

Legacy Meets Next Gen. Topology: 5G Network using Disaggregated Cell Site Gateways

CASE STUDY: ASIA PACIFIC TELECOM, TAIWAN

Overview

Asia Pacific Telecom (APT) is a leader in innovative telecom services in Taiwan with over 2 million subscribers. APT is rolling out a network of thousands of Cell Site Routers (CSRs) to deliver the next generation of services and increased connectivity for subscribers and Internet of Things (IoT) in Taiwan.

The disaggregated CSR solution delivered in partnership by IP Infusion, UfiSpace and Foxconn Global Network Co., Ltd. (a.k.a. "FHnet"), has routers that can support the increased 5G data volumes and yet be compact, efficient, and simple to maintain.

Original Networking Challenges

To develop a future-ready telecom network, APT had identified the following challenges:

- APT needed to roll out 5G without disrupting the deployed LTE services. The network transition from 4G services to 5G deployment had to be planned smoothly.
- For 5G Cell Sites, the timing requirements are stringent and could not be met with the legacy default PTP Profile support. The supported PTP default Profile had one Grand Master clock situated at each core POP, providing an end-to-end timing support of +/- 1.5 microseconds. For various 5G applications, the timing requirements can be under 250 nanoseconds.
- Adoption of the disaggregated white-box solution to deliver significant CapEx and OpEx savings.

Why IP Infusion & UfiSpace Solution?

IP Infusion and UfiSpace's Disaggregated Cell Site Gateways (DCSG) solution is the industry's first white box Cell Site Router

HIGHLIGHTS

- 5G services launched by deploying Non-Standalone (NSA) mobile back-haul architecture in Q3 2020; 28GHz
- Extended 5G enterprise private network services
- Extensive timing support including PTP (G.8275.1, G.8275.2 profiles), T-GM, Synchronous Ethernet (SyncE)
- End-to-end MPLS Service and OAM support
- Segment Routing and EVPN Ready IP/MPLS Transport Network
- Configuration Tools supported include CLI, SNMP and NETCONF
- Hardware: UfiSpace S9500-30XS
- Software: OCNOS-SP 3.0



(CSR) to be deployed by a global tier-one telecom provider. The high timing accuracy provided by the solution meets the stringent requirements of 5G applications. The powerful MPLS suite enables efficient deployment of a variety of services.

The future-proof design allowed APT to deploy disaggregated open network infrastructure at lower cost. It also provided the capability to rapidly scale existing services for edge computing, mobile backhaul, and broadband access applications.

“IP Infusion, UfiSpace and FHnet are delivering the solution that will help APT to establish a fast, reliable 5G network for Taiwan’s consumers and business users.”

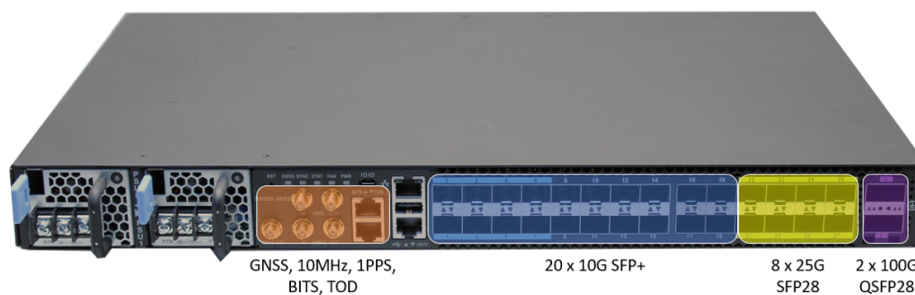
– JM Chien, Sr. VP, APT

Software – IP Infusion (OcNOS)

IP Infusion’s OcNOS is a feature rich Network Operating System which has support for multi-protocol backhaul services.

With IP Infusion’s OcNOS® network operating system, the IP/MPLS network was divided into different IGP domains. The routes were exchanged across domains using BGP. BGP-LU was used to provide network resiliency and scalability. This architecture allowed the customer the capability to seamlessly scale up to tens of thousands of nodes in a multi-domain environment.

Hardware – UfiSpace (S9500-30XS)



UfiSpace S9500-30XS

The UfiSpace S9500-30XS was used as the Cell Site Router to build the 5G access ring. It was able to provide a well-rounded port mix to support all the service requirements of 1G/10G/25G and with a 100G backhaul. The S9500-30XS comes with full SyncE and PTP timing support, including the PTP G8275.1 timing profile which was needed in order to meet the stringent 5G latency requirements.

The S9500-30XS has a proven record as an open disaggregated cell site gateway. It was OCP Accepted, lab tested with TIP and had an accumulation of over 100 million hours of smooth in-field operation deployed with a global tier 1 telecom. This provided the customer with the added benefits of a stable platform for faster time to market 5G services.

“UfiSpace’s DCSG has enabled us to begin our next generation 5G network into urban areas of Taiwan.”

– JM Chien, Sr. VP, APT

After Sales Support – IP Infusion Technical Assistance Center (TAC)

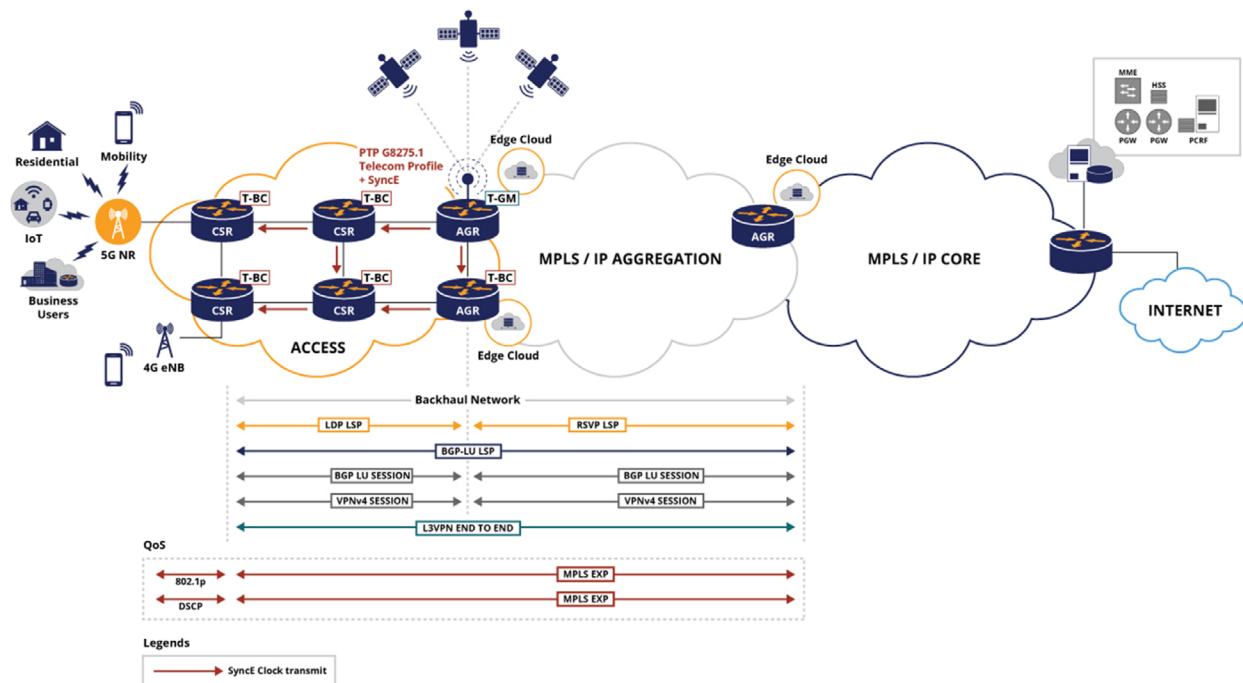
APT chose UfiSpace and IP Infusion because the comprehensive proposal included network topology design, timing configuration, and align our partner ecosystem for services, plus provided an implementation and maintenance plan. Additional services included training for the telecom’s staff on equipment and technology management and a three-pronged communication network was set up for SI-Telco-Vendors to improve support services for deployment and maintenance.

- APT designated their system integrator, FHNet, to become the main contact point for after services.
 - UfiSpace and IP Infusion provided the training needed for FHNet to provide all integration, installation and maintenance services.
 - While FHNet was familiarizing themselves with the technology, UfiSpace and IP Infusion provided first line of technical support for any troubleshooting issues.
 - FHNet collected the relevant facts from APT and engaged with UfiSpace and IP Infusion TAC.
 - TAC Team reproduces reported issues, and on an as-needed-basis has joint debug sessions to isolate reported issues.
 - TAC Team manages the OcNOS related configuration, installation and software related issues reported from the field.
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“As we enter the new era of 5G, we will be able to accelerate network transformation, expand the depth and breadth of 5G applications, and realize more business opportunities in a more flexible manner. We will be leveraging the benefits of IP Infusion’s open software platform and white box hardware to gain cost savings and efficiencies in our network.”

– JM Chien, Sr. VP, APT

Deployment



- The access ring (CSR) was setup using UfiSpace S9500-30XS running IP Infusion's OcNOS software.
- The aggregation nodes (AGR) are UfiSpace S9500-30XS running as T-GM for timing source.
- The topology is divided into two IGP regions and use IS-IS protocol to convey the IGP routing information.
- In the access ring, LDP is leveraged to generate MPLS labels.
- In the aggregation ring, RSVP is used to build the primary LSP as well as backup ones to achieve the protection and fast re-route.
- BGP-LU is used to stitch the label between regions.
- L3VPN is deployed to achieve the end-to-end MPLS VPN service.
- Each UfiSpace S9500-30XS is configured with PTP (G.8275.1 profile) and SyncE to reach the target of precise synchronization. They will share one source.
- Unused ports on the S9500-30XS are reserved for enterprise tenants.
- Enable 10G backhaul transportation and is upgradable to 100G when service grows.
- Hardware and network topology redundancy ensure the reliability of transport network.

Results

APT launched Taiwan's first 5G architecture using open disaggregated white box technology. They were able to do so without the network buildout affecting their current LTE services to existing customers. This also extended their network's capacity to offer next-generation 5G services as well as being able to connect even more enterprise customers to their network.

The versatility of UfiSpace's S9500-30XS coupled with IP Infusion's OcNOS allowed APT to move away from a "rip and replace" situation, which would have affected operations, brand image and quality of service. It also allowed APT to implement 5G timing synchronization without having to purchase additional grandmaster timing equipment by enabling the T-GM mode on UfiSpace's S9500-30XS.

"Our disaggregated network OS solution for APT, along with our close partners UfiSpace and FHnet, will allow APT to cover its targeted geographic areas and expand in the future."

– Atsushi Ogata, President and CEO of IP Infusion

Benefits Realized:

- Increased network capacity from 1G to 10G with 100G backhaul.
- Expanded their network capacity for more enterprise customer connections.
- Enabled 5G timing synchronization without the need to purchase extra Grandmaster equipment.
- Deployed a 5G infrastructure without interrupting current services.
- Enabled APT services such as GtTV mobile TV APP, with new 5G live broadcast

Contacts for more Information:

For more information on the OcNOS software, please contact sales@ipinfusion.com.

For more information on the UfiSpace S9500-30XS, please contact sales@ufispace.com.

ABOUT IP INFUSION

IP Infusion, a leader in disaggregated networking solutions, delivers enterprise and carrier-grade software solutions allowing network operators to reduce network costs, increase flexibility, and to deploy new features and services quickly. IP Infusion is headquartered in Santa Clara, Calif., and is a wholly owned and independently operated subsidiary of ACCESS CO., LTD. Additional information can be found at <http://www.ipinfusion.com>

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