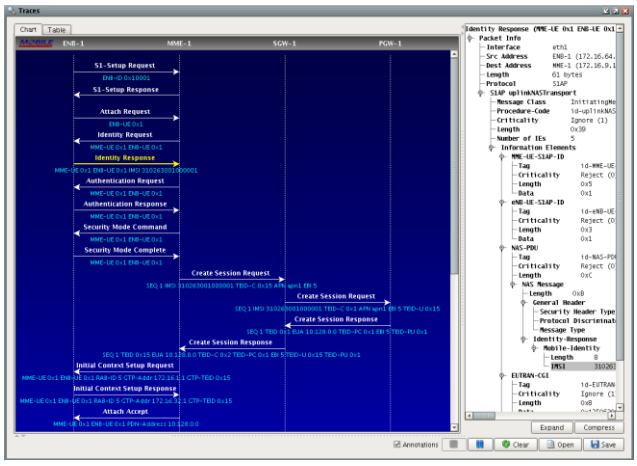
Torrent 6200 LTE Test System

Product Data Sheet (Preliminary)

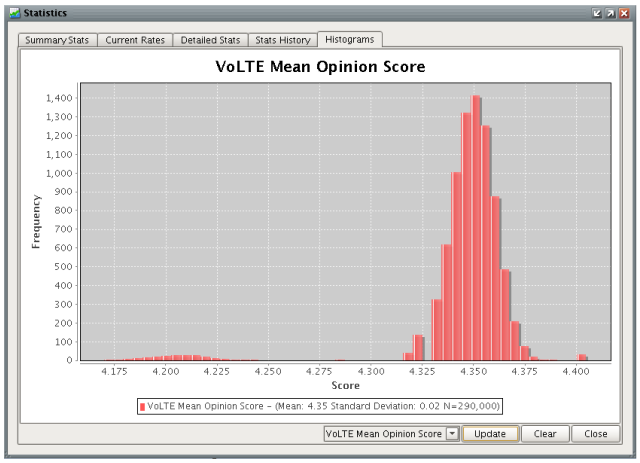
The Torrent 6200 is a Linux based real time system for testing 3GPP LTE eNBs and UEs both functionally and from a performance standpoint. It is well suited for both initial development of such systems, as well as for verification of them in an network operator lab.

The 6200 builds on ground breaking technology developed for its WiMAX counterpart that allowed for 4000+ mobiles on a single channel. It supports both TDD and FDD, and channel bandwidths of 10 and 20MHz.

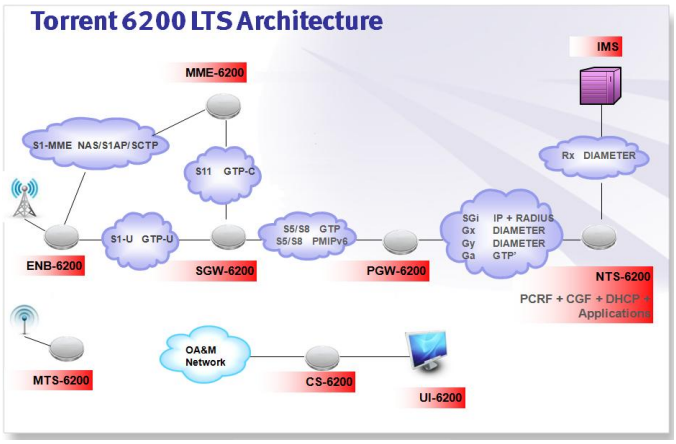
Packed with features from the award winning Torrent series, it adds numerous new ones of its own to bring you a state of the art test experience. Easily bring up a single session and trace it:



Or bring up thousands of subscribers running data and voice (VoLTE) applications to verify KPIs:



Architecture Overview



Torrent 6200 consists of several high performance server applications that together can emulate the LTE EPC or just parts of it.

This central controller for the system, called the CS-6200, automatically configures, starts, and directs the traffic servers in the system to run tests as directed by the user through a GUI interface.

The MTS-6200 traffic server authentically simulates thousands of UEs per channel. The optional ENB-6200 emulates an eNB for UE testing purposes. The MME-6200 simulates the Mobility Management Entity, or alternatively can be replaced with the MME under test. Similarly the SGW-6200 and PGW-6200 simulate the Serving Gateway and PDN Gateways respectively, and like the MME-6200 may be replaced with their counterparts under test as desired. Finally, the NTS-6200 provides a convenient aggregation of network servers (IMS-Core, MMS, HTTP, FTP, SMTP, DHCP, PoC, WAP, etc.) as well as acting as a PCRF, CGF, and Radius Server.

The system scales linearly so that more channels may be added seamlessly with additional servers.

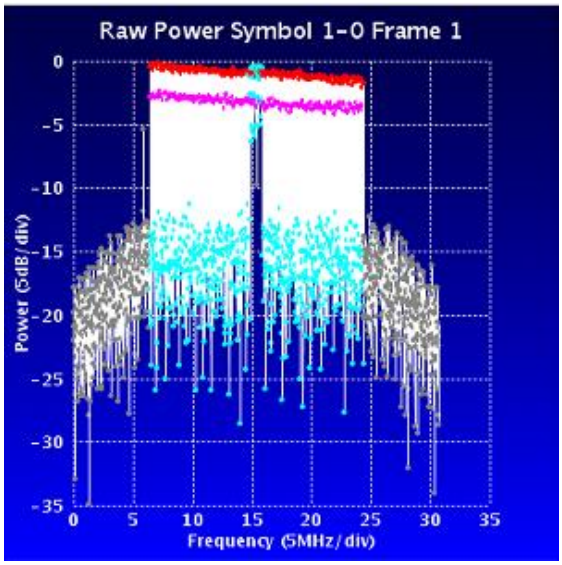
Hardware Platform

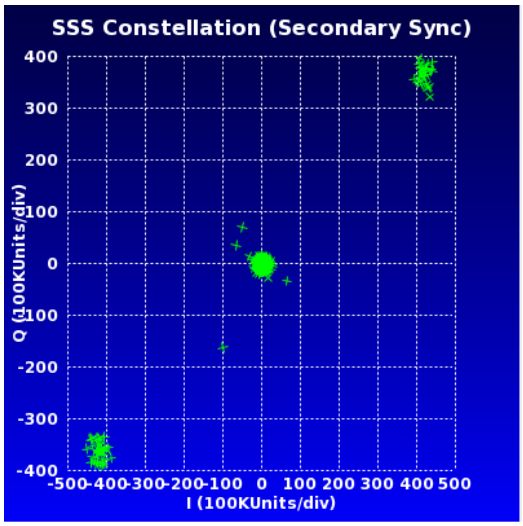
The 6200 runs on a Linux based 2U SDR platform featuring our 6200 LTE MAC and PHY layers as well as authentic emulators for the LTE EPC.

RF/PHY Hilights of this platform include the following:

- Channel Bandwidth Support to 20MHz
- RF Band Coverage 100MHz-6GHz
- FDD/TDD Support
- 2x2 MIMO Per Chassis
- Handover Support
- Realistic Fading on a per UE level
- Doppler Shift Emulation

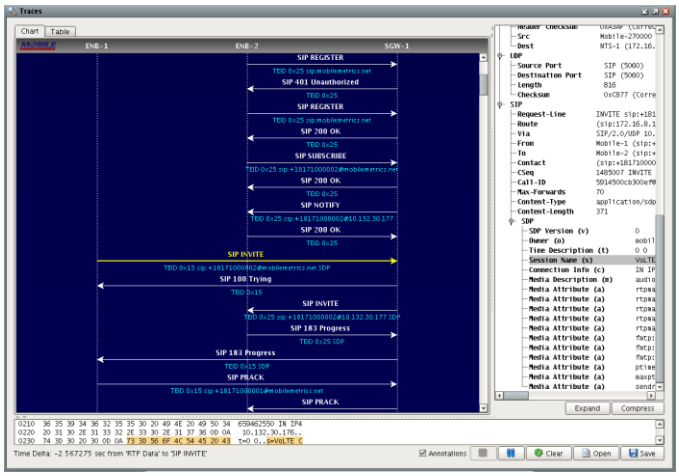
The first IOT test for the platform was in 2011 with a well known vendor's eNB at 20MHz channelization:





VoLTE Testing Support

The 6200 features comprehensive end to end VoLTE testing support:



With it you can saturate test your eNB with VoLTE calls (concurrently with numerous other types of traffic) to see how well they perform, view MOS score histograms, etc.

SMS Testing Support

The system also allows mobiles to send and receive text messages via an SMS/SIGTRAN interface (MAP/TCAP/SCCP/MTP3/M2PA/SCTP):

Key System Features

The Torrent system has numerous features field proven features, some of which are listed below:

- Functional Testing
- Load Testing
- Full Automation
- Linear Scalability
- Graphs
- Histograms
- Detailed Hierarchical Statistics

- Realistic Mobile Subscriber Emulation
- IPv4 and IPv6 Support
- MILENAGE Authentication
- Test/XOR Authentication
- AES Ciphering (128-EEA2)
- Null-Ciphering (128-EEA0)
- VLAN Tagging (IEEE 802.1Q)
- VoLTE Support
- 10 Gigabit Ethernet Support (LR/SR)
- S1/X2 Handover During Streaming
- Multiple PDN Connections
- Multiple Dedicated Bearers

Mobile Protocols Supported

Each mobile has its own protocol stack and supports the following protocols:

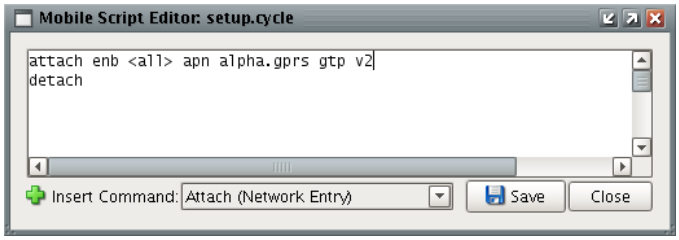
- IPv4
- IPv6
- TCP
- HTTP
- UDP
- FTP
- SMS
- MMS
- SMTP
- POP3
- VoLTE
- SIP/RTP/RTCP
- ICMP
- DNS
- PPP
- SSL
- Streaming (Youtube, Netflix, Pandora)

3GPP Interfaces Supported

- S11 - The MME to SGW Control Interface
- S1-U - The ENB to SGW Data Interface
- S1AP/S1-MME - The ENB to MME Control Interface
- NAS – The UE to MME Interface
- S5/S8 - The SGW to PGW Interface
- SGi - The PDN / Internet Interface
- Gx - The PGW to PCRF Interface
- Gn – For SGSN to GGSN Communication
- C – The HLR to SMSC-GMSC Interface
- E – The MSC to SMSC-GMSC Interface

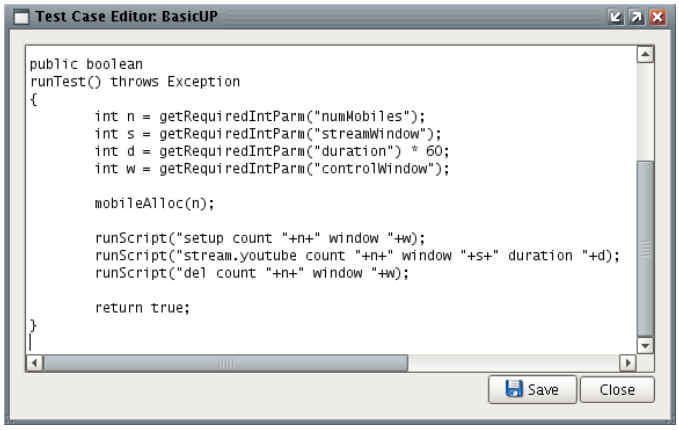
Scripted Mobile Behavior

Virtually everything mobiles do can be scripted down to the single-mobile level:



Java Based Test Cases

Typically, traffic is generated in the system through the use of automated, Java-based test cases which can invoke mobile scripts on arbitrary ranges of mobiles, and which can also run other test cases:



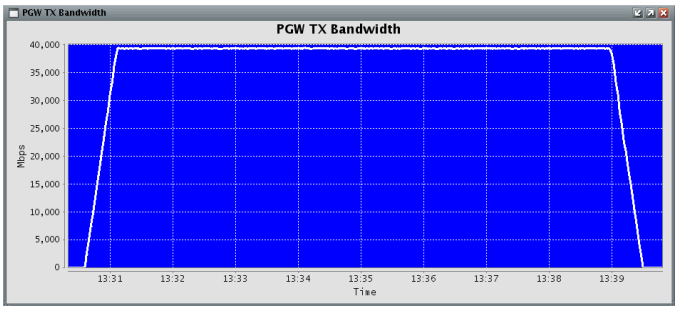
These tests may be run for short durations, or they may be run for days or even weeks to soak the system under test.

Test cases are associated with a pass/fail result, the criteria for which can be adjusted per your requirements:

Test Case	TC #	State
BasicUP (numMobiles=200000,controlWi...	1	PASSED

Real-Time Graphs

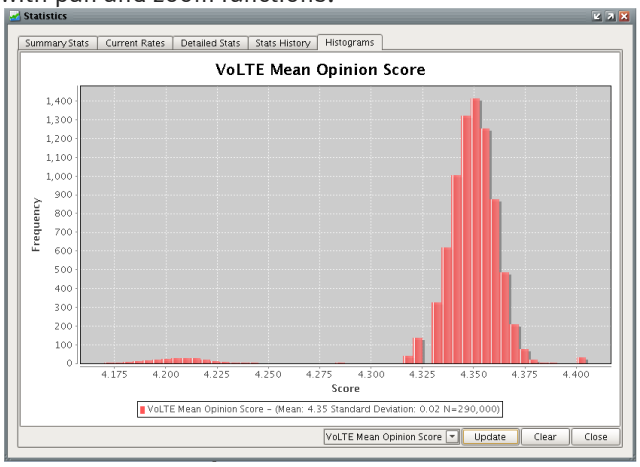
The system allows a wide variety of level and rate metrics to be graphed in real time:



Standard features such as zoom, pan, save, and print are available for all of them.

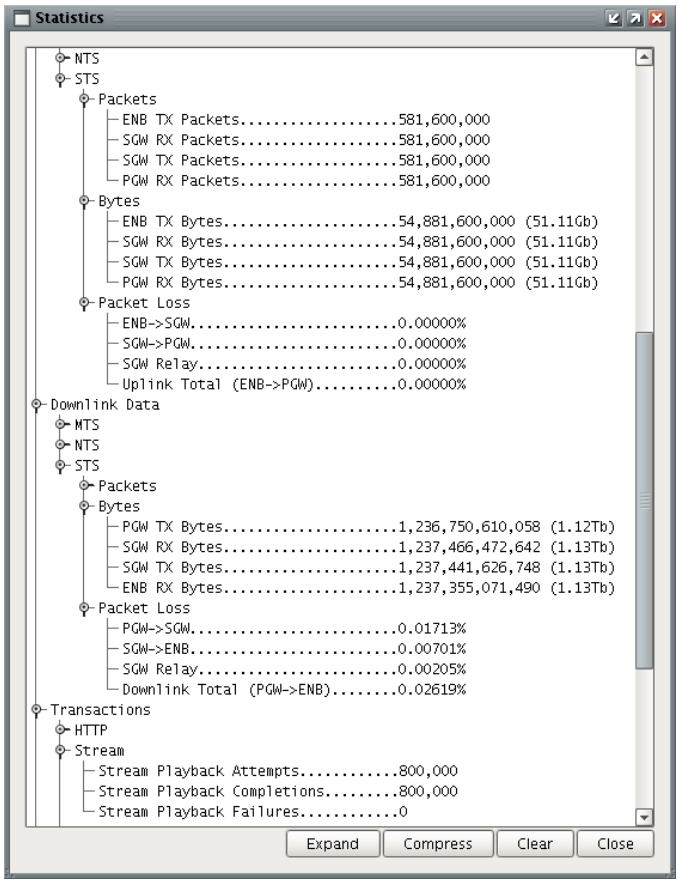
Histograms

Histograms are available as well (e.g. delay, jitter, latency), with pan and zoom functions:

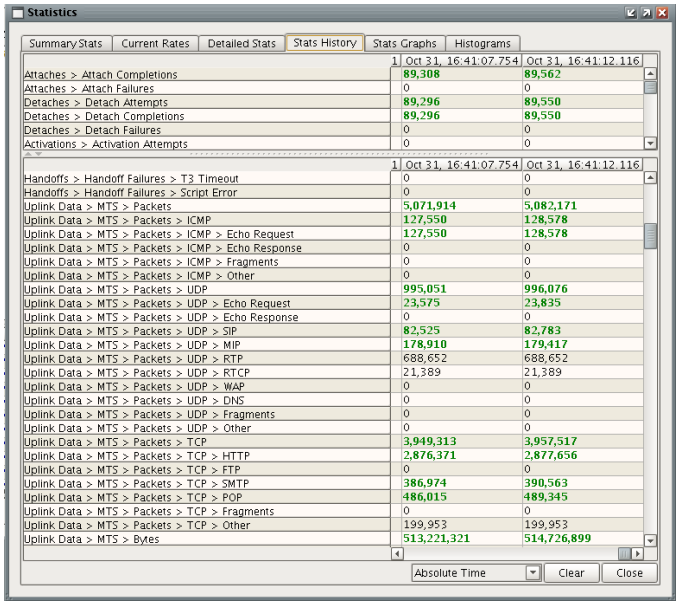


Detailed Statistics

The system tracks numerous statistics system wide and they're available to be viewed in tree form:



As well as spreadsheet form, the underlying information for which is also saved in CSV format for arbitrary post processing:

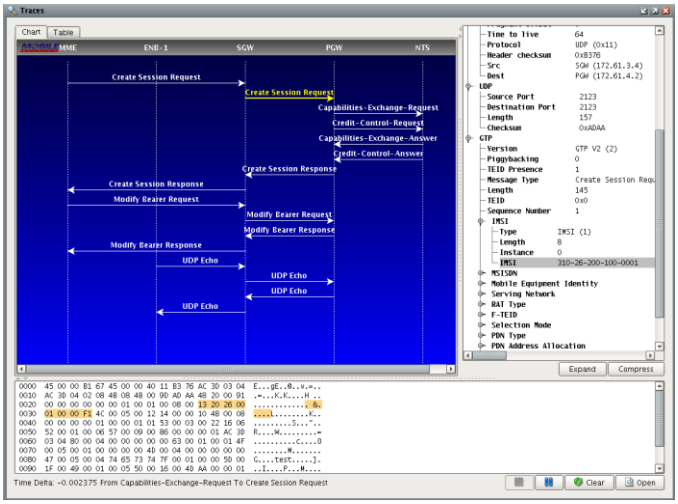


	1 Oct 31, 16:41:07.754	Oct 31, 16:41:12.116
Attaches > Attach Completions	89,308	89,562
Attaches > Attach Failures	0	0
Detaches > Detach Attempts	89,296	89,550
Detaches > Detach Completions	89,296	89,550
Detaches > Detach Failures	0	0
Activations > Activation Attempts	0	0

	1 Oct 31, 16:41:07.754	Oct 31, 16:41:12.116
Handoffs > Handoff Failures > T3 Timeout	0	0
Handoffs > Handoff Failures > Script Error	0	0
Uplink Data > MTS > Packets	5,071,914	5,082,171
Uplink Data > MTS > Packets > ICMP	127,550	128,578
Uplink Data > MTS > Packets > ICMP > Echo Request	127,550	128,578
Uplink Data > MTS > Packets > ICMP > Echo Response	0	0
Uplink Data > MTS > Packets > ICMP > Fragments	0	0
Uplink Data > MTS > Packets > ICMP > Other	0	0
Uplink Data > MTS > Packets > UDP	995,051	996,076
Uplink Data > MTS > Packets > UDP > Echo Request	23,575	23,835
Uplink Data > MTS > Packets > UDP > Echo Response	0	0
Uplink Data > MTS > Packets > UDP > SIP	82,525	82,783
Uplink Data > MTS > Packets > UDP > MIP	178,910	179,417
Uplink Data > MTS > Packets > UDP > RTP	688,652	688,652
Uplink Data > MTS > Packets > UDP > RTCP	21,389	21,389
Uplink Data > MTS > Packets > UDP > WAP	0	0
Uplink Data > MTS > Packets > UDP > DNS	0	0
Uplink Data > MTS > Packets > UDP > Fragments	0	0
Uplink Data > MTS > Packets > UDP > Other	0	0
Uplink Data > MTS > Packets > TCP	3,949,313	3,957,517
Uplink Data > MTS > Packets > TCP > HTTP	2,876,371	2,877,656
Uplink Data > MTS > Packets > TCP > FTP	0	0
Uplink Data > MTS > Packets > TCP > SMTP	386,974	390,563
Uplink Data > MTS > Packets > TCP > POP	486,015	489,345
Uplink Data > MTS > Packets > TCP > Fragments	0	0
Uplink Data > MTS > Packets > TCP > Other	199,953	199,953
Uplink Data > MTS > Bytes	513,221,321	514,726,899

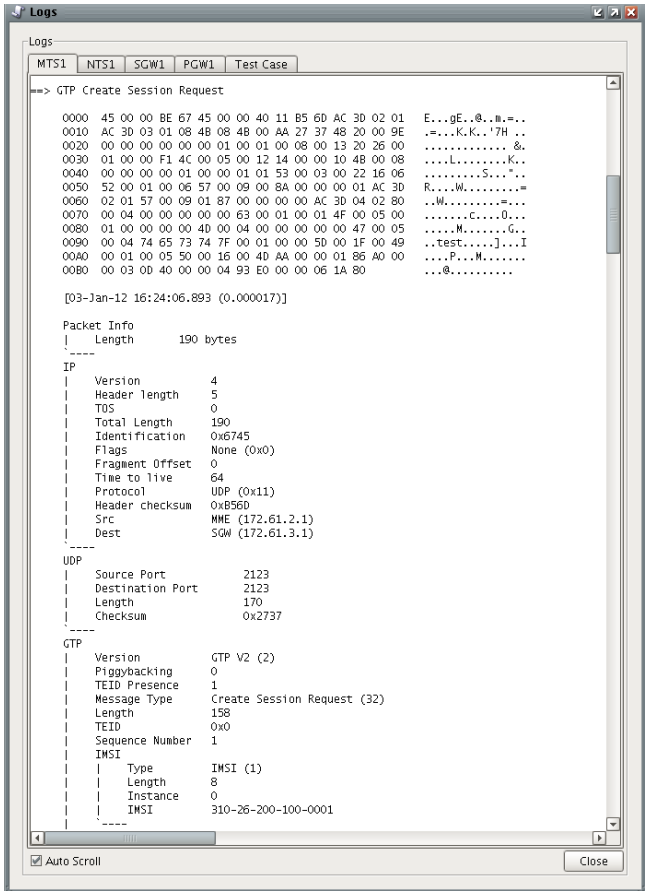
Graphical Tracing

As far as we know, the Torrent system was the first wireless test system to incorporate graphical tracing; allowing you to see “the big picture” with greater ease:



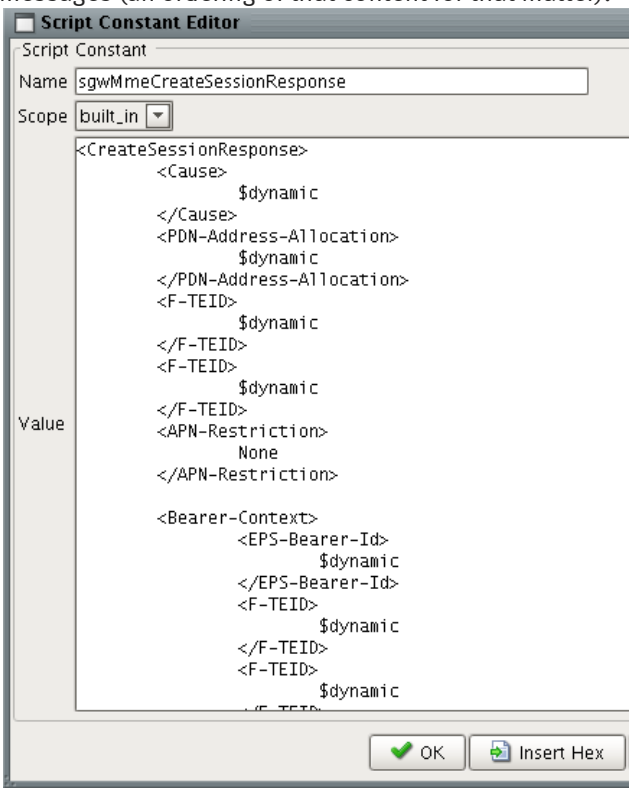
Text Based Tracing

In some cases it’s useful to have a text based representation of a captured message flow (e.g. for detailed study), which the system offers as well:



Configurable Message Templates

One of the biggest changes in the 6100 as compared to its predecessors in the Torrent series is an innovative XML Template Engine which allows you to specify the content of messages (an ordering of that content for that matter):



Fields may be hard coded, omitted, or re-arranged as desired. Certain ones, tagged as "$dynamic" are filled in intelligently in real time.

Specification Compliance

3GPP TS 36.211 – Physical Channels & Modulation
3GPP TS 36.212 – Multiplexing & Channel Coding
3GPP TS 36.331 – RRC
3GPP TS 29.060 – GTPv1
3GPP TS 29.274 – GTPv2
3GPP TS 29.281 – GTP-U
3GPP TS 29.273 – EPS AAA
3GPP TS 24.301 – NAS
3GPP TS 36.413 – S1AP
3GPP TS 29.212 – Policy and Charging over Gx
3GPP TS 32.299 – Diameter Charging / Telecom Mgmt
3GPP TS 32.296 – Online Charging System
3GPP TS 29.212 – SGW to PCRF Interface
3GPP TS 29.212-214 – Gx
3GPP TS 23.040 – SMS
3GPP TS 29.02 – MAP
3GPP TS 33.401 – LTE Security
3GPP TS 23.228-229 – IMS

ITU Q.713-714 – SCCP
ITU X.691 – ASN.1 PER
ITU Q.704 – MTP3
ITU Q.772-775 - TCAP

RFC 791 – IPv4
RFC 2460 – IPv6
RFC 6733 – Diameter
RFC 5516 – Diameter 3GPP Codes
RFC 3261 - SIP
RFC 3550 –RTP
RFC 3605 – RTCP
RFC 2616 – HTTP 1.1
RFC 2960 – SCTP
RFC 1034 – DNS
RFC 1939 – POP3
RFC 2821 – SMTP
RFC4165 – M2PA

Note that the system complies with **Release 10** of the 3GPP specifications unless otherwise note

MOBILE METRICS

12 Greenway Plaza, Suite 1100
Houston, TX 77046
877-404-2600
281-836-4600
214-594-2700 FAX
www.mobilemetrics.net