SMART FACTORY WITH COMBA FLeX5

Case Study

June 2021

Comba Group

COMBA GROUP INTRODUCTION

Established in 1997 and listed in the Hong Kong Stock Exchange in 2003, Comba Group is a global leading solutions and services provider of wireless and information communications systems with its own R&D facilities holding 4,800 patents, a manufacturing base of 80,000 square meters, as well as global sales and service teams.

Comba's core product portfolio includes antennas and subsystems and network products (DAS, Small Cells, Repeater, RRU, etc.), offering turnkey solutions for indoor and outdoor 2G/3G/4G/Wifi/5G to our global customers with services covering consultation, network design, optimization, and commissioning. The company has footprint in wireless network projects in shopping malls, airports, sports stadiums, government buildings, and telecom operator headquarters across multiple global regions.

With more than 30 offices in China and over 10 overseas offices worldwide, Comba provides products and services in more than 100 countries and regions. The company has strong foothold in APAC regions particularly in Singapore and Thailand. For example, Comba demonstrated its expertise in providing best-in-class wireless solution to a metro line in Bangkok with a wide range of services including consultancy, DAS system design, drive test and benchmarking, maintenance, managed services, network data analytics, network optimization and training. Moving towards the era of Internet of Things, Comba's know-how in delivering quality wireless networks with high capacity, fast speed and stable connectivity are indispensable to support the evolution of smart cities.

BACKGROUND

Smart Factory is about digitization of manufacturing processes, like raw material preparation, parts assembly, production, packaging and delivery. It was not long ago when enterprise relied on wired network to make this transformation. Private 5G networks flexibly connect IoT devices and machines in the factory to industrial applications in the MEC (Multi-Access Edge Computing) achieving autonomous operation and improve productivity.

As part of "Guangdong Province "5G+Industrial Internet" Application Demonstration Park Pilot Program (2020-2022)", Comba has **deployed a private 5G network in the R&D Centre and Manufacturing Base** in Guangzhou using Comba FLeX5 solution. Based on 5G Standalone Architecture, **Comba has successfully demonstrated multiple 5G+ industrial applications**.

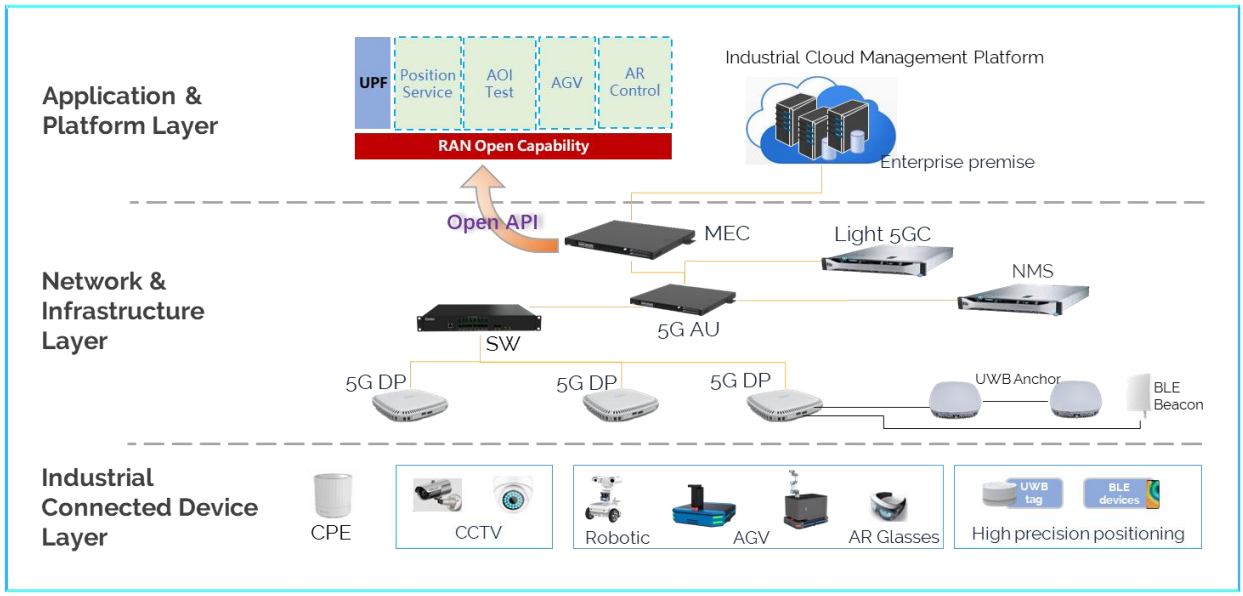
This case study will discuss how Comba FLeX5 enables industrial grade services in factory.

FLeX5 – COMBA 5G PRIVATE NETWORK SOLUTION

FLeX5

F lexible
L ight
e nable
X for all industries
5 (5G cloud-based small cell, Light MEC, Light 5GC, IoT, NMS)

FLeX5 supports large bandwidth, low latency, highly available and reliable networks satisfying various fragmented, diversified, and complex industry applications. It is comprised of a collection of network elements forming an end-to-end solution, including light-5GC, light-MEC, NMS, 5G Small Cell, and IoT devices. Disaggregated RAN architecture allows software to be hosted on **COTS hardware**, enabling flexible and scalable deployment for enterprise's needs.



SOLUTION HIGHLIGHT

- Containerized and Cloud-native 5G solution to support industrial private 5G deployment, localized network infrastructure. Enterprise has full control of the network.
- Light-weight 5GC with low-to-medium capacity, providing core network functionalities in a cost-effective manner.
- Support interoperability with other core vendors.
- Support data local breakout, data processed within premise, ensure data security.
- Open for 3rd party's software integration via open API on COTS hardware, easy deployment of vertical application.
- Network Management System (NMS) used to manage network performance, and configurations.
- Rich radio portfolio for indoor and macro coverage.
- Completed solution with CPE attached to industrial UE such as AGV, camera, and sensors.
- Dedicated SIM card with unlimited data usage, no more monthly subscription.

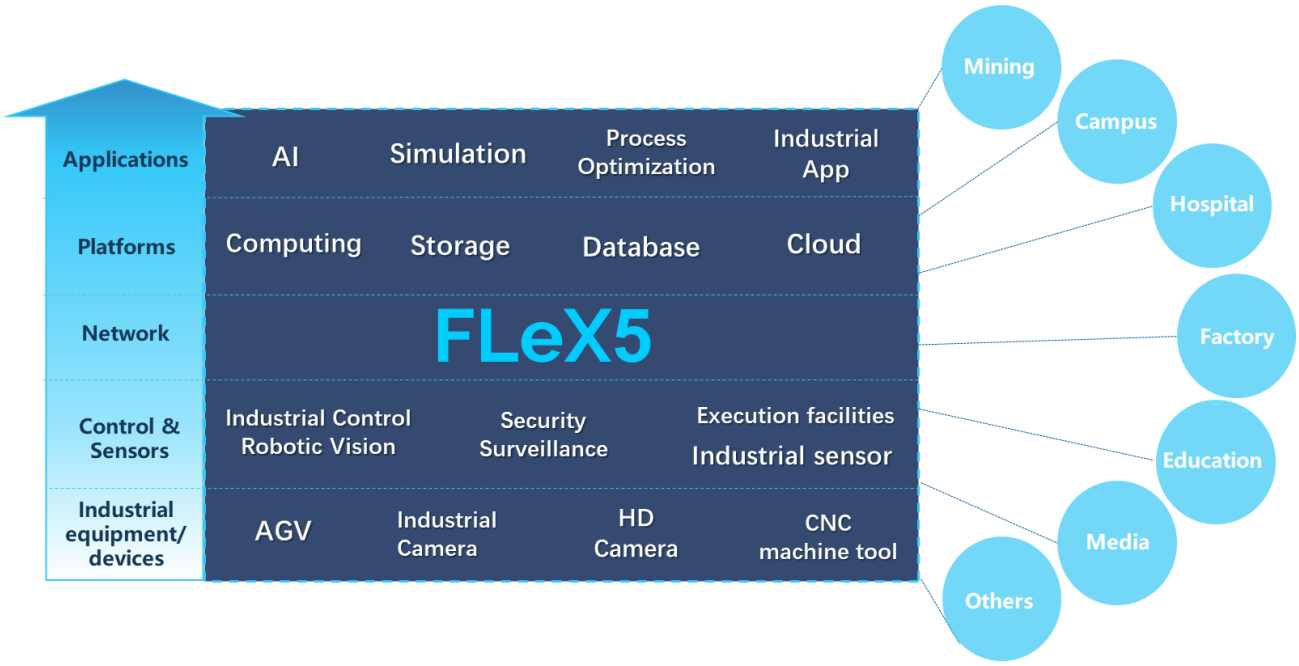
PRODUCT HIGHLIGHT

5G AU 	**5G NR Baseband Unit Based on COTS Hardware** • Layer 1/2/3 signal processing • Support local breakout
5G SW 	**5G NR Extension Unit (Indoor Small Cell)** • Data merge for uplink, and forwarding in downlink • Power supply for Distributed Unit (DP) via hybrid (optical + power) cable
5G DP 	**5G NR Distributed Unit (Indoor Small Cell)** • Radio transmitter with integrated antenna • Provide 5G wireless coverage to indoor
5G RRU 	**5G Remote Radio Unit (Outdoor Small Cell)** • Outdoor radio transmitter with RF output • External antenna port for antenna
NMS 	**Network Management System** • Fault configuration management • System log and tasks management • Performance and user management
Light-Weight MEC 	**Multi-Access Edge Computing Based on COTS Hardware** • On-premise deployment • Open API for 3rd party integration • Allows application data to be processed locally • Support local breakout
Light-Weight 5GC* 	**5G Core Network Based on COTS Hardware** • Support N1/N2/N3/N6 interface • UE Management (registration, authorization, Mobile management, Data cache) • Upstream and downstream data routing

*Interoperability with other core vendor can be supported.

ECOSYSTEM PARTNERSHIP BASED ON FLeX5

There are four layers in the ecosystem structure: Control & Sensors, Network, Platforms, and Applications. It requires cooperation of players from upstream to downstream to build this industry ecosystem. FLeX5's openness allows interworking between different platforms and applications, and facilitates integration between IT and CT infrastructure. In this extensive collaboration, Comba and partners have worked together to build the a comprehensive 5G solution for a multitude of vertical industries.



USE CASE DEMONSTRATION

5G private network not only provides dedicated indoor coverage, it also enables many applications with its high bandwidth, low latency, and intelligent features.

FLeX5 Integrated Industrial IoT Platform

- ✓ **Retrieve, storage and visualize factory IoT data for integrated management and analysis**
  - Enable data sharing and break the barrier of information silo in legacy system
  - AI-powered resource scheduling, dynamic optimization and automatic decision making
- ✓ **Streamline processes**, increase productivity, improve efficiency

UWB/BLE Indoor Positioning

- ✓ **UWB/BLE technology**
  - Highly precision UWB (20cm), BLE (2m-5m)
  - POE interface, connect to 5G cell
  - Asset location tracking
  - Real-time crowd monitoring

Automated Optical Inspection (AOI)

- ✓ **PCB inspection**
  - Leverage 5G NR large bandwidth and high uplink throughput, upload large number of high-resolution inspection pictures at real-time
  - Examine 128 pictures of single PCB
  - Detect defects via big data analysis
- ✓ **Reduce human intervention** and **mitigate error**

Automated Guided Vehicle (AGV)

- ✓ **AGV Connection**
  - Base on Simultaneous localization and mapping (SLAM) algorithm and 5G for AGV navigation
  - 5G CPE integrated into AGV for NR connection
  - SLAM algorithm software is integrated with traffic schedule system to provide flexible production

AR Glass: Remote Diagnose/Coaching

- ✓ **5G-connected AR glasses**
  - AR glasses connected to 5G network
  - Dual direction high speed live video streaming
  - Real-time guided operation enabled by 5G
- ✓ **Operation efficiency greatly improved via remote monitoring and coaching**

AI-powered Access Control

- ✓ **ScanViS™ access control system**
  - Facial Recognition powered ID verification
  - Visitor management via central management system (CMS)
  - Integration with existing HRM system
  - Real-time access log data transmission over 5G
- ✓ **FLeX5 for service integration**
  - Cloud-based Central Management System (CMS) deployed on MEC
  - Multiple access control devices connected via 5G
  - Visual analytics, data base management, logs storage, alarms and reporting

ABOUT COMBA GROUP

Comba is a leading supplier of infrastructure and wireless enhancement solutions to mobile operators and enterprises to enhance and extend their wireless communications networks. With over 50,000 system deployments around the world including turnkey in-building systems, urban/rural wireless systems, and transport wireless networks, Comba's end-to-end network solutions include consultation, network design, optimization and commissioning.
Comba's product portfolio includes DAS, small cells, tower mounted systems, antennas, subsystems, passive accessories, Wi-Fi systems and digital microwave links.

Listed on the Hong Kong Stock Exchange, Comba is headquartered in Hong Kong and has operations throughout the Americas, Europe, Middle East, Africa and Asia Pacific. To learn more, visit www.comba-telecom.com and follow Comba on LinkedIn for regular updates.

LinkedIn

www.comba-telecom.com

marketing@comba-telecom.com

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