The 3GMaster is one of the most powerful and flexible protocol analyzers for Mobile Networks on the market. As a portable test and troubleshooting tool, it monitors both signaling and network traffic while simultaneously supporting multiple users on different tiers. With support for E1, T1, Fast/Gigabit Ethernet, and OC-3/STM-1, 3GMaster is ideal for multi-protocol and multi-interface environments like GSM/GPRS/EDGE, UMTS, IMS and CDMA.

The 3GMaster is flexible. In conjunction with the Accanto Systems TAMS (Traffic Analysis & Monitoring System) platform, 3GMaster can also be used as a high-performance distributed probe in a network-wide monitoring, analysis and reporting system. In this capacity, the 3GMaster effortlessly monitors all calls and data services, collecting and correlating critical data for use in central analysis by TAMS.

The 3GMaster is an ideal tool for operators delivering or migrating to 3G/3.5G mobile data services, as it offers an unparalleled toolset for diagnosing difficult network and equipment problems. It also provides a wide array of network optimization utilities for quality of service (QoS) analysis. Best of all, once configured, the 3GMaster can easily be operated by moderately skilled-personnel.

### Features

- Advanced protocol analysis for GSM, GPRS, EDGE, UMTS, HSPA, CDMA 2000/EVDO, and VoIP/IMS
- Simultaneous use as a portable troubleshooting tool or as a distributed probe
- Runs simultaneous monitoring and/or simulation tests, with up to 8 different protocol stacks per test
- Single-user, multi-user or distributed platform for 8 simultaneous users

### Benefits

- Ease of operation
- Scalability
- Multiple user
- Field-proven technology
- Maximum use of capital investment
Main Wireless Applications

Convergent Core Network

The “all-over IP” migration for circuit switched voice traffic is in full swing. This migration introduces a significant amount of complexity in managing the overall network as several protocols and interface types must work together seamlessly.

For example, in the access part of the network, mixed 2G/3G access technologies interface with the core network in the following scenarios:

- GSM A/Gb and UMTS Iu are being transported over IP (with mixed implementations over legacy E1/T1 backhaul)
- Split control-user plane architectures (including MSS and MGW) are being deployed in the core, creating additional requirements for IP-based transport
- SS7 based signaling (MAP, ISUP etc) is now being transported in an IP-based format due to the introduction of the SIGTRAN protocol architecture

The Accanto Systems 3GMaster provides full coverage of these and other scenarios, giving the operator end-to-end visibility from 2G/3G access all the way through the core.

GSM/UMTS Access

The radio interface between the mobile handset and the base station is one of the most critical areas in the overall mobile network. This interface is the main source of technical problems, and as a result, one of the primary sources of poor service quality experienced by the customer.

By analyzing and correlating information collected from access interfaces, the operator can better understand and troubleshoot problems that occur in the radio interface. This in return allows the operator to more quickly address issues that adversely affect the user experience, and ultimately reduce churn.

For GSM/GERAN networks, the 3GMaster provides thorough analysis of Abis/A and Gb interfaces, allowing detailed troubleshooting of issues related to mobility management, dropped calls due to failed handovers and interworking problems between the access and core network.

The same can be done for UMTS access interfaces (e.g., lub, lur and Iu), as well as for soft handover analysis and 2G -> 3G / 3G -> 2G handovers which are specific UMTS (or mixed 2G/3G network) problems.

Mobile Data Services

Due in part to increasing customer demands, mobile data services are finally gaining momentum. Unfortunately, provisioning and managing these new services is very difficult due to the signaling complexities involved.

The 3GMaster is an indispensable tool for provisioning these new services. It allows the operator to use a top-down approach (i.e. using the hierarchy of the actual network), by first checking the Gn/Gi interface to get a snapshot view of the state of the services and the quality provided. Then, if further investigation is required, the user can zoom in by examining the Gb/IuPS interfaces as well as the lub / Abis interfaces to determine the exact location of the problem.

CDMA EVDO Networks

Data services over CDMA 2000 1X and EVDO networks are also growing significantly. These networks tend to be very complex, however, due to the myriad interfaces involved during the set-up and management of a data session.

3GMaster addresses all the most important interfaces and transactions, such as:

- A10/A11 - to verify interworking between the radio access network and the mobile network, and to verify quality of services delivered over the PPP-GRE channels
- A12 - to validate authentication procedures
- A13 - to check mobility issues of individual data sessions
Tightly-Coupled Passive and Active Monitor

In the 3GMaster series, monitoring functions are tightly integrated with the active monitoring capabilities for full-visibility regression testing for the following protocols:

SIP | SS7 | IMS/MMD

Active Monitoring allows the operator to inject traffic in the network, check how the network elements involved react and check the correct management and routing of the signaling messages.

With the 3GMaster's Simultaneous Multi-interface monitoring and Correlation the Call Detail Record (CDR) illustrated below displays signaling messages from different interfaces in a single, comprehensive view.
Run Various Tests While Supporting Multiple Users

The 3GMaster is able to run three simultaneous tests and monitor several interfaces at the same time (up to 8 different protocol stacks per test).

Test configurations and results are saved in libraries, allowing network and equipment performance to be measured consistently over time, ensuring that revisions in hardware, firmware or software do not impact network performance. Basic libraries of tests can be defined and then performed each time a component changes to ensure that network or equipment performance does not suffer.

With the 3GMaster's Simultaneous Multi-Interface Monitoring and Correlation, the Call Detail Record (CDR) displays signaling messages from different interfaces in a single, comprehensive view.

Target Users

For Network Equipment Manufacturers (NEMs)

While operators have historically purchased individual network elements from NEMs, there is growing demand for NEMs to provide complete network solutions. In this case, the 3GMaster becomes a key part of the complete solution as a highly integrated network diagnostic and troubleshooting tool. Additionally, for NEMs who offer network monitoring and management to operators, the 3GMaster provides all capabilities for real-time network monitoring, alarming, reporting and troubleshooting.

For Network Operators

Network operators have a variety of areas that can benefit from the 3GMaster's test and simulation capabilities:

Software Release Testing - The 3GMaster can be used in the test lab to verify software revisions from network equipment manufacturers before deploying on the actual network.

Network Operation and Maintenance - The 3GMaster's ability to store test results, as well as its ease of use and remote operations capability makes it a preferred choice for network operations and maintenance teams.

Offline Network and Service Analysis - The 3GMaster has the ability to process huge amounts of data for the analysis of complex scenarios

QoS Analysis - The 3GMaster is able to perform intrusive QoS measurement, generating end-to-end calls. Or it can perform non-intrusive measurement, monitoring actual calls and assigning voice scores.

The 3GMaster offers the ability to extrapolate basic Key Performance Indicators (KPI) to optimize network resources, maximize service quality and to simulate and test service strategies before they are offered. This KPI generation can be enhanced by the TAMS system as a part of a larger network-wide distributed analysis system.

Scalability and Flexibility

The 3GMaster is the most scalable and flexible protocol analyzer available. Here is a typical way the solution might be utilized over time:

1. A basic 3GMaster is used for a specific monitoring or simulation application, configured with only the required options.

2. Monitoring or simulation capabilities are increased by adding either expansion cards, expansion boxes or software.

3. Later, a distributed solution is created by purchasing additional 3GMasters to remotely monitor several locations at the same time. Accanto Systems also provides PC software solutions used to manage these additional units and correlate the data. Calls can be traced across the network while testing is in progress.

4. Finally, by adding the centralized Accanto Systems Traffic Analysis and Monitoring System (TAMS) and using the 3GMasters as distributed probes, a more sophisticated network-wide analysis and reporting platform can be created. The combined 3GMaster/TAMS system can analyze huge amounts of network data with dedicated statistics or database queries.

This type of scalable approach mitigates the risk of purchasing costly, system solutions that often do not work as promised. This modular approach adds functionality one piece at a time as required. The result is a tailored system/test solution with all of the capabilities and none of the risk, plus a higher degree of flexibility to increase monitoring capabilities as a network grows and evolves.
Easy-to-Use Interface

The 3GMaster incorporates an easy-to-use graphical interface. Up to 8 users (clients) can simultaneously access the server through a TCP/IP network.

The appropriate user interface for an operating system can be downloaded using an Internet connection.

UTRAN monitoring tests are the most difficult to configure due to the dynamic channel/bearer allocation. A configuration wizard (associated to a VPI/VCI auto-monitoring function) guides the users through Iub, IuPS and IuCS monitoring test settings.

The 3GMaster allows users to independently customize the trace, apply filters, perform statistical analysis, decode messages, analyze Call Detail Records (CDR), and correlate events through multiple protocols and interfaces.

A built-in security administration system prevents unauthorized usage.

For each available protocol, the 3GMaster offers:

- Physical layer status and statistics
- Call Detail Records
- Customizable Protocol Trace
- Arrowed diagrams for Trace and CDR
- Display Filters for Trace and CDR and text search filter
- Statistics on all the main protocol events
- Call/Transaction statistics
- Disconnection Cause statistics
- CDR-to-frames correlation
- Frame-to-CDR function
- CDR forwarding to external systems
- Multi-interface and multi-protocol CDR correlation

Example of statistical and graphical test results. This figure shows a list of all signaling errors that occurred during monitoring. The pie chart provides at-a-glance network status.
Advanced Protocol and Interface Analysis

The 3GMaster is the only integrated tool that can fully verify, monitor and troubleshoot the signaling and services deployed over PCM, ATM, and LAN networks over a variety of popular protocols. Multi-interface correlation provides an end-to-end view of all calls and transactions on the network.

IP capture filters performed at HW level allow to focusing the analysis on the IP protocols that matter the most and greatly increase the overall performances.

The 3GMaster supports all of the protocols and interfaces in the tables below.

### Supported Protocols for Monitoring

<table>
<thead>
<tr>
<th>Network Type</th>
<th>Protocols</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GSM Network</strong></td>
<td>- A, Abis and proprietary O&amp;M, MAP, GSM-R, SMS &amp; MMS</td>
</tr>
<tr>
<td><strong>GPRS/EDGE Network</strong></td>
<td>- Gb over E1 and IP, Gs, Ge (CAMEL), Gi over LAN and Frame Relay, Gn/Gp/Ga, Gf, Gd, GC, Gr (MAP)</td>
</tr>
<tr>
<td><strong>UMTS (up to R6) Network</strong></td>
<td>- Iub (with auto-configuration and dynamic CID management), Iur, Is-41 (C,D,E)</td>
</tr>
</tbody>
</table>

### Supported Protocols for IMS/MMD Network

- SIP
- Diameter / Radius
- COPS

### Supported Protocols for Sigtran

- SCTP, M2UA, M3UA, SUA, IUA, M2PA

### Supported Protocols for VoIP Network

- H.323
- SIP (over UDP/TCP)
- SIP-T, SIP-I
- MEGACO/H.248
- MGCP
- RTP/RTCP

### Supported Protocols for SS7 Networks

- ISUP (national variants: Japan, New Zealand, Australia, Finland, France, Singapore, Hong Kong, Switzerland, Germany, Austria, China, Spain, Sweden)
- MAP
- INAP, INAP+, AIN, CAP
- BICC

### Supported Protocols for Active Testing

<table>
<thead>
<tr>
<th>Network Type</th>
<th>Protocols</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VoIP / IMS Networks</strong></td>
<td>- SIP</td>
</tr>
<tr>
<td><strong>SS7 Networks</strong></td>
<td>- ISUP</td>
</tr>
</tbody>
</table>
3GMaster Series
All models may act both as a standalone protocol analyzer and probe for the Accanto Systems’ centralized monitoring system (TAMS).

3GMaster 1000-QX
Portable unit that monitors all protocols in wireless networks.

3GMaster 6000-QX / 6500-QX
High performance rack-mounted unit that offers additional capacity, larger HD storage and redundant power supply for active / passive monitoring and probe application. The 6500 model manages 30% more of CDRs if compared with the 6000 and it is NEBS compliant.

<table>
<thead>
<tr>
<th>Board Type</th>
<th>Max # of ports</th>
<th>Max # of ports with Exp. boxes</th>
<th>Interface type</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAE-E1T1</td>
<td>24 (1)</td>
<td>68</td>
<td>E1/T1/PCM/ATM</td>
</tr>
<tr>
<td>PAE-XPRO-100</td>
<td>10</td>
<td>20</td>
<td>155 Mbps ATM</td>
</tr>
<tr>
<td>PAE-XPRO-200</td>
<td>16</td>
<td>-</td>
<td>Eth.10/100/1000</td>
</tr>
<tr>
<td>PAE-GIGA</td>
<td>4</td>
<td>-</td>
<td>Eth.10/100/1000 el.</td>
</tr>
<tr>
<td>PAE-GIGA</td>
<td>16</td>
<td>-</td>
<td>Eth.10/100/1000 op.</td>
</tr>
</tbody>
</table>

Note: For combination of different PAEs, please contact the Accanto Systems sales team (sales@accantosystems.com)

3GMaster 9000-QX / 9500-QX
Rack-mounted unit designed to monitor Next Generation and Broadband Networks. Its RAID controller coupled with its capability to store up to 10 terabytes allows the simultaneous monitoring and analysis of both the Control Plane of the MSS and the Control and User Plane of the Media Gateways. The 9500 model manages 30% more of CDRs if compared with the 9000 and it is NEBS compliant.

<table>
<thead>
<tr>
<th>Board Type</th>
<th>Max # of ports</th>
<th>Max # of ports with Exp. boxes</th>
<th>Interface type</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAE-E1T1</td>
<td>20 (1)</td>
<td>68</td>
<td>E1/T1/PCM/ATM</td>
</tr>
<tr>
<td>PAE-XPRO-100</td>
<td>8</td>
<td>20</td>
<td>155 Mbps ATM</td>
</tr>
<tr>
<td>PAE-XPRO-200</td>
<td>8</td>
<td>-</td>
<td>Eth.10/100/1000</td>
</tr>
<tr>
<td>PAE-GIGA</td>
<td>12</td>
<td>-</td>
<td>Eth.10/100/1000 el.</td>
</tr>
<tr>
<td>PAE-GIGA</td>
<td>8</td>
<td>-</td>
<td>Eth.10/100/1000 op.</td>
</tr>
</tbody>
</table>

(1) Maximum 8 in ATM mode
Physical Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Format</th>
<th>Power</th>
<th>Dimensions</th>
<th>Weight</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000-QX</td>
<td>Portable</td>
<td>Universal power supply 90-240 V AC, 50/60 Hz, 350W</td>
<td>17.5&quot; x 13.1&quot; x 9.6&quot; (445 mm x 333 mm x 245 mm)</td>
<td>36.38 lb (16.5 kg) fully equipped</td>
<td>Operating temperature: 10° to 35° C</td>
</tr>
<tr>
<td>6000-QX</td>
<td>4 Units, 19&quot; Rack Mount</td>
<td>Universal Redundant Power Supply 90-240 V AC, 50/60 Hz, 460W (Optional -48V DC PS 360W)</td>
<td>19&quot; x 7&quot; x 26.5&quot; (482 mm x 178 mm x 673 mm)</td>
<td>55 lb (25 kg) fully equipped</td>
<td>Storage temperature: -20° to 65° C</td>
</tr>
<tr>
<td>6500-QX</td>
<td>3 Units, 19&quot; Rack Mount</td>
<td>Universal Power Supplies (100/240 VAC, 650 W)</td>
<td>19&quot; x 5.25 x 28&quot; (482 mm x 134 mm x 699 mm)</td>
<td>99.21 lb (45 kg) fully equipped</td>
<td>Humidity: 8% to 90% non-condensing</td>
</tr>
<tr>
<td>9000-QX</td>
<td>3 Units, 19&quot; Rack Mount</td>
<td>Triple Redundant V Power Supplies</td>
<td>19&quot; x 7&quot; x 28&quot; (482 mm x 134 mm x 699 mm)</td>
<td>99.21 lb (45 kg) fully equipped</td>
<td></td>
</tr>
</tbody>
</table>

Expansion Boxes

Expansion boxes are used to increase the maximum amount of either ATM or E1/T1 physical interfaces. Each probe can host only one Expansion Box through one PCI-E x1 slot. The software license to manage the additional boards is included in the package.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max # of ports</th>
<th>Interface type</th>
<th>Compatibility with 6000/6500 models</th>
<th>Compatibility with 9000/9500 models</th>
<th>Dimensions</th>
<th>Weight (Kg)</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCIE-PCIX-XPS-7S</td>
<td>14</td>
<td>155 Mbps ATM</td>
<td>yes</td>
<td>yes</td>
<td>17&quot;W x 6.5&quot;H x 18&quot;D</td>
<td>12</td>
<td>Operating temperature: 0° to +35°C Storage temperature: -40° to +85°C</td>
</tr>
<tr>
<td>EB-6-PCIX-SLOTS</td>
<td>12</td>
<td>155 Mbps ATM</td>
<td>yes</td>
<td>no</td>
<td>19&quot;W x 7&quot;H x 17.7&quot;D</td>
<td></td>
<td>Ambient Temperature: 0° to 50°C Storage Temperature: -20° to 60°C Relative Humidity: 5% to 85%</td>
</tr>
<tr>
<td>EB-7-PCI-SLOTS</td>
<td>28</td>
<td>E1/T1/PCM/ATM</td>
<td>yes</td>
<td>yes</td>
<td>19&quot;W x 7&quot;H x 17.7&quot;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EB-13-PCI-SLOTS</td>
<td>52</td>
<td>E1/T1/PCM/ATM</td>
<td>yes</td>
<td>yes</td>
<td>19&quot;W x 7&quot;H x 17.7&quot;D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information or a directory of sales offices: sales@accantosystems.com