Air Interface Simulator

Brings the Subscriber’s Mobility into the Lab

GSM  EDGE  UMTS  HSPA  LTE  WiFi
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 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
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 \( n \text{ UEs} \times m \text{ cells} \) and \( I \times j \text{ MIMO} \) can be
  customised with \((nxi)\times(mxj)\) 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...

- **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.
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

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