



Q o s m o t e c

software solutions gmbh

Air Interface Simulator



*Brings the Subscriber's
Mobility into the Lab*

GSM EDGE UMTS HSPA LTE WiFi

<http://www.qosmotec.com>



Description

How do you simulate wireless mobility in a lab?

The Qosmotec Air Interface Simulator (AIS) simulates aspects of the air interface which are of utmost importance for network or terminal validation in a laboratory environment, where radio signals must be confined in shielded coaxial cables. It can be applied to tests of network as well as terminal equipment.

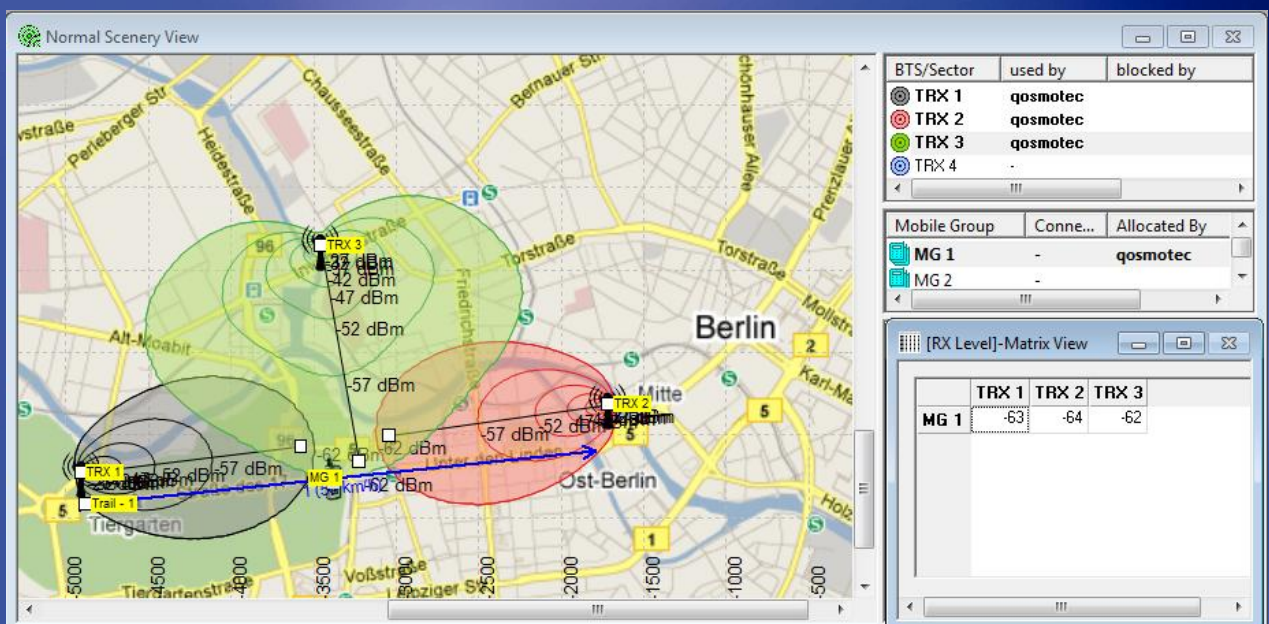
AIS is inserted into the coaxial links between real mobiles and base stations or base station simulators to simulate essential effects of signal propagation through open space, such as *path loss*, *varying angle of arrival / angle of departure*, *slow or fast fading*, *drop-outs* and various *handover situations*.



AIS 6x6 Rack

AIS Simulates Subscriber Mobility in the Lab

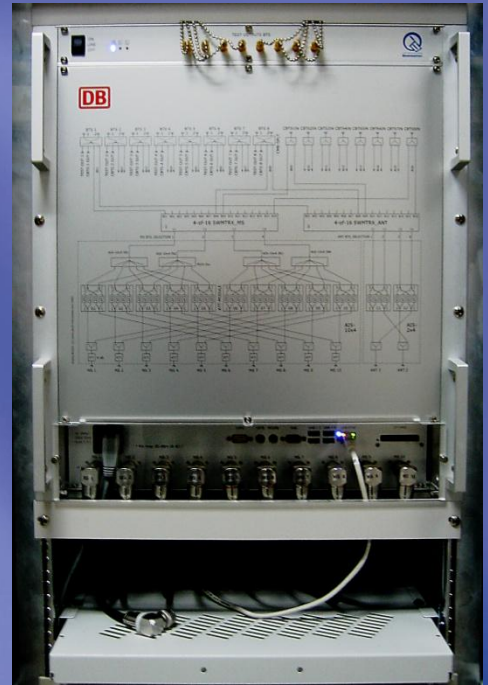
- ▶ **Invoke handovers / cell reselections**
Simulate handover/cell reselection scenarios
- ▶ **Emulate or replay drive tests in the lab**
Play back recorded or synthesized signal profiles
- ▶ **Optimise your network prior to installation**
Use real mobiles in a virtual copy of your network
- ▶ **Improve the quality of testing**
Test reproduction with millisecond accuracy
- ▶ **Easy-to-use graphical user interface**
Draw your test scenario on a map
Drag & drop operation
- ▶ **Reduce time to market & operational costs**
Unattended 24/7 testing in conjunction with an automatic call tester (e.g. Qosmotec LTS)
- ▶ **Simplify your test set-up**
Can be used with any mobile type
Supports all radio access technologies



AIS Virtual Drive Test Graphical User Interface

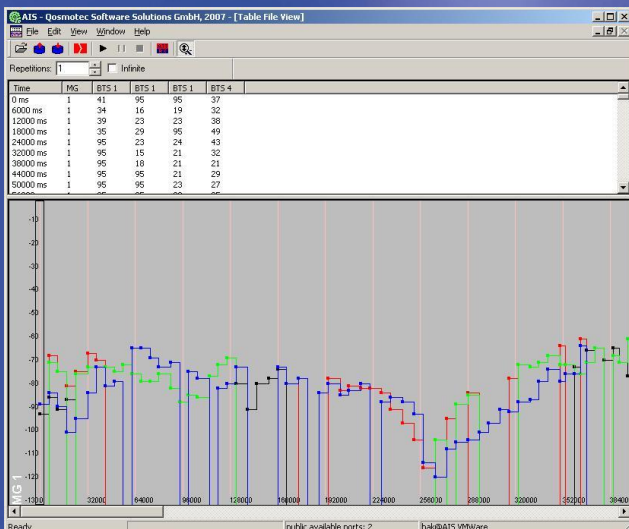
Characteristics

- ▶ **Intuitive, real-life-like GUI**
Providing access to a multitude of simulation features:
 - **Signal Degradation Scenarios**
Simulation of actual cell coverage in 3 dimensions
 - **Soft / Softer Handovers, Cell Reselection**
by graphical representation of the simulated network
 - **Inter frequency / InterRAT handover**
between different bands/carriers or 3G to 4G
 - **Simulation of multipath reception (Fast Fading)**
Rayleigh / Rician fading; fluctuation speed up to 2 kHz,
 - **Beamforming (MIMO) tests**
Simulation of level & phase, angle of arrival / departure for linear or circular antenna arrangements
 - **Playback of signal profiles**
Replay of recorded drive tests or generated signal profiles
Support of various drive test formats, e.g. ROMES, NEMO
 - **Predictive Drive Testing**
Emulation of network predictions based on topography and antenna location / characteristics for network tuning or reproduction of particular network situations
- ▶ **Broadband, bi-directional operation**
Full frequency range passband (380...3000 MHz)
Option to separately control up- and downlink
- ▶ **Wide selection of system sizes**
Any configuration of n UEs x m cells and l x j MIMO can be customised with (nxi) x (mxj) individually controllable paths.
- ▶ **Suited for all networks from 380 MHz to 6.0 GHz**
LTE(-A), UMTS-FDD/TDD, (E)GSM(-R), TETRA, CDMA / 2000 / EV-DO, PDC, DECT, WiFi 802.11a-y, WIMAX, DVB...

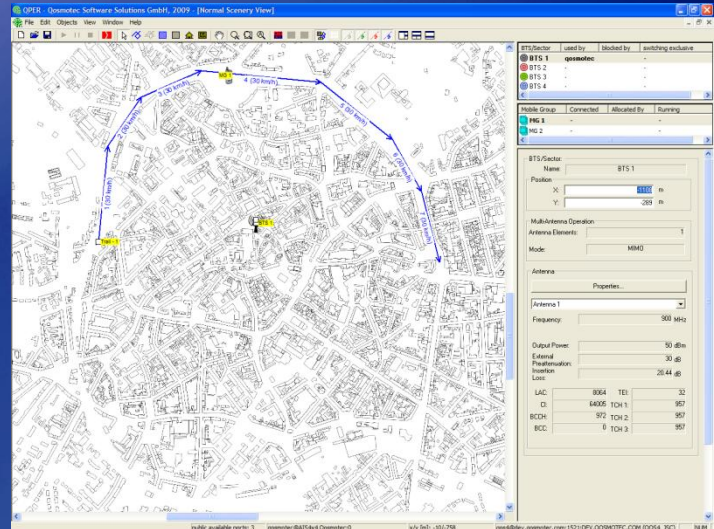


AIS Customized Solution for 10 UEs x 16 Cells

- ▶ **Multi-user operation**
Multiple testers can share the connected UEs and use them in individual test scenarios
- ▶ **Integrated with Qosmotec Digital Switch Matrix**
Dynamically selects subset of cells to simulate drive tests across an extended number of connected cells.
- ▶ **Test automation API for unattended testing**
Synchronized mobility simulation during call tests.



Drive Test Replay Mode



Predicted Drive Test Mode

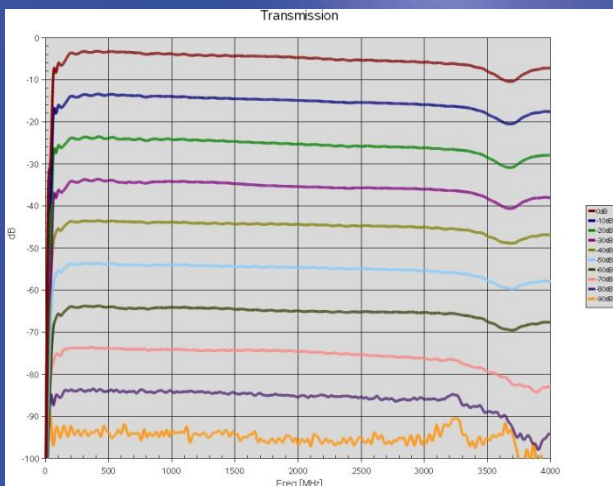


AIS Hardware Specifications

Power Supply:	110-240 V, 50/60 Hz
Attenuator Control:	Integrated CPU with realtime OS
Control Interface:	100 Mbps Ethernet
Frequency Range:	380-3000 MHz (up to 6 GHz on request)
Impedance:	50 Ohms
RF Connectors:	N female
Adjustable Attenuation:	0...95 dB
Attenuation Resolution:	0.5 dB
Maximum Single Step:	95 dB
Attenuation Accuracy:	± 0.8 dB or 2.5% ref. to insertion loss
Adjustable Phase Shift:	0...254° @ 1GHz, 0...508° @ 2 GHz
Phase Shift Resolution:	2° @ 1GHz, 4° @ 2GHz
Phase Shift Accuracy:	± 1.5° @ ≤ 75°, ± 2° @ > 75°
VSWR in/out:	< 1.6:1 attenuators only < 1.9:1 with phase shifters
Insertion Loss, 2x2 array:	< 11 dB @ 0.38-1 GHz ...13 dB @ 3 GHz attenuators only < 20 dB @ 0.38-1 GHz ...24 dB @ 3 GHz with phase shifters
Insertion Loss, 4x4 array:	< 19 dB @ 0.38-1 GHz ...21 dB @ 3 GHz attenuators only < 28 dB @ 0.38-1 GHz ...32 dB @ 3 GHz with phase shifters
Max. Input Power:	+26 dBm (higher power levels on request)
Switching Delay:	< 250 μs (switches all attenuators simultaneously)
Drive Test Playback:	1 ms resolution
Operating Temperature:	0°C to 70°C



AIS 2x2 MIMO portable unit with phase shifters



Attenuator linearity

Contact Information

Postal address:

Qosmotec Software Solutions GmbH
Schloss-Rahe-Straße 3
52072 Aachen
Germany

Phone +49 241 8797 510

Fax +49 241 8797 515

E-mail info@qosmotec.com

Internet <http://www.qosmotec.com>