UMTS Network Monitoring
Analysis Suite for UMTS Networks

Technology overview

With demand for high-speed mobile services skyrocketing, service providers have been searching for a unified network architecture that offers users high speed connectivity, and at the same time allows for a phased transition of their current 2G networks. UMTS main goal is to unify the different standards used by current second-generation wireless networks and provide a wide range of services including telephony, messaging, paging, Internet access and broadband data services.

UMTS is not a simple architecture. By adopting UMTS, service providers must deal with the myriad technical issues in introducing, and then managing UMTS Releases 4, 5 and 6.

For example, UMTS Release 4 introduces the separation of transport and bearer control in the Circuit Switched Core Network, as well as an IP-based GPRS-Gb. Releases 5 and 6 then introduce HSPA support, which significantly increases packet data performance over the radio interface and in the overall network.

There are many other elements of complexity in a UMTS network, all of which require specialized testing, monitoring and troubleshooting for a successful implementation.

The Accanto Systems solution

Accanto Systems has developed a comprehensive set of non-intrusive analysis and monitoring suites for UMTS and other advanced networks such as GSM, GPRS/EDGE, CDMA and IMS/MMD.

This application note focuses on the UMTS Monitoring and Analysis suite, which is currently supported by the Accanto Systems Pantera Analyzer and Probe Family.
UMTS Analysis suite

The UMTS Analysis suite has been designed to cover all the Protocol Interfaces in the network. It is a complete monitoring solution and, in combination with the GSM and GPRS/EDGE suites, provides full coverage of the terrestrial part of a UMTS network.

The UMTS Analysis suite allows complete troubleshooting of both the signaling and user data protocols, plus simultaneous decoding of all the main UMTS interfaces and TCP/IP protocols. Trace features like filtering make it easy to investigate problems involving Network Elements or User Traffic. Extensive statistical reports provide real-time information on performance and loading. Call Detail Record (CDR) features allow the collection of traffic data so that users can generate statistics on network usage and troubleshoot recurring problems.

The UMTS Analysis suite covers every aspect of UMTS network management:

- Performance analysis
- Troubleshooting of both signaling and data (TCP/IP) protocols
- Network Surveillance for immediate reaction upon detection of anomalies
- Network planning for control of traffic loading among Network Elements
- Service reporting to generate off-line statistics on network usage

UMTS Analysis Results

The UMTS Analysis suite provides a unique set of results in real time, including:

- Protocol Trace with full message decode and presentation in compact, expanded, user-designed and graphical (ladder diagrams) formats
- Upper layer PDU reassembly
- Filtering system based on a tree-view of all major fields in the protocols for easy, intuitive analysis
- Full protocol statistics counters in tabular and graphic formats on all protocol layers
- TCP/IP side: integrated TCP/IP monitor package for the lub and lu interfaces. Decoding of the IP/UDP/TCP layers and the main IP services like RADIUS, DNS, HTTP, WAP, SMPP, SMTP
- Proprietary protocol support over the lub interface
Special Features

**CDR, CDR-to-Frames / Frames-to-CDR Functions, and Arrow Diagrams**

Call Detail Records show the complete call summary and highlight the main call information such as addressing, duration and cause of disconnection. CDRs are generated over all the different UMTS interfaces supported.

The CDR-to-frame function automatically recovers all the related signaling frames and shows the entire call flow in graphical format, while the Frame-to-CDR function automatically recovers the CDR related to a selected signaling message.

**CDRs for Distributed Monitoring**

CDRs collected from the Pantera portable protocol analyzer can also be forwarded to the Telecom Network Management System (TAMS) system for more detailed post-analysis, reporting and trending. This is a powerful addition to the service providers UMTS toolset, as the same Pantera that is used in the field for troubleshooting and maintenance can also be used as a high-powered remote probe in a sophisticated distributed monitoring system.

**KPIs (Key Performance Indicators)**

KPIs can be used as global or local indicators to support Performance Management, Network Management and Optimization activities in 3G Networks. The main goal is to detect service quality degradation at early stages before user complaints or network failure and to monitor network resource usage.

KPIs also serve as an indicator that specific network nodes might require network maintenance (troubleshooting) or optimization (network tuning) actions. KPI values are displayed in CDRs and a dedicated statistic provides a summary on all the monitored calls.

**Multi-interface Correlation and Call Tracing**

CDRs/TDRs from up to 7 different protocol stacks can be correlated in real-time. The algorithms are based on combinations of matching keys from the following fields: IMSI, IMEI and IMEISV, Called/Calling numbers and MSISDN Numbers. Correlation can be performed even for soft handover transactions.

**UMTS Iub Signaling Deciphering**

Deciphering is performed in real-time or in post-analysis. CK keys are retrieved from the IuCS and IuPS protocol stacks and transferred to the lub to decipher both circuit and data calls. 3GPP Confidentiality (F8) and Integrity (F9) UMTS Encryption Algorithms (also known as MISTY/KASUMI) are fully supported.

**HSPA Support**

HSDPA and the HSUPA over Iub are supported (implementation based on 3GPP rel. 6 specs). ALCAP, NBAP, and RRC CDRs are consequently updated.

All user data transported over the HSPA channels are available in the IP protocol stack when piled on top of the lub protocol stack.

**Triggers**

This feature allows the creation of an advanced ‘trap’ system that combines protocol events, counters and timers.
Protocols Supported

The protocols supported by the UMTS Analysis suite are aligned to Release 6.

<table>
<thead>
<tr>
<th>UMTS</th>
<th>SS7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSCOP/SCCF/MTP-3b</td>
<td>ITU-T (MTP, SNM, SNT, TUP, ISUP, SCCP, TCAP)</td>
</tr>
<tr>
<td>Iu PS and IuCS control planes (RANAP, ALCAP, NAS)</td>
<td>ANSI (MTP, SNM, SNT, ISUP, SCCP, TCAP, AIN)</td>
</tr>
<tr>
<td>Iub Control (NBAP, ALCAP, RRC, NAS) and User Planes</td>
<td>BTNR-167</td>
</tr>
<tr>
<td>Iur Control (RNSAP, ALCAP, RRC, NAS) and User Planes</td>
<td>CHINA SS#7 (TUP, ISUP)</td>
</tr>
<tr>
<td>Support of all the main manufacturers</td>
<td>Japan TTC</td>
</tr>
<tr>
<td>MAP 3G</td>
<td>Local Number Portability</td>
</tr>
<tr>
<td>CAMEL (TS 29.078, 22.078-22.097)</td>
<td>ETSI INAP (CS1/CS2) and INAP+</td>
</tr>
<tr>
<td>HSDPA, HSUPA (rel. 6, Iub)</td>
<td>HSL SS7 Version (on 31 aggr. TS)</td>
</tr>
<tr>
<td>TD-SCDMA (UMTS-TDD)</td>
<td>SS7 over MTP3-Broadband or Sigtran</td>
</tr>
<tr>
<td>IuBC User Plane Broadcast Data (CBC - Cell Broadcast Center / RNC - Radio Network Controller Interface)</td>
<td><strong>IMS/MMD</strong></td>
</tr>
<tr>
<td><strong>VoIP</strong></td>
<td>SIP</td>
</tr>
<tr>
<td>H.323 (H.225, H.235, H.245, H.450)</td>
<td>Diameter</td>
</tr>
<tr>
<td>SIP and SIP-T</td>
<td>COPS</td>
</tr>
<tr>
<td>MGCP, Aspen-MGCP (Nortel) and NCS</td>
<td><strong>Sigtran</strong></td>
</tr>
<tr>
<td>MeGaCo/H.248, GCP</td>
<td>SCTP, M2PA, M3UA, SUA, M2UA, IUA</td>
</tr>
<tr>
<td>RTP/RTCP</td>
<td></td>
</tr>
<tr>
<td>T.38 (Fax over IP)</td>
<td></td>
</tr>
</tbody>
</table>

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