

# 讓 AI 看懂產線：OT 通訊與資安成為 智慧製造的關鍵橋樑



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Cisco 亞太區工業物聯網 產品經理

# 從IT機房延伸到產線、機台、管道間、戶外環境

## Campus & Branch Networking

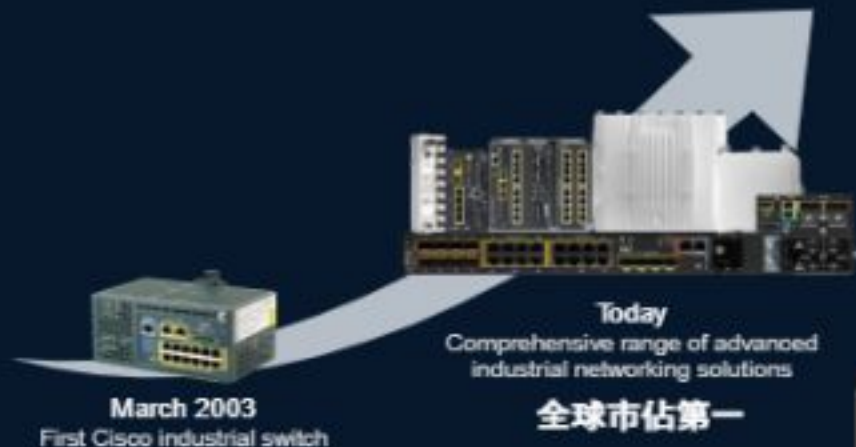


## Rugged Networking



Consistent Network Architecture

# Cisco 在OT產業數位化與創新上推動已超過 20 年



## 滿足OT應用需求

完整支援 OT 通訊協定與架構, 例如 PROFINET、Ethernet/IP、HSR/PRP/OLR 等等



## 促進 OT/IT 合作

透過新科技與AI, 使IT/OT業務創新、營運、安全與未來擴展性等各種需求



#1 Market Share  
Global Industrial Edge

Industrial  
Switching

24%  
2022  
vs. 2021

Industrial  
Routing

34%  
2022  
vs. 2021

Industrial  
Wireless

57%  
2022  
vs. 2021

Source: IHS Markit, 2022 Q3 vs. 2021 Q3

Cisco 已與超過 **52,000** 家  
製造業客戶與組織合作，遍及  
**139** 個國家，合作超過 **20** 年



# AI 時代下的未來工廠



## Chatbots

Humans talk to AI



## Agentic

Workflows get automated



## Physical

Anything that moves has AI

# AI 關鍵資源：工業現場數據

75%

of enterprise-generated  
AI data will be created in  
**industrial environments**



## 製造業AI數位轉型常見難題

- 資料在現場，但拿不到
- 設備在運作，但看不清
- 風險在累積，但不敢動
- 想升級 OT，卻怕一動就停線

Infrastructure

Inventory  
& RFID

Industrial  
Robots

eCommerce

IoT

Motors and  
Pumps

SCADA

PLCS

Applications

ERP

Video  
Cameras

Safety  
Systems

Logistics  
Operations

Environment  
Systems

Telephony &  
Contact  
Center

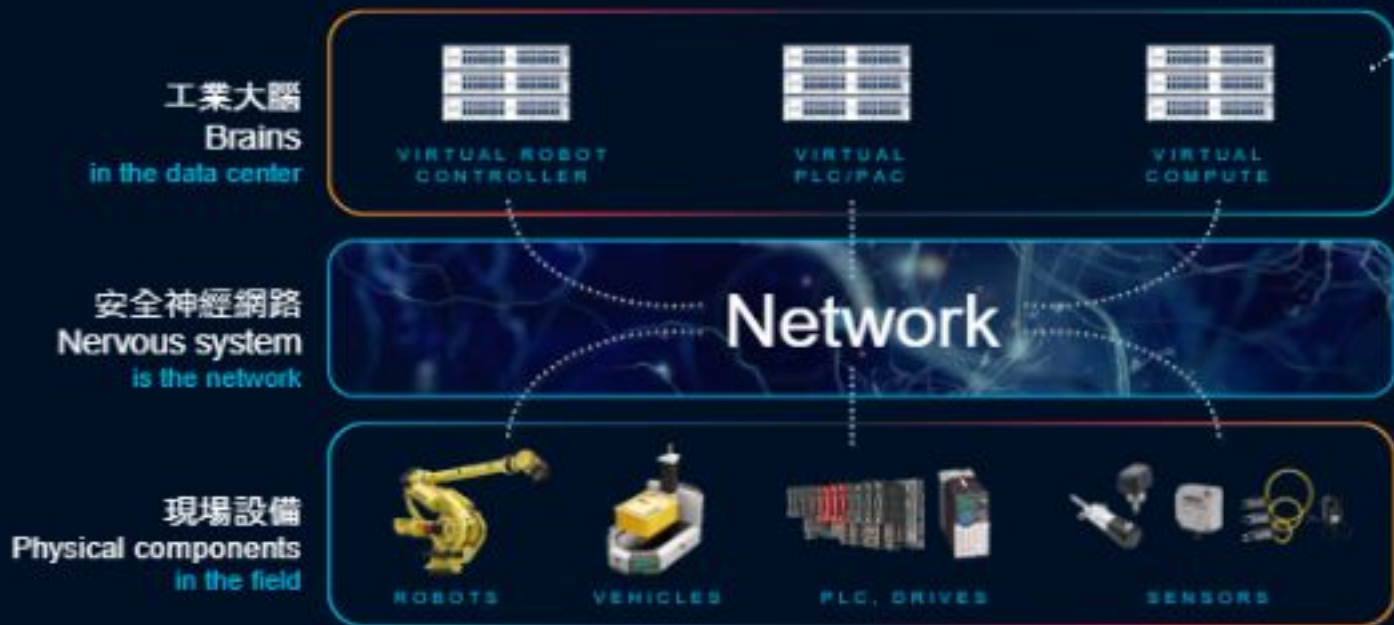
Quality  
Control

5G/  
Wifi  
Network

# 數位轉型第一步: 三階層架構，建立OT神經網路



資安防護跟上了嗎?



# 完整工業等級通訊方案，以安全的設備建置安全的網路

## DIN-rail Portfolio



## IP67 Portfolio



## Rackmount Portfolio



# New IE9300 Rugged Series Switch

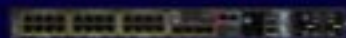
- 主機功耗僅35W(用越多,省越多電)
- 內建堆疊模組



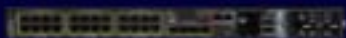
**IE-9310-26S2C**  
26x 10G SFP ports  
2x 10G combo ports



**IE-9320-24T4X**  
24x 10G ports  
4x 10G SFP ports  
Stackable



**IE-9320-24P4S**  
24x 10G with PoE/PoE+  
Up to 480W PoE budget  
4x 10G SFP ports  
Stackable



**IE-9320-24P4X**  
24x 10G with PoE/PoE+  
4x 10G SFP ports  
Up to 720W PoE budget  
Stackable



**IE-9320-26S2C**  
26x 10G SFP ports  
2x 10G combo ports  
Stackable



**IE-9320-22S2C4X**  
22x 10G SFP, 4x 10G SFP  
2x 10G combo ports  
Timing input  
Conformal coating  
Stackable



**IE-9320-16P8U4X**  
8x mDtg with 90W 4-pair PoE  
16x 10G with PoE/PoE+ ports  
Up to 720W PoE budget  
4x 10G SFP ports  
Stackable



**IE-9310-16P8S4X**  
16x 10G with PoE/PoE+ ports  
8x 10G SFP ports  
Up to 480W PoE budget  
4x 10G SFP ports

NEW



# Introducing Cisco IE3500 Rugged Series Switches

NEW

## Base



### IE-3500-8T3S

8x 10G ports  
3x 10G SFP ports



### IE-3500-8P3S

8x PoE/PoE+  
3x 10G SFP ports  
360W PoE Budget

NEW

## Advance



### IE-3505-8T3S

8x 10G ports & 3x 10G SFP ports  
HSR/HSR+DLR



### IE-3505-8P3S

8x PoE/PoE+ 3x 10G SFP ports  
HSR/HSR+DLR  
480W PoE budget

NEW

## 10G/4PPoE



### IE-3500-8T3X

8x 10G ports  
3x 10G SFP ports



### IE-3500-8U3X

8x PoE/PoE+/4PPoE (80W)  
3x 10G SFP ports  
480W PoE budget

NEW

## Common Expansion Modules



### IEM-3500-6T2S

6x 10G ports  
2x 10G SFP ports



### IEM-3500-6T

6x 10G ports



### IEM-3500-8P

8x PoE/PoE+



### IEM-3500-8S

8x 10G SFP



### IEM-3500-14T2S

14x 10G ports  
2x 10G SFP ports



### IEM-3500-16T

16x 10G ports



### IEM-3500-16P

16x PoE/PoE+



### IEM-3500-4MU

4x 2.5G  
PoE/PoE+/  
4PPoE (80W)

# Cisco Industrial Ethernet

OT網路不再只是會通就好!!



具備邊緣運算功能的乙太網路交換機

Cyber Vision & Secure  
Equipment Access  
OT可視化 & 安全遠端連線



ThousandEyes  
全域網路可視化



OT Visibility & Secure Remote Access

Assurance

Application Hosting



Line Rate Segmentation Enforcement

一套設備同時也幫您打造工業網路、完整OT可視化、安全遠端連線、網路微分割等資安防護架構

# 數位轉型第二步: 透視OT盲盒

## Cyber Vision 可視化分析，完整掌握OT系統

- **OT資產盤點 (Visibility of connected assets)**  
自動偵測並呈現所有 OT/IT 設備，清楚掌握工廠內「到底有什麼」
- **OT設備漏洞 (Identify and track vulnerabilities)**  
解析韌體版本、協定、廠牌，並對照 CVE 漏洞資料庫持續追蹤風險
- **追蹤風險暴露面 (Track your risk exposure)**  
提供風險評估，讓管理者知道哪些資產最脆弱、最可能被攻擊
- **防止資料外洩 (Stop Leaks)**  
監測非預期或異常傳輸，避免 OT 資料外洩
- **偵測惡意入侵 (Detect malicious intrusions)**  
透過 DPI 與威脅情報，及早發現異常行為
- **衡量改善進度 (Measure Progress)**  
提供報告與指標，量化「風險是否真的下降」
- **資產分組以制定安全策略 (Asset grouping for security policy)**  
依生產線/區域/設備角色分組，便於推動差異化的安全管控

## Cyber Vision Center



內建AI分析功能

Cyber Vision  
Sensors



Deep Packet Inspection & Active Discovery  
直接於網路交換機進行分析

## Cyber Vision 最懂OT系統的語言



[Cisco Cyber Vision Protocol Support Data Sheet - Cisco](#)

Cisco's Deep Packet Inspection understands process information even when using proprietary protocols



# Cisco Cyber Vision portfolio

Center

## Hardware Appliance

UCS based servers with Hardware RAID



- CV-CV1448N
- 24 core CPU
- 128 GB RAM
- 3.2TB drives

## Software Appliance

Virtual Machines



VMware  
ESXi OVA



HyperV  
VHD



Nutanix  
HAV



Amazon Web  
Services



Microsoft  
Azure



Google Cloud

Minimum requirements  
x86 server CPU, 16 cores  
32GB RAM and 1TB SSD  
1 or 2 network interface

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x86 server CPU, 16 cores  
32GB RAM and 1TB SSD  
1 or 2 network interface

Sensors



IC3000, IC3400,  
and IC3500  
Switch



IC3400HQ and  
IC3500HQ  
PSE Switch



Catalyst 9110  
Cellular Router



Catalyst 9180  
Cellular Router



Catalyst 9800  
Multiservice Router



Catalyst IC8000  
Rugged Switches



Catalyst S3000/S4000  
Aggregation Switches

## Network Sensors

DPI and active discovery built into network elements eliminating the need for SPAN



ASR or A1M54 compute  
running Docker



ASR Compute  
running VMware



Cisco IC3000  
Industrial Compute

## Hardware Sensor

DPI and active discovery via SPAN to support brownfield

# You can't secure what you can't see

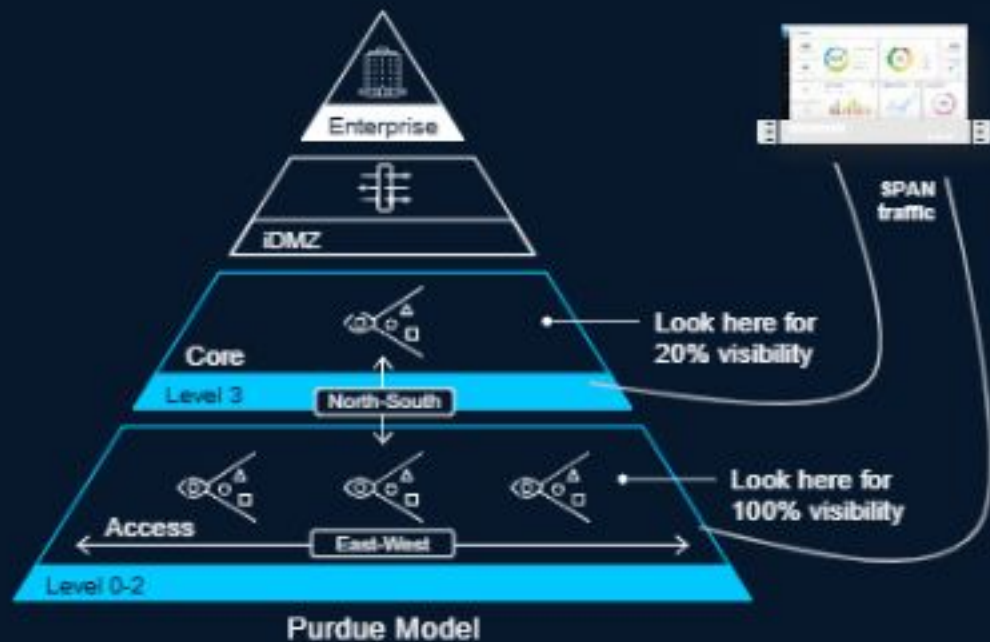








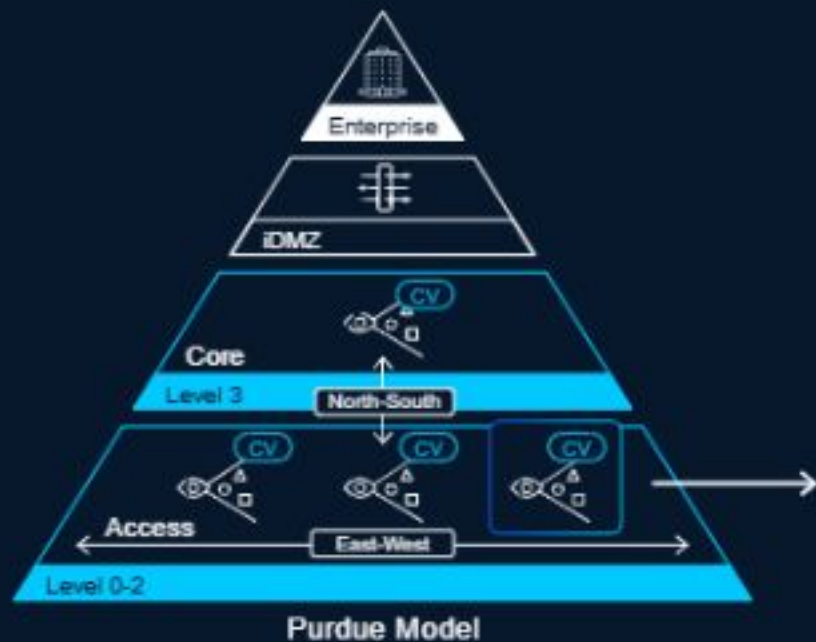
# 資安源於可視化，而分析封包的位置是成功關鍵



分析Core Switch封包，僅能得到南北向數據，現場東西向資料為盲區

透過 SPAN 或專屬硬體來實現OT完整可視化既昂貴又複雜

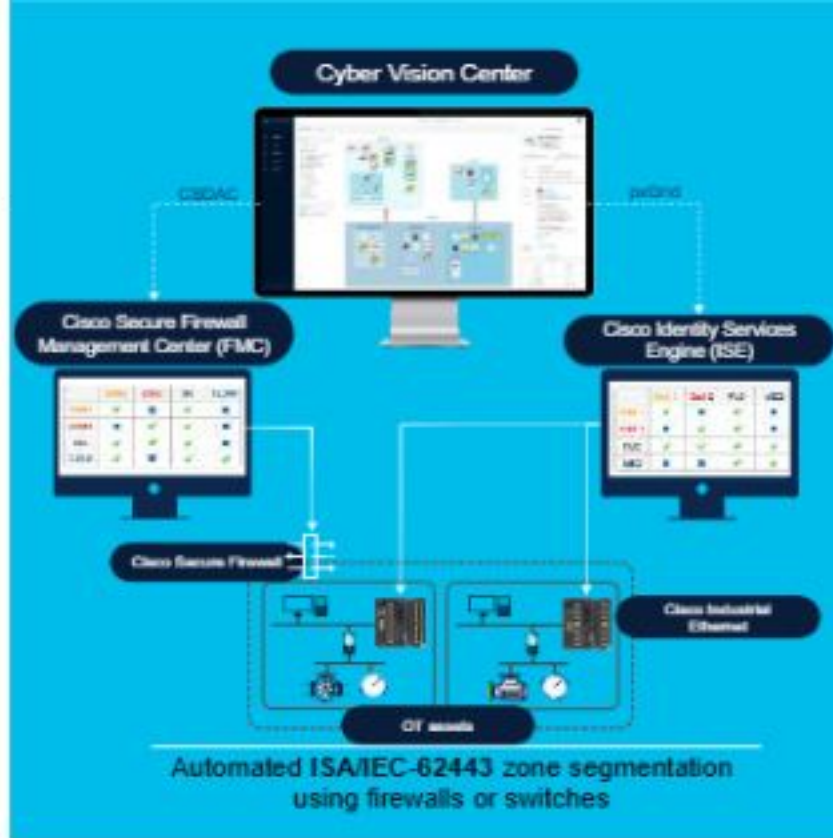
# 基於可視化的自動化網路微分段，隨環境即時調整



# 數位轉型第三步： 建立零信任安全網路架構

OT 可視性驅動分段策略，精準對應工業系統與實際應用

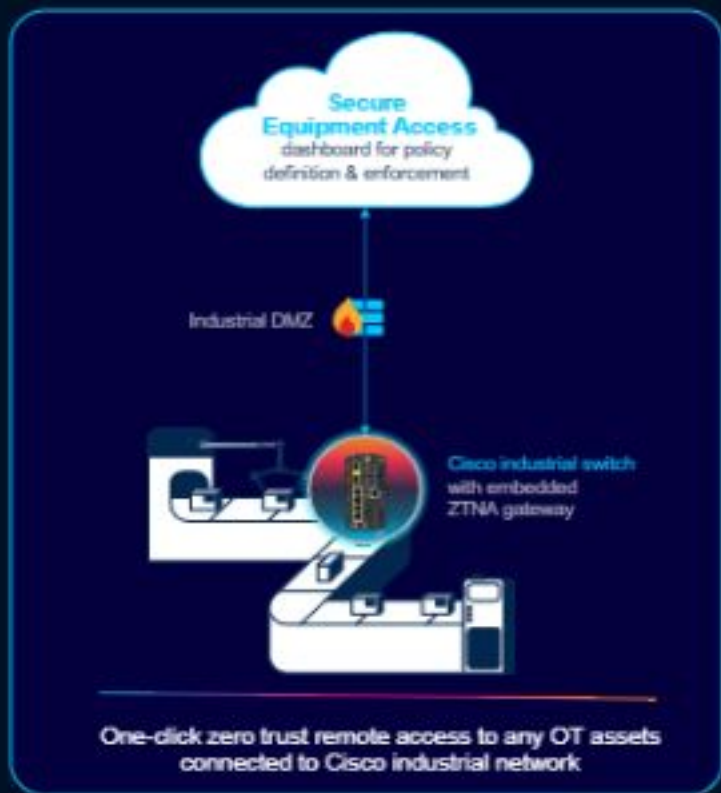
- ✓ 透過 Cyber Vision 協助 OT 團隊依信任層級將資產劃分至不同區域
- ✓ 偵測並識別異常或違規的流量行為，降低潛在風險
- ✓ 支援第三方資安設備整合，強化區域分割與即時防護策略執行
- ✓ 建立自動化網路微分割(Micro-Segmentation)，當資產在網路中移動時，自動調整安全政策，維持防護一致性



# 數位轉型維運好幫手： 零信任遠端連線SEA

透過網路交換機即可建立遠端連線，  
無需額外硬體或伺服器

- ✔ 零信任遠端連線，設備不對外暴露
- ✔ 不用額外硬體，直接連在既有工業網路上
- ✔ 彈性存取控管，符合製造業作業節奏
- ✔ 完整連線可視性與稽核能力
- ✔ 多因子驗證，帳密不外流



One-click zero trust remote access to any OT assets  
connected to Cisco industrial network

# SEA安全遠端連線-同時滿足IT、OT、設備廠商與稽核機關需求

無論是內部OT人員或外部協力夥伴，皆可在企業內部管理者允許範圍內，透過SEA安全連線存取廠內設備進行維護



**超高彈性 Flexible**  
透過網頁即可建立連線，無需安裝VPN軟體



**超高支援度 For anyone**  
Policy-based 安全連線方式，輕鬆建立內/外網連線機制



**超安全 Secure access**  
Built-in security policies

「對於機場這類關鍵基礎設施而言，穩定且安全的 IT/OT 架構是確保營運不中斷的核心。透過清楚的架構設計與策略整合，我們能在提升安全性的同時，維持極高頻度的高可靠度與可擴展性。」

Patrick Koks

Enterprise Architect, IT Infrastructure

Schiphol Airport

ZEISS

AMS Schiphol

Schiphol

## 保護生產完整性

「保護生產完整性對我們的業務至關重要。透過將 OT 安全與工業網絡融合，思科與 ZEISS 共同為利奧尼奧斯提供安全最佳實踐，確保未經授權的訪問，並防止代價高昂的生產停機。」

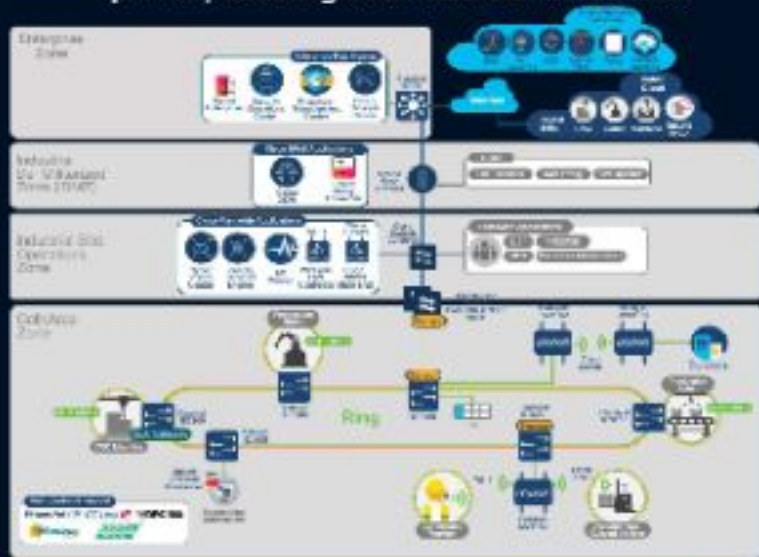
Theravoulos Myrtilidis - 網路營運總監 (CIT-ON) 主管，企業資訊科技部  
利奧尼奧斯公司

# 思科製造業建議架構CVD



Technical blueprints and architectures, tested and proven, enabling seamless standardization

- ✓ Deploy secure network infrastructure
- ✓ Gain Visibility of Assets, communication patterns and security risks
- ✓ Deploy security segmentation policy based on OT-grouping
- ✓ IT-defined, OT utilized secure remote access
- ✓ Threat Detection & Response by integrating into SOC operations
- ✓ Secure operations by applying consistent policies and SW versions with Catalyst Center





即使橫山跨海

# 無線所及 體驗無限

體驗依然一致

思科超可靠無線解決方案 CURWB  
Cisco Ultra-Reliable Wireless Backhaul



IW無線(CURWB) 應用: 軌道交通、製造業(AGV/AMR/遠端操控)、港口、電梯井、難佈線場域....



# 思科超可靠無線解決方案CURWB

Cisco Ultra-Reliable Wireless Backhaul



802.11b

802.11g

802.11n

802.11ac

802.11ax



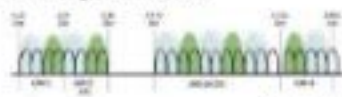
Wi-Fi

Wi-Fi 4

Wi-Fi 5

Wi-Fi 6/6E

The Wi-Fi Spectrum: 5GHz



## URWB



MPLS over the wireless

Low latency (<10 ms)  
Single hop net



Multipath Operations (MPO)

Uninterrupted connectivity



Make-before-break

High-speed mobility  
Zero hand-off

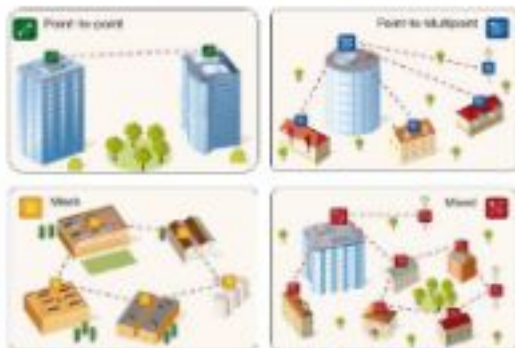
# 思科超可靠無線解決方案CURWB

Cisco Ultra-Reliable Wireless Backhaul



**WiFi 6**  
**CURWB**

光纖網路佈署不易的環境  
Connectivity where fiber isn't  
available or is too costly



移動設備需要不間斷無線通訊  
Connectivity for moving assets



高頻寬  
(>500M)

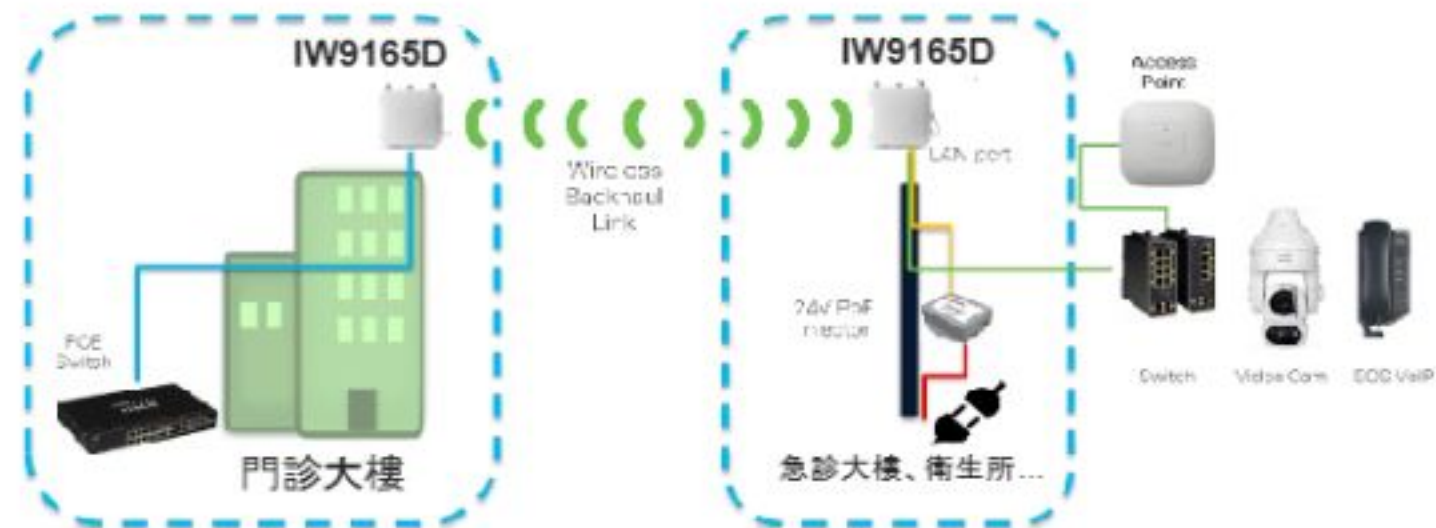
超低延遲  
(<10 ms)

漫遊零丟包  
無縫切換

免授權頻段

# 點對點無線骨幹-緊急備援通訊

透過一對IW設備即可輕鬆建立大樓間的通訊，可以作為樓宇之間備援線路或是臨時醫療站通訊延伸，免除費難拉線工程與成本，也避免臨時的光纖線路被踩斷的風險，幫您把通訊延伸到任何需要的角落



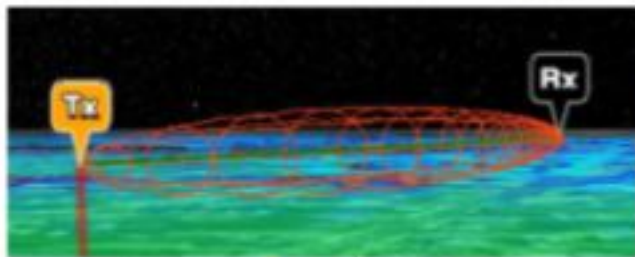
# 無線常見問題



AP



AGV



- AGV/AMR搬運車連線不穩
- AP加再多都沒用，車子總是黏在遠處AP
- IT相關設備連線都正常，就車子有問題



您需要的是專為工廠設計的  
AP+車載Client方案!!

# Catalyst IW9165E IW9165E

The 6 GHz-ready wireless client that connects mobile industrial assets

**WiFi 6**  
**CURWB**



WGB



Autonomous robots and vehicles for  
manufacturing, ports, logistics



Rail and light-rail  
rolling stock

4WDR125 certified for rail operations



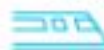
## Connect more machines to your network.

Compact form factor for integration into existing assets.



## Get more from your industrial assets.

Bluetooth Low Energy (BLE), GNSS, GPIO capabilities for advanced use cases.



## Connect moving vehicles to your systems.

Ultra-low latency and zero packet loss during handoff.



## High-performance and modular wireless.

Dual 802.11ax radios with wide choice of antennas.



## Works with your Wi-Fi infrastructure.

Supports **Workgroup Bridges (WGB)**/universal WGB (uWGB) or **Cisco® Ultra-Reliable Wireless Backhaul (Cisco URWB)**. Evolve as your needs change.

# 思科移動設備無線-三種方案，滿足各式場域需求

## 1. CURWB(Cisco Ultra-Reliable Wireless Backhaul)

適用情境: 移動過程中不允許任何掉包、斷線

設備需求: 環境Cisco AP支援URWB技術、

移動設備搭載IW9165E

方案特點: 雙無線模組、漫遊0掉包、

超低延遲(<10ms)



## 2. IW9165E—WGB模式

適用情境: 移動切換必須穩定順暢、

僅可允許低延遲與少量掉包

設備需求: 環境為Cisco AP、

移動設備搭載IW9165E

方案特點: 雙無線模組、順暢漫遊

、超低延遲(20-50ms)



## 3. IW9165E—uWGB模式

適用情境: 移動切換希望穩定順暢、

斷線後可以自動重連

設備需求: 環境為雲管理/第三方AP、

移動設備搭載IW9165E

方案特點: 標準Wifi功能、低延遲、

順暢漫遊





# Reliable AGV connectivity

## Challenges

- Roaming and density issues when the AGVs are on the move
- Need for ultra-reliable communication to support on-board PLC control and industrial safety protocols
- Need for an easy-to-deploy solution to address tight project timeline

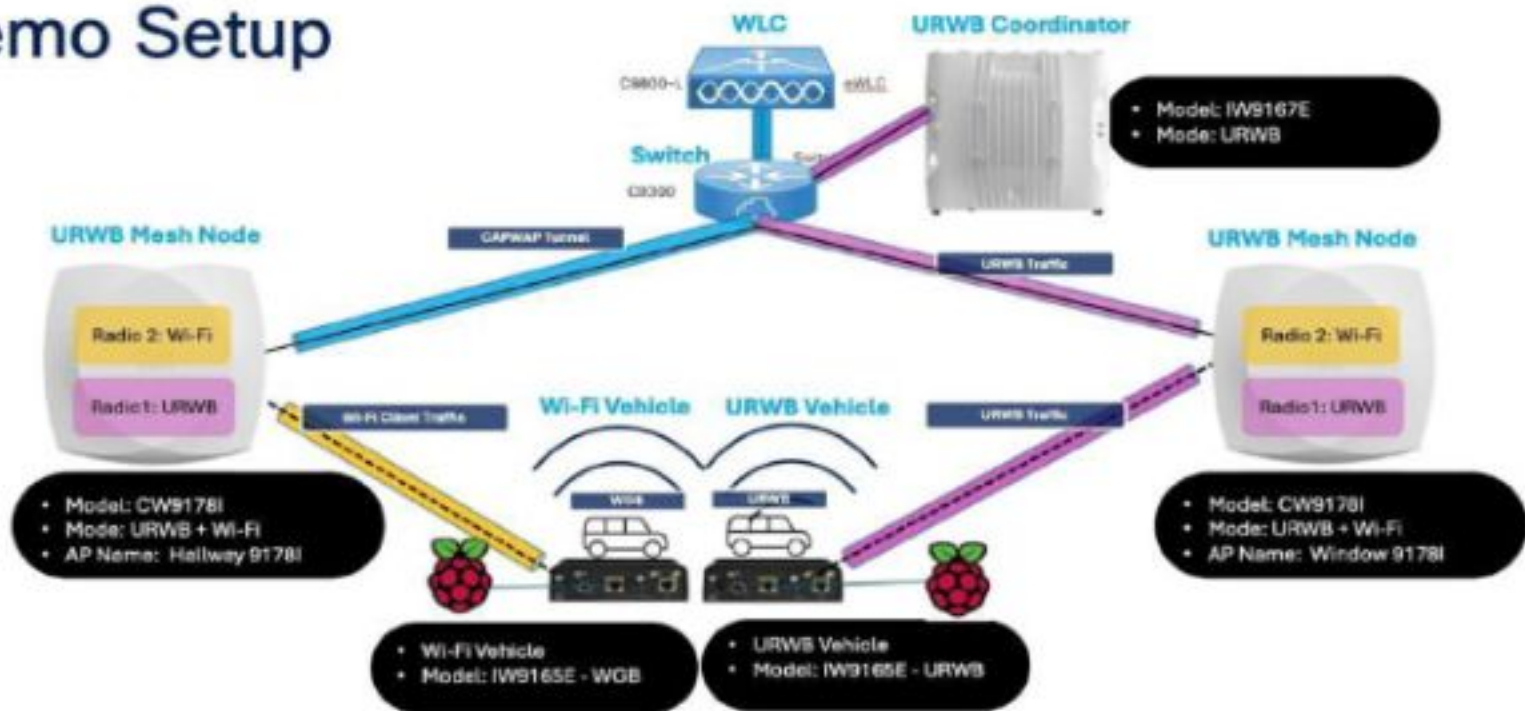
## Solution

- Cisco® URWB supporting Fluidity
- IW9165E as onboard radio for AGV
- IW9167 as infrastructure AP

## Outcome

- 0.01% packet loss, 移動過程不斷線, 確保AGV精準定運作不失聯
- <10ms average latency, 傳輸超低延遲, 確保系統穩定且安全運作
- 簡易佈線與維護, 快速上線且方便管理, 無須部署網絡知識

# Demo Setup



### URWB Statistics

Latency	Jitter	Packet Loss last 3 mins
<b>Good</b>	<b>Good</b>	<b>0 packets</b>

### 3 Minute Comparison

1.5% less latency on URWB  
 79.5% less jitter on URWB

Packet loss is equal

### Wi-Fi Statistics

Latency	Jitter	Packet Loss last 3 mins
<b>Good</b>	<b>Good</b>	<b>0 packets</b>

Connected AP

## Hallway-CW9178



URWB Vehicle

Connected AP

## Hallway-CW9178



Wi-Fi Vehicle



# 電梯通訊常見痛點

- 高溫、高濕、高粉塵、設備容易壞
- 施工環境艱困，難以進行維修



- 車廂對外連線不穩

# 電梯通訊最佳解決方案

- 工業等級IP67防塵防水，耐高溫、高濕、高粉塵
- 工業等級認證，持續震動都不怕
- 工業等級認證，抗電磁干擾



- 思科CURWB，工業無線技術
- 高頻寬、超低延遲
- 內建高功率指向天線，輕鬆建立連線

## 電梯車廂對外連線=動態調整距離的點對點通訊



### 方案說明:

1. 透過一對IW-9165D建立CURWB無線連線，讓電梯裡面的AP可以透過IW連線到機房
2. 此狀況IW設備為點對點連線，無Roaming需求，可以購買最基本的Essentials即可

\*目前實測300m高度對IW-9165D內建指向型天線，建立點對點連線可以得到相當好的連線效果

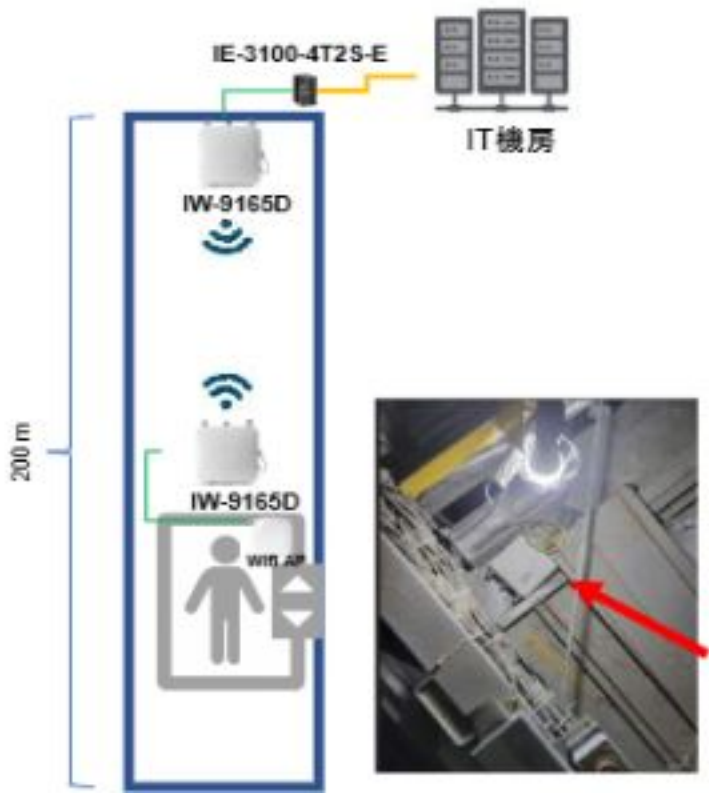
\*一對IW9165D即可完成一組電梯對外連線

### 設備清單:

1. IW-9165D\*2
2. IE-3100-4T2S-E\*1(工業等級交換機)

# 電梯通訊測試參考

# 電梯車廂對外連線=動態調整距離的點對點通訊



電梯井頂端



電梯車廂上方

Security cameras



Outdoor Wi-Fi



Mobile assets



Gate access control



ATMs



工廠有線/無線通訊、資安，找思科！



Wireless backhaul for non-wired locations



Private mobile wireless on campus



Building management systems



Outdoor digital signage



Emergency call buttons

Thank you

