

5G 應用與產業創新會議

5G世代創新平台與智慧服務 5G的用例與技術平台,台灣在地的優勢,5G創新智慧服務與新型態商業模式

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5G Key Use Case



From - Recommendation ITU-R M.2083

Enhanced Broadband (including fixed access)

- Leverages mmwave "to the prem/device" for increased access BW
- Not concerned with connection density or latency.
- May not need high mobility (e.g. for fixed access)
- → Data plane has to scale and deploy separately from control plane and state management (CUPS)

ΙοΤ

- Focused on low power wide area NB-IoT with high connection density and energy efficiency
- → Slicing, flexible deployment, NFV

Ultra-Reliable Low Latency

- For mission critical use cases (self driving vehicles, ... Public safety, ...)
- Desired 1ms access time only refers to radio interface and would be most useful in near field mission critical apps
- → Push data plane to the edge, remove state from user plane

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Technology Details for 5G Use Case



Cloud Scale Networking with Cloud RAN / SD-WAN



Mobile network to scale with video using MEC





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Cisco Innovations in 5G

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Converged Core

Cloud-native converged 5G core supporting licensed, unlicensed and IoT



Network Slicing

Application driven slicing w/ segment routing and IPv6

Per application connectivity and path optimization



Edge Distribution

Unified access: fiber, licensed, unlicensed

Open RAN ecosystem MEC and VPP for better QoS, low latency experience



Virtual Scaling

Cisco cloud-native for scale and container location

Vector Packet Processing for optimization



Service Automation

Cisco Crosswork full lifecycle operation automation Multi vendor, multi-domain SON, SONFlex



Security

Hardened infra end-end across physical and virtual

Industry leading Talos Threat team (250+) for expertise, R&D, remediation

5G Opportunities - Enabling Digital Transformation



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(1) 台灣在地的優勢



Business Plane Orchestration Workflow with MEC





V2I and I2V Data Flow



(2) Verizon completes successful test of Cisco's Hybrid Information-Centric Networking

• <u>https://www.telecomtv.com/content/tracker/verizon-completes-successful-test-of-ciscos-hybrid-information-centric-networking-in-its-network-30321/</u>

NEW YORK – In an industry first, Verizon and Cisco are collaborating on accelerating adoption of Hybrid Information-Centric Networking (ICN), an emerging and innovative approach to content-aware service offerings. By focusing network communication around "named data" rather than location identifiers such as IP addresses, Verizon and Cisco believe they can dramatically simplify next-generation network architecture; enhance user-to-content communication; and improve mobility, storage and security in the network.

In collaboration with Cisco, Verizon successfully demonstrated Cisco's open-source ICN software and validated its benefits over standard TCP/IP solutions for optimized mobile video delivery in a lab at the Verizon Innovation Center in Waltham MA.

"The Hybrid-ICN solution delivers all the benefits of ICN communication with minimal existing IP infrastructure upgrades required," said Srini Kalapala, vice president, Technology Architecture and Strategy at Verizon. "By demonstrating the benefits of a virtualized Hybrid-ICN network at scale, we showcased how the technology can simplify the way users access content in a mobile environment and lead to a better user experience. We' re pleased with the results of our collaboration with Cisco and with the promise of the technology."

"Cisco" s Hybrid-ICN solution provides secure content-intelligent transport for network service providers," said Dave Ward, senior vice president, CTO of Engineering and Chief Architect at Cisco. "Through our co-development with Verizon, we found that H-ICN empowers the network edge with low latency caching and computing capabilities for the support of new revenue-generating applications such as enterprise multi-radio access, augmented and virtual reality, and IoT for 5G."

Hybrid Access Technology - MPTCP



Converged Network as a Services - ICN Routing

ICN routers comprise three components (rather than one)

- FIB: Forwarding Information Table

 can have multiple forwording entries per prefix
- ii. PIT: Pending Interest Table return route state for outstanding requests
- iii. Content Store: Integral content cache in networking layer



ICN Introduces per-packet state into the networking fabric

Seamless Consumer Mobility



- The mobile device sends request packets to AP1
- When it moves it sends not satisfied requests to the AP2 without waiting any time
- In-flow data from server are retrieved by in-path cache
- Load-balancing between original server and intermediate caches is dynamically decided by network routers

Location Independent Routing means No Connection to Migrate No Tunneling, No Anchor, No Explicit Signaling, Access-Agnostic

Asynchronous Multicast





Anchorless Producer Mobility



- Mobile producer sends Interest Updates (IU) to himself, hence routed towards previous location
- IU trigger local FIB updates
- Requests coming from the edge do not need to go through the backhaul but follow IU updated paths
- For latency sensitive apps faster producer tracking via local discovery

Efficient routing updates, Low-Latency Infrastructureless Operation for High Resiliency



Thank You