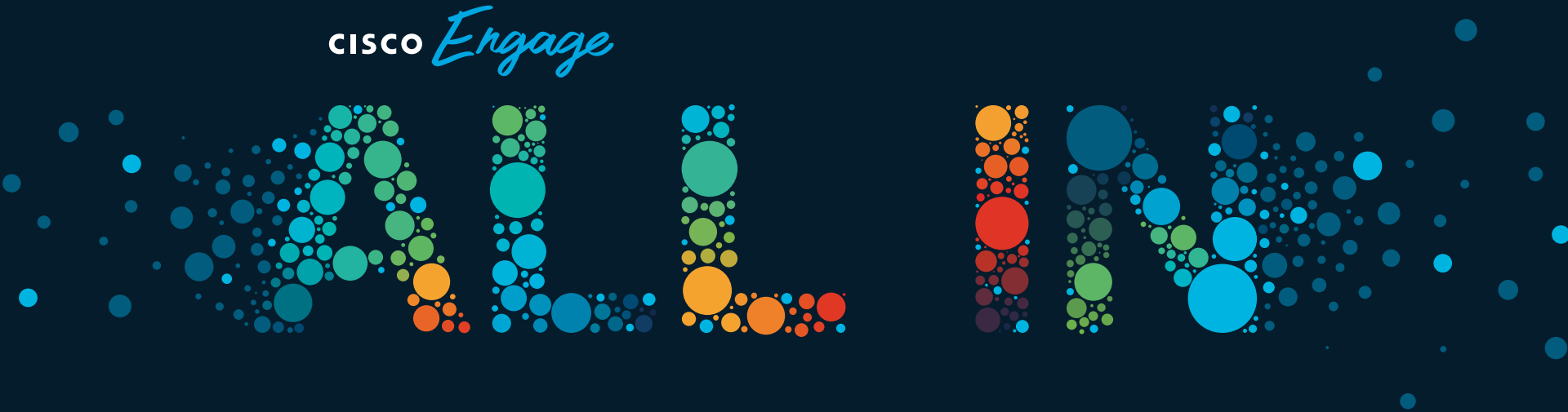

#CiscoEngage

The bridge to possible

數位轉型的前世與今生

Under the Hood

Byron Lo 資深技術顧問

Session ID

Agenda

- 介紹
- 類比世界與數位訊號
- 數位轉型簡史與Apps
- 數位轉型-網路篇
- 結論

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介紹

當今世界，萬物互聯

每分鐘都有成百上千的“物體”接入到網路中

- By 2022 年將存在 28.5 billion 聯網設備和連接
- 4.95 billion 互聯網用戶
- 4.62 billion 活躍的社交媒體用戶
- 世界上最大的計算機網絡是什麼？
- 我們已知最複雜的網路是什麼？
  - 人體有11個器官系統, 30 trillion 個細胞
  - 腦有100 billion 個神經元

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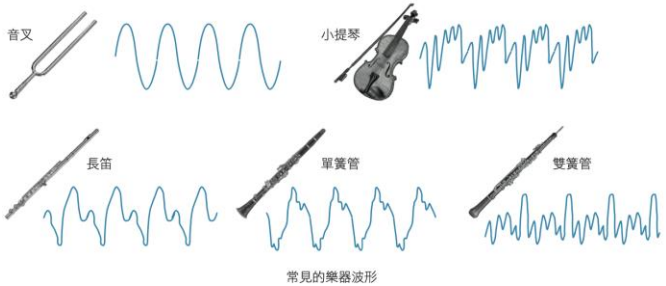
類比世界與數位訊號

自然世界

- 耳朵可以聽到幾種音調？鼻子可以聞到幾種氣味？心跳，光的明暗，說話音量的大小
- 定義：可隨時間連續變化的量，而且量是連續不間斷
- 量子力學：Everything is a wave
- 波是能夠平滑波動的連續信號: 聲波，電磁場，電流，無線電波
- 信息(information)是關於某人/事/物的事實
- 信號(signal)承載信息



常見的樂器波形

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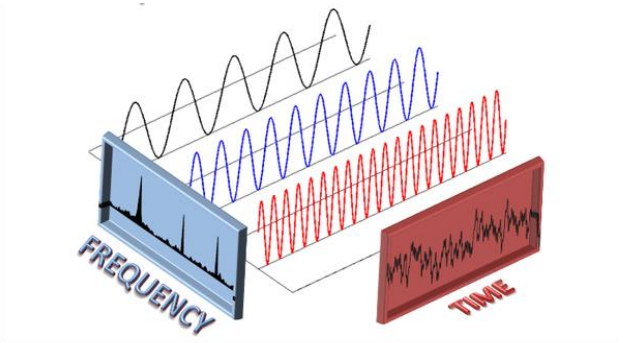
數位訊號

- 西元1948年，英國人Maurice Bartlett發現了數位訊號
- 類比訊號經過取樣，量化後，再用 digital bits 表示
- 電腦是數位的：易於編輯，操縱，配置，傳輸和長期存儲
- 但是無論信息和信號變得多麼數位化，最後還是需要返回到物理世界
- 方波是無數sine wave的疊加
- 可以根據信號的特徵，時間，空間或是頻率來簡化處理的過程



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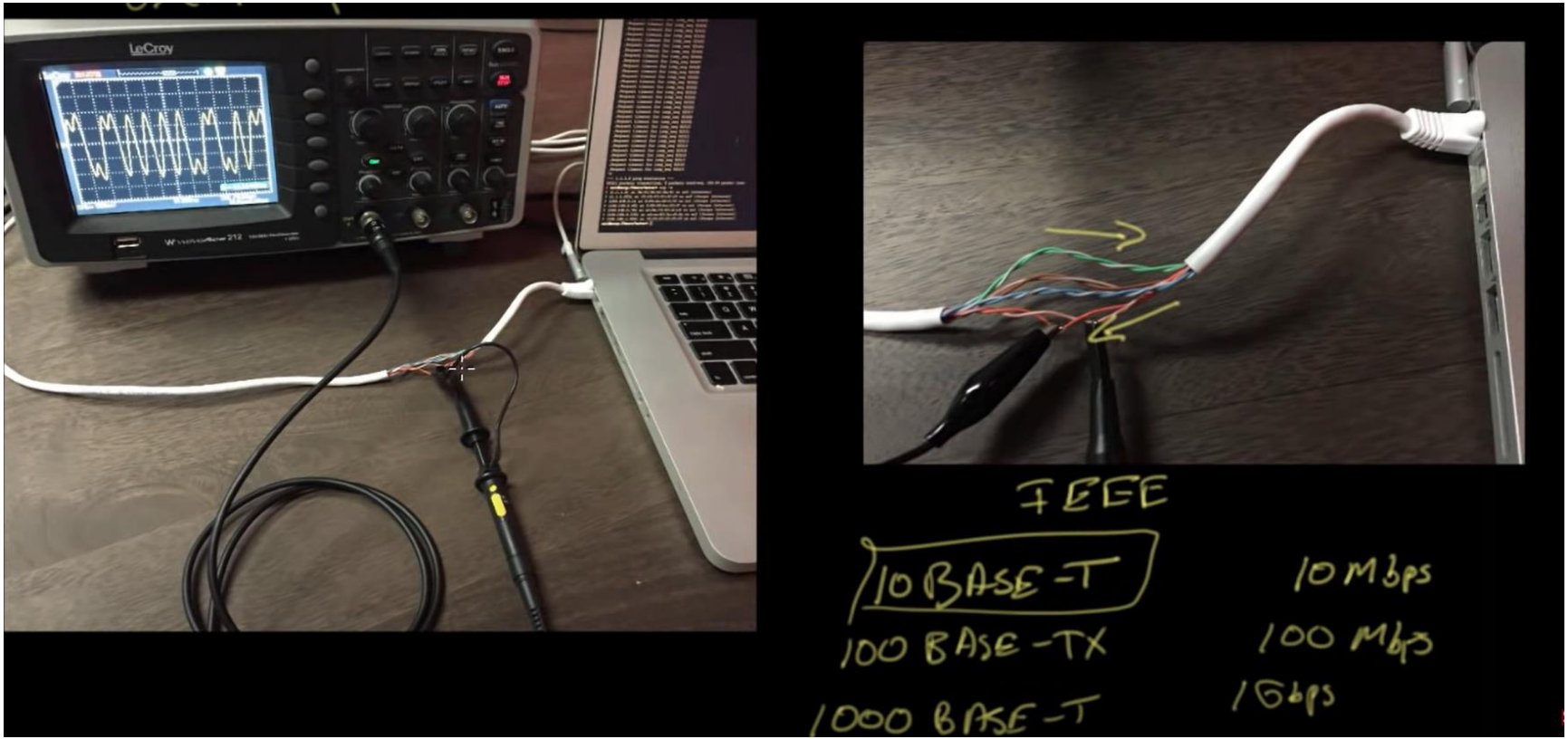
10 BASED-T 實際編碼



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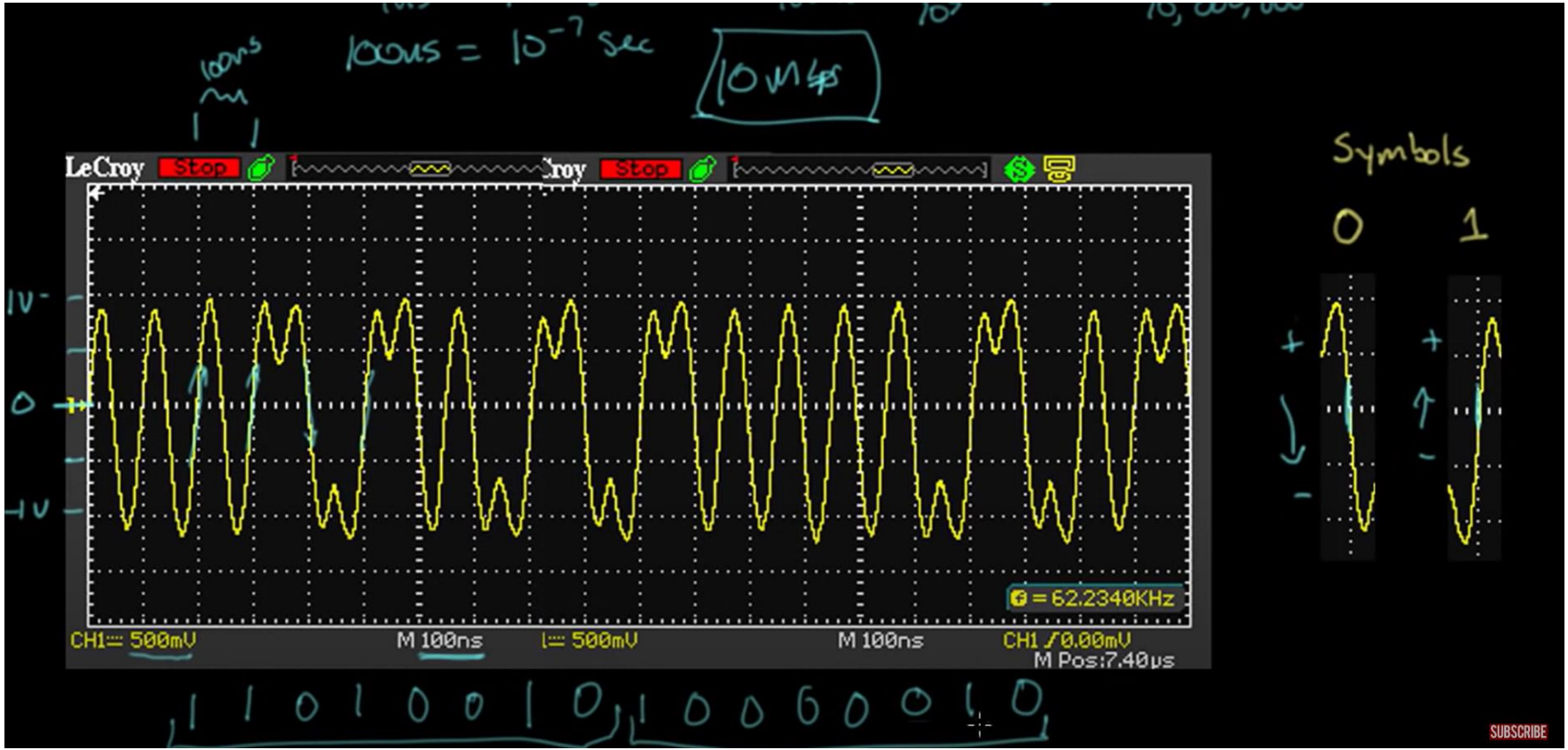
曼徹斯特編碼 (Manchester code)



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數位轉型簡史與 Apps

cisco Engage

起源與發展

- 使用現代的數位技術來創建或修改業務流程、文化和客戶體驗，以滿足不斷變化的業務和市場動態
- 數位轉型涉及用尖端技術和軟體應用替換舊的、過時的工具和流程
- 30多年前，開始用電腦化程序，使操作自動化
- 然後，Internet讓企業通過web sites與客戶連通，並且提供多樣服務
- Online 系統進一步發展成為社交和網路平台

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Apps是數位轉型的核心

- 手機使用者每8分鐘中有7分鐘是用來操作Apps
- Mobile apps or Web apps
- Spotify、AirBnB 和 Uber 等數位原生企業
- 現代應用程序架構對商業成功至關重要
  - 現代應用架構– APIs, microservices，containers，etc.
  - 現代開發最佳實踐 DevOps, DevSecOps, Agile，etc.
  - 四大支柱：可擴展，可移植，具韌性與敏捷性

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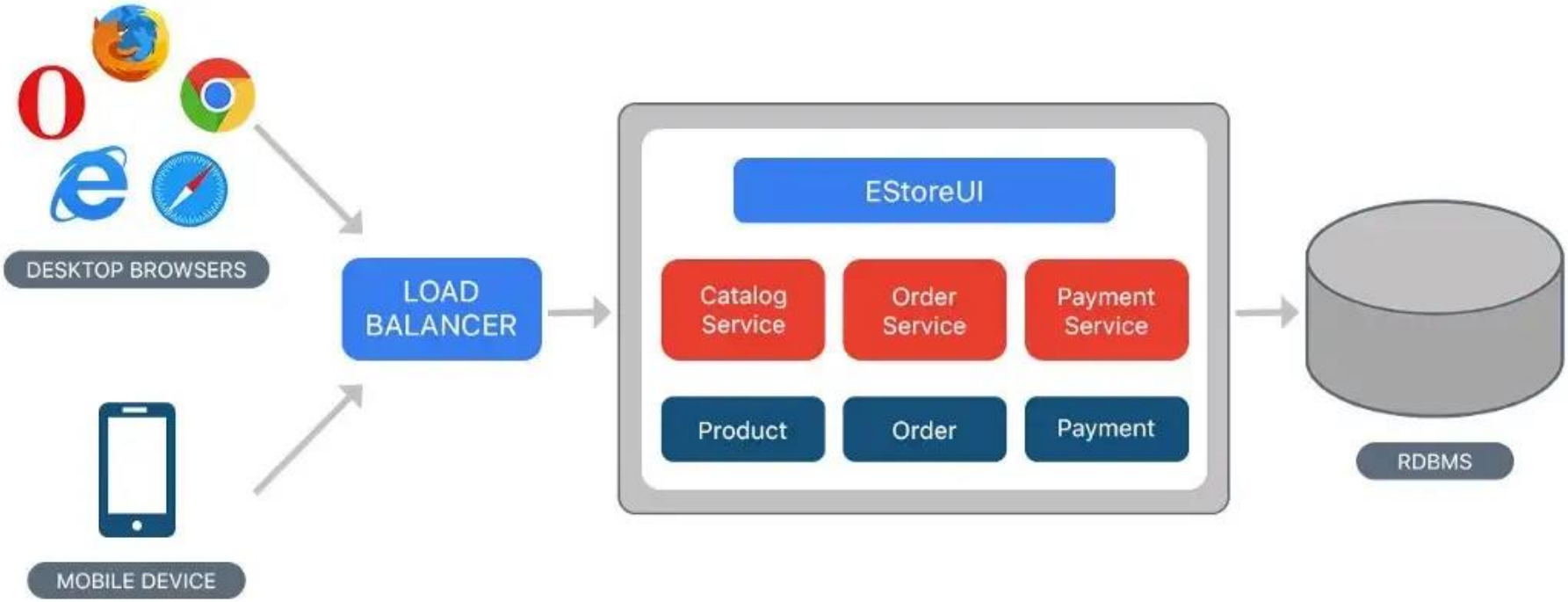
傳統單體式 Monolithic 架構



* When LinkedIn, Netflix and Amazon started

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現代 Microservices 架構

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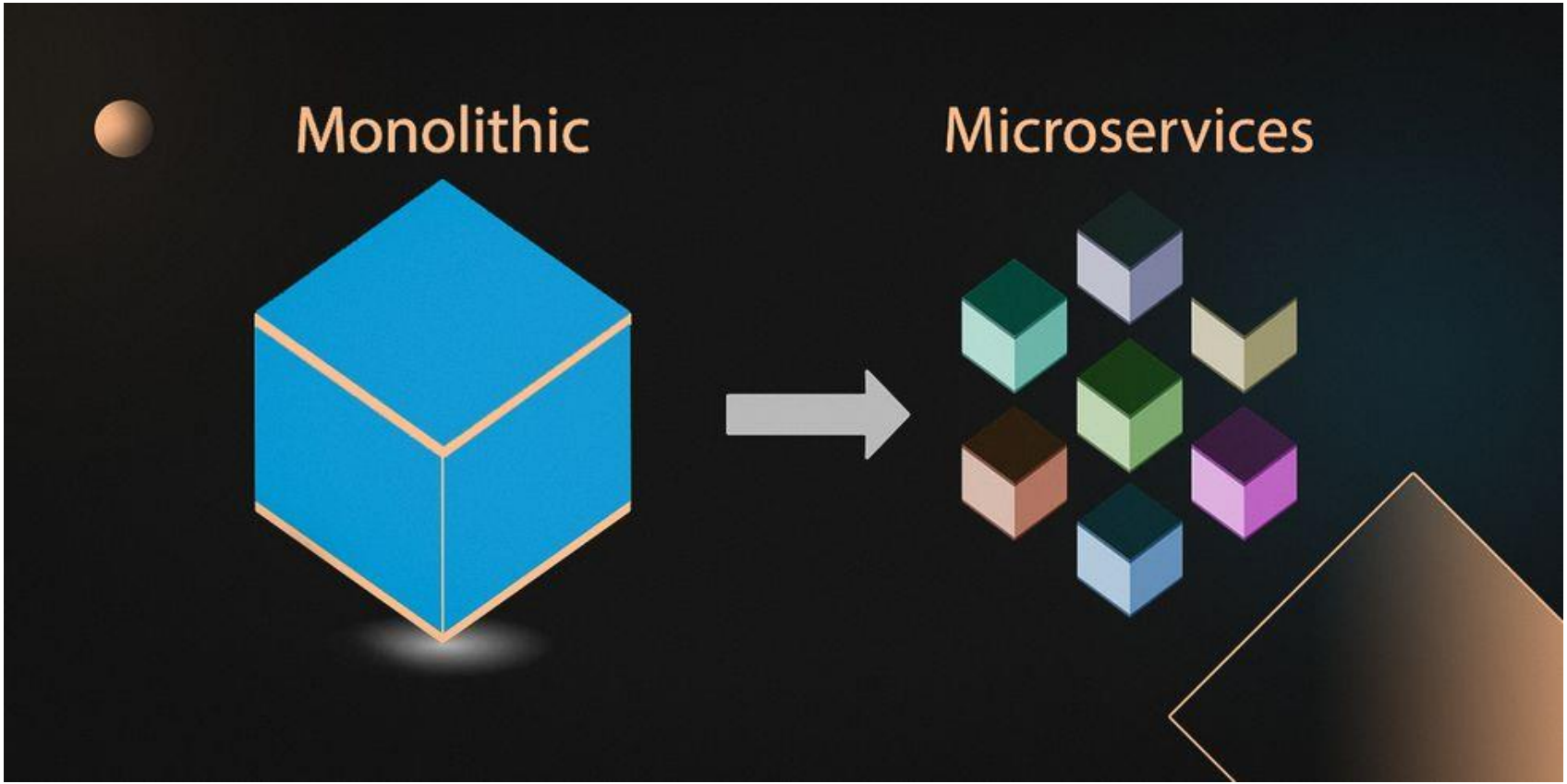
微服務 vs 單體式架構



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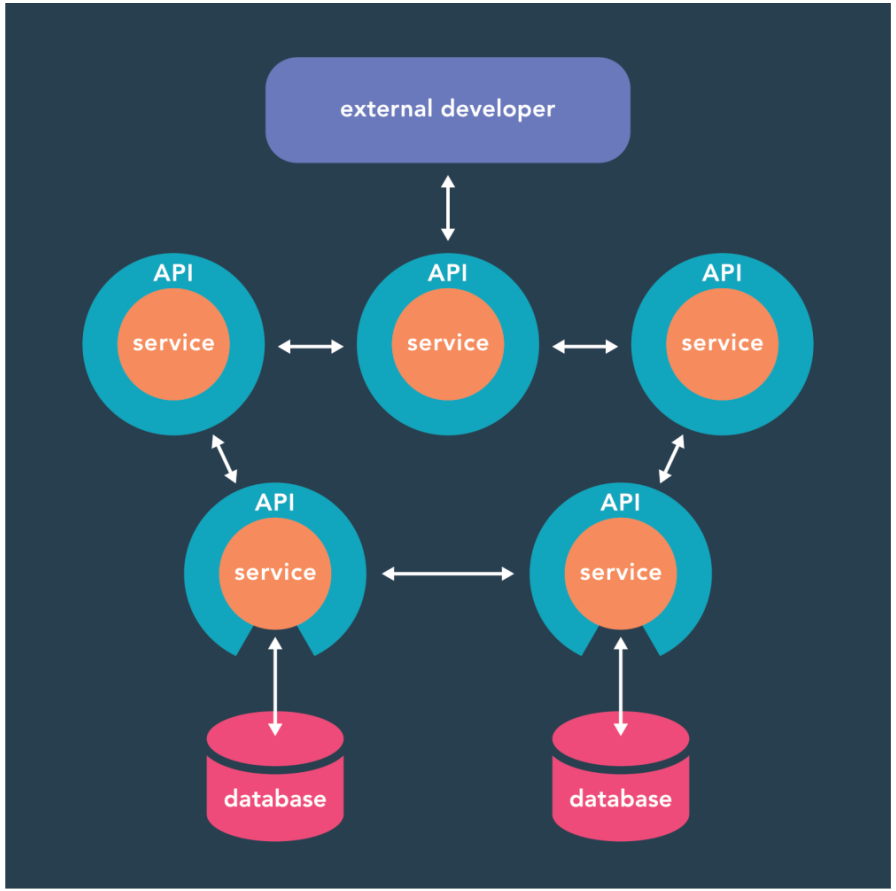
微服務架構與內部APIs



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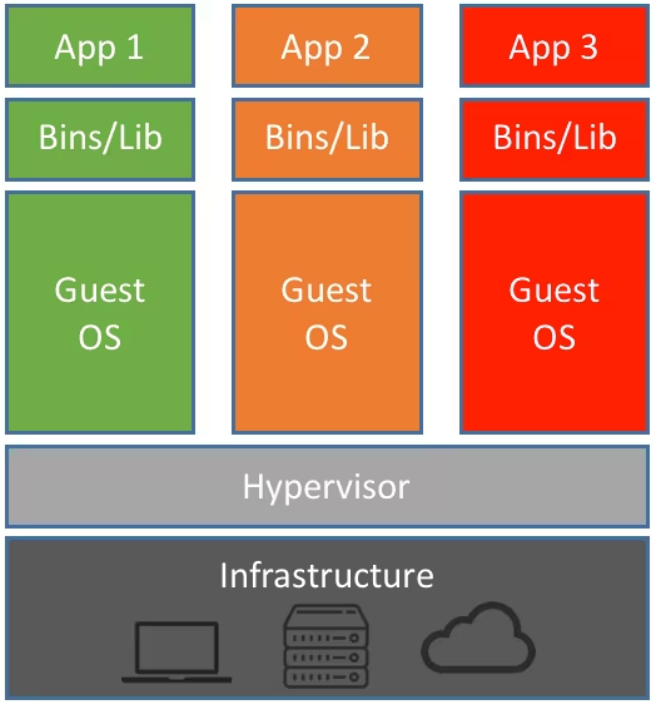
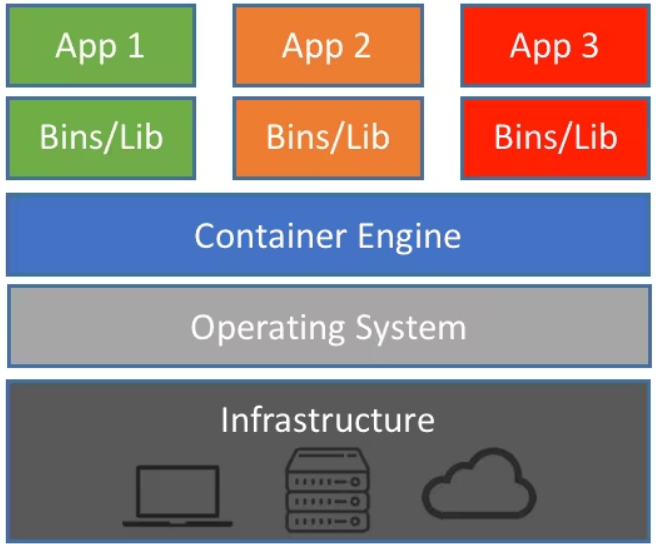
微服務的部署：容器 vs. 虛擬機器



Machine Virtualization



Containers

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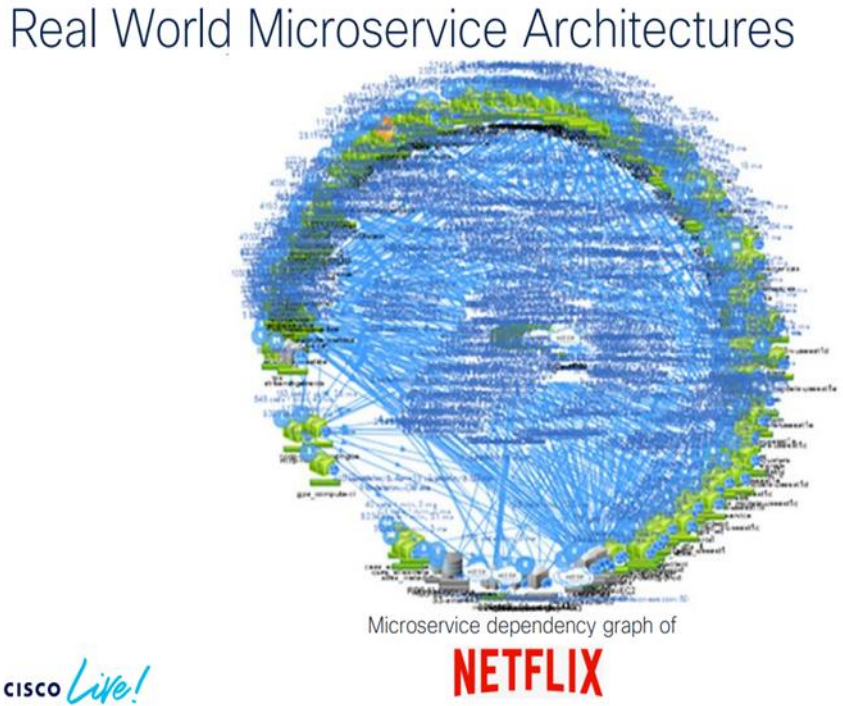
真實世界中基於微服務的應用架構

在未來三年內創建超過 7.5 億個應用程式



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數位轉型與網路

人類網路

- 範圍:村，里，市，國家
- 區公所公告，全國公告土地現值
- 層級劃分的地址和電話號碼
- 遷學區寄戶口
- 公司內跨部門郵件系統

電腦網路

- LAN，WAN
- 廣播，群播
- IP address 141.213.127.13
- 虛擬化
- Overlay and Underlay

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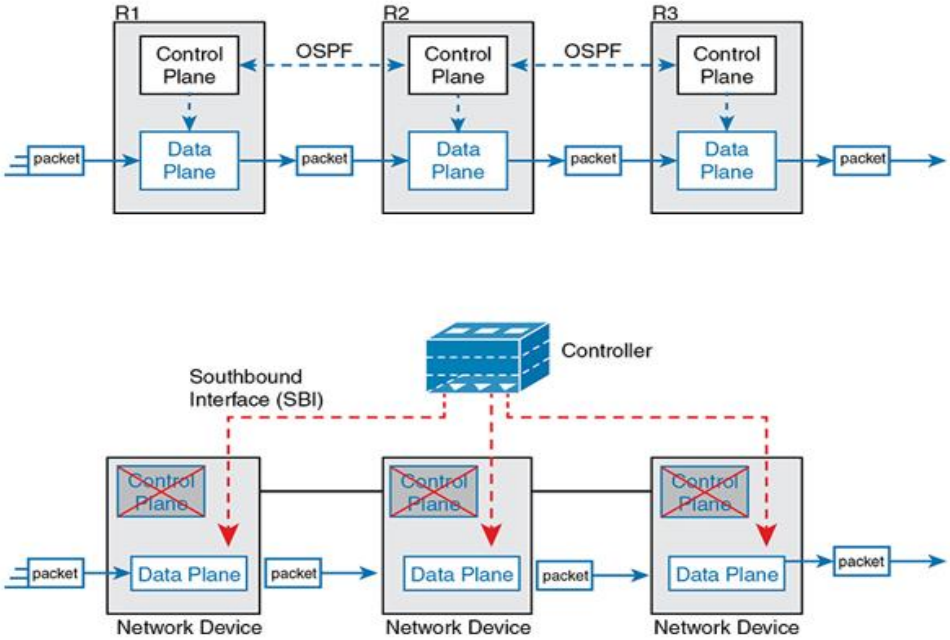
軟體定義網路 (SDN)

控制層和資料層分離，集中控管， 可程式化，Nick McKeown @ Stanford in 2009



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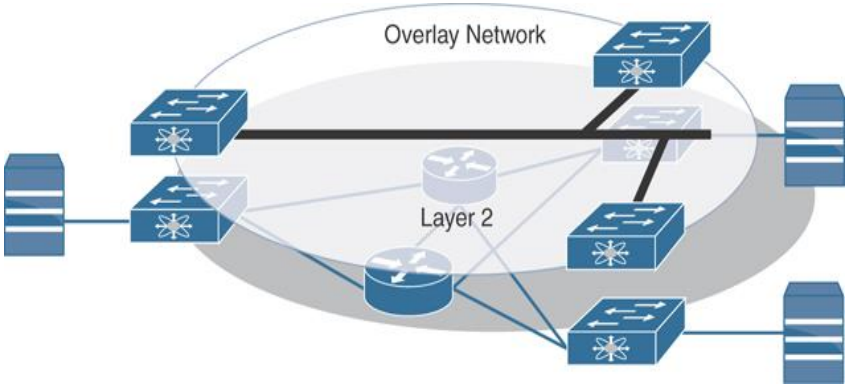
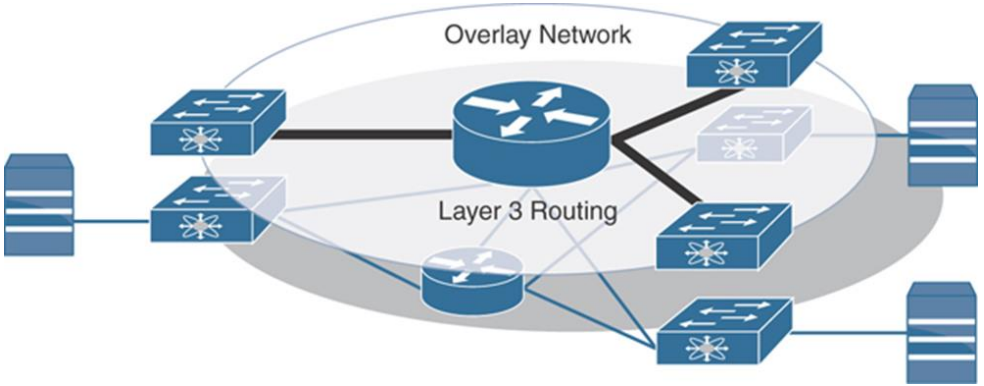
網路功能虛擬化(NFV)

Overlay and Underlay networks





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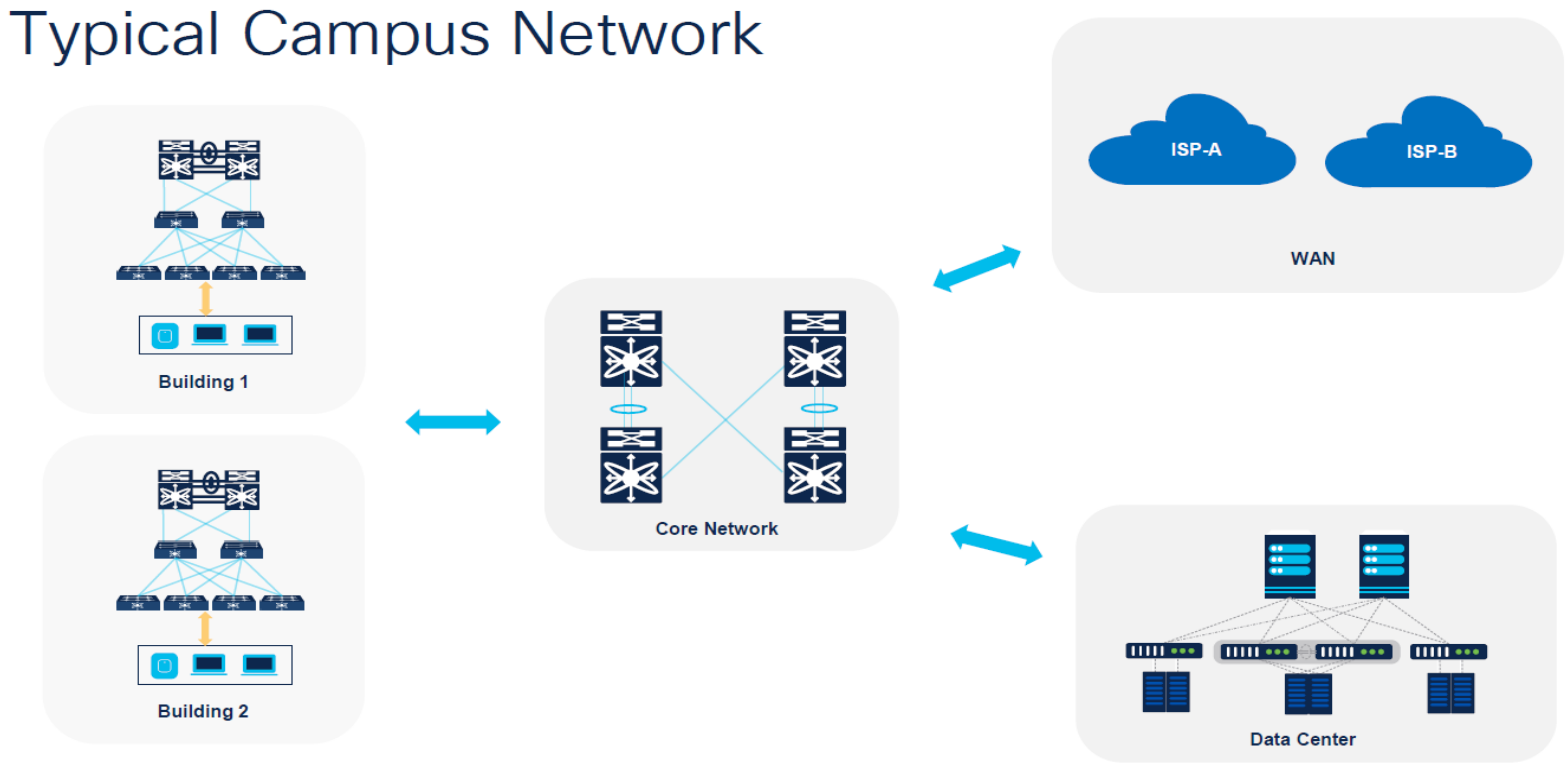
典型 Campus 網路



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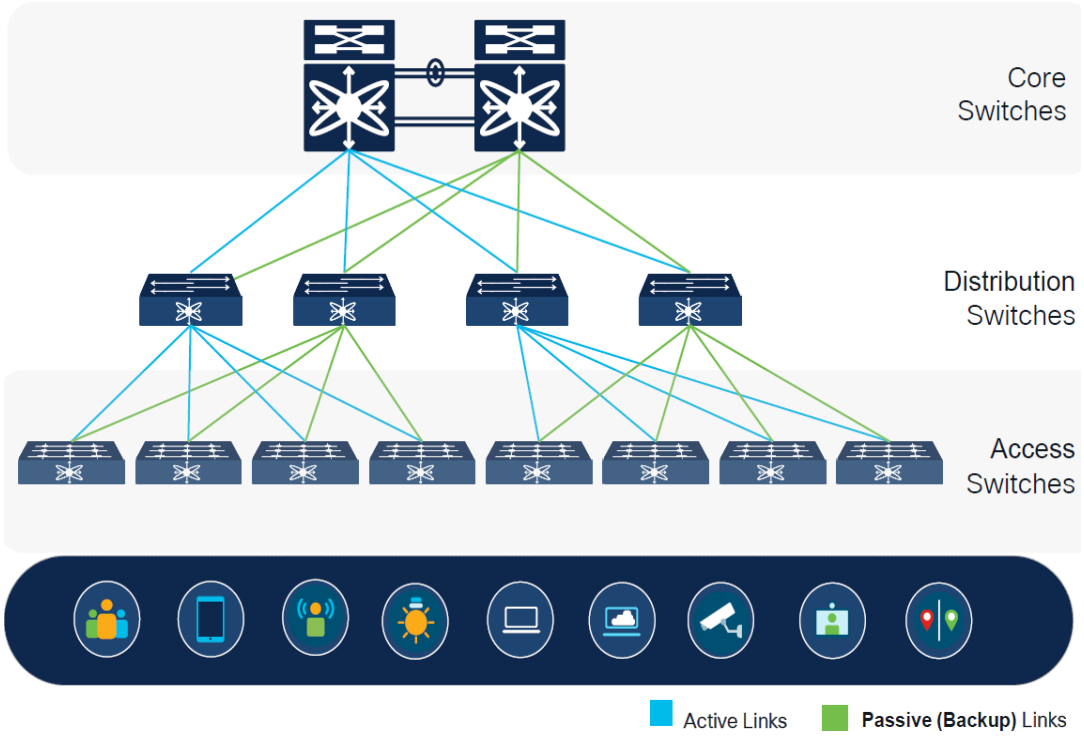
傳統3層網路架構

- VLAN 數目4K的限制
- Unused Links (STP)
- VM Mobility



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理想化網絡架構

全網狀連接

- Provides logical full-mesh connections in networking
- We replace or eliminate older L2/L3 protocols (often up to 15-20 protocols) with as few as 3 protocols
- By terminating Layer 3 at the ToR, the sizes of the broadcast domains are reduced
- Layer 2 at the access layer: mobility domain across which virtual machines (VMs) can be moved across mobility domains

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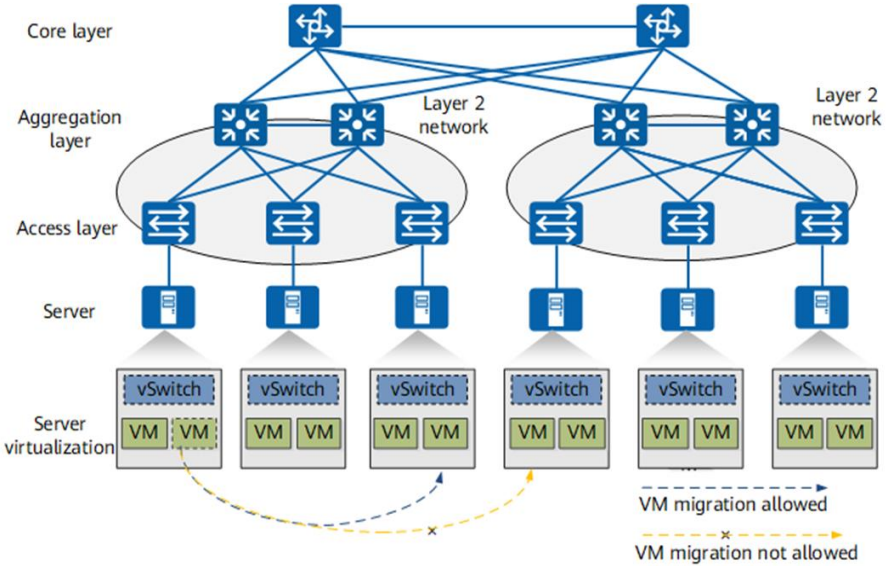

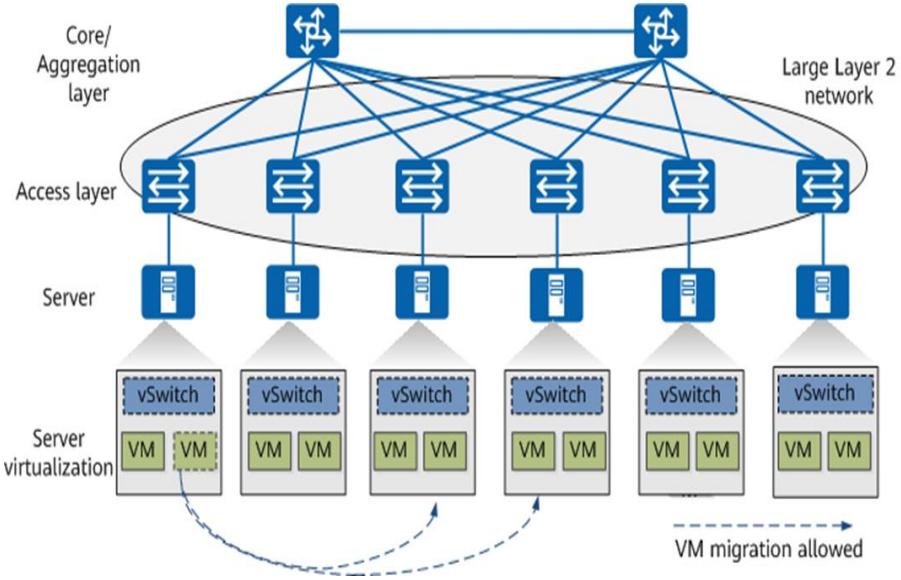

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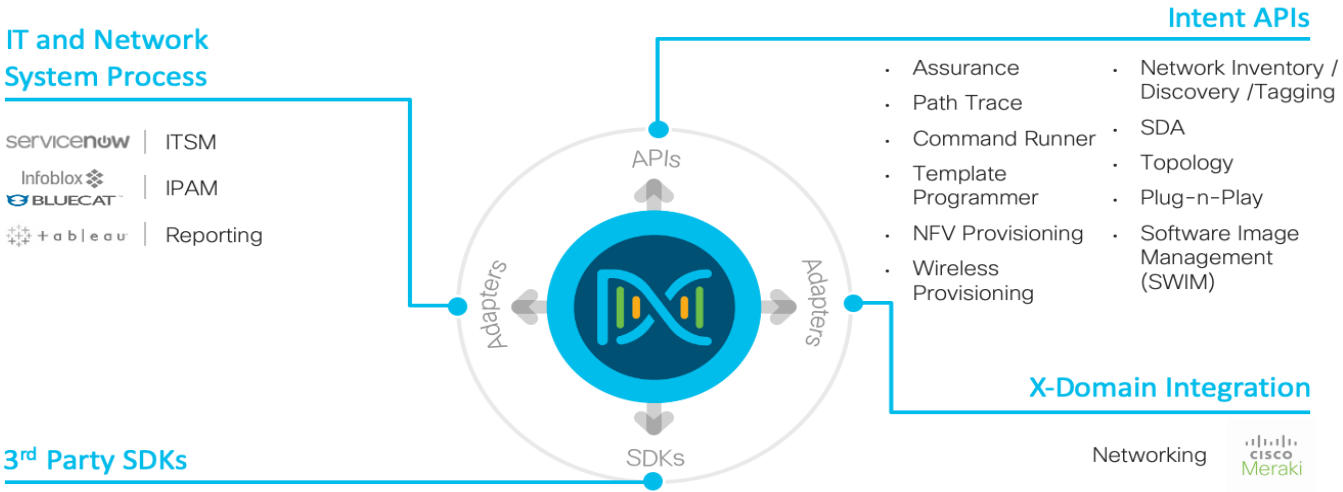
網路的可程式化 REST API

Open and Modular

Platform Capabilities – APIs, Adapters & SDKs



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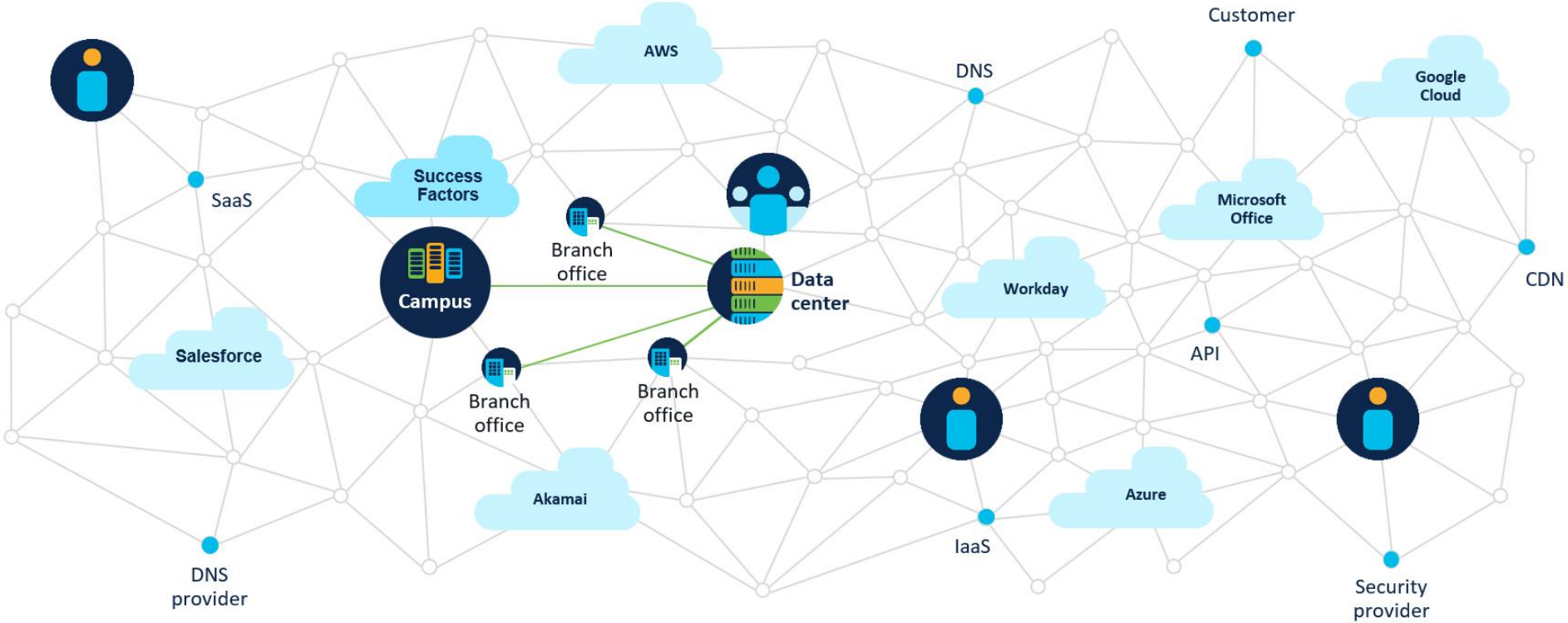
現代網絡是數位世界的生命線



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網路變化的速度超過了人力的規模

每週，典型的網路工程師要花費20多個小時以上做troubleshooting

5:1

Ratio of OpEx to CapEx on building and running a traditional network[1]

19%

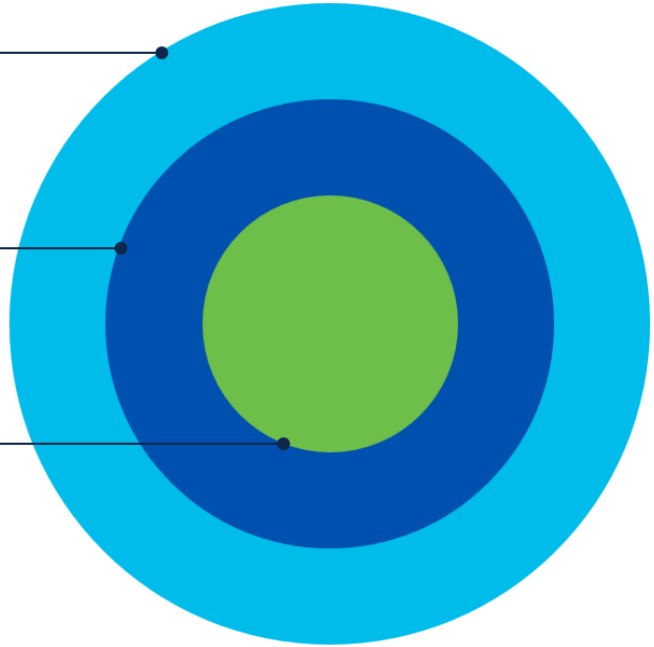
Spent analyzing latency and delay[2]

19%

Spent monitoring bandwidth consumption[2]

24%

Spent determining problem root causes[2]



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Intent Based Networking – focus on “what” not “how”

Extends SDN to continuously meet new business needs

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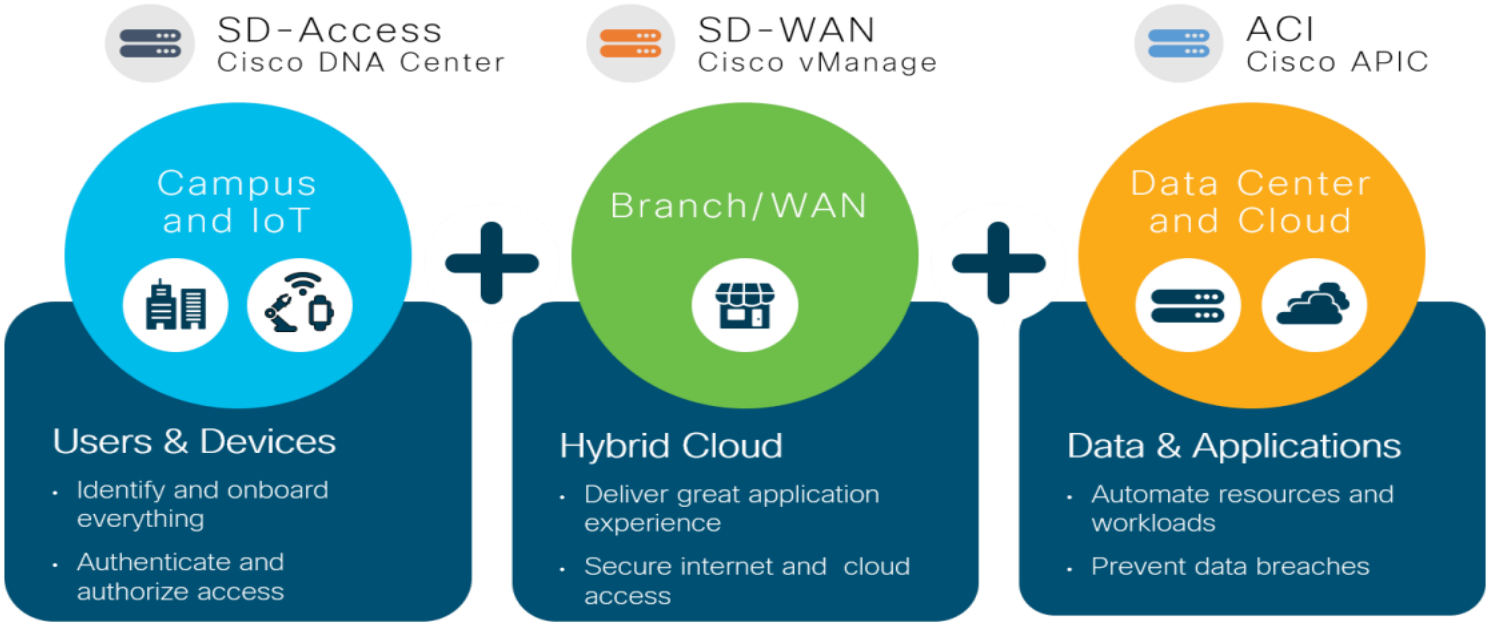
思科的軟體定義世界

Really Really High-Level View



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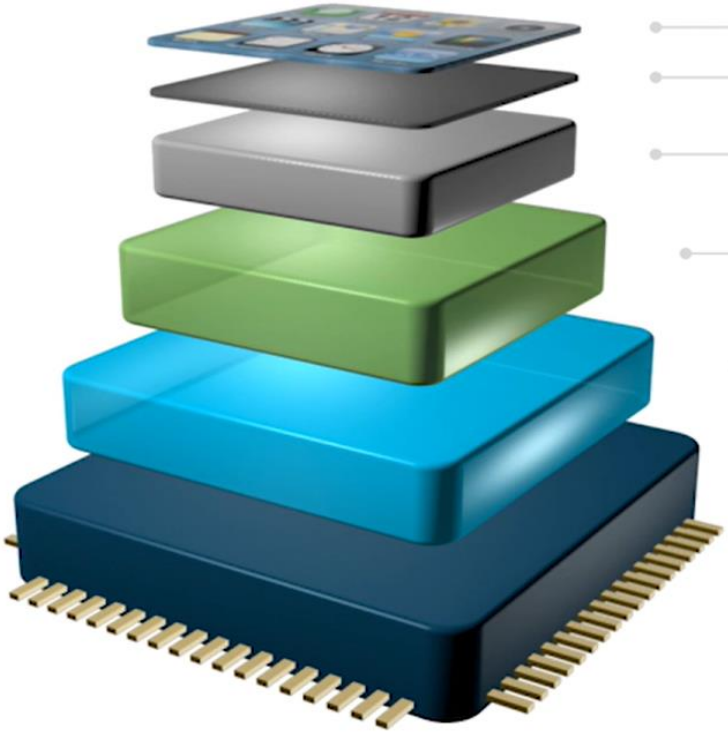
Why Hardware Still Matters

Digital Network Architecture



Applications

APIs

Domain controllers

Powered by Cisco IOS-XE

Physical and virtual infrastructure

Hardware and ASICs

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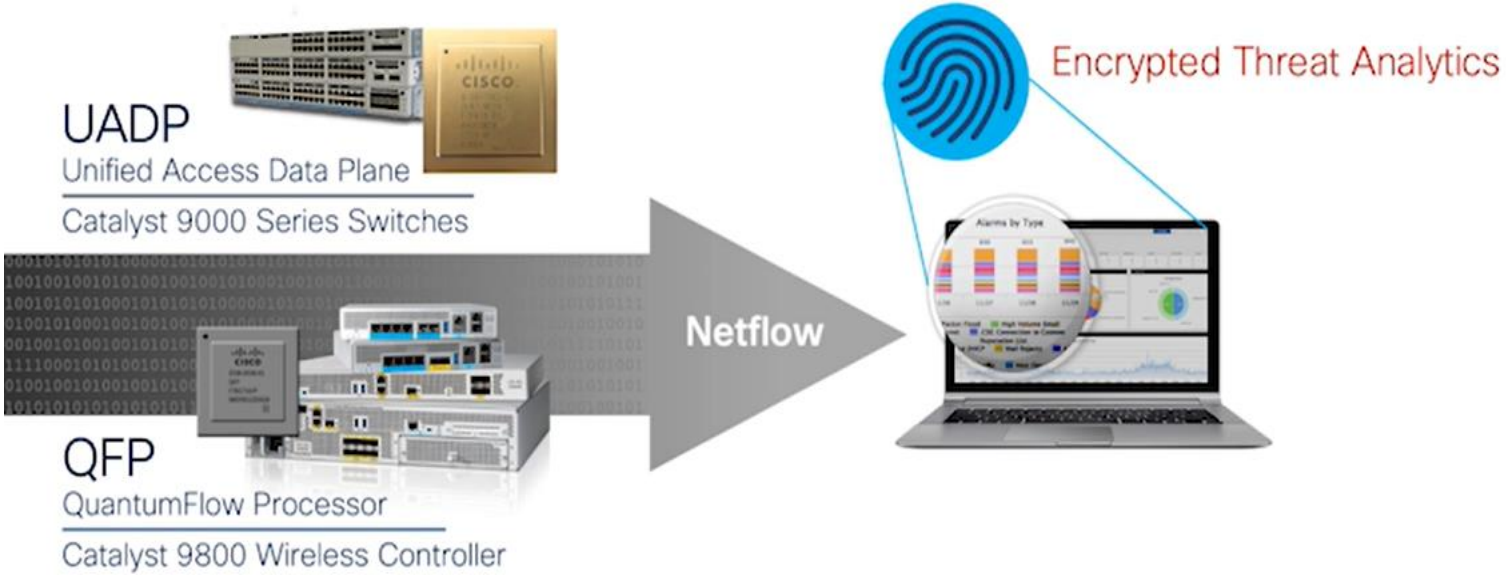
Why Hardware Still Matters

Cisco Silicon Differentiation



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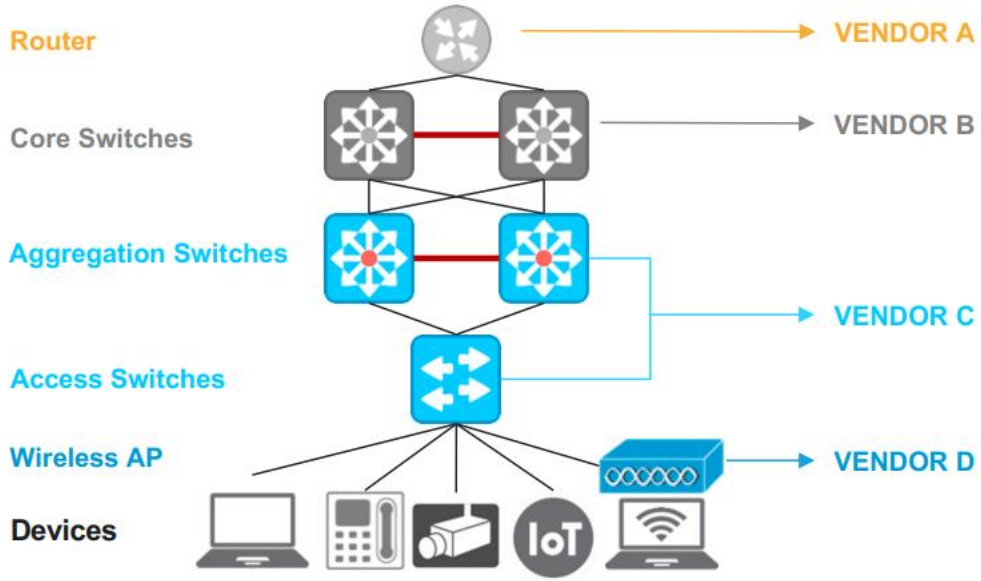
多供應商解決方案帶來許多挑戰



Complex Management	Managing multiple vendors becomes a complex affair, especially when it comes to uptime and availability
Limited Visibility	Time-consuming network troubleshooting which takes days to resolve because of limited visibility
Disparate Security System	Siloed solutions to protect specific problem. Managing a constant deluge of security alerts from multiple networking products.
Compatibility Issues	Devices made by different manufacturers cannot integrate causing an inability to combine and complement the collected data from different sensors and devices.

Multivendor Solution

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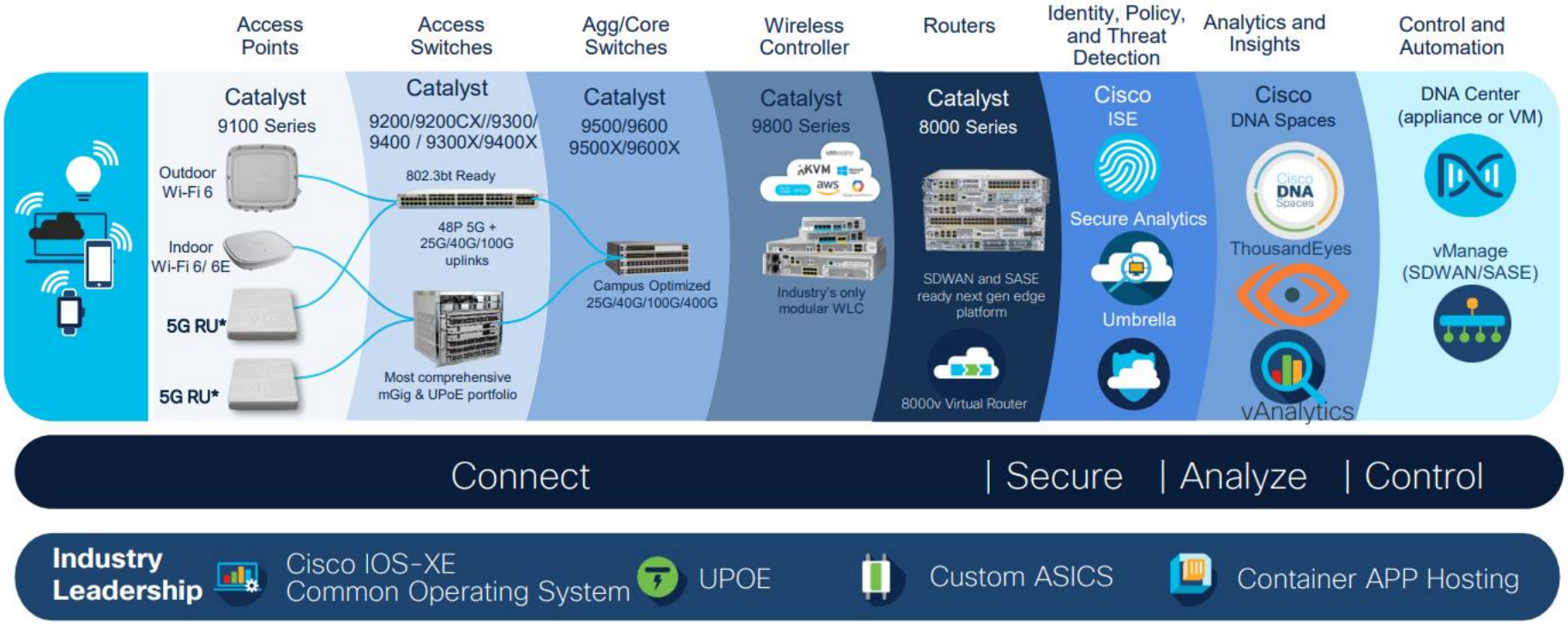
全棧式 Full Stack 超越 IBN and SDN

Interconnected software defined SYSTEM of software and hardware platforms



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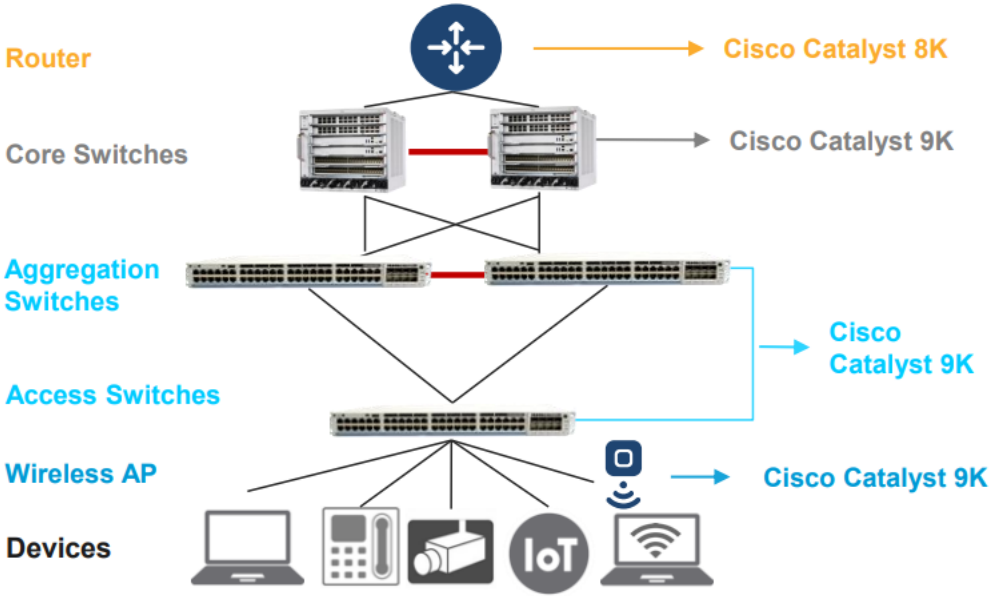
Cisco Catalyst 全棧式的優勢



Simplified Management	Simplified single management solution across Routing, Switching and Wireless. To ensure network is always on with high availability design
End to End Visibility	CFS turns your network devices into sensors, and then uses AI and machine learning to make sense out of all this data
Complete Security	Cisco CFS offers a comprehensive solution to secure all access across your applications and environment, from any user, device, and location
Compatibility at all layers	Cisco IOS-XE being the single OS for enterprise wired and wireless access, aggregation, core, and WAN, reduces business and network complexity.

Increasing value over time with adoption of Innovations

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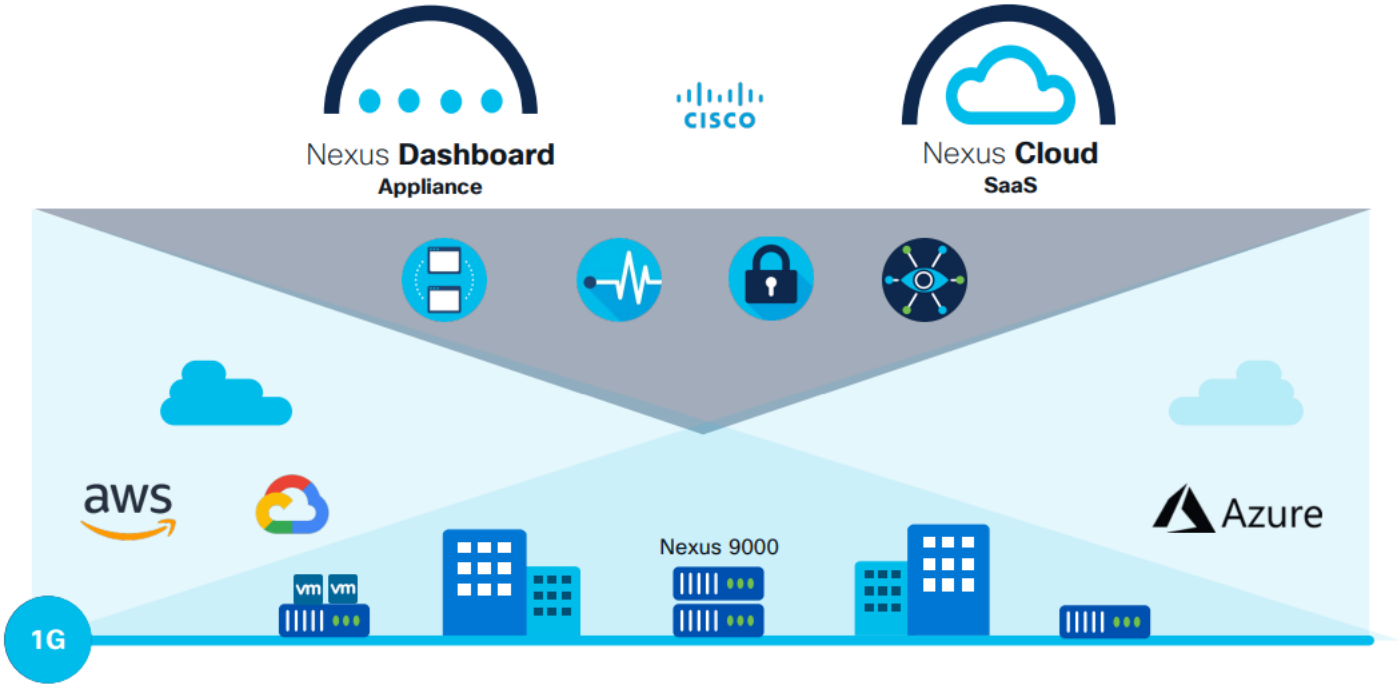
Cloudify the network

Simplify and consolidate resilient Data Center and Cloud network operations



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結論

- 聖經：太初有道，道就是神
- 道德經：萬物之始，大道至簡，衍化至繁
- 由簡入繁易，由繁返簡難
- Simplicity is the ultimate sophistication 簡單是複雜的終極 -達文西
- Cisco is in the best position to lead!

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The bridge to possible

Thank you

cisco Engage