

Inventec *5G*



Inventec x NexAIoT 5G Smart Factory AI-DX Solution

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NexAIoT: CC Lin

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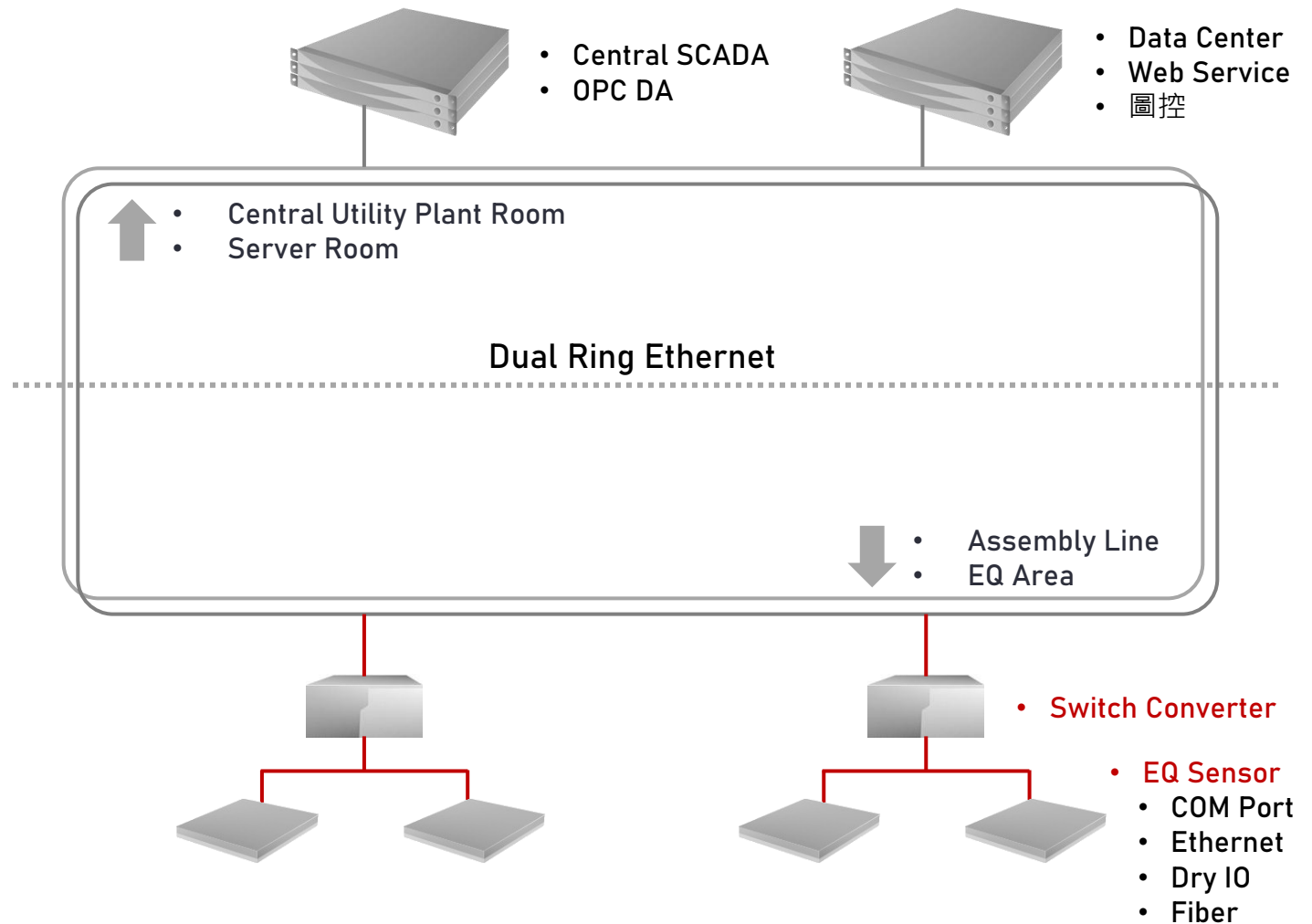
Applications in Inventec 5G Smart Factory

5Ging

Ethernet CMS in Semiconductor Fab

Ethernet vs. 5G

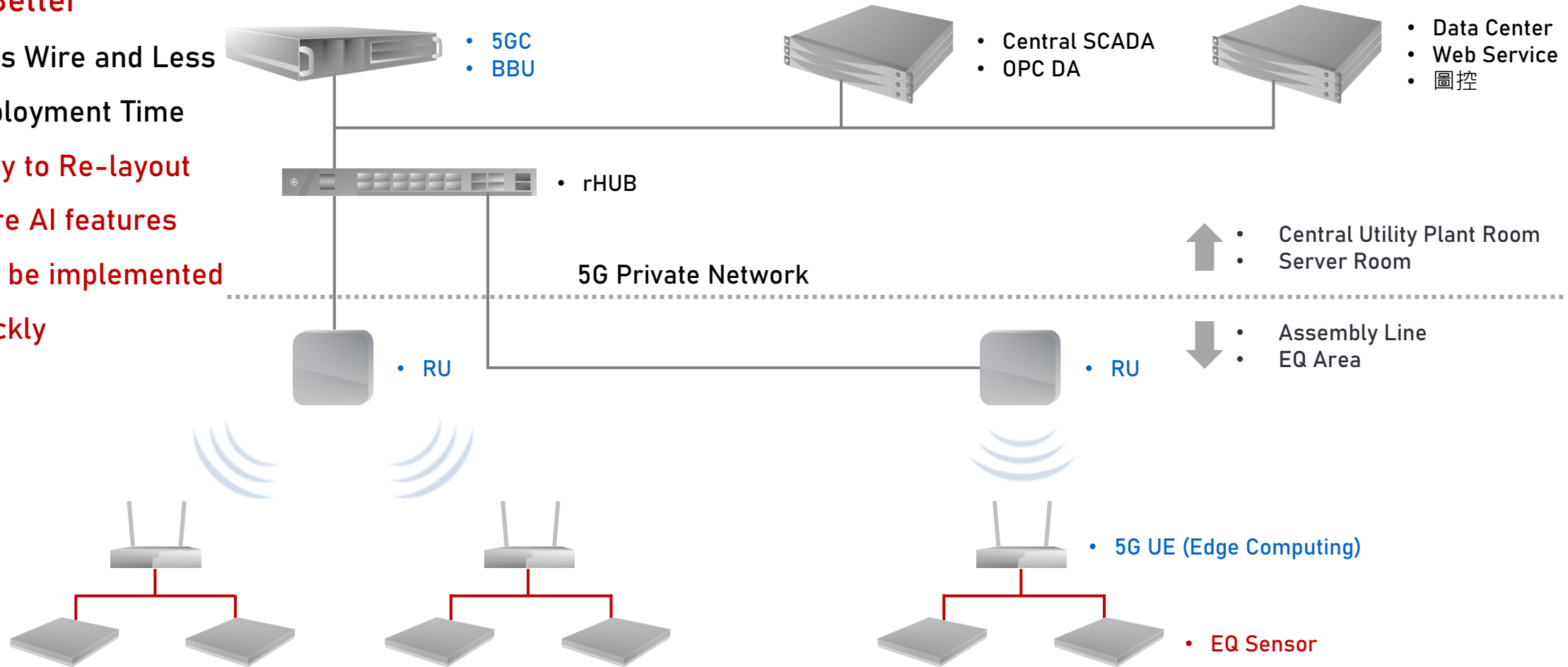
- Deploy and Design Difficulty
- Fiber Cost and Deployment Labor Cost
- Security Concern of Outsourcing Labor Go In/Out the Manufacturing Plant
- **Hard to Re-layout, High Maintenance Cost**



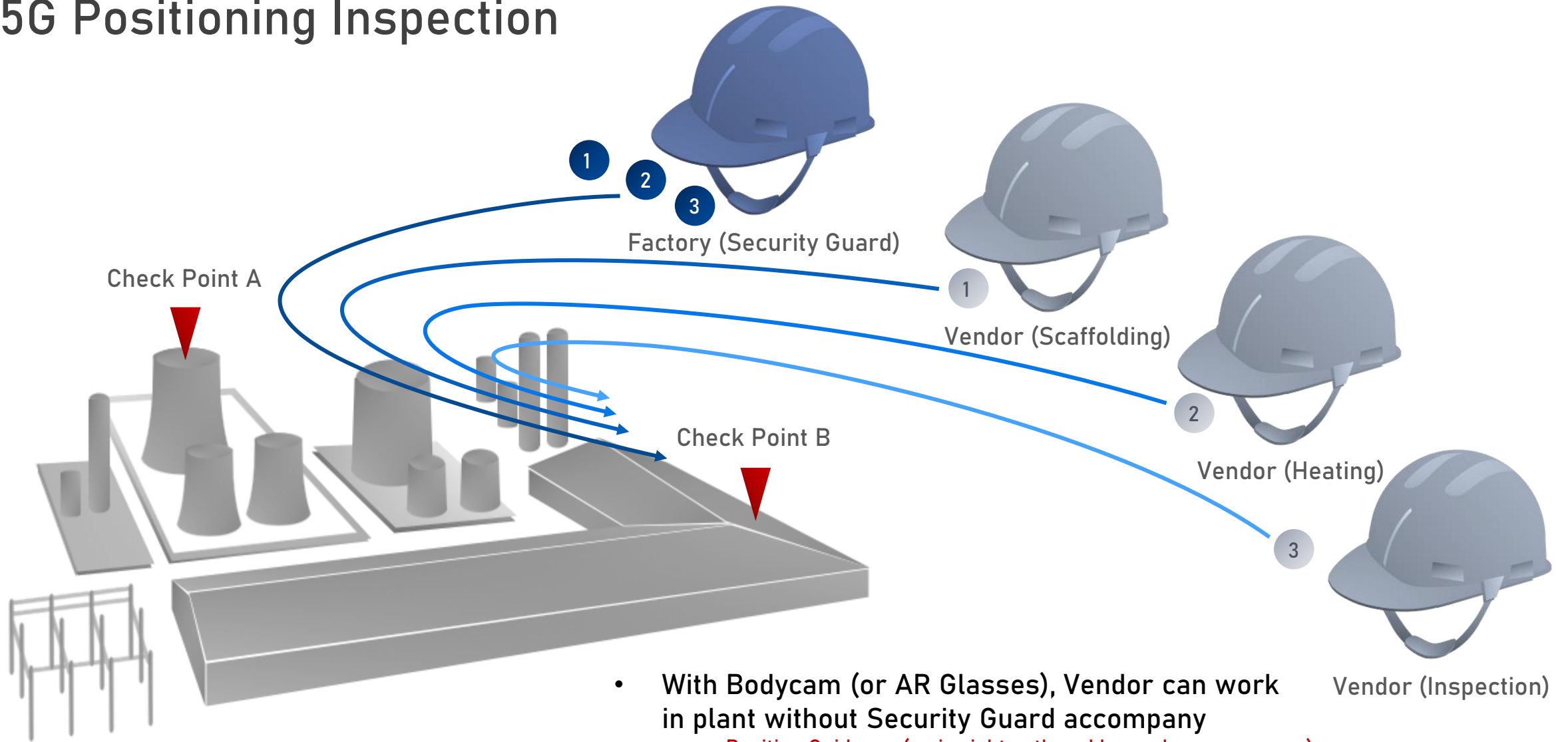
5G Private Network in Semiconductor Fab

5G is Better

- Less Wire and Less Deployment Time
- Easy to Re-layout
- More AI features can be implemented quickly



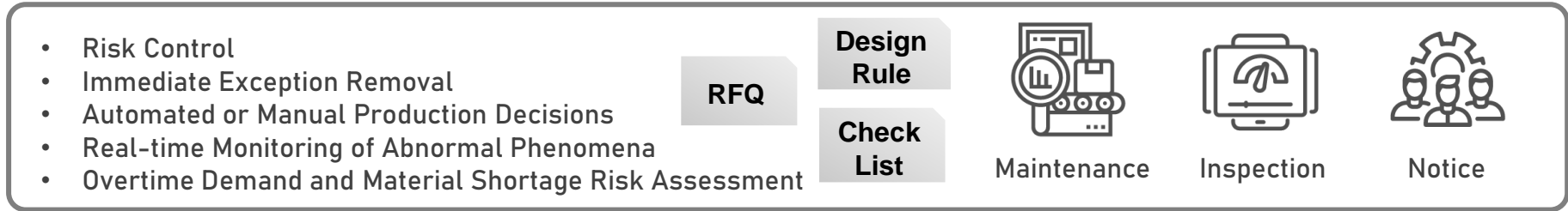
5G Positioning Inspection



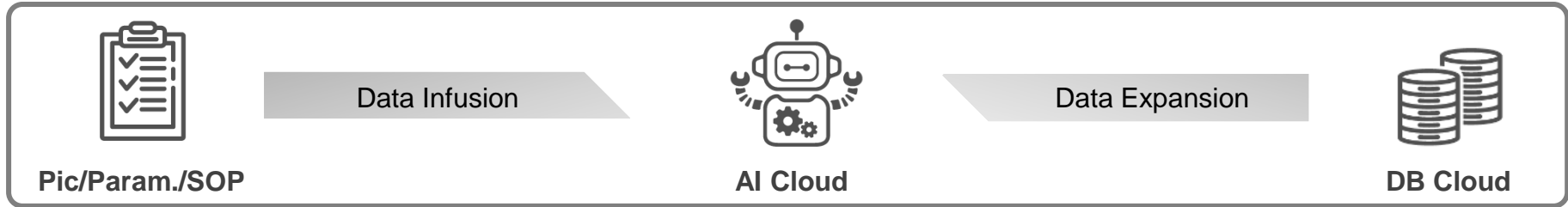
- With Bodycam (or AR Glasses), Vendor can work in plant without Security Guard accompany
 - Positioning Guidance (go in right path and leave dangerous area)
 - Remote Assistance and eSOP
 - On-Site Video Recording and Post-Maintenance Analysis

5G AI & DX Smart Factory

TPMS
Manufacturing Network



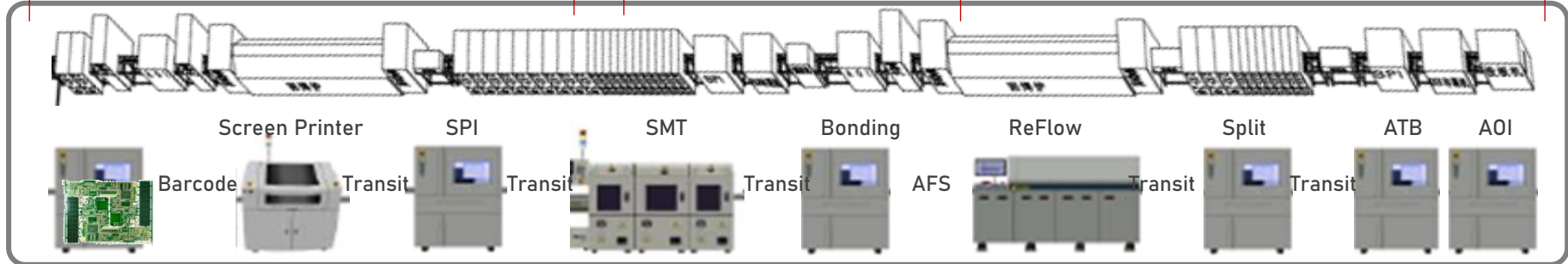
AI Cloud
Computational Network



DX Working
People Network



Digital Twins
14.0 Network



5G AI Application



Digital Twins and AISC



eSOP



Remote Assistance



Intelligent Inspection



AI Vision Application



AI AOI

Inventec



5G-enabled Cyber Physical Integration System

層

英業達智慧工廠

L41

A區

投入站

印刷機B

錫膏檢測機B

置件機B

迴焊爐B

SMT自動光學檢查機B

印刷機A

錫膏檢測機A

置件機A

迴焊爐A

SMT自動光學檢查機A

裝插站

HI自動光學檢查機

波峰焊

3D X-ray

監控

CCTV_1

CCTV_2

CCTV_3

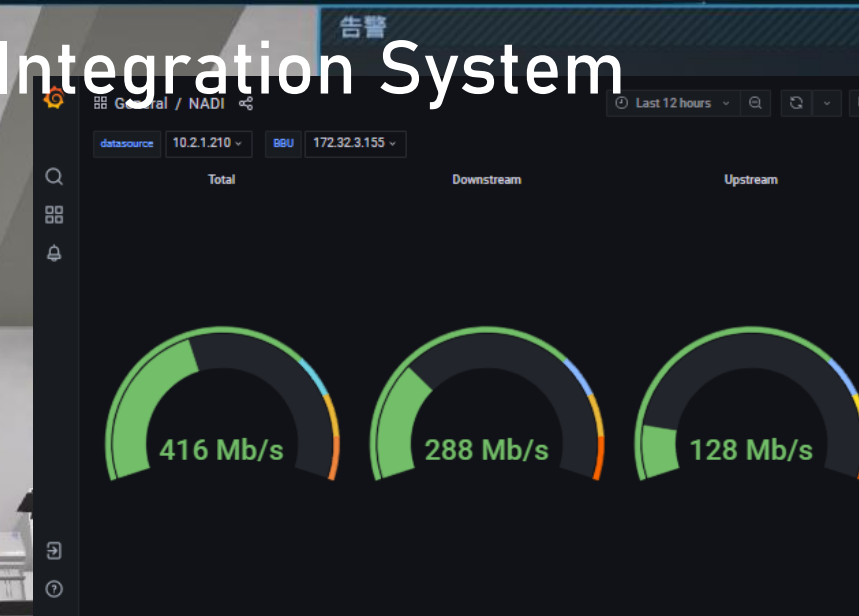
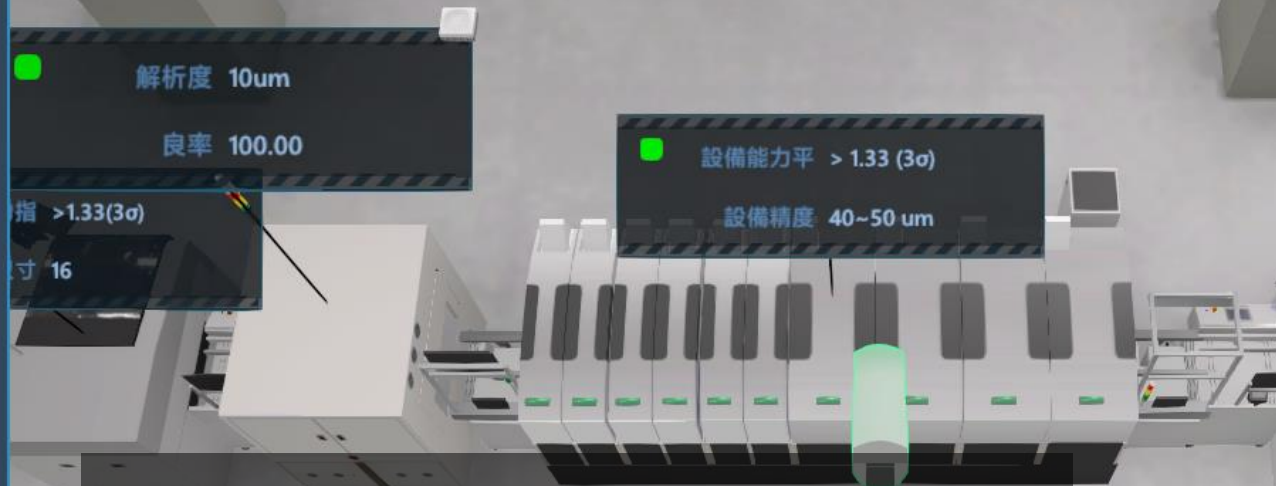
CCTV_4

CCTV_5

5G Private Network

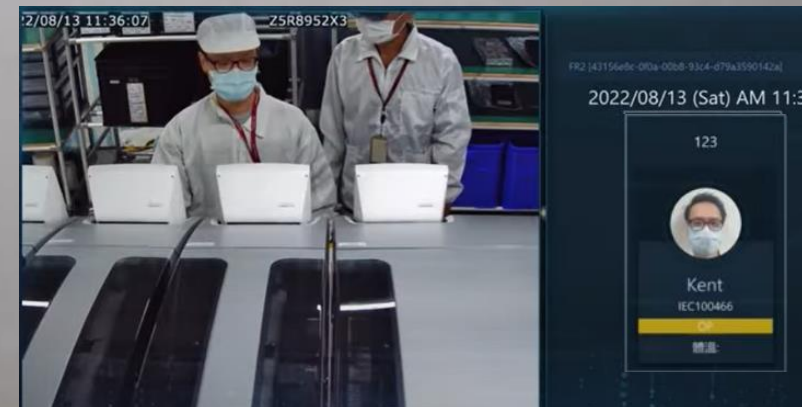
RU01

RU02

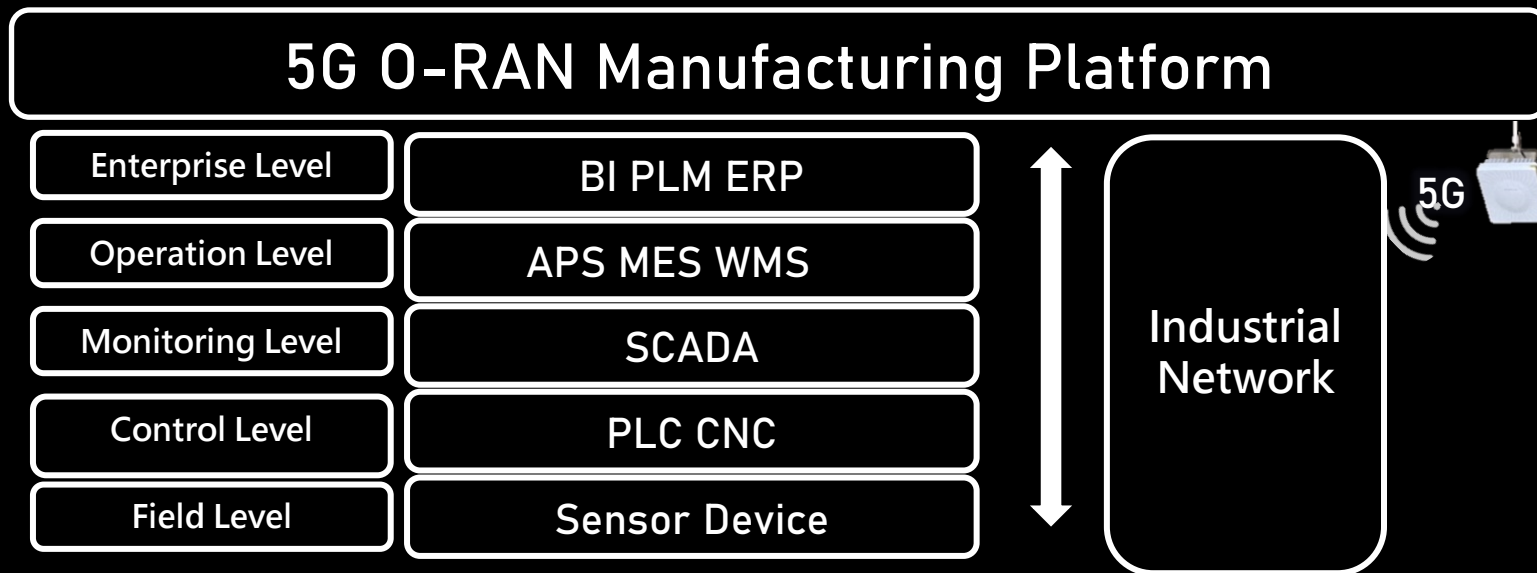
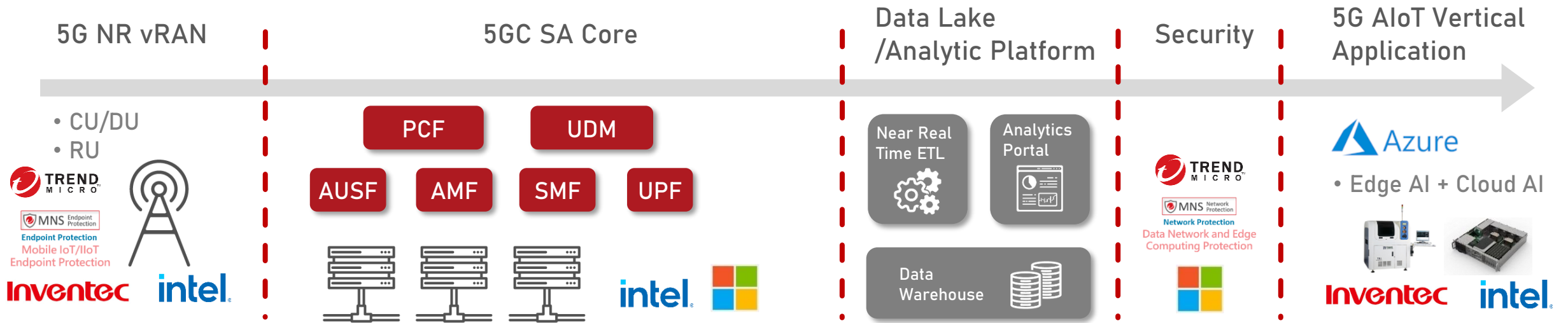


Manufacturing Line

- Digital Twin
- Smart Surveillance (AR)
- eSOP Training (MR, VR)
- Remote Assistance (MR)
- Navigation System
- AI Integration



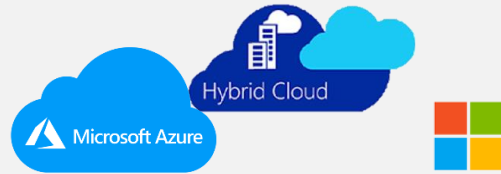
Inventec 5G O-RAN based Smart Factory Infrastructure



Inventec 5G Network Infrastructure Product List

Core Network

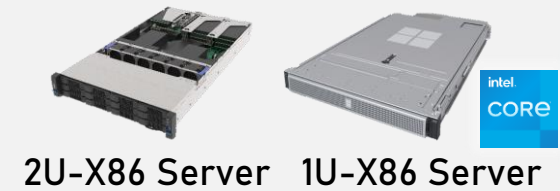
On-Cloud/On-Premise



On-premise SW

Inventec

On-premise HW



ORAN

All-in-One



All in One
Small-Cell

RU



Indoor-RU Outdoor-RU

Fronthaul



rHUB

BBU



X86 server



Rack solution

IoT Devices

uCPE



Industrial-EdgeBox

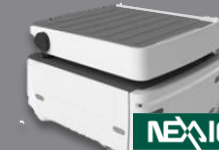


Industrial-CPE

Connected OTs

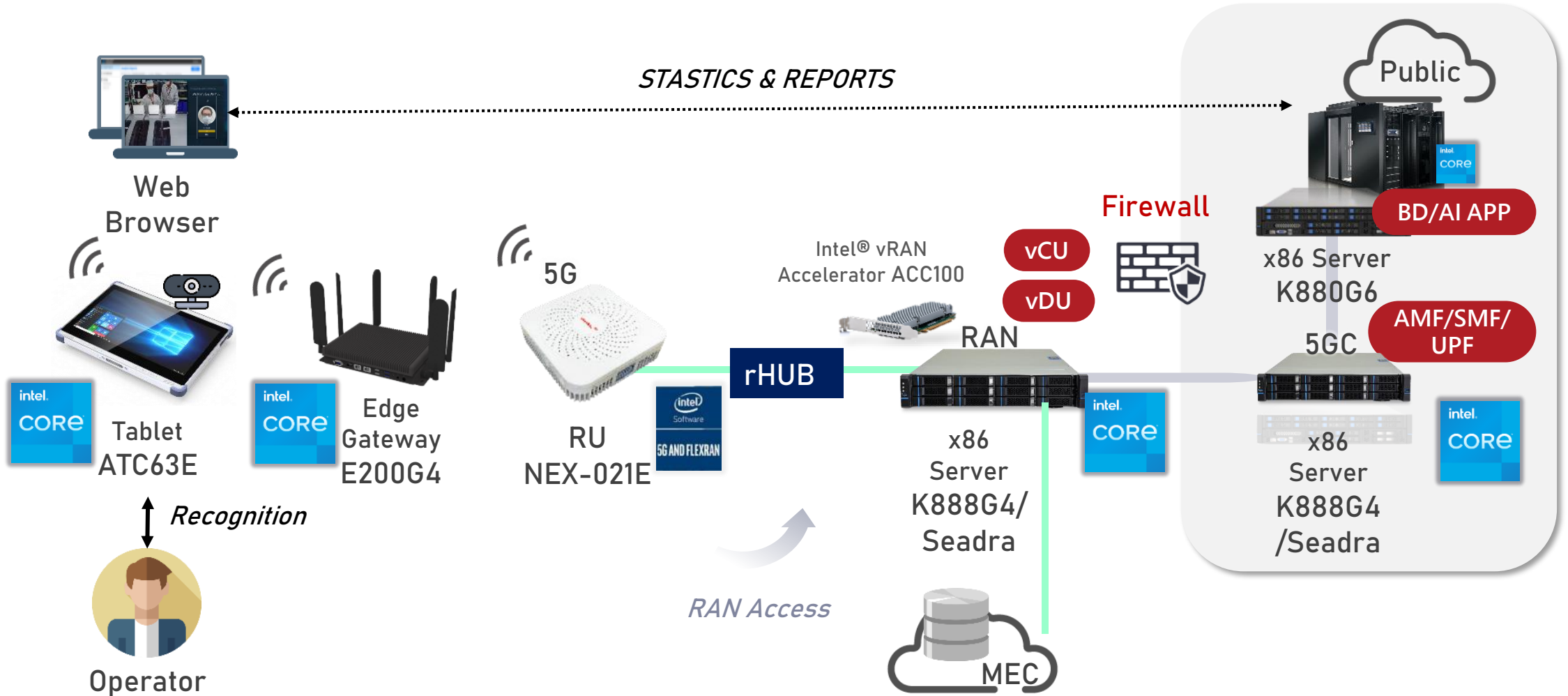


NB/Smart Phone/Tablet...



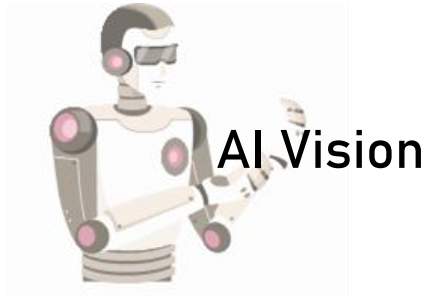
MFG/Traffic/Medical...

Intel Edge to Cloud Fabric enabled 5G Smart Factory Application



Smart Manufacturing / Digital Twins

- Connecting key 5G application scenarios for total benefits:



AI Vision

- Personnel status collection & action analysis to prevent abnormal behavior.
- Digitalization of human wisdom in manufacturing; MI applications in simulation and prediction.



AR/MR

- MR for Training & eSOP
- Interactive smart surveillance & real-time defeat inspection



AI-IoT

- Param. self-adjustment & decision intelligence of devices. Simulation and prediction for diversified product production.
- Real-time traffic scheduling MGMT for AGV/AMR
- Smart inspection, active energy saving & carbon emission prediction of factory ENVIR.
- Digital Twins & Cyber-Physical System

Benefits



Increasing

10% ↑

Yield Rate



Reducing

12% ↓

Scrap Rate



Reducing

40% ↓

WIP



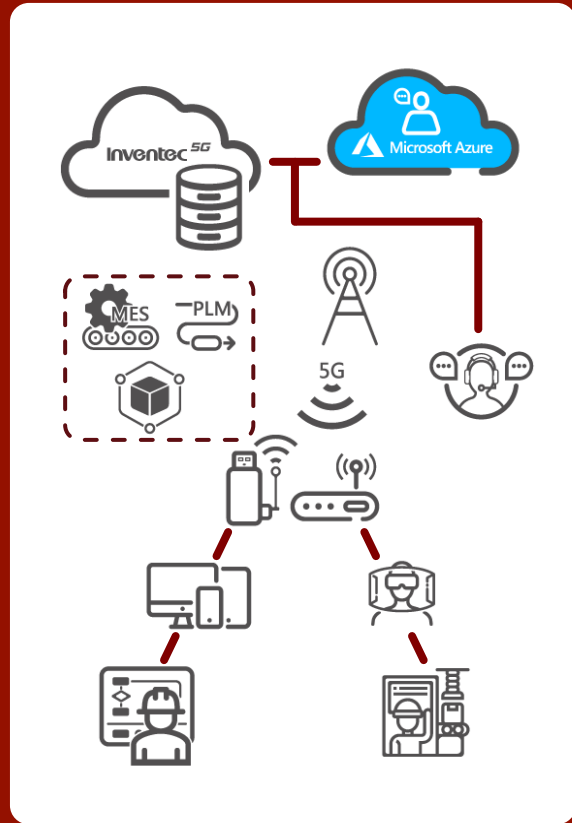
Reducing

35% ↓

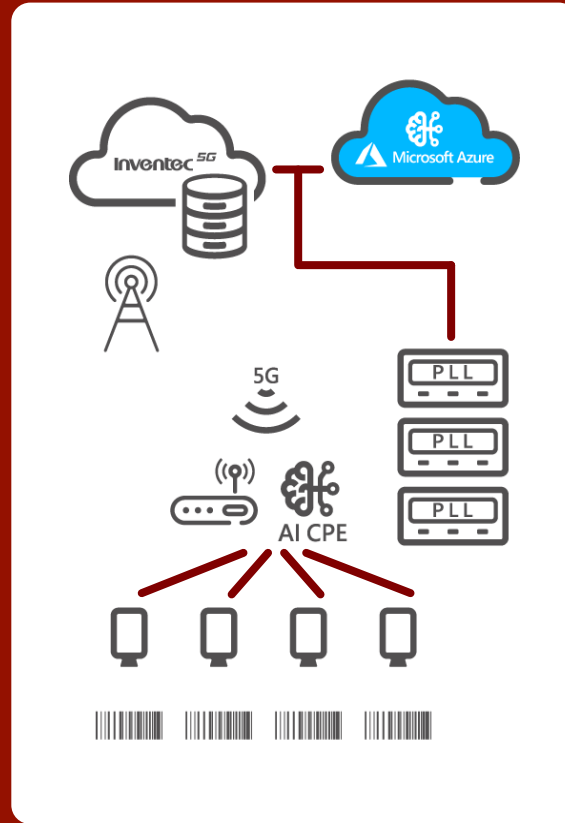
Working Hours

Use Case in Various Vertical Domains

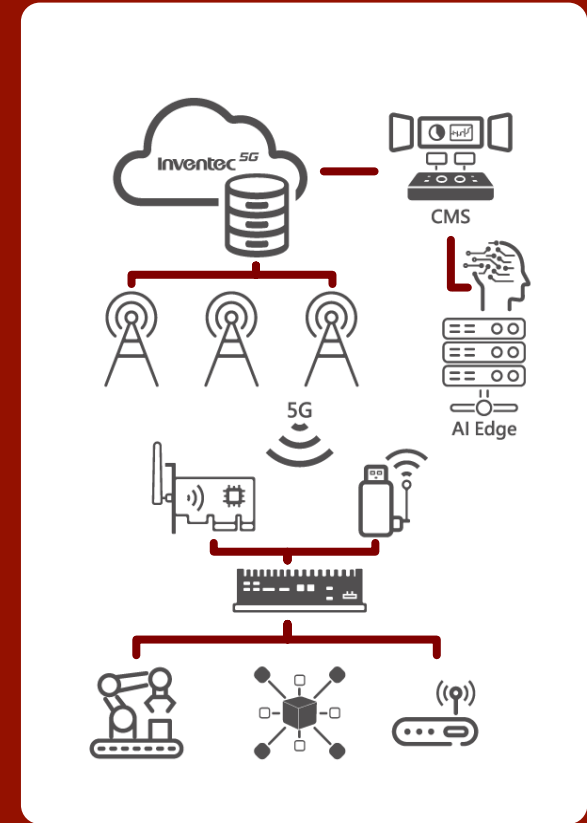
AR Remote Assistance for PCB Assembly



Anomaly Detection of Textile Products



AI + CMS Monitoring for Fab Plant



5G AI Smart Factory Solution

Priority	Solution Name	Application
1	5G AIoT4.0 Solution	Intelligent Inspection
		Abnormal Alarm / Preventive Maintenance
		Issue Tracing
		Digital Twins
2	5G Efficient Production Solution	AI AOI
		SOP Checking
3	5G EHS Solution	Face Recognition
		Fall Detection
		e-Fencing
4	5G Remote Assistance Solution	Distance Learning
		Interactive Collaboration
		eSOP
5	5G AGV/AMR Solution	AGV
		AMR

Inventec 0-Rack



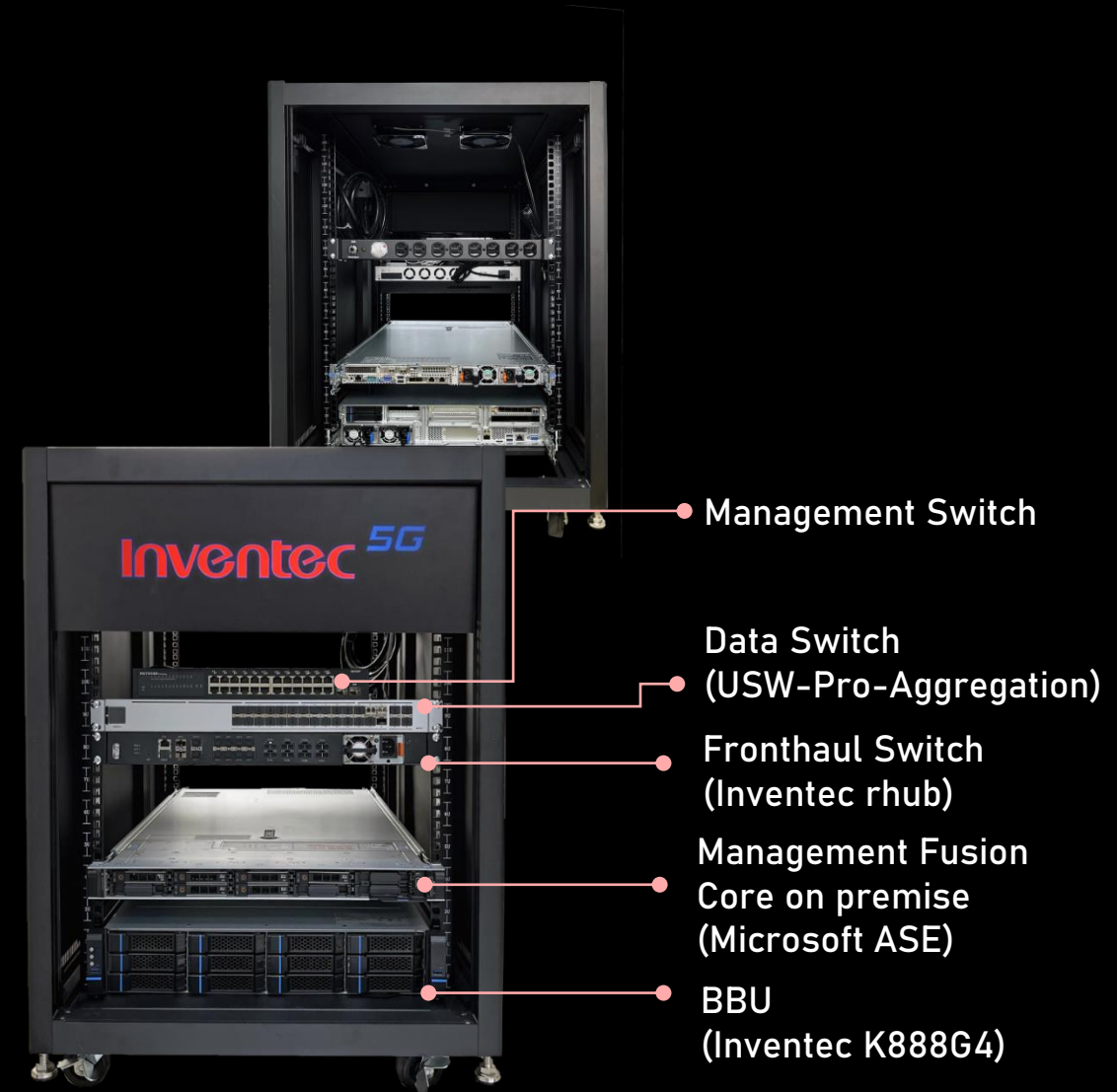
Inventec 0-Rack



- All-in-one 5G ORAN infra rack solution plus radio unit
- Performance: 1 UE, DL: 800 Mbps, UL: 200 Mbps
- Antenna spec: n79, 4T4R Indoor and Outdoor RU
- RF coverage: 250mW for 30M
- Modulation: DL 256QAM, UL 64QAM
- FR1 for 5G private network
- RF standard: TS 38.104 category B
- Maximum number of MIMO layers: SU-MIMO 4x4
- Band and bandwidth: N79, 100MHz Bandwidth for 5G private network
- Max output power: 24dBm/channel
- 128 active users per cell
- GPS time sync support
- Security Function: 3GPP Ciphering - NIA0/NIA1/NIA2/NIA3
3GPP Integrity - NEA0/NEA1/NEA2

0-Rack Specification¹

	Item	Description
Rack	Chassis Dimension	(W) 580mm x (D) 1000mm x (H) 800mm
	Power Supply	Max. 2000 W 100~250V/20A
Core	PDU session	200 (Supporting up to 200 UE)
	Data bandwidth	25Gbps
	Antenna	4T4R Indoor and Outdoor RU (supporting up to 32 RU per BBU)
	Band, Bandwidth	N78,N79
RAN	RF coverage	250mW for 30m coverage
	Modulation	DL 256QAM, UL 64QAM
	Maximum MIMO	SU-MIMO 4x4
	Max output power	24dBm/channel
	Active users per cell	200
	Latency	20~60ms
	Performance	DL: 800 Mbps, UL: 200 Mbps (1 UE) ²



1. Subject to conditions
2. Currently each BBU can support up to 4~5 camera upload points (8 Mbps each) and 3~4 video data download points (100 Mbps each) at the same time

Customer Story

Customer Success: Nexcom(新漢) Huaya Smart Factory

- 新漢邁入30年,是台灣前十大的工業電腦生產商
- 2015年便專注於I4.0,智慧製造系統方案,成立新漢智能系統
- 開發出一套I4.0方案: iAT2000,並於2018年建置於自身工廠
- 該系統完全符合企業與生產單位各層級人員需求
- Intel I4.0方案一路相陪,從台塑石化建置開始,成功的成為領先者
- 如今有英業達5G的加持,帶來如下優勢,並開啟另一I4.0里程



90% 產線實現移動式, 即時性 數據一目了然

- 採用5G 專用網絡打通 iAT2000 可視化資訊系統的強大功能, 可由 AR 眼鏡進行智能監控, 實現 anytime ,anywhere 生產管理

全廠AMR 5G信號覆蓋率95%

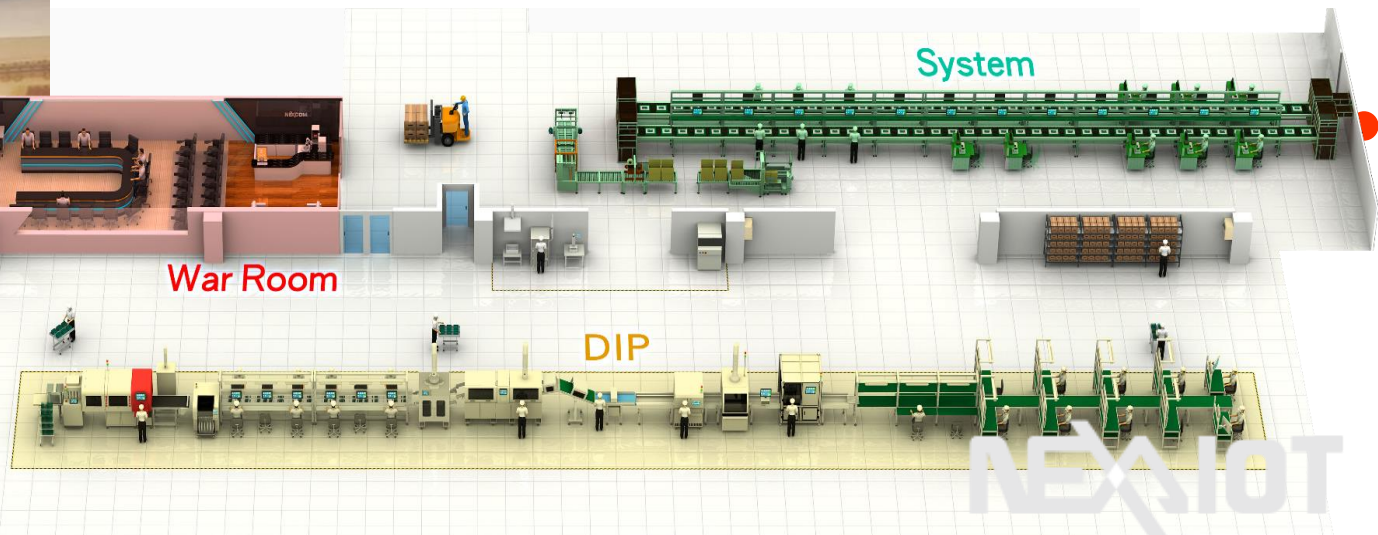
- 與 WiFi 相比, 具備安全性私有 5G 網絡的高速和超低延遲, 並具有更高效能的部署, 並在生產線與倉儲區實現無縫界接 與輕易更換Wifi

移動網絡安全100%的信任

- 在端點設備能防止任何未經授權的設備進入5G網絡, 同時在網絡層之識別具備阻止漏洞、惡意內容與可疑網絡行為

新漢華亞廠

- 成為台灣領先實現的智慧工廠
- 龜山華亞園區：2700坪EMS產線
- 具備完整17個方案給於各層級人員
- 經濟部沈榮清部長蒞臨開幕
- 工業局培訓與各企業展示場域
- 年辦超過100場以上給予各企業參考
- 英業達5G企業專網展示場域



數字企業：總部戰情室與功能(17個方案)

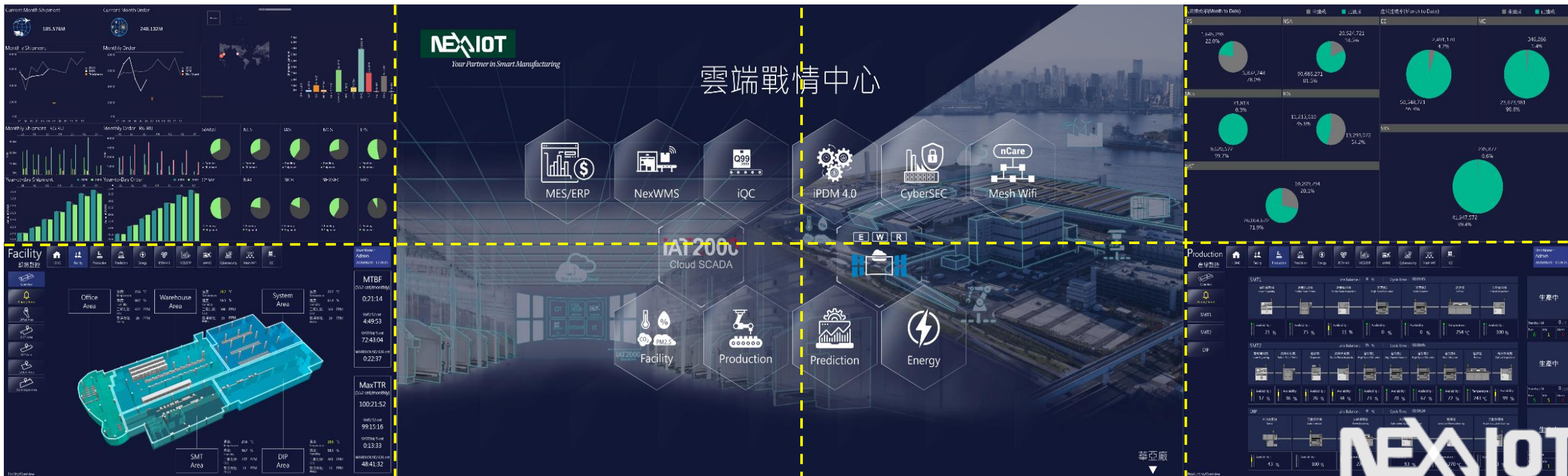
特色：秒級與分鐘級資訊，應映各級人員得以快速反應與決策

上位資訊整合 (IT 管理層)

- ERP業務
- MES工單效能
- iPDM 生產成品決策4.0
- APS先進排程系統
- 智慧倉儲(RFID)
- 設備資產管理
- 設備資訊安全
- 材料/成品iQC平臺
- RMA追溯系統

產線監控方案 (OT 廠務層) : iAT2000

- 3D 立體工廠
- Facility (水氣, 空調, 環境)
- Production 產線監控
- 工廠安全監控
- AR眼鏡遠端維護
- Energy 節電方案
- IP CAM 廠區監視
- PDM 預知保養



新漢華亞廠5G建置影片：產線虛擬看板 達到真正Anytime, Anywhere管理與維運

生產數量	999
程式管理	4BQ00XGSB9X10
功率	50
狀態燈	黃燈
稼働率	19.75289



Public



新漢智能 智慧製造服務內容

Digital Transformation Solution



新漢集團



新漢智能

- 台灣執行最多智慧製造專案廠商
- Turn-key供應商,顧問規畫與執行SI
- 至少超過50個智慧製造專案
- 智慧廠務, 智慧產線,工業局輔導商
- 工業物聯網5G方案
- 無人化工廠與Robot應用
- ESG 於“ E” 節能顧問方案

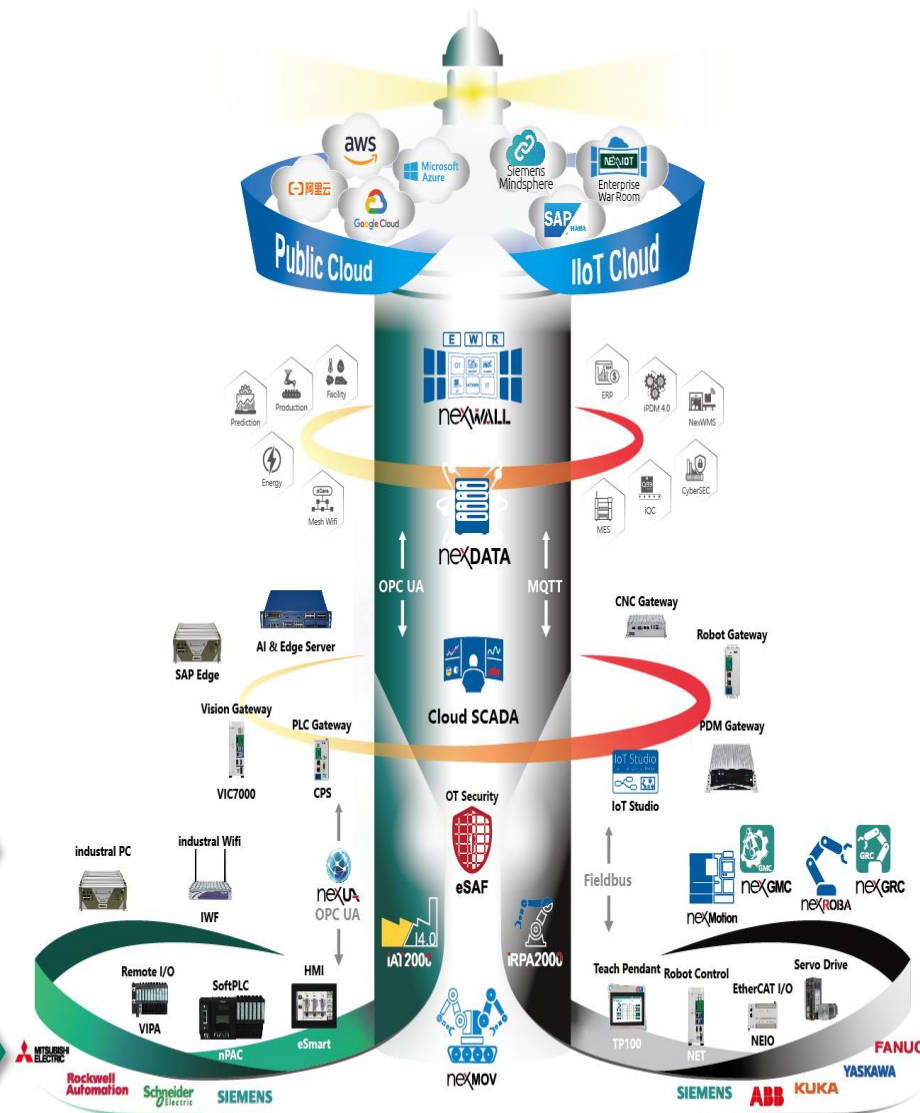
Cloud Services

AI and Microservices

Data Convergence

Smart Manufacturing

Smart Machinery & Robotics



數據化

無人化



提供 I4.0各階段並量化的執行方案

工業 3.0 到工業 4.0 的 9 個里程碑 (可依客戶需求逐次建置)

智慧產線

- 工業 3.0 : 機台自動化
- 工業 3.1 : 生產線監控自動化
- 工業 3.2 : 無(少)人化, 機器人自動化
- 工業 3.3 : 數位化及邊緣運算智動化

智慧機台

- 工業 3.4 : 生產資訊雲端管理化
- 工業 3.5 : ERP/MES整合的即時決策系統
- 工業 3.6 : 跨製造廠域協作的企業數位總部
- 工業 3.7 : 數位化運營的業務及數據中台
- 工業 3.8 : 虛實整合的AIoT製造業服務

智慧工廠



智慧工廠 - 電子EMS廠

廠務/產線整合

工業3.7

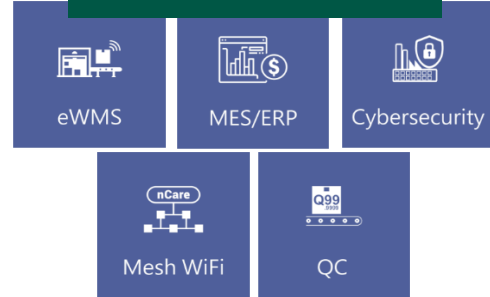
SCADA 監控



戰情中心



IT MES等整合



Intranet

SCADA-FMCS



IIoT Gateway



Device Gateway



Sensors
(Temp., Pressure, ...)



SCADA-Product



IIoT Gateway



Nonprotocol Gateway



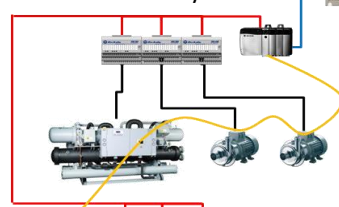
Machine Gateway



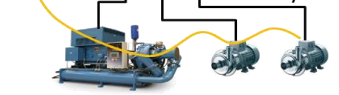
SCADA-PDM



Data analyser



Motors/Pumps



SCADA-Energy



IIoT Gateway



Device Gateway



Power Meters



eWMS Server



Production Line



Warehouse



廠務 環安衛,工安



Facility

SMT/DIP產線機台聯線



Production

重要設備預知監測
震動頻譜分析技術



Prediction

節能方案
需量,尖峰離峰分析



Energy

倉儲整合
與RFID方案



eWMS

新漢智能10大案例影片-各行業隱形冠軍

新漢智能
十大智慧製造精典專案

新漢智能於I4.0服務與使命

新漢智能網站: WWW.NEXAIOT.COM



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NEXIOT