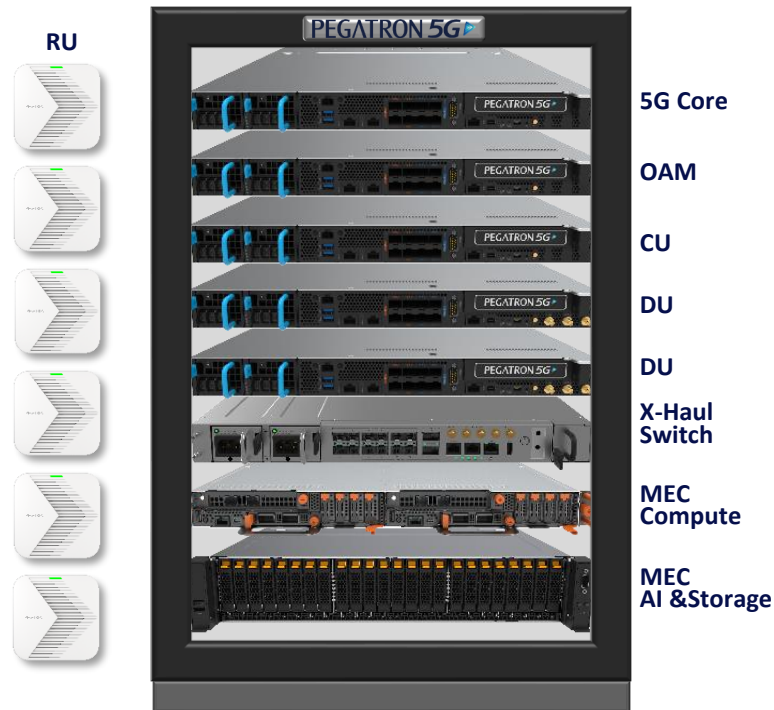


Leverage 5G eMBB & uRLLC for massive data collection and real-time model inference





Scalable 5G, AI Edge Solutions





PEGATRON Microsoft intel

Deploy 5G Private Network with Edge Computing to help Pegatron Taipei Factory for digital transforming and improve manufacturing efficiency and quality.



5G Camera



5G Dongle



5G Hotspot



5G CPE



5G O-RU



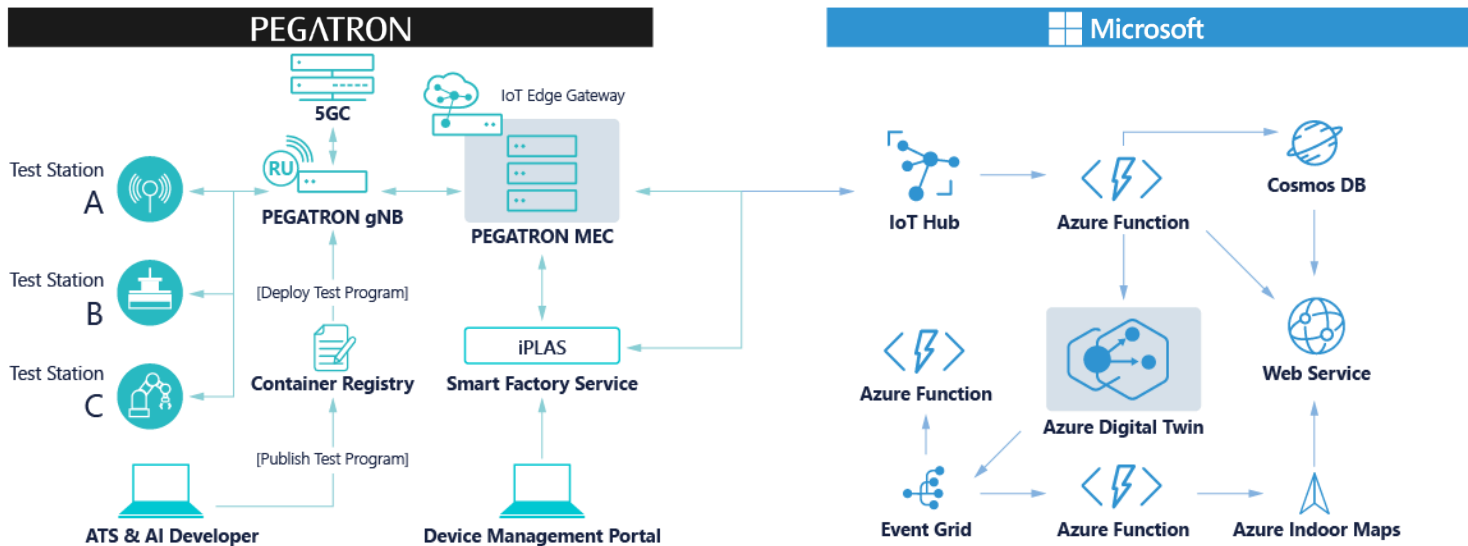
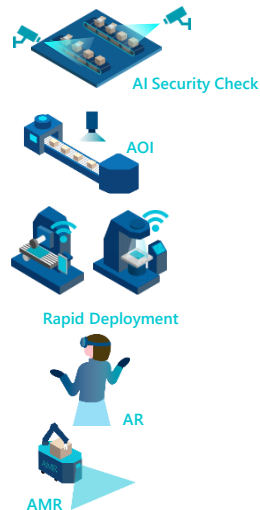
5G O-DU



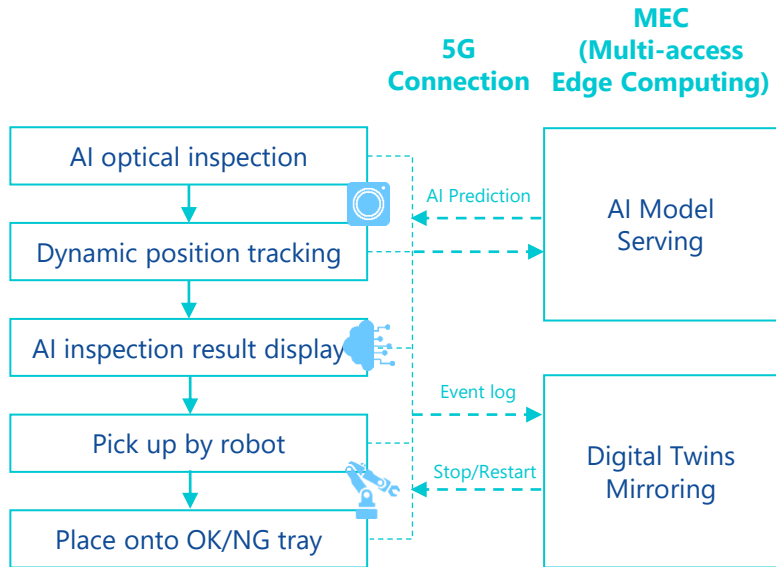
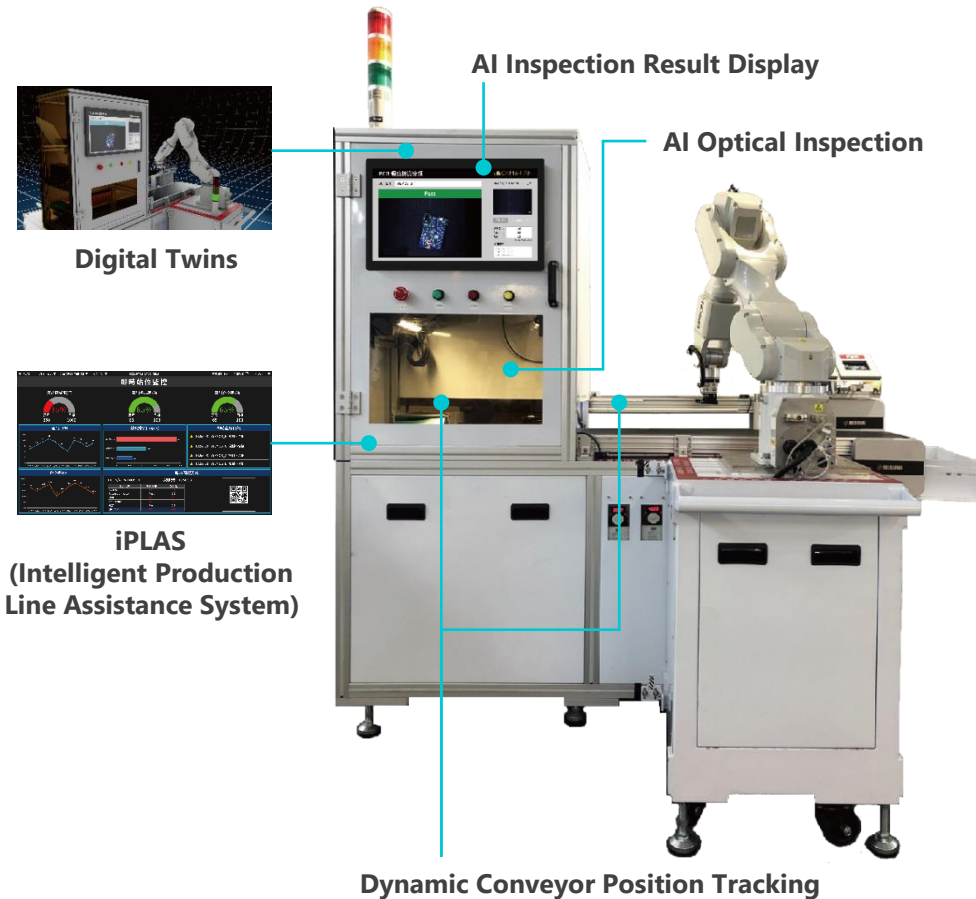
5G O-CU



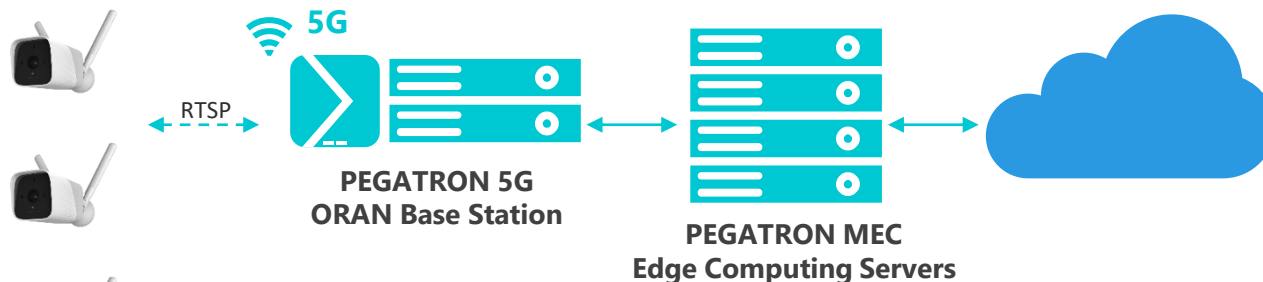
Edge Computing Server



5G x AI Edge Computing x Automation x Digital Twins



Process Flow



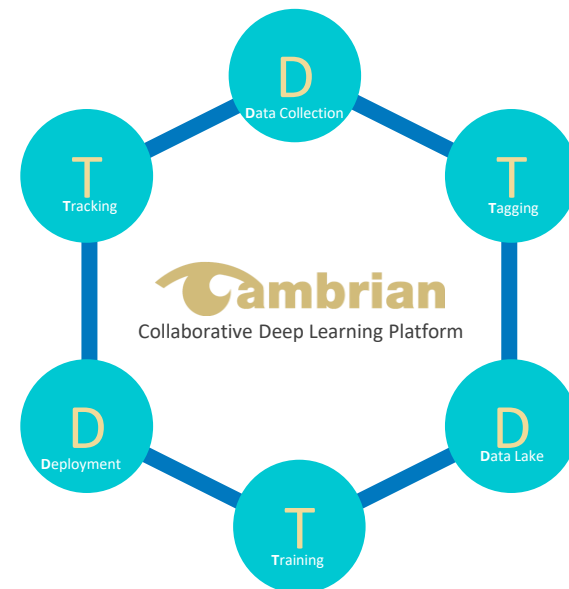
Face Recognition, People Counting, Virtual Fencing, SOP Monitoring, AOI, Barcode Reader,

Surveillance VMS

- Camera Management
- Recording (Motion/Event based)
- Playback (1x /2x /4x...)
- Event Search / Smart Search
- Alarm
- Web & Mobile Client for live stream + AI detection result

AI Models

- Model Management
- Optimized Inference Server on MEC
 - TRT
 - OpenVino
- Easily build and deploy model
 - Build on Azure / MEC
 - Deploy on MEC
- Prebuilt models
- Open interface API for 3rd party AI model integration
- Teams Integration for anomaly notification



A highly reliable movable orbital satellite 5G disaster relief network system

Able to support multiple voice calls, video calls, and live video streaming



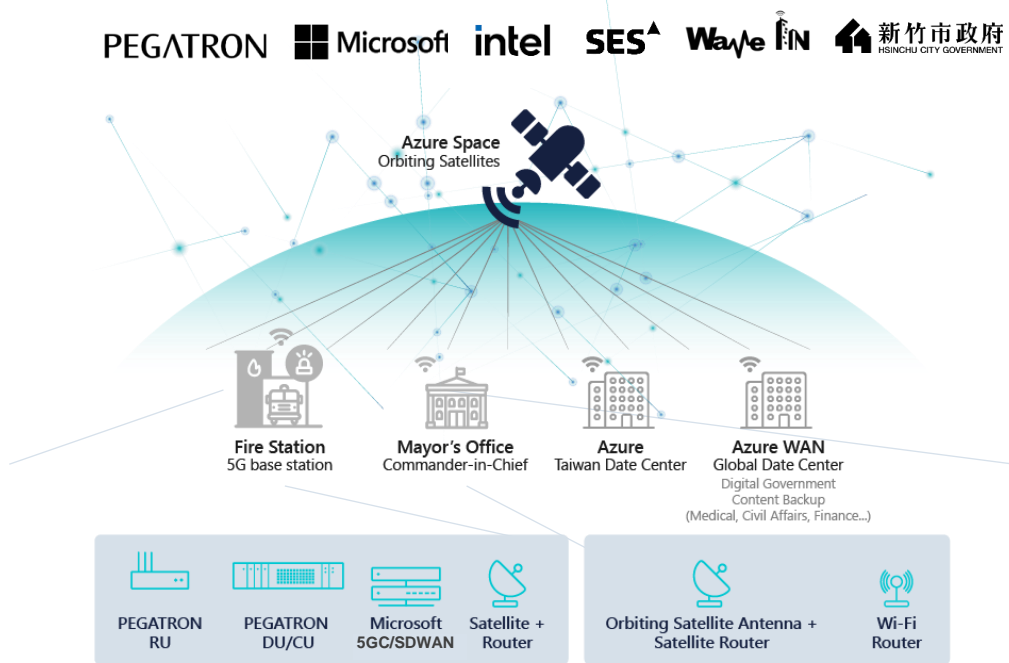
Hurricane

Tornado

Forest Fire

Earthquake

PEGATRON Microsoft intel SES^ Wayne FIN 新竹市政府 Hsinchu City Government



FLEXIBLE O-RAN SOLUTION



Forestry

- Enhance productivity with two-way video.
- Transportable private network depending on the working location.



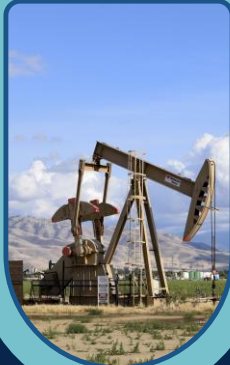
Building / Mining

- Easy to deploy in remote locations.
- Avoid occupational hazards with video & AIoT.



Oil / Gas Wells

- Strengthen equipment management with AIoT.
- Ensure workplace safety with real-time video.

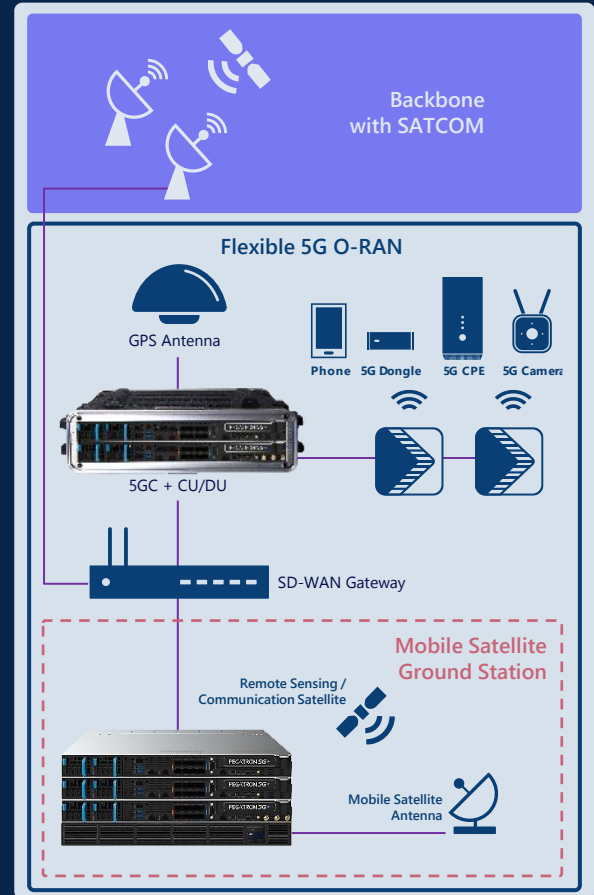


Satellite GS

- Ground Station (GS) placement is not restricted.
- Meet the need for unrestricted mobility.



Network Architecture



Thanks



5G ORAN Brochure



5G User Equipment