

WiMAX Simulation with the G35 Protocol Tester



Scaling Up WiMAX Interface Testing with the G35

With the addition of mobility to WiMAX, involved network elements must handle control-plane and user-plane procedures at a level of complexity that was unseen for in fixed WiMAX networks. The challenges lie both in the verification of Mobile WiMAX network element's functionality as well as their scalability in the network, i.e. their ability to handle a large number of subscribers. This is especially applicable to network elements located in the network's core and handling a multitude of interfaces, such as the Access Services Network (ASN) Gateway.

Secure the Quality of your WiMAX Products.

- Verify function and scalability of your products with minimum effort
- Demo the capabilities of your products at trade-fairs and customer shows
- Verify product compliance with latest WiMAX Forum specifications
- Support end-to-end system tests with real mobile terminal equipment
- Rapid test case development with easy-to-use tools

Features & Benefits

- Real-world ready-to-use test scenarios for R3 and R6 interfaces
- Flexible platform supporting modification of existing / creation of new messages, procedures and complete test scenarios
- Efficient support for functional testing under load conditions
- WiMAX Forum / IEEE compliant R1, R3, R4, R6 & R8 protocol support
- Trigger individual message exchanges or simulate automatically complete WiMAX procedures
- Small learning curve with a dedicated, easy-to-use User Interface
- Re-usability of test scenarios from Functional to Load Testing

Applications

- Simulation of ASN towards CSN, and CSN towards ASN on the R3 interface
- Simulation of MSS/BS towards ASN-GW and ASN-GW towards BS/MSS on the R6 interface
- ASN-GW bracket testing on the R3 and R6 interfaces
- Simulation of WiMAX network elements for end-to-end transport of real application traffic
- WiMAX R1 monitoring and simulation

The versatile G35 protocol test platform supports functional testing on the Mobile WiMAX interfaces R1, R3, R4, R6 and R8 as well as load testing on the R3 and R6 interfaces. Simulation scenarios that have been developed for functional tests can easily be scaled up to load test scenarios just by adapting subscriber/mobile device – and, if applicable, network topology – related configuration parameters. By reusing these simulation scenarios for different test applications, you can significantly reduce the time needed for the execution of your test plans.

Software modules for WiMAX testing provide you with a set of ready-to-use test scripts that will enable you to start right away with simulation tasks. Individual WiMAX procedures (for example, Initial Network Entry on the R6 interface) can be triggered manually to perform bug-fixing on the implementation under test. Or, you can include these test scripts in automatic call scenarios that trigger all necessary message exchanges required to simulate particular subscriber behaviour. Complex procedures, like handover, are also split up into multiple individual sub-procedures, thus giving you the flexibility to quickly define a handover procedure that corresponds to your particular implementation.

The G35 provides the necessary flexibility to address the evolving nature of WiMAX standards. It provides a broad range of test case development tools. You can adapt existing test cases or develop entirely new test cases according to the feature specification of your WiMAX products. You can modify the structure of messages, for example in terms of required TLVs, according to your requirements. The monitoring application that is an intrinsic element of the G35 platform provides full visibility over message exchanges between the protocol tester and the device under test.

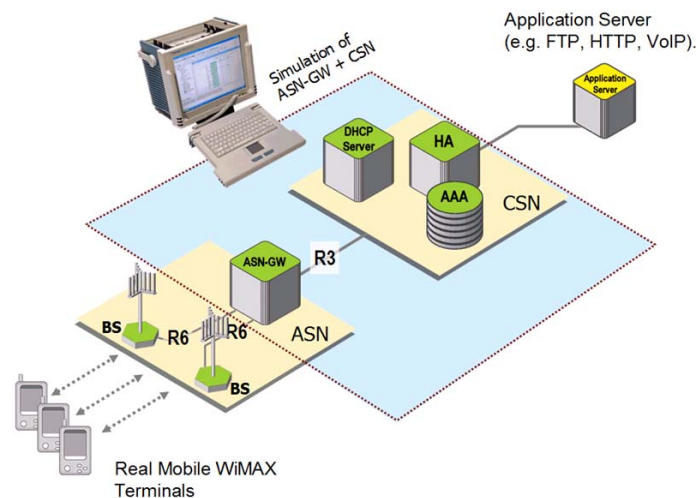


Figure 1 – Forwarding real application traffic from mobile terminals to external application server.

In addition to simulating real-world control-plane traffic and to the generation of user-plane content, the G35 can also forward packets from real external applications, such as HTTP or VoIP clients. In this way, the G35 can be used to simulate missing network elements to support end-to-end system testing involving real end-user equipment and application servers (see Figure 1).

For the purpose of rapid test case generation, a dedicated User Interface application is available that renders the configuration and development, especially of load test scenarios, easier than ever before. It is based on a work-flow approach that is required for the definition of network topology, subscriber and payload characteristics, and for the creation of ‘call scenarios’(see Figure 2).

Depending on the availability of an appropriate mirror port on the WiMAX Base Station (BS) that supports also active testing, the G35 provides, on the R1 interface, the protocol layer support required to enable you to build scenarios for simulating MAC management procedures such as network entry, radio resource management or mobility management. Sample R1 simulation scenarios are available to enable you to quickly adapt them to your needs. Bracket testing of the BS is also enabled with the support of active testing on the R6 interface.

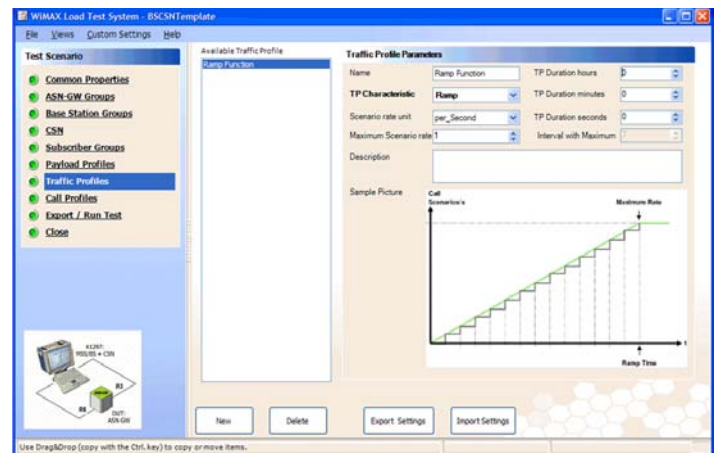


Figure 2 – Graphical User Interface for configuration of WiMAX functional and load test scenarios.



Characteristics

Simulation Scenarios

- R6 interface: Simulation of Subscribers + BS towards one or more ASN-GW(s)
- R6 interface: Simulation of ASN-GW + CS towards BS
- R3/R6 interfaces: ASN-GW bracket testing
- R3: Simulation of (multiple) ASNs towards (multiple) CSNs
- R3: Simulation of (multiple) CSNs towards (multiple) ASNs
- External application traffic forwarding

WiMAX Forum Protocol Compliance

- Protocol support for R1.0.0, R1.1.0, R1.1.1, R1.1.2, R1.2

Control Plane Procedures

- Network Entry / Exit
- Data Path Management (incl. ISF creation)
- Intra-ASN Handover (ASN Profile A / C)
- MS Idle Mode support (paging, location update, ...)
- Subscriber authentication on R3 interface
- Accounting procedures
- Client MIP / Proxy MIP
- DHCP-based IP Address Management
- Authentication protocols: EAP-TLS, EAP-TTLS, MSCHAPv2, X.509 certificates

User Plane Procedures

- IP Convergence Sublayer on R6 interface
- GRE Tunnelling (R6), IP-in-IP Tunnelling (R3)
- Send / receive dummy data
- Send / receive stored audio / video data (e.g. AMR, H.264)
- Send / receive application layer protocol data from external data source (e.g. HTTP server)
- Mobile-to-mobile calls

Test Result Reporting

- Display of MSS state and network element state information (e.g. MSS authenticated, ISF created, ...)
- Display of key MSS / network element parameters
- Counters for successful, rejected and timed-out procedures
- IP-layer throughput, packets sent, received & lost
- Real-time display of statistics with the Realchart application
- Export into external file formats like .csv and .xls



About Tektronix:

Tektronix has more than 60 years of experience in providing network operators and equipment manufacturers a comprehensive and unparalleled suite of network diagnostics and management solutions for fixed, mobile, IP and converged multi-service networks.

These solutions support architectures and applications such as fixed mobile convergence, IMS, broadband wireless access, WiMAX, VoIP and triple play, including IPTV.

Learn more about Tektronix' communications test, measurement and network monitoring solutions by visiting:
www.tektronix.com/communications

For Further Information:

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology.

Please visit www.tektronix.com/communications

Contact Tektronix:

Please visit www.tektronix.com/communications

Phone:
1-800-833-9200 option 1
+1-469-330-4000

Locate your nearest Tektronix representative at:
www.tektronix.com/contactus