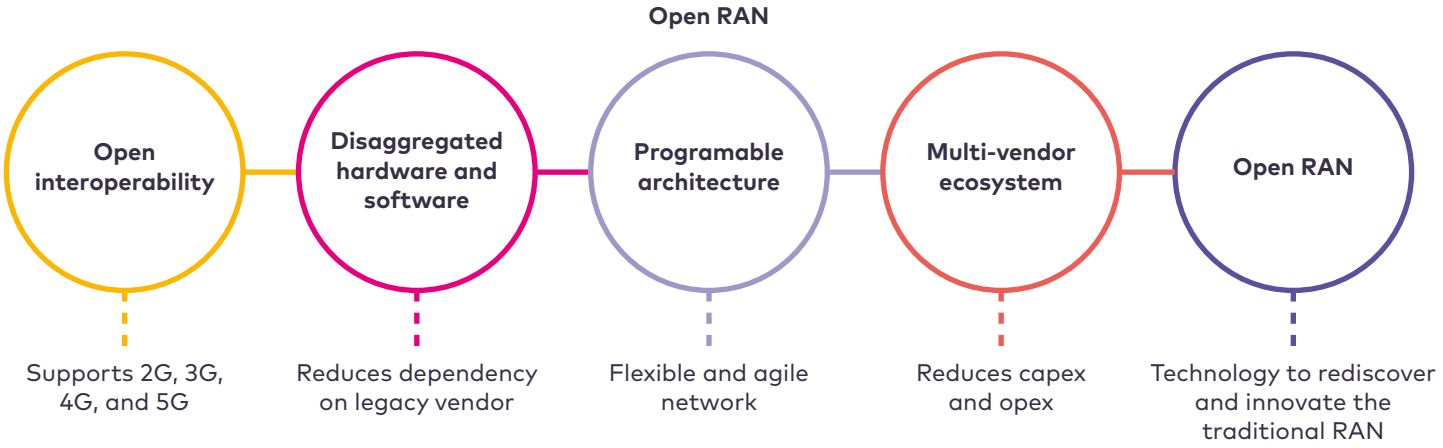
case study

Open RAN:
An Indonesian University

amdocs

"If you want something you've never had, then you've got to do something you've never done."



Open RAN is believed to be the key to providing connectivity and services in developing countries as well as driving local network technology development. Analysts like Dell'Oro Group forecast the Open RAN market to see sales upwards of $10 billion by 2025. Now is the time to enhance your digital infrastructure by leveraging Open RAN to provide connectivity and services.

O-RAN and OpenRAN are the two main governing bodies within the Open RAN movement.

O-RAN refers to the O-RAN Alliance or its designated specification. The O-RAN Alliance is a consortium defining next-generation RAN infrastructures, empowered by principles of intelligence and openness.

OpenRAN led by Telecom Infra Project (TIP), has a mission to accelerate innovation and commercialization in the Radio Access Network (RAN) domain with multi-vendor interoperable products and solutions that are easy to integrate in the operator's network. TIP's OpenRAN program supports the development of disaggregated and interoperable 2G/3G/4G/5G NR RAN solutions based on service provider requirements.

Mobile operators in Indonesia needed to test and trial Open RAN technology to determine whether open, disaggregated technology could play a part in plans to take mobile broadband connectivity to thousands of rural villages in the expansive country that comprises more than 17,000 islands and is home to more than 270 million people.

The country has pockets of high-density urban areas, such as the capital Jakarta, but it also has an extensive rural population, with thousands of villages lacking any communications infrastructure. Despite the rollout of 3G and 4G networks by mobile operators, about 61 million Indonesians currently don't have access to the Internet, according to the GSMA.

And in common with many other developing markets, network operators are faced with the conundrum of how to build out network cost-efficiently in a market with relatively low ARPU levels and challenging return on investment models.

GSMA, TIP, the Indonesian government, an Indonesian University and Tier-1 mobile network operators (MNOs) are collaborating to support the country's effort to support the 'Making Indonesia 4.0' program. This program is the basis of the Industry 4.0 revolution, which is supported by five key technological advances: internet of things, artificial intelligence, human-machine interface, robot and sensor technology, and 3D printing. Yet to make the program a reality it is first essential to establish reliable connectivity throughout the country.

The TIP Community Lab at an Indonesian University aims to significantly improve connectivity in the country.

The lab's activities will focus on testing and validating standards-based open, interoperable, and disaggregated network technologies, accelerating the deployment of commercially viable solutions, expanding the local talent pool of experts, and nurturing a diverse and a robust ecosystem of innovative companies.

The challenge

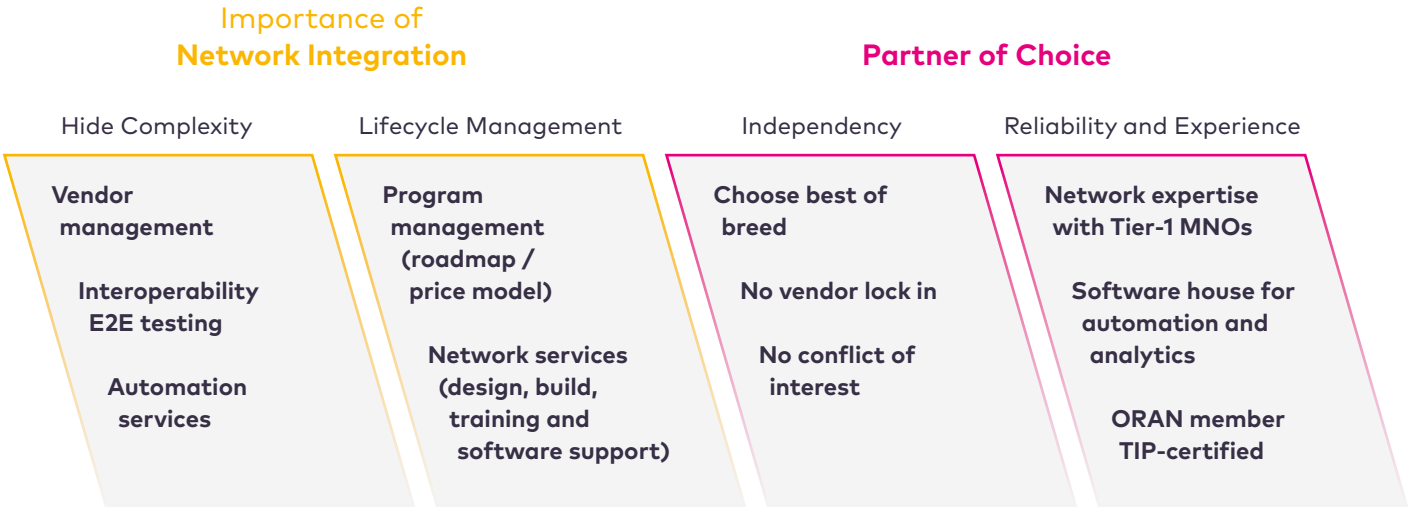
Disaggregation of traditional network elements following Open RAN initiatives enables a variety of network virtual functions. However, the complexity involved in testing/ deploying and supporting this growing vendor ecosystem is complex and not without risk.

The solution

To kickstart the testing process, TIP, in collaboration with various Tier-1 operators, built the first-of-its-kind community lab in southeast Asia at an Indonesian University. Lab activities focused on testing and validating standards-based open and disaggregated network technologies, accelerating deployment of commercially viable solutions, expanding the local talent pool of experts and nurturing a diverse and a robust ecosystem of innovative companies.

Amdocs' role

Choosing a partner to manage the lifecycle, while hiding the complexity of the new open ecosystem of a multi-vendor, disaggregated mobile access network, are key elements of successful Open RAN adoption. Amdocs' integral involvement in both the O-RAN alliance and TIP OpenRAN community place us at the forefront of system integration, making us uniquely positioned to fulfil this partnership role for an Indonesian University.



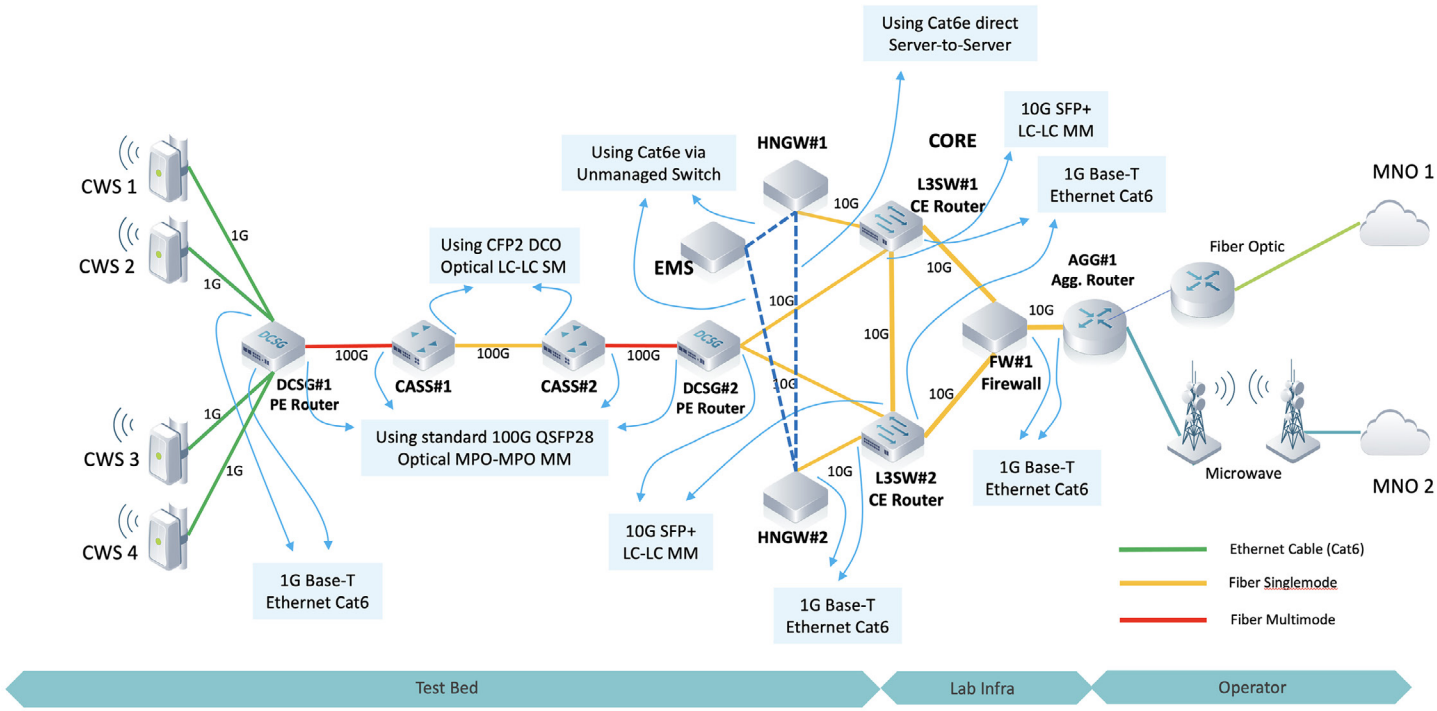
Services Performed

- Solution assessment
- End-to-end network design (IP,RAN, CORE)
- Prepare bill of material
- Material procurement
- Test plan creation
- End-to-end network integration and installation support
- Test execution, validation and reporting

At the TIP Community Lab in an Indonesian University, Amdocs played a key role in the **assessment**, **procurement**, **integration** and **ongoing testing** of solutions across all areas of the network stack, including access, transport, core and services.

Network design and integration

Amdocs, in collaboration with TIP and Tier-1 MNOs, completed an Indonesian University's network design, which includes the architecture IP planning, RAN, transport and core. For the first phase of the implementation, the lab was connected to two of the MNOs using microwave and satellite for backhaul. The lab infrastructure consisted of Open RAN-compliant equipment from vendors like Parallel Wireless, Mavenir and Altiostar. For the transport, elements from the TIP Open Optical Packet and Transport (OOPT) project group, such as Disaggregated Cell Site Gateway (DCSG) and Cassini (Transponder) were integrated into the topology.

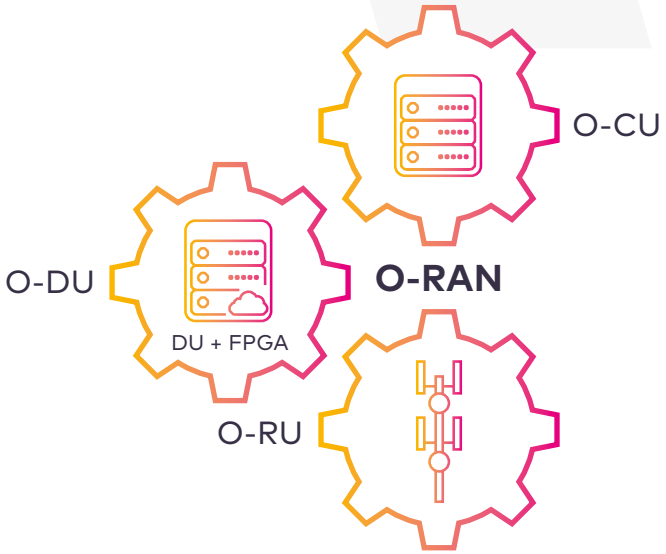


Solution components

Testing and verification

Testing was driven by O-RAN & 3GPP Standards. Test cases were planned and drafted to ensure all areas of O-RAN architecture were tested and verified. Major areas of testing can be seen below.

- M-Plane IOT Test
- S-Plane IOT Functional Test
- S-Plane IOT Performance Test
- C/U-Plane IOT Test
- System Functions
- Features Verifications



Test ID	Test Area	Test Objective
Basic		
FN-01	Basic	Attach and detach
FN-02	Basic	Latency. 1000x ping. Repeat 10 times. Min/Mean/Max
FN-03	Basic	Start data session. UL and DL data transfer. Verify MIMO used.
FN-04	Basic	Multiple PDNs
FN-05	Basic	MO and MT VoLTE call (VOIP if VoLTE not supported)
FN-06	Basic	Re-establishment (lose network and re-connect)
Mobility		
Performance		
PER-01	Performance	Single UE, DL throughput 64QAM, mean throughput
PER-02	Performance	Single UE, DL throughput 64QAM, MIMO usage
PER-03	Performance	Single UE, DL throughput 64QAM, CQI and SINR reporting
PER-04	Performance	Single UE, UL throughput 16QAM, CQI and SINR reporting
PER-05	Performance	Single UE, UL throughput 64QAM, mean throughput
PER-06	Performance	Single UE, UL throughput 64QAM, MIMO usage
Stability		
Operational		
Performance and Capacity		

Test areas

Performance		
PER-01	Performance	Single UE, DL throughput 64QAM, mean throughput
PER-02	Performance	Single UE, DL throughput 64QAM, MIMO usage
PER-03	Performance	Single UE, DL throughput 64QAM, CQI and SINR reporting
PER-04	Performance	Single UE, UL throughput 16QAM, CQI and SINR reporting
PER-05	Performance	Single UE, UL throughput 64QAM, mean throughput
PER-06	Performance	Single UE, UL throughput 64QAM, MIMO usage

Test cases

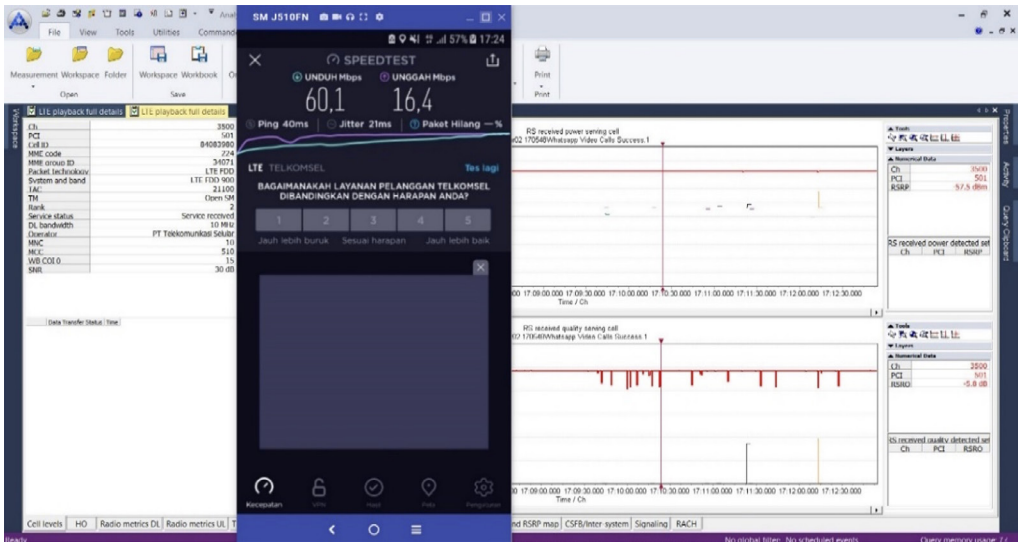
- UE attach and detach
- Network stability & reliability tests
- UE UL and DL speed tests
- UE latency testing
- Voice call (VoLTE)

Successful test execution

The lab team successfully executed the first cycle of testing, resulting in several major achievements, including enabling voice and video calls using the Open RAN equipment while connecting to the MNO's existing core network.

Initial results with 5MHz and 10MHz bandwidth:

- Average DL speeds of 38 Mbps, with a max DL speed of 60Mbps
- Average UL speeds of 14 Mbps, with a max UL speed of 16.4 Mbps



Results

As system integrator for the TIP, Amdocs integrated the lab environment for Tier-1 MNOs-focused green/brown-field network improvement, ensuring the architecture simulated the real-world environments. Findings from the labs enabled the MNOs to mitigate risks in the real-world deployments such as interoperability issues between hardware and software vendors.

For more information, visit Amdocs Open Wireless Networks

about amdocs

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