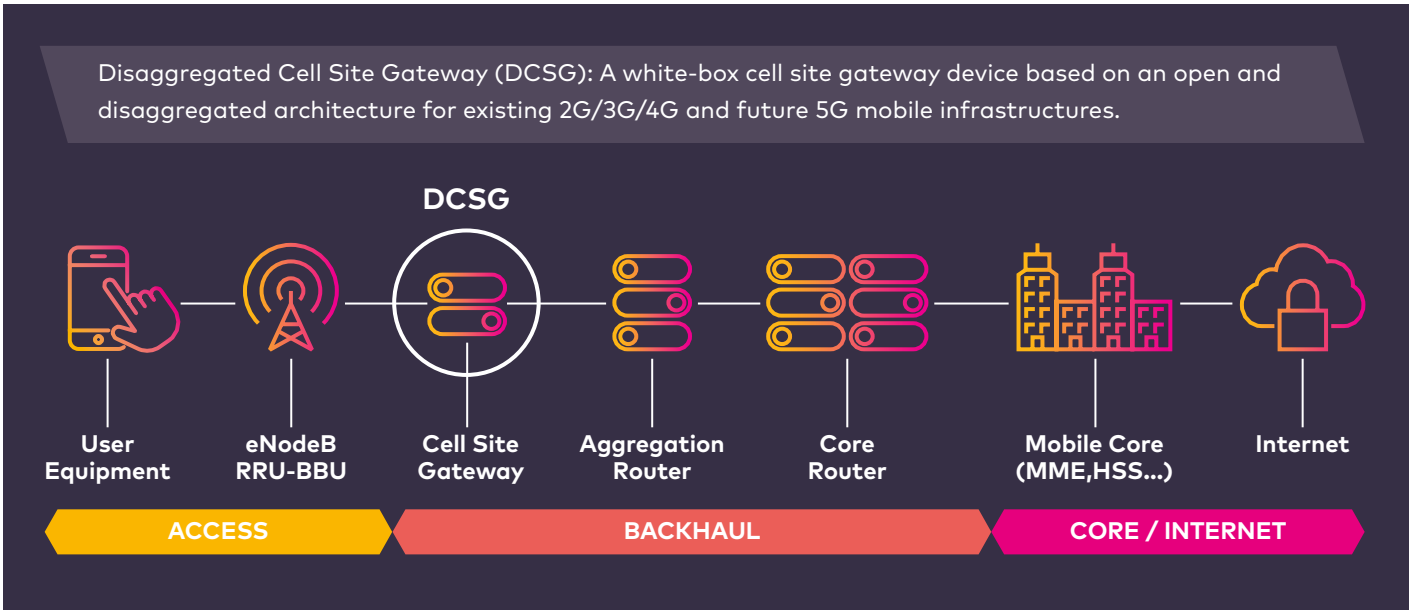
case study

Disaggregated Cell Site Gateway (DCSG) – a step towards changing the future

amdocs

"The first step toward change is awareness. The second step is acceptance."



As service providers transition towards 5G, an infrastructure upgrade is one of the most formidable challenges they face. Since most upgrades are required in the access segment of the network and cell sites, and with 5G access data rates expected to reach up to 10 Gbps, operators will need to make substantial investments in cell site equipment to support 5G deployment.

Cell site gateway routers will enable providers to expand mobile bandwidth capacity, while maintaining compatibility with legacy networks and seamless migration without increasing costs.

What is Disaggregated Cell Site Gateway (DCSG)?

DCSG is a concept pioneered by the Telecom Infra Project (TIP). It was developed as part of the Open Optical & Packet Transport (OOPT) project group, which focuses on the definition of open technologies, architectures and interfaces in optical and IP networking.

Fundamentally, DCSG is a white-box device based on an open and disaggregated architecture for existing 2G/3G/4G and future 5G mobile infrastructures.

Foreseeing a large number of cell site deployments with 5G deployments, its technical specifications were developed by TIP, while considering costs, features and ease of deployment.

The challenge:

While disaggregation of network elements enables a variety of feature enhancements, the complexity of testing, deploying and supporting the growing vendor ecosystem is complex and not without risk.

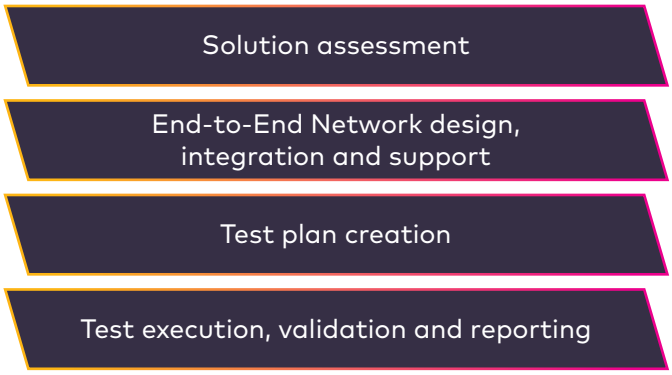
The solution:

Formerly known as PlugFest, the Test & Integration (T&I) group in TIP is tasked with validating TIP-incubated technologies in an end-to-end environment, a process that helps evaluate a product's maturity toward commercial readiness. Towards this goal, the group works with various ecosystem partners, including hardware and software vendors, test equipment providers and system integrators.

As the DCSG concept gained traction, the T&I group invested in testing and validating various DCSG hardware and software, with Amdocs as the chosen system integrator.

Amdocs' role:

Choosing a partner to manage the lifecycle and hide the complexity of the new open ecosystem of a multi-vendor, disaggregated mobile access network, is a key element to success in the path towards successful open and disaggregated network adoption. Amdocs is uniquely positioned in that it has been playing an integral part in both the Open Networking Foundation and TIP community, placing us at the forefront of systems integration.



In the TIP T&I project group, Amdocs plays a key role in **assessing, procuring, integrating** and the **ongoing testing of** solutions across all areas of the network stack, including access, transport, and core.

Solution assessment: Amdocs' team worked with each DCSG solution provider to assess their capabilities and identify areas for improvement.

End-to-end network design, integration and support: The team prepared and implemented the network IP design for all elements within the end-to-end system architecture.

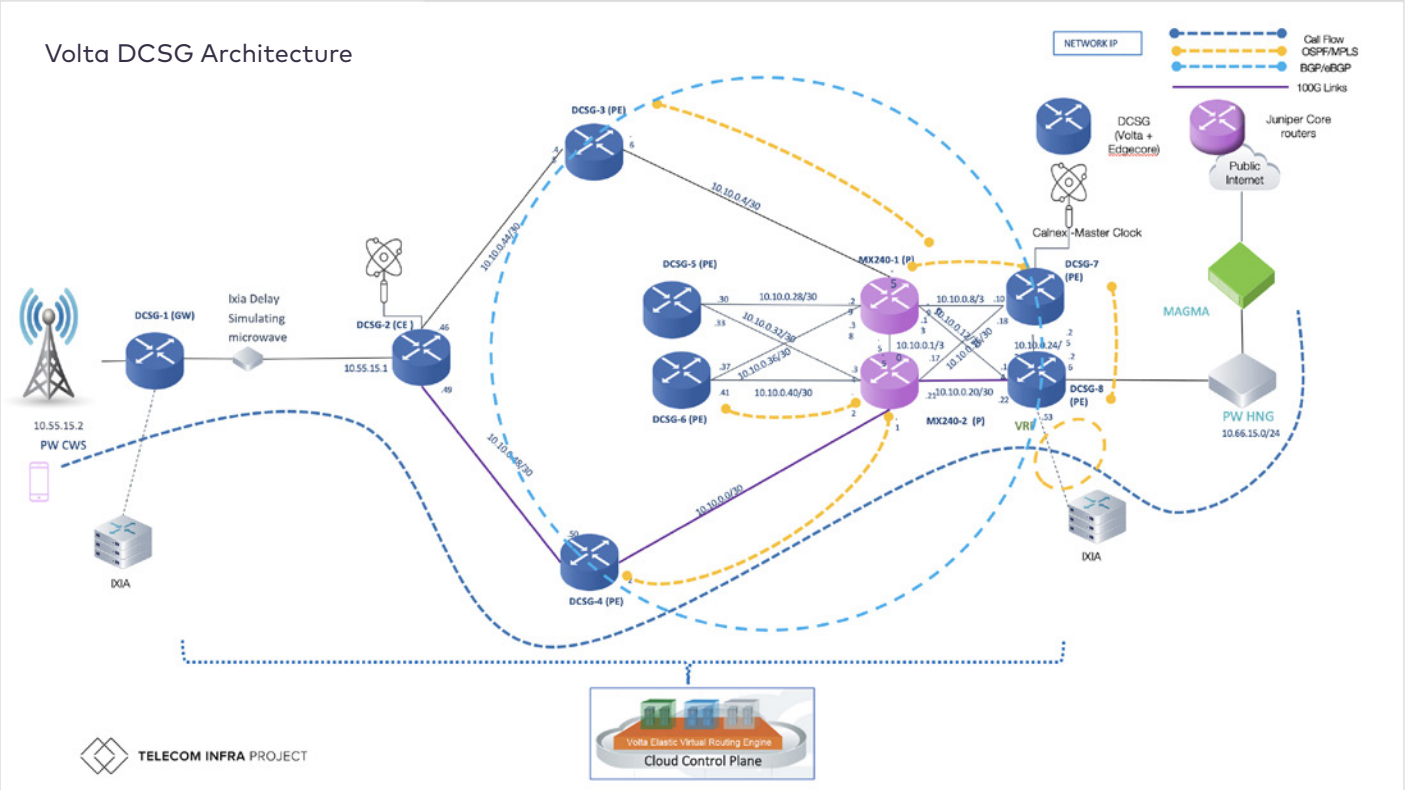
Test plan creation: Using the reference DCSG specification released by the TIP Open Optical & Packet Transport project group, Amdocs' team prepared and prioritized test cases to be executed during the scheduled period.

Test execution, validation and reporting: Each test cycle had a predefined testing window during which Amdocs' team collaborated with each DCSG solution provider as well as test equipment vendors to execute the test cases. The goal for each cycle was to execute 100% of priority 1 and 80% of priority 2 test cases, based on time constraints. All test results were documented in Test Rail, the official test case management tool.

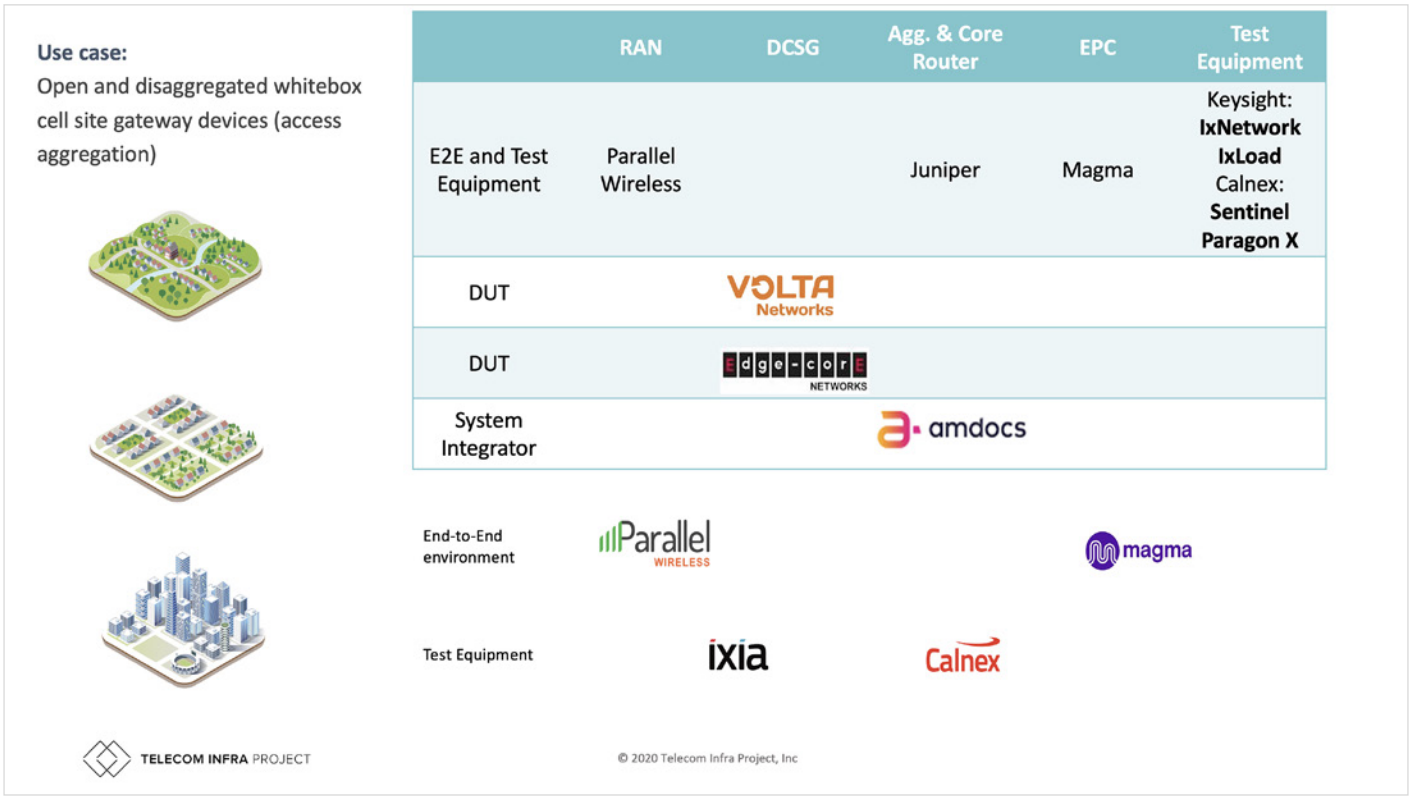
Network design and integration:

Amdocs' team, in collaboration with the TIP T&I team, as well as globally dispersed solution providers and test equipment vendors, completed the network design, which included the architecture IP planning, RAN, transport and core. To date, four cycles of testing various solution providers have been successfully completed.

Over time, the network architecture evolved, incorporating feedback from mobile network operators to simulate a real-world network scenario within a lab environment to the best of our ability. For the first phase of the implementation, the test focused on the needs of a specific service provider in the LATAM region. The second phase incorporated network design requirements from Tier-1 operators like Vodafone and Telefonica. The lab infrastructure consisted of various DCSG solution providers like IP Infusion, Volta, Exaware, Edgecore and Delta. RAN vendors including Parallel Wireless, Baicell and Tecore, as well as core vendors like Magma and Tecore. Test equipment such as Calnex, IXIA and Spirent also played a vital role in simulating synchronization and traffic throughout the testing period.



Volta DCSG Test and Integration (PlugFest)



Solution components

Testing and verification:

Testing is driven by TIP DCSG specifications and MNO inputs, and test cases are planned and drafted to ensure critical areas of DSG requirements are tested and verified. Major areas of testing can be seen in figure 1.

- 1588/Sync E
- Quality of Service (QoS)
- Device Resiliency
- Protocol (OSPF, MPLS, IS-IS..)
- Networking (L2,L3 VPN, VLAN)
- Features Verifications

Figure 1: Test Areas

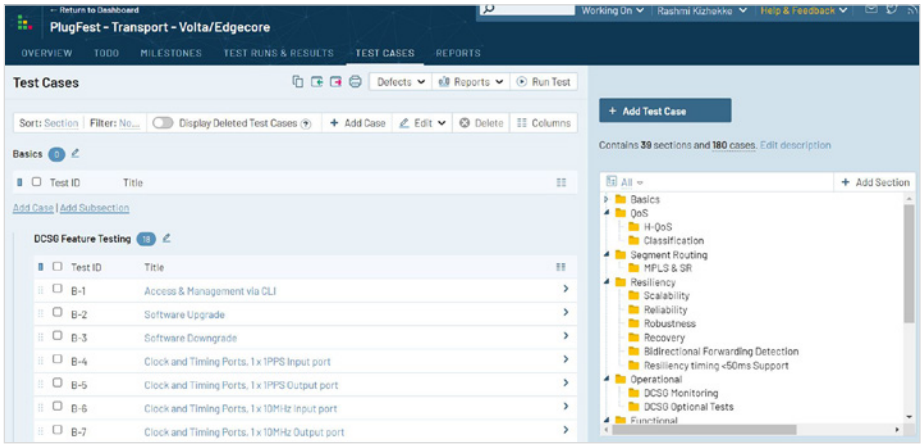
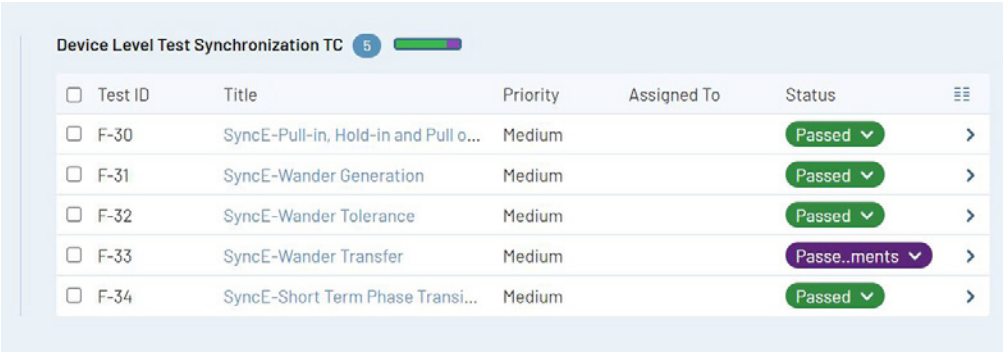
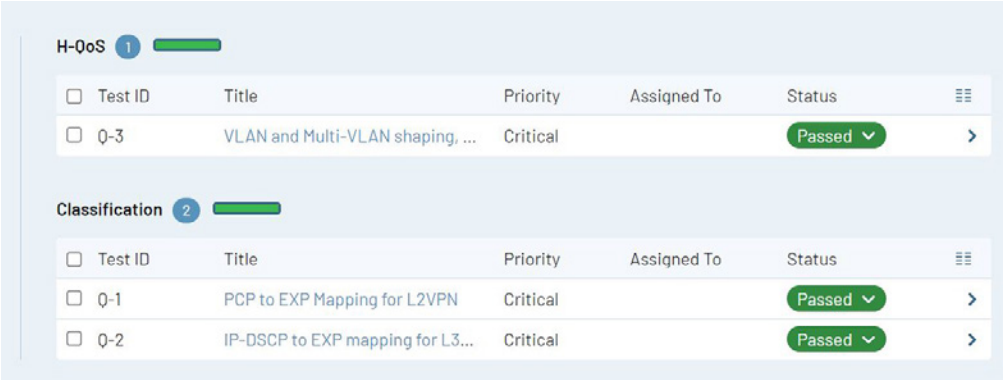


Figure 2: Test Cases

The team successfully executed multiple cycles of testing during which every key category of DCSG requirements was examined and validated. Issues with each vendor were subsequently channeled back to vendors and are expected to be resolved in upcoming releases.





Successful test execution

- Interoperability verification of different DCSG hardware and software vendors
- DCSG functionality limits were pushed by testing them not only as a gateway, but also as an edge router
- Throughput and latency requirements met DCSG specifications
- Synchronization tests across various ITU-T profiles were verified with results varying based on each vendor; overall, there were no alarming concerns
- Flawless performance across various layer 2, layer 3 and VLAN configurations
- Standard response times were observed during redundancy and resiliency test executions

For more information, visit Amdocs Open Wireless Networks

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Amdocs' purpose is to enrich lives and progress society, using creativity and technology to build a better connected world. Amdocs and its 26,000 employees partner with the leading players in the communications and media industry, enabling next-generation experiences in 85 countries. Our cloud-native, open and dynamic portfolio of digital solutions, platforms and services brings greater choice, faster time to market and flexibility, to better meet the evolving needs of our customers as they drive growth, transform and take their business to the cloud. Listed on the NASDAQ Global Select Market, Amdocs had revenue of $4.2 billion in fiscal 2020. For more information, visit Amdocs at www.amdocs.com.

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