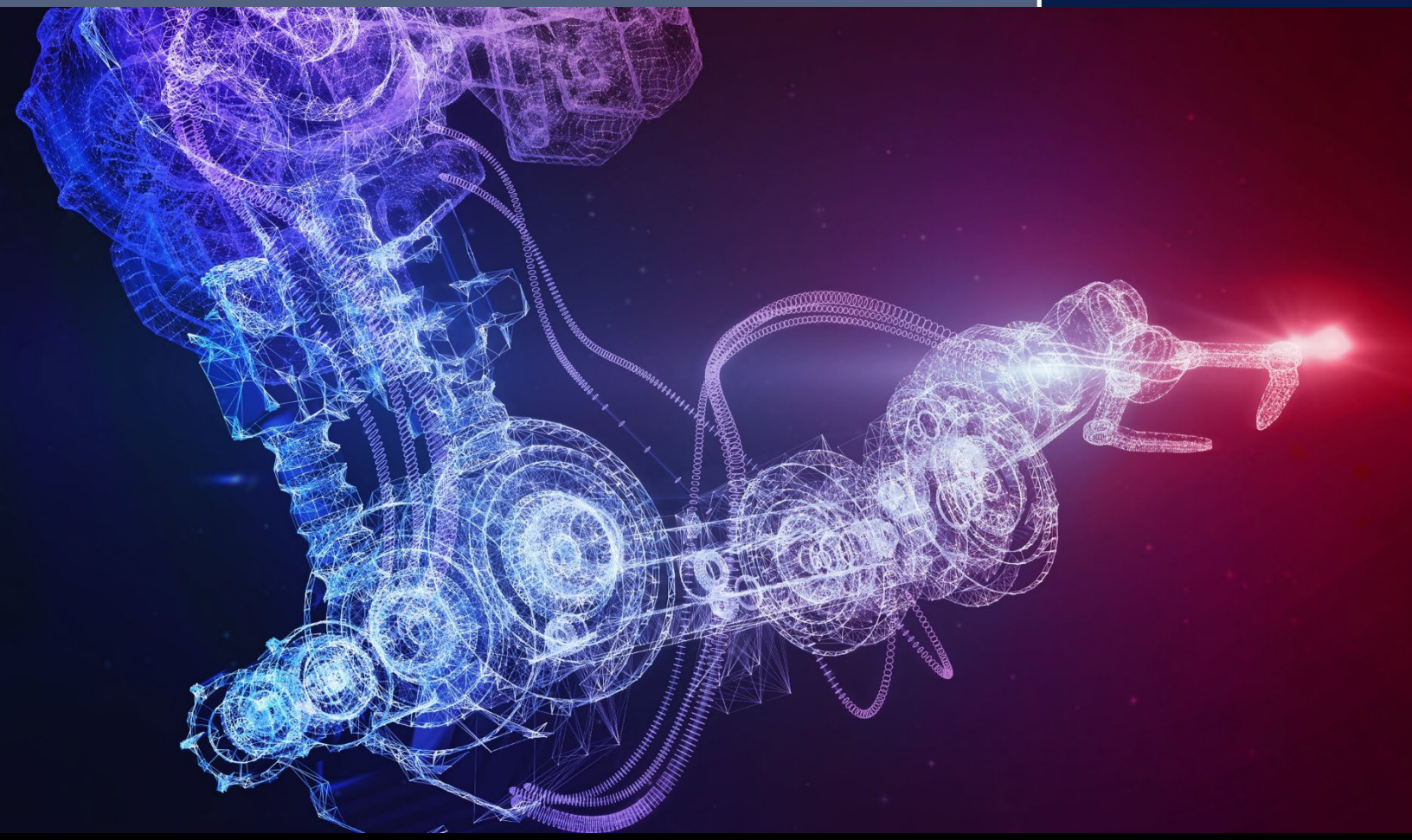
CASE STUDY



Quectel Completes 5G RedCap and Non-Terrestrial Network Verification for IoT Modules

5G IoT Module Verification

KEYSIGHT

Based on press release June 28, 2023

Keysight Enables Quectel to Complete 5G RedCap and Non-Terrestrial Network Module Verification

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Global provider of IoT wireless modules

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Verify RedCap and NTN support via end-to-end 5G data calls

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Verified RedCap and NTN connections across three IoT modules

Quectel Wireless Solutions, a global provider of IoT wireless modules, recently worked with Keysight Technologies to verify that its 5G modules support two of the newest features in the 3GPP Release 17 specification: reduced capability (RedCap) and non-terrestrial networks (NTN). Using the Keysight S8711A UXM 5G Test Application, Quectel established end-to-end data call connections to validate protocol, radio frequency, and performance behavior across three IoT modules, accelerating the availability of Rel-17-compliant designs.

RedCap and NTN are two of the most significant additions to the 5G Release 17 standard, enabling a new generation of IoT devices that balance performance, cost, and coverage. By verifying support for both technologies on the same test platform, Quectel positioned its module portfolio to serve markets ranging from industrial sensors to satellite-connected asset tracking.

> **Norbert Muhrer,**
> **President and CSO, Quectel Wireless Solutions**
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> We are glad to see that Keysight's RedCap and NTN test solutions have enabled us to develop modules supporting these technologies much quicker than anticipated, helping accelerate the availability of commercial services for these technologies.

The Challenge

Quectel needed to confirm that its IoT wireless modules could establish reliable, standards-compliant connections using two brand-new 5G Release 17 features: reduced capability (RedCap) devices and non-terrestrial networks (NTN). Both technologies were largely unproven in commercial modules, and Quectel needed a way to validate real end-to-end call performance before committing to production designs.

RedCap introduces a new class of 5G devices with reduced complexity, lower cost, and lower power consumption, targeting use cases such as industrial sensors and wearables. NTN, based on satellite-to-ground communication, extends connectivity to remote areas without terrestrial coverage, supporting use cases such as industrial IoT, mission-critical communications, and connected vehicles.

To bring these capabilities to market quickly, Quectel needed to emulate a live 5G Release 17 network with RedCap enhancements, as well as a constellation of satellites operating in geostationary orbit, and verify that its modules could complete end-to-end data calls and meet protocol, RF, and performance requirements.

Figure 1. As 5G Release 17 extends coverage beyond terrestrial networks, satellites in geostationary orbit enable non-terrestrial network (NTN) connectivity for IoT devices in remote areas.

The Solution

To complete these milestones, Quectel used the Keysight S8711A UXM 5G Test Application, part of Keysight's 5G Device Test Solutions portfolio. Built on the Keysight UXM 5G Wireless Test Platform, the application provides first-to-market support for the latest Rel-17 features, including the ability to emulate satellites in geostationary (GEO), geosynchronous (GSO), and low earth orbits (LEO), along with advanced orbit and fading scenarios.

Using the UXM 5G Test Application's intuitive interface, Quectel engineers established end-to-end RedCap and NTN data calls, then validated overall module functionality: correct implementation of 3GPP protocols, RF performance through Block Error Rate (BLER) measurements, and data throughput across a range of scenarios.

The S8711A UXM 5G Test Application runs on the Keysight UXM 5G Wireless Test Platform and provides an intuitive, easy-to-use interface for testing across protocol, RF, functional, and performance domains, giving module makers first-to-market support for the latest 3GPP Release 17 features, including RedCap and NTN, in a single instrument.

The S8711A is part of Keysight's 5G Device Test Solutions portfolio, which spans conformance, functional, and performance testing for 4G and 5G devices. Together, these tools helped Quectel validate its RedCap and NTN modules against the same standards its customers rely on for commercial deployment.

Figure 2. The Keysight S8711A UXM 5G Test Application running on the UXM 5G Wireless Test Platform, showing downlink and uplink OTA throughput and BLER measurements during RedCap verification

Results

Quectel successfully established an end-to-end RedCap data connection to its Rx255C module by emulating a 5G Release 17 network with enhancements supporting RedCap devices, confirming the module's readiness for reduced-capability use cases.

Quectel also completed successful end-to-end NTN connections to its CC660D-LS and CC950U-LS modules by emulating a constellation of satellites in geostationary orbit operating in transparent mode, verifying the modules' ability to deliver a satellite-based network connection.

Following the successful data call establishments, Quectel validated overall module functionality, including correct protocol implementation per 3GPP standards, RF performance via BLER measurements, and data throughput rates across a range of scenarios, accelerating the deployment of 3GPP 5G Release 17-compliant designs.

Conclusion

By partnering with Keysight to verify RedCap and NTN support on the same test platform, Quectel accelerated its path to market for a new generation of 5G IoT modules.

The Keysight S8711A UXM 5G Test Application gave Quectel a single, easy-to-use solution for validating protocol, RF, and performance behavior across multiple Release 17 technologies, reducing the time and complexity of bringing new modules to market.

As RedCap and NTN adoption grows across industrial, wearable, and satellite-connected IoT applications, Quectel is well-positioned to support customers deploying the next generation of 3GPP Release 17-compliant devices.

Related Information

- S8711A UXM 5G Test Application product page
- 5G Device Test Solutions portfolio page
- Quectel company website
- Keysight Enables Quectel to Complete 5G RedCap and Non-Terrestrial Network Module Verification, June 28, 2023 press release

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