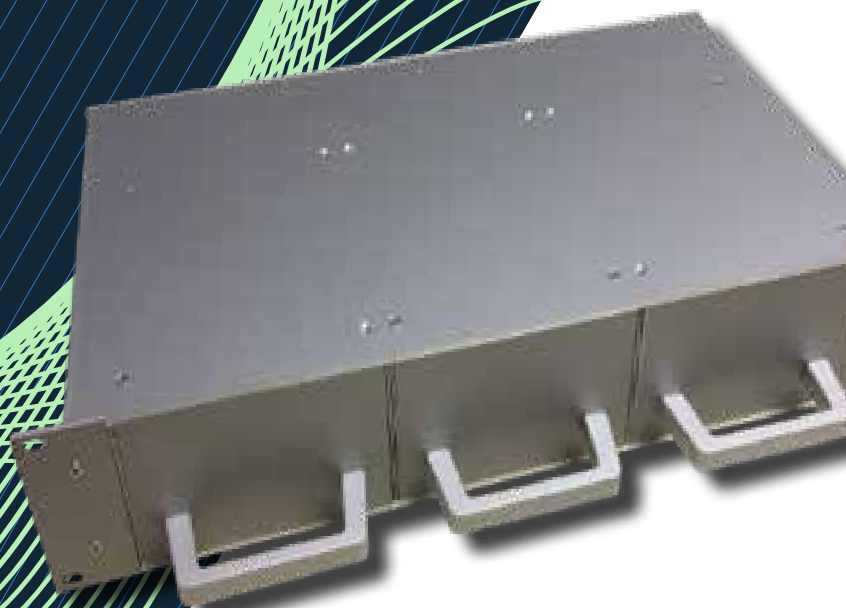




SIMCard Switching

An overview of the systems from
MTS Systemtechnik GmbH

Individual high-frequency technology



// Content



Your partner for customised solutions -
„Development, Production & Service“
all from a single source.

// High frequency technology
// EMC technology
// CNC milling technology

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// About MTS Systemtechnik

Tailor-made solutions for high frequency technology, EMC, electronics and mechanics

Our customers include manufacturers of highly sensitive equipment in the market segments of mobile communications, telecommunications, aerospace, defense, medical, automotive and electronics. Our devices, systems and components are used worldwide by leading, internationally active companies.

For over 25 years, MTS Systemtechnik stands for state-of-the-art technology, absolute reliability, discretion, transparent processes and certified quality according to DIN EN ISO 9001.

With about 50 employees we develop and manufacture individual and high-quality devices, systems and components „Made in Germany“, as well as customer-specific products.

Our electronic products include coax relays, attenuators, power splitters, systems for the distribution of LF-, video-, RF-signals, RF matrices, assembled coax cables, etc. complex switching and distribution tasks in the high frequency range have made us a leading manufacturer of relay switching units, air interface emulators, power splitter units and matrices.

For the mobile radio and telecommunications industry we supply customised shielding boxes, air interface emulators for various test scenarios and smart antenna simulators.

With our modern CNC production centre we manufacture customer-specific precision milled parts for the aerospace, optical and high-frequency industries.

The distribution of coaxial connectors from IMS Connectors and the assembly of coaxial cables complete our product range.



Systems for the distribution of LF, video and RF signals in the fields of tele- and satellite communication and radio surveillance



Production of mechanical components for the aerospace, optical and high-frequency industries



Development and production of active and passive components for high frequency technology

// Introduction

The test setup for implementing automated software tests on mobile devices is a cooperation between MTS Systemtechnik GmbH and QUALIGON GmbH.

The system supports you in implementing automated software tests on mobile devices that require SIM card multiplexing or roaming tests of cell phones.



The test setup consists of:

- // Matrix SIM Switchbox MSSB
- // Radio field simulation Air Interface Adapter (attenuator unit)
- // Shielding box slide-in system MSBU



Compact solution

Air Interface Emulation - Shielding Box Solution - SIMCard Switchbox

Air interface emulators like Air Interface Adapter (AIAD) and Standard Coupling Field (SCF) from MTS Systemtechnik offer the possibility of testing mobile radio base stations and mobile stations in the lab via the air interface.

If you want to develop, test or compare in the field of radio transmission, you need a room - ideally - that is completely free of radio signals, because you want to know how your test object behaves under certain conditions. The mobile phone cells next door or your own in-house WiFi can massively influence the results or make measurements impossible. That is why we have developed a corresponding shielding box.

What kind of tests can be performed?

This setup enables the implementation of automated tests of applications and devices/UEs using different SIM cards with, e.g. different profiles and roaming scenarios in conjunction with the tuning of network parameters. All systems can be fully controlled via API calls which facilitates the implementation of fully automated test cases for continuous testing.

// Matrix SIM Switchbox



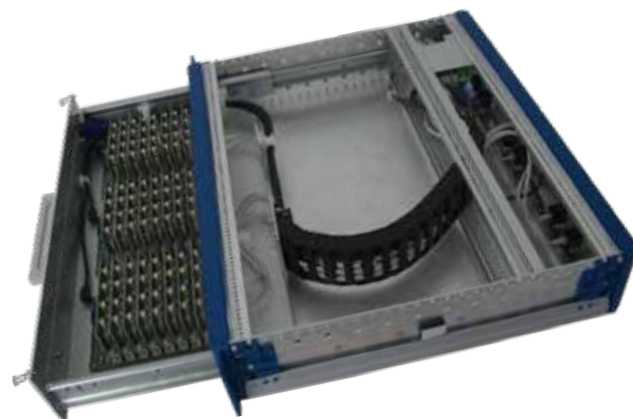
Matrix SIM Switchbox MSSB

With the Matrix SIM Switchbox MSSB, up to 32 SIM cards can be automatically connected to up to 4 mobile devices or terminals. Switching is done via a graphical user interface (Web-GUI) or by using the REST-API with HTTP commands. The system supports you in implementing automated software tests on mobile devices that require SIM card multiplexing or roaming tests of cell phones.

The system uses real SIM and works without SIM virtualization. It provides complete and transparent access to SIM cards in addition to simplified SIM accessibility. The MSSB 4x1 can be controlled via bluetooth especially for mobile use-cases.

We support customers such as mobile phone companies, professional APP developers, test houses, cell phone manufacturers and business consultancies.









Matrix SIM Switchbox adapts perfectly to your test automation processes. You can control MSSB with commands directly from your testing frameworks or systems.



Available versions

QUALIGON's Matrix SIM SwitchBox (MSSB) features intelligent technologies to control and switch up to 32 SIM cards and additionally up to four modems or handsets via USB or LAN. Select between the different versions available according to your needs.

Powered by a microprocessor, MSSB deploys real SIMs without any SIM virtualisation. All versions can be used universally in standalone scenarios, are fully drive-test capable and represent a cost-efficient solution in many areas where SIM switching is required.

Switching X SIMs			To Y Devices	
	4	X	1	
	8	X	4	
	16	X	2	
	32	X	1	

MATRIX SIM SWITCHBOX - The easy way of SIM switching

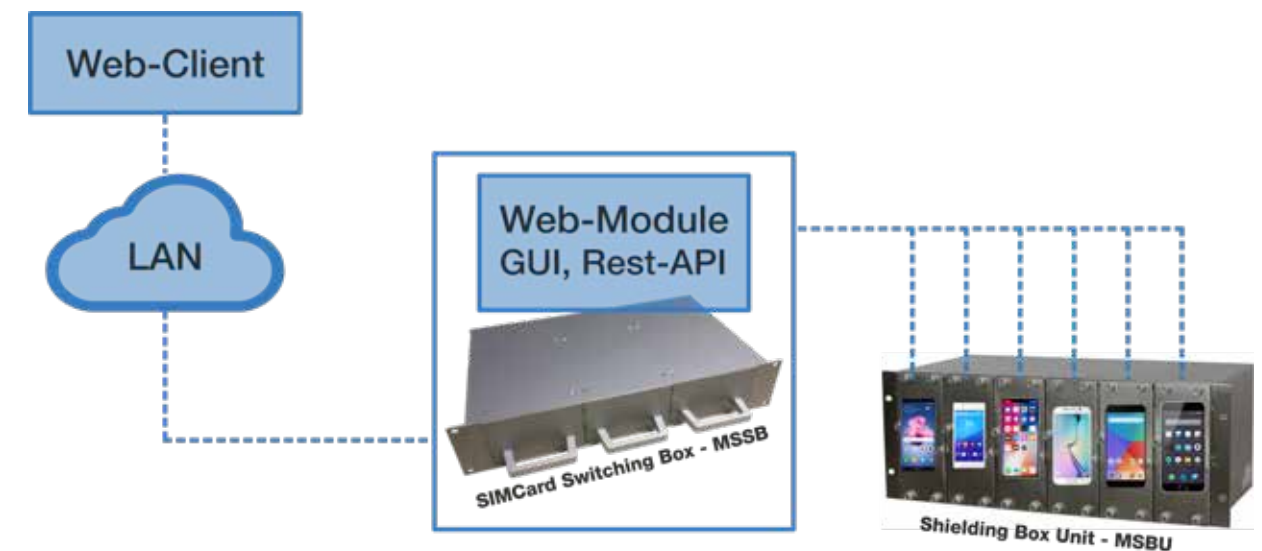
Gain your benefits by using MSSB in one of the following scenarios:

- // Testing of the interworking between SIMs and mobile devices
- // Testing of SIM profiles for different network technologies
- // Ready for the integration in automated test systems
- // Realisation of “always-on” functionality with redundant access to mobile networks
- // Optimisation of your data connectivity by switching between mobile networks
- // Assurance of machine-to-machine (M2M) communication via network selection

Features

Gain your benefits by using MSSB in one of the following scenarios:

- // Combined SIM multiplexer with software-controlled switching of up to 32 SIM cards and up to 4 devices
- // Support for testing and implementation of two-factor authentication (2FA) use cases
- // Easy access to SIM cards
- // Enhanced support for smartphones and USB devices
- // Easy integration in existing systems
- // Control via Terminal (Linux, Mac OS) or PowerShell (Windows)
- // Combination with shielding boxes and automated attenuators for influence analysis of network properties
- // Integrated display for system status
- // Customised software controlled network access and login procedures based on your requirements
- // Easy integration into test frameworks, such as Perfecto, Digital.ai, Segron etc.
- // Rack system for integration in server rooms
- // Transportable desktop system available
- // MSSB 4x1 with Bluetooth control



MSSB Admin

- // MSSB Admin offers host based control of the MSSB
- // Software interface provides external control of all MSSB functionalities and key features using HTTP commands
- // User friendly and cost-efficient integration in existing systems

Do you want to include MSSB Admin in your architecture?
Our team is ready to support you. Please contact us.

// Radio Field Simulation

Radio Field Simulation - Attenuator Unit

The Air Interface Emulator (AIAD) offers a test possibility for mobile radio base stations and mobile devices in the laboratory via the air interface. Reproducible RF tests can thus be performed independently of live networks and radio interference from the environment.

With our AIAD devices you have the possibility to efficiently test a variety of specific handover scenarios. Sources of error can thus be quickly and reliably localized in the laboratory. Our radio field simulations were developed for mobile phone tests from **2G to 5G FR1**, but can also be used for **Wi-Fi, Bluetooth** and other radio technologies (f.e. TETRA).

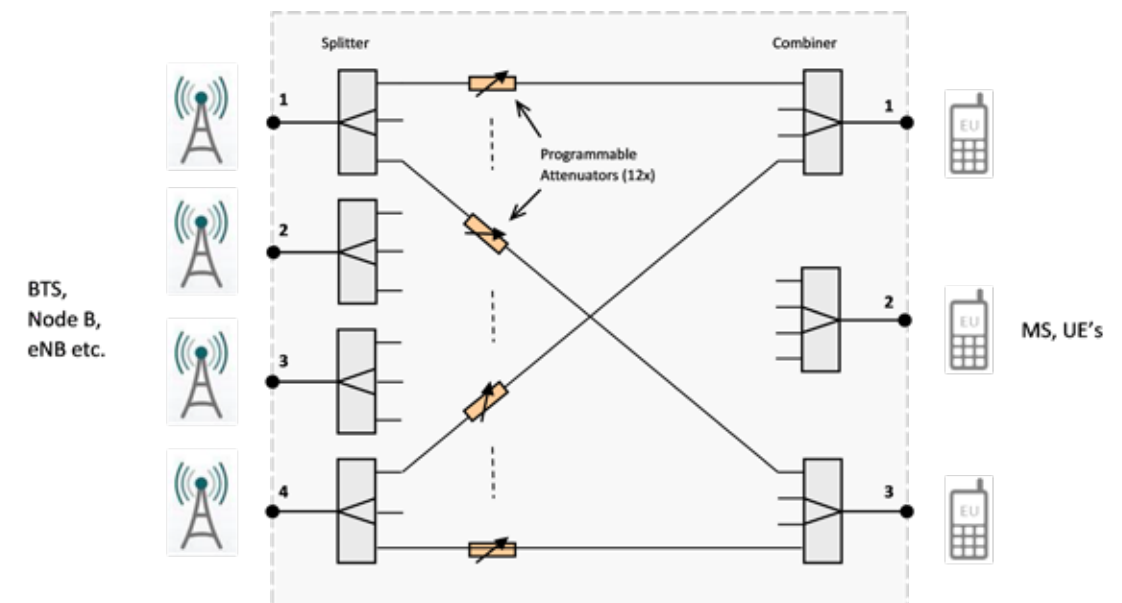
How does it work?

Via semiconductor switches, different attenuators (1 dB, 2 dB, 4 dB, 8 dB etc.) can be switched into the signal path whereby all attenuation values in the range from 0 to 95 dB are possible in 1 dB-steps (0,5 dB-steps on request). A built-in logic selects the required attenuation steps. In these programmable attenuators the RF is transmitted bidirectional (uplink and downlink has the same attenuation). The internal attenuator-switchovers are continuously and without breaks. Several programmable attenuators are built into the AIAD together with different signal splitters and signal combiners to emulate the radio field by an attenuation network. It is controlled via various interfaces (LAN, USB, RS-232 etc.) using SCPI-like command strings.

A Windows program which allows to quickly program ramps for handover tests is available as an accessory.



Block diagram, example AIAD-4/3:



AIAD-X/Y (X/Y = number of inputs/outputs)

Many programmable attenuators are connected in a matrix (full-fan-in full-fan-out attenuation matrix) to simulate different radio conditions of the air interface. The AIAD is connected on one side to different base station signals and on the other side to different mobile devices in a corresponding shielding box via an antenna (accessory). This allows tests without interference from the environment and without disturbing mobile subscribers in live networks. The desired attenuation values can be set separately for all signal paths between the base stations and the mobile devices.

PAH-X, Programmable Attenuator Unit

(X = number of paths) Several programmable attenuators are built into one device. All connections are accessible from the front or rear panel. Usually with built-in manual control.

Features

- // Different types of handover test scenarios are possible.
- // Switching time <10 ms (TTL version available with 50 µs switching time)
- // Supply of interference sources, e.g. noise for BER test
- // Robust design through semiconductor switched attenuation
- // No calibration required

// Shielding Box - MSB

EMC shielded boxes are essential for reliable testing of radio interfaces. The RF shielded boxes enable reliable and reproducible measurements when a shielded test environment is required.

In research and development laboratories as well as in test, calibration and manufacturing processes of electronic products, a shielded environment is required to prevent spurious emissions or interference of unwanted radio signals.

Using the right equipment ensures an optimal environment, saving a considerable amount of time and reducing costs.

These processes require an appropriate shielding box. We manufacture in our own mechanical milling centre and in our own electronic production, individual shielding boxes in different sizes, with special interfaces and/or various filter components. With our many years of technological know-how and expertise in the design and manufacture of the shielding boxes, we implement the customer's requirements accordingly and are thus flexible in the realisation.

MTS Systemtechnik GmbH also already has a large number of EMC-shielded boxes in its range. This makes it possible to offer an appropriate solution for almost all areas in which a defined RF environment is required. The extremely solid and high-quality design offers an extremely long service life without having to accept any compromises in operability.

Shielding Box Unit MSBU-6CA-4HU:



MTS Shielding Box - MSB-Series

The **Shielded Box Unit (MSBU)** can be used for measurements and tests of electronic devices such as mobile phones without electromagnetic interference from the environment.

MTS Systemtechnik GmbH has developed a compact EMC shielded plug-in housing to meet multi-purpose requirements. The stable construction of the shielded box (MSBU series) is predestined for industrial long-term tests. To offer maximum flexibility and user-friendliness, the shielding box unit consists of six independent shielding chambers (other configurations are possible), each equipped with RF and communication interfaces. This allows the shielding box unit to be used for different tests or by different users at the same time. The operation of the DUTs can be done independently for each chamber via the communication interfaces supplied.

Features

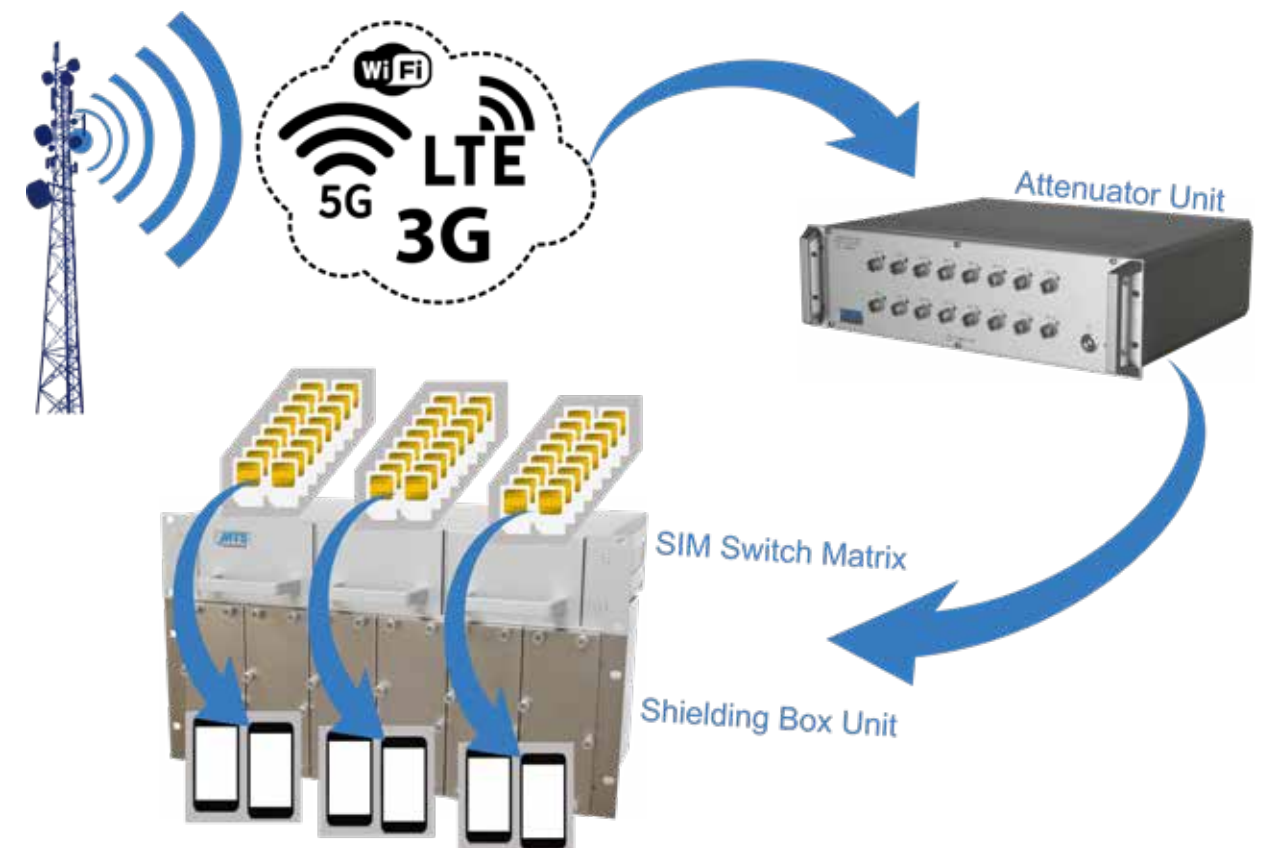
- // Highest quality materials for extended service life and high level of testing
- // Economical solution for high RF shielding and reproducible test scenarios to avoid time-consuming and expensive tests in laboratories
- // Suitable for frequencies between 500 MHz and 6000 MHz
- // 19" rack-mounted housing
- // A wide range of supply and communication interfaces are available
- // Changes / modifications according to customer

// Summary

SIMCard Switching Test Solution

By combining the MTS Systemtechnik air interface emulation (Air Interface Adapter) with the Qualigon matrix SIM switchbox and the MTS Systemtechnik shielding box systems, you are able to perform highly flexible tests under different network conditions and using different SIM cards on different terminals. The systems can be remotely controlled and easily and flexibly integrated into your automated test environment.

- // Direct support in the test system platforms of e.g. Perfecto, Experitest, Segron
- // No software on mobile device necessary
- // Ready for the integration in automated test systems
- // Software controlled switching of SIM cards for integration into automated software tests
- // Highest quality materials for extended service life and high level of testing
- // Economical solution



Do you want to include the SIMCard Switching Test Solution in your architecture?

Our team is ready to support you.

Please contact us.

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