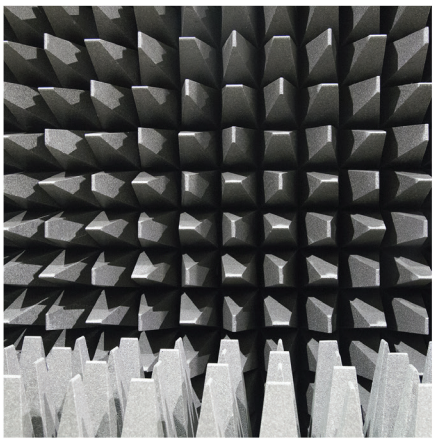
Keysight Technologies
Propsim Channel Emulation MIMO Over-the-Air (OTA) Testing



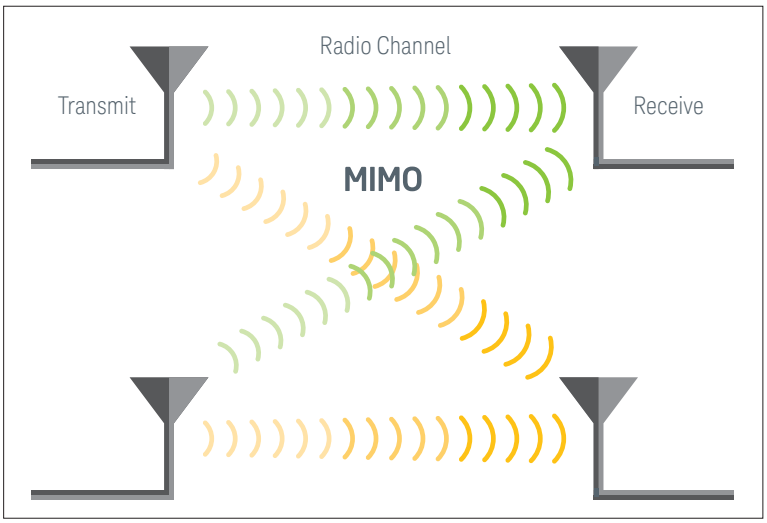
KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

Anite is now part of **Keysight Technologies**

Verify the Actual Performance of a Mobile Device with Keysight's Future-Proof Integrated Test Solution

LTE delivers an improved end-user experience with faster data rates compared to WCDMA HSPA+. Faster data rates lead to more complex mobile devices that require more extensive testing prior to market introduction. As a result many mobile operators and device manufacturers conduct performance testing based on channel emulators to develop and launch products that meet end-users' increasing expectations. Propsim radio channel emulators from Keysight Technologies accurately simulate the characteristics of real-world radio channel conditions within a laboratory environment. cost-effective investment.



MIMO delivers superior data rate services to mobile device users

Achieve Compliance with Industry Test Plans Mandated by CTIA, 3GPP and CCSA

MIMO (Multiple Input, Multiple Output) – a key feature in LTE and LTE Advanced – delivers higher bandwidth and data rate services to end users. Mobile devices with MIMO technology - where both the base station and the device are equipped with multiple transmit and receive antennas - are highly complex and difficult to test. Over-the-Air (OTA) testing effectively overcomes this complexity by incorporating the device antenna performance. Perform tests under similar conditions to how the device operates in the real world – in other words – without any cables connected to it.

Use MIMO OTA performance testing to evaluate the end user's experience accessing data services on a mobile device. All critical parts of the mobile device design – including the antennas, RF front end, baseband processing – are thoroughly and simultaneously tested in real-life conditions. Poorly designed devices significantly increase network load and optimization issues, so major mobile operators mandate specific test requirements to ensure correct device performance.

Complex devices require efficient, precise and non-intrusive testing that emulates real-world field conditions across a large sample of devices and over various manufacturing runs. MIMO OTA device testing accurately emulates the end-user's experience when accessing applications, downloading video in 'landscape mode' or browsing in 'portrait mode'.

Propsim is used by major mobile operators for device MIMO OTA performance testing.

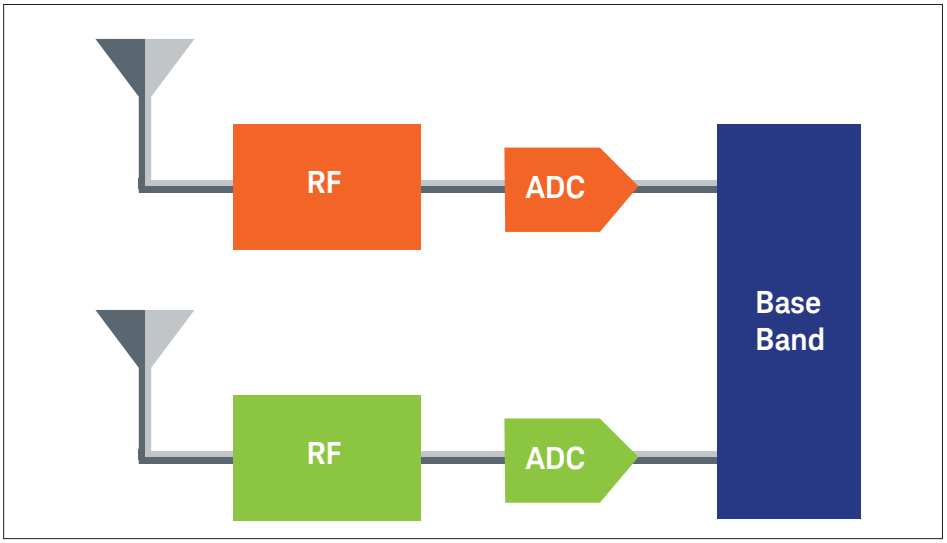
Ready and validated industry standard MIMO OTA channel models.

Unique Propsim FAST-OTA capability provides up to 12x faster device MIMO OTA testing compared to conventional test methods.

Create realistic RF conditions with Propsim Channel Emulators

Propsim channel emulators create realistic RF conditions for testing MIMO devices within an anechoic or reverberation type chamber. Keysights's Propsim F32 can test up to 32 RF and 128 MIMO channels in a single box. This makes it a future-proof and cost-effective solution for testing carrier aggregation capable LTE-Advanced devices. Propsim F32 offers more than twice the emulation capacity compared to other products on the market. Its unique multi-link capacity enables easy configuration across a wide range of test configurations.

Propsim F32 is the only single box channel emulator solution available on the market that supports a configuration of 8 or 16 dual-polarized probe antennas. This set-up creates a multi-probe environment around the device for even more accurate performance testing.



Verify the Actual Performance of Mobile Devices with MIMO OTA Testing

Test from early stage development through market acceptance

The Propsim tools and applications enable you to test a device from early stage research and development through to market introduction. Keysight supports mobile operator test plans across the globe by developing and implementing relevant test cases. As the main contributor to all relevant channel models used in the wireless industry – Winner, Winner II, 3GPP, CTIA, ITU, METIS (5G) – Keysight has the largest pool of patents in the field of radio channel modeling and emulation.

Consistent and reliable MIMO OTA testing in an anechoic chamber

MIMO OTA testing performed in an anechoic chamber fulfills all technical requirements set by 3GPP, CCSA and CTIA. It also enables the most consistent and reliable test results, even for future features such as Uplink MIMO, CoMP and adaptive antennas.

The Propsim F32 channel emulator is compliant with the draft CTIA specification related to MIMO OTA testing of all currently planned LTE transmission modes in anechoic chamber system installations. This enables you to verify that a particular mobile device meets expected industry and operator requirements. Propsim F32 is ideally suited for OTA testing in an anechoic chamber due to its high RF I/O capacity, compact size, ease of use and configurability.

Propsim's advanced modeling tools enable device testing in the R&D phase using a wide range of use case scenarios. Propsim MIMO OTA and field-to-lab Virtual Drive Testing Toolset enable you to define and create customized test scenarios based on data (RF propagation conditions) captured in an existing network.

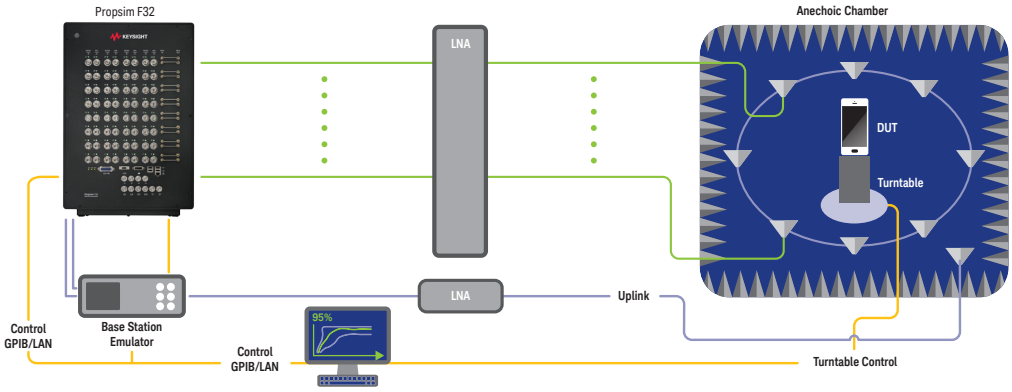
Simplify OTA testing in a reverberation chamber

Propsim FS8 is ideal for OTA testing in a reverberation chamber because it enables simple control of critical parameters. This includes dynamic mobile speed, multipath profile, range delay and base station antenna correlation. Other parameters include noise and inter-symbol interference caused by base station signals as well as distant propagation path reflections to the device.

Over-the-air testing in a reverberation chamber based on a Propsim FS8 channel emulator allows you to assess a device's average data throughput performance relative to other devices. In this case, isotropic SCME-based channel models (Long and Short Delay Spread) for transmit diversity modes (TM2) as defined in the CTIA MIMO OTA test plan are used.

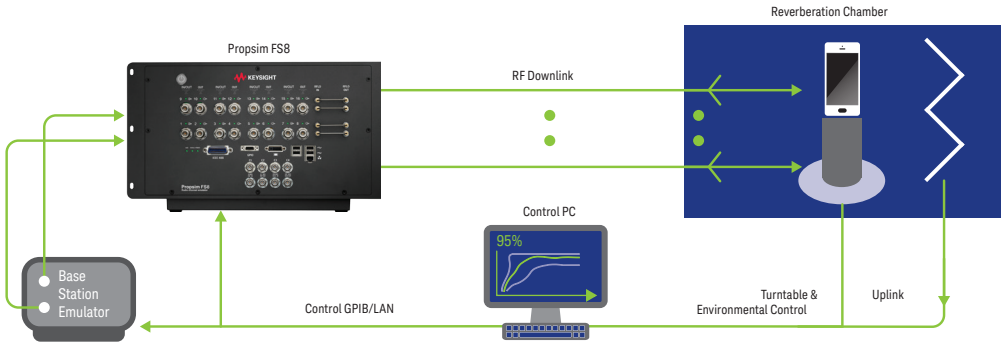
Propsim Enabled MIMO OTA Testing Supports Test Plans Endorsed by Major Mobile Operators

Anechoic chamber set-up



The base station emulator emits RF signals that pass through the channel emulator, which applies a realistic fading model to the signals. A power amplifier amplifies the signals that are then received by the MIMO device placed on a turntable in the middle of the chamber. The device emits an uplink signal emitted back to the base station emulator. Automate and control the entire test setup from a PC.

Reverberation chamber set-up



Perform OTA Testing to Verify the Actual Performance of MIMO and Other Types of Diversity-Capable Mobile Devices

Propsim Channel Emulator

Propsim enabled MIMO OTA testing supports a wide range of technologies (LTE, LTE-A, HSPA, WCDMA) and industry-standard test plans (CTIA, CCSA and 3GPP).

Chamber types supported

- Anechoic
- Reverberation

Supports standards and test plans promoted by

- CTIA, CCSA, 3GPP
- Major operator test plans

MIMO

- Up to 8 MIMO data streams and LTE-CA

RF range

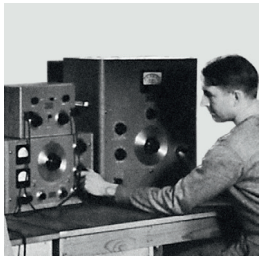
- Baseline 2.7GHz optional up to 6 GHz

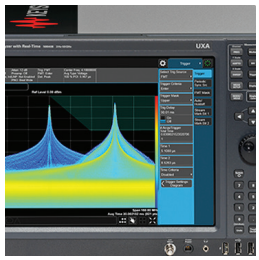
CTIA MIMO OTA Channel Models currently available

- Anechoic chamber channel models SCME UMa, UMi
- Reverberation chamber channel models: Long Delay Spread, Short Delay Spread models

Evolving

Our unique combination of hardware, software, support, and people can help you reach your next breakthrough. We are unlocking the future of technology.





From Hewlett-Packard to Agilent to Keysight

myKeysight

myKeysight
www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

Keysight Infoline

Keysight Infoline
www.keysight.com/find/Infoline
Keysight's insight to best in class information management. Free access to your Keysight equipment company reports and e-library.

KEYSIGHT SERVICES

Keysight Services
www.keysight.com/find/service
Our deep offering in design, test, and measurement services deploys an industry-leading array of people, processes, and tools. The result? We help you implement new technologies and engineer improved processes that lower costs.

Keysight Channel Partners
www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

www.keysight.com/find/mimootatesting

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 11 2626
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	800 000154
Sweden	0200 882255
Switzerland	0800 805353 Opt. 1 (DE) Opt. 2 (FR) Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-06-08-16)

DEKRA Certified
ISO9001 Quality Management System

www.keysight.com/go/quality
Keysight Technologies, Inc.
DEKRA Certified ISO 9001:2015
Quality Management System

KEYSIGHT TECHNOLOGIES
Unlocking Measurement Insights

Published in USA, July 20, 2016
5992-1603EN
www.keysight.com