

# MAXIMIZE IP DATA THROUGHPUT FOR 5G DEVICES

The R&S®CMX500 radio communication tester is ideal for testing the maximum possible IP throughput for mobile device transmitters and receivers.



R&S®CMX500 5G radio communication tester: FR1/FR2 test setup for data throughput testing.

## Your task

Enhanced mobile broadband (eMBB) is one of the three pillars of 5G New Radio. Taking into account the continuously increasing speed and capacity requirements of smartphone users and other vertical markets, 3GPP has defined spectrum for 5G in the mmWave range greater than 24 GHz or FR2. However, this creates significant testing challenges, where new numerologies and newly available radio resources with greater bandwidth and extensive carrier aggregation scenarios require ever more complex downlink and uplink testing scenarios.

Meeting end user expectations involves more than just concentrating on the RF layer throughput but also involves examining the IP layer, which plays a key role in quality of experience (QoE) for end users. Testing throughput on multiple layers to identify bottlenecks is essential and relies on powerful T&M equipment that provides repeatable test results. Easy to handle monitoring and tuning tools help optimize traffic channels for various applications that use different layers and different protocols, such as TCP or UDP.

## Rohde & Schwarz solution

Designed for over 20 Gbps of data in combination with a comprehensive toolchain, the powerful hardware architecture of the R&S®CMX500 radio communication tester creates a unique environment for LTE and 5G testing. A fully integrated software toolchain simplifies throughput testing in the RF layer as well as in the uplinks and downlinks in the IP and application layers.

An integrated MAC throughput monitor helps analyze throughput on the lower layers for FR1 and FR2 frequencies. The integrated Iperf tool and the powerful Rohde & Schwarz Throughput App 2 let users quickly check throughput values for TCP and UDP traffic. Various throughput graphs help visualize values over multiple layers to identify and isolate throughput bottlenecks and integration issues.

## The throughput wizard simplifies test setups

IP throughput testing involves two services: measurement and tuning. The integrated maximum throughput wizard simplifies test setups with an easy to handle graphical user interface. Users just have to enter basic test setup data and cell configurations. The wizard creates a preconfigured test scenario for maximum data rates and arranges the R&S®CMX500 workspace. Users can directly start measurements and monitor measured data in real time on the multilayer throughput graph.

The results can be used to analyze potential bottlenecks due to interface capacity or configuration settings in the individual layers.

Application Card | Version 01.00

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## Automatic throughput performance improvement

The second step uses the unique service IP tuner and the Rohde&Schwarz Throughput App 2 to automatically improve throughput performance by configuring the IP and stack parameters on the network side. This tool searches for the highest MCS values for transmitting the most useful bits within a symbol. It also focuses on important IP channel parameters. The resulting values enable both uplink and downlink throughput optimization and can automatically be applied to user equipment scheduling configurations for further measurements. The maximum throughput wizard and the IP tune application are ideal for identifying throughput problems.

## Test automation with R&S®CMsequencer

Throughput testing becomes complex when testing scenarios use multiple bands and carrier aggregations. The R&S®CMsequencer automates maximum throughput testing and offers extensive E2E IP level testing. The shuffler function enables quick and easy automatic iteration across bands and band combinations reported by the DUT. This allows for a major reduction in user time and effort needed to test IP throughput performance in all the available combinations.

## Remote control

Scripting is becoming more important for both production and development. The R&S®CMX500 has two interfaces: SCPI and the new XLAPI Python based interface for the faster integration of the R&S®CMX500 into software landscapes for remote control of the R&S®CMX500 and most functions.

## Summary

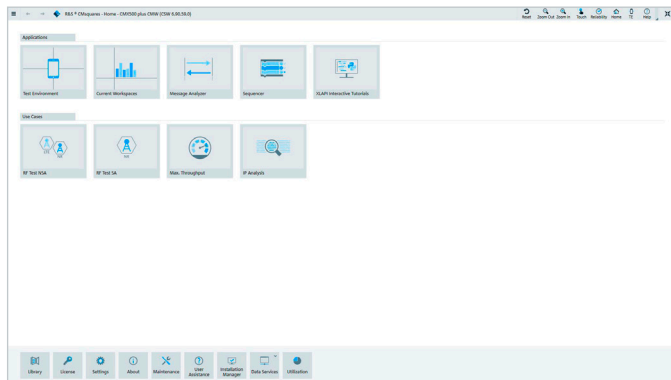
IP throughput testing and throughput optimization have never been easier and more cost efficient for device manufacturers and network operators. The R&S®CMX500 platform together with the throughput wizard and the IP tune application provide all the necessary tools to evaluate and tune throughput signal properties for 5G devices.

## See also

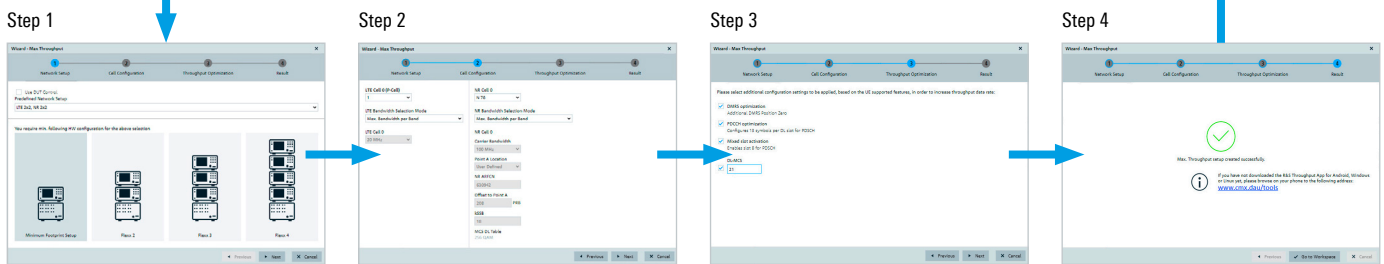
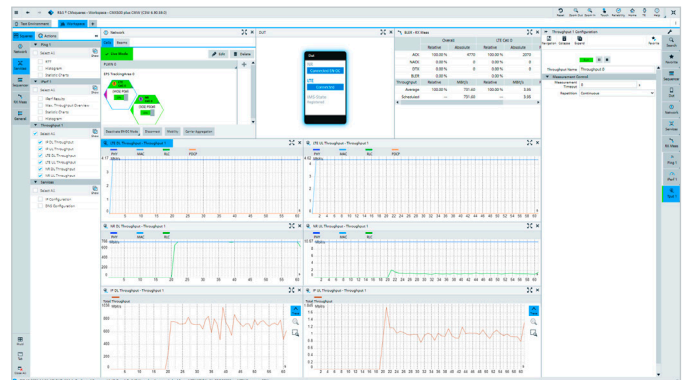
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## R&S®CMX500 throughput wizard simplifies 5G device test setups

Wizard entry



The workspace is created automatically and the user can start the measurement.



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Maximize IP data throughput for 5G devices  
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