Case Study

Network management and operations teams at MNOs
Mobile network operators

intel.

Digis Squared and Intel® Deliver Network Optimization in Angola

Africell uses Digis Squared and Intel technology for radio testing as a service (RTaaS) to manage 2.5 more data[1].

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At a Glance

- Africell required network testing tools ahead of the commercial launch of its new Angolan mobile network

- Digis Squared delivers cloud-based fault management, configuration management, and performance management

- The new Africell service has a mandate to transform the country's digital landscape

There is no doubt that 5G networks are having a major impact on mobile communications. The global 5G services market was valued at $47.3 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 52.0% from 2022 to 2030. Many of these networks are being deployed in emerging nations, like Angola where the new Africell network deployment is 5G-ready.

For telecommunications service providers such as Africell, the deployment of a new mobile network involves deploying two types of solutions. The first is network service equipment: cell towers, base stations, access points, and routers. Second, they need management tools to understand how well the equipment operates while providing the ability to troubleshoot and fix any performance glitches.

Founded in 2016, Digis Squared is a telecommunications system integrator and managed service provider, whose executive team held senior leadership positions at tier one telecom operators. As a result, they understand the challenges involved in delivering dynamic, high bandwidth, mobile services to businesses and consumers.

Digis Squared is an Intel® Network Builders ecosystem partner and worked with Intel to further develop the cloud-version of its network testing and optimization solution, INOS*, using 3rd Generation Intel® Xeon® Scalable processor-based servers in the Intel Network Builders Edge & Networking Testbed (Intel Testbed). Recently, Digis Squared used the cloud-based tool to carry out significant network testing with Africell ahead of the commercial launch of the new mobile network in Angola.

Digis Squared's INOS Simplifies RF Cluster Testing

Radio frequency testing can be a challenge because ideal tower placement is impacted by many factors. The ideal placement represents a honeycomb (see Figure 1) with a base station in each cell broadcasting its signal to the edges of the cell. In reality, these signal borders are not tessellating hexagons, but are distorted by buildings, hills and other obstacles. Signal overlaps can cause interference and so testing these boundaries and adjusting the signal strength is a key part of setting up and maintaining a network.

With legacy radio testing systems, a test team drove around each cell checking signal levels. They were followed by another team that would manually adjust the RF signal strength of each base station to minimize signal overlap. The drive test team would then return to that cell and repeat the test-and-adjust process until there was no signal overlap. Digis Squared migrated its INOS premises-based radio-testing systems to the cloud and enabled its field-based equipment to be instantly updatable over the air, removing the need for engineers in the field. In turn, this increases network testing efficiency, convenience, and scalability. INOS' cloud-based implementation and modern architecture transforms the cumbersome steps legacy equipment requires.
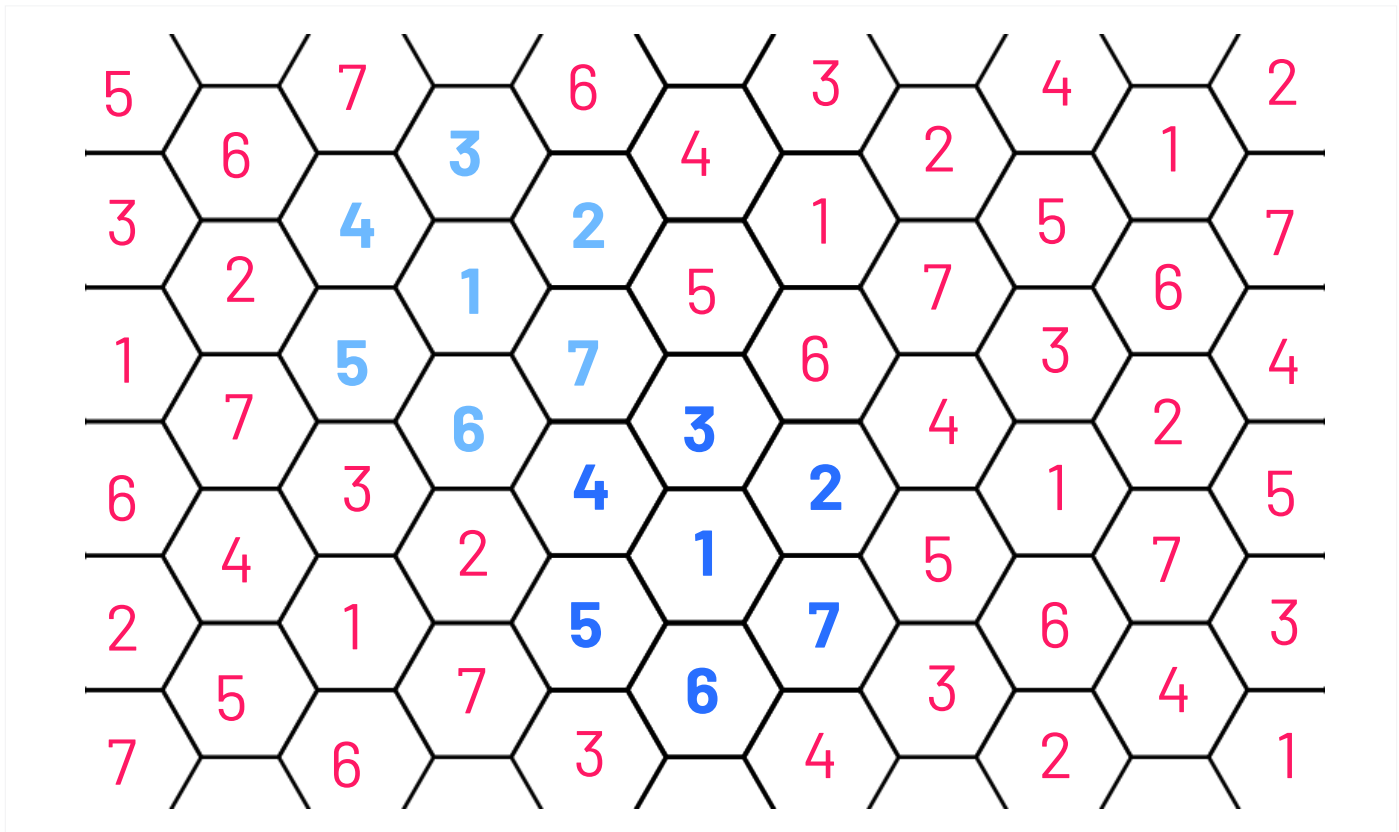
Figure 1. The blue numbers define a simplified 7-site cell cluster.

Figure 2 shows the INOS system that can be deployed as a static, wall-mounted solution for in-building active measurement, packed neatly into a shoulder bag for in-building or inner-city testing, or in a suitcase form factor for drive testing.

INOS can run thousands of radio network tests from anywhere, anytime. The solution features smart automation. For instance, if key performance indicators (KPIs), such as latency or bandwidth utilization deviations arise, network technicians receive real-time alerts about the issues. They then dig in, determine why network performance is degrading, and address the problem.

Figure 2. Three form factors of the INOS radio testing system. Photo by Digis Squared

Developing the Cloud-Based Solution

Working with the Intel® Network Builders, the Digis Squared team enabled the first cloud-based installation of INOS, running on 3rd Generation Intel Xeon Scalable processors, specifically the Intel® Xeon® Gold 6338N processor. The testing teams ran 25 different radio field tests in the Intel Testbed, with the following results[2]:

Increased Cores and Threads: The Intel Xeon Gold 6338N processor enabled Digis Squared to setup two or more parallel INOS containers serving multiple different customer accounts. The benefit of this added capacity is higher processing capacity from multiple INOS modules running at the same time, lower response time and faster handling of APIs and web requests and higher availability. The response time measured across all 25 tests, shows that the Intel Xeon Gold 6338N easily scales along with a 2.5 times increase in the data payload over the 25 tests (see Figure 3).

Intel® Turbo Boost Technology 2.0 Frequency: The "bursty" nature of mobile networks can cause capacity problems for INOS during periods of high traffic bursts. The availability of Intel Turbo Boost Technology in Intel Xeon Scalable processors increases the capability of INOS to receive sudden bursts of requests, keeping stable progress and high performance resulting in no delay on data retrieval, no delay on rendering data to maps and tables, and reduced time to prepare reports.

Expanded number of Intel® Ultra Path Interconnect (Intel® UPI) links: High-speed chip interconnects to other parts of the system are important features for INOS because it consumes a huge volume of processor capability and RAM. The availability of UPI links in the Intel Xeon Gold 6338N better integrates with other I/O devices improving the INOS performance.

Expanded Memory Size: For INOS, more memory means more concurrent users, more software threads running in parallel, and an increase in the number of simultaneous Docker containers. The increased maximum memory size of 3rd Generation Intel Xeon Scalable processors delivers more than three times the number of INOS containers.

Data Security: Both the Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI) and Intel® Trusted Execution Technology are available in the 3rd Generation Intel Xeon Scalable processor providing encryption performance for INOS, which utilizes sensitive client data.
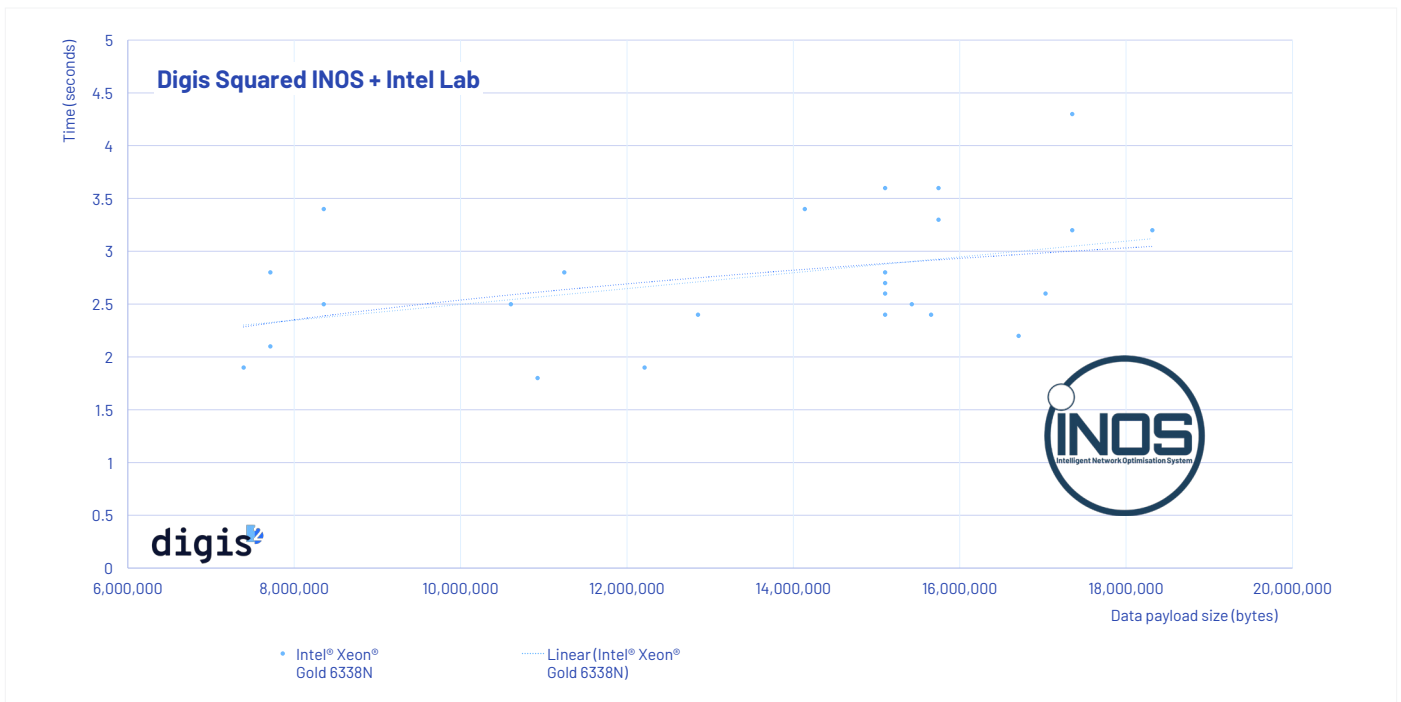

Figure 3. Scatter diagram showing data payload growing 2.5 times with a nominal effect on processing time.

Africell Utilizes Digis Squared's INOS RTaaS to Test Angola Mobile Network

Africell entered the Angolan mobile market with the goal of building a new mobile network offering a range of high-bandwidth services to Angolans to transform the country's digital landscape. Ahead of launch, the independent operator needed a state-of-the-art network cluster testing and acceptance process to support the technical "go-live" of its new network, and Digis Squared's INOS fit the bill.

With a population of more than 30 million and one of the larger economies in the region, Angola is a leader in sub-Saharan Africa. However, compared to its peers, the country's telecommunications infrastructure has historically experienced limited competition, investments, and capabilities.

Founded in 2001, Africell launched its first commercial operations in Gambia and followed with services in Sierra Leone, the Democratic Republic of Congo, and Uganda. The mobile service provider wanted to provide Angolans with more choice, greater coverage, and public access to digital products and services. In February 2021, Africell secured Angola's fourth unified telecommunications license. To date, the company has spent more than $150 million building a new network with an initial capacity of more than 6 million subscribers.

Africell needed entire network management capabilities for its new Angolan service and awarded Digis Squared a multi-year contract to provide end to end managed services covering radio, core, BSS, VAS, and field services, for the new network. INOS was used ahead of commercial launch for network cluster testing and acceptance and will continue to be used post-launch for network optimization and in-building coverage activities.

With its cloud-based INOS, ahead of network launch Digis Squared engineers were able to remotely control and update scripts, push revised routes to drivers, and review data live in the cloud during the tests. During the pre-launch phase engineers ran field measurements using INOS for clusters and sub-clusters, undertook the analysis to identify coverage issues, implemented optimization changes live on the network, and then re-tested and benchmarked the results against the initial data – all from the company's offices.

Conclusion

The new Africell Angola network, and its 5G-ready capability, will continue to benefit from the network testing and optimization capability of Digis Squared's cloud-based INOS, and the extra compute capability of 3rd Generation Intel® Xeon® Scalable CPUs. Because of the higher throughput of 5G networks, the signal interference issue will be a bigger challenge for these 5G networks. In the past, radio testing has been a manual process that consumes a large amount of human resources and takes too much time. But moving key radio testing processes into the cloud makes a dramatic improvement in response time and accuracy, and as networks accelerate 5G deployment, cloud-based tools will become more and more beneficial. Digis Squared is a pioneer in cloud-based radio testing and has proven the benefit of this in its work with Africell in Angola.

Working with Intel® Network Builders Edge & Networking Testbed, Digis Squared had access to servers that utilized the latest Intel Xeon Scalable processors which demonstrated the compute power needed to capture the efficiencies that come with this cloud-based service.

Pioneering this advanced cloud-based radio-testing-as-a-service solution in Angola means a better network for Angolans, and contributes to transforming the country's digital landscape.

Learn More

Digis Squared

INOS

Intel® Network Builders Ecosystem

3rd Generation Intel® Xeon® Scalable

Africell