Network-Wide Wireless Test Solutions

RCATS
Remote Cellular Automated Test System

3GMA
Drive Test Tool

Cable & Antenna Analyzers
GC723A/724B
GC725A/726A

Base Station Analyzer
GC7105A

RF Analyzer
GC7106A

FST-2209/2310
Test Pad

ANT-5
SDH Access Tester

MTS-6000
Compact Optical Test Platform

T-BERD 8000
Transport Module

8635, 8632, 8631
Protocol Analyzer

SITT IMS/SGSN/GGSN
Scalable Intensive Test Tools

DA-3400 Data
Network Analyzer

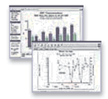
CT-650 CENTEST
Wideband Test Unit

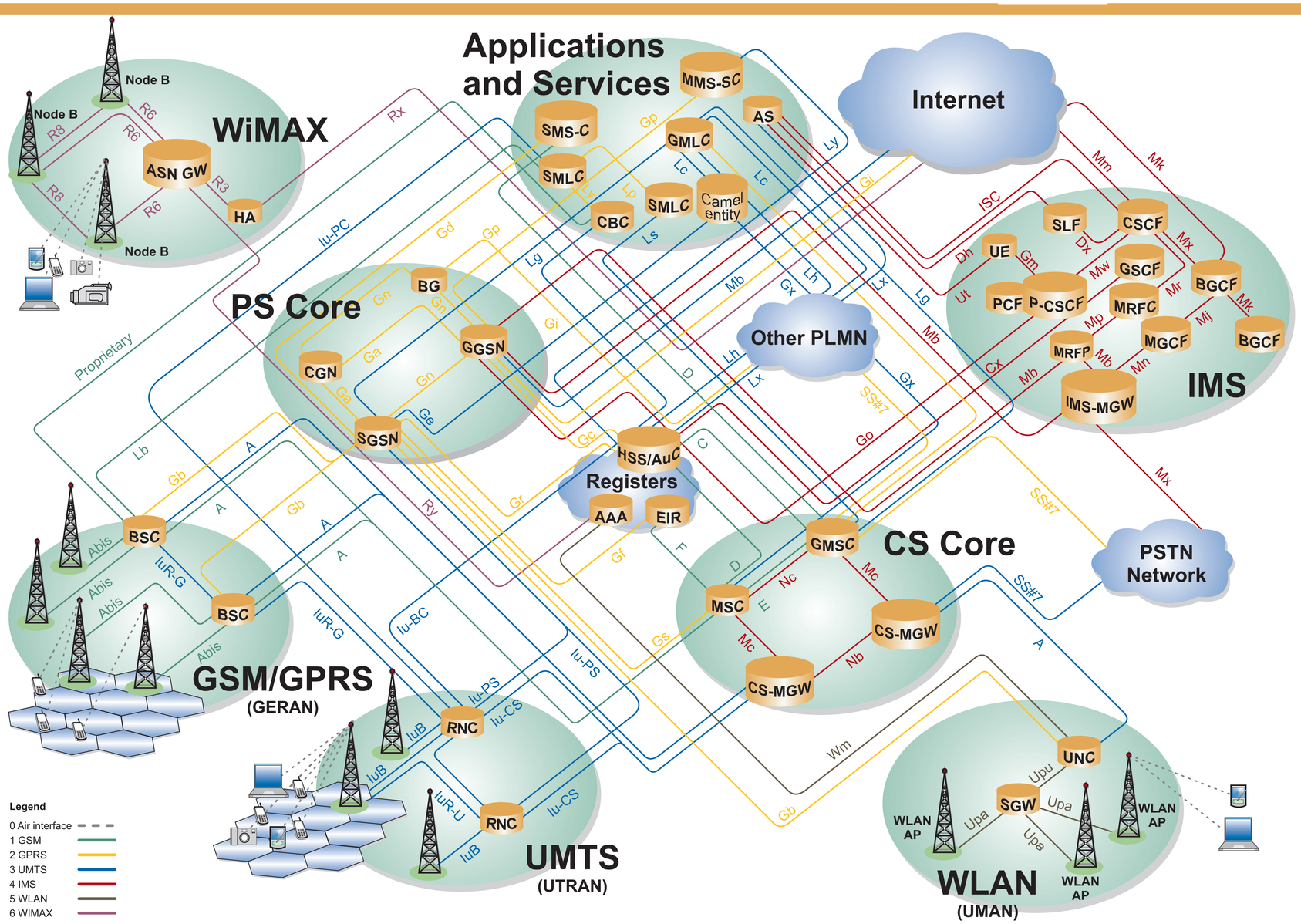
QT-600
Ethernet & Triple Play Probe

EtherNID & MetroNID
Demarcation Units

NetAnalyst
Test Management Software

NetOptimize
Operations Support System



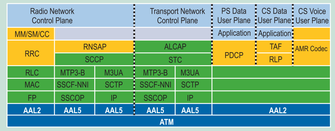


Legend

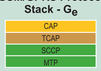
0 Air interface
1 GSM
2 GPRS
3 UMTS
4 IMS
5 WLAN
6 WIMAX

Interface Protocol Stacks

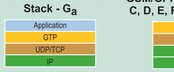
UMTS Protocol Stack - I_{ur}



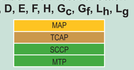
GSM/GPRS Protocol Stack - G_e



GSM/GPRS Protocol Stack - G_a



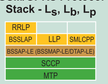
GSM/GPRS Protocol Stack - C, D, E, F, H, G_c, G_f, L_h, L_g



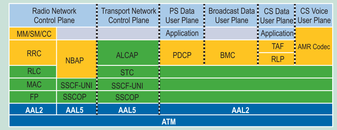
GSM/GPRS Protocol Stack - G_i

GSM/GPRS Protocol Stack - G_n, G_p

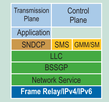
GSM/GPRS Protocol Stack - L_s, L_b, L_p



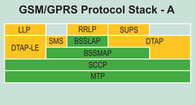
UMTS Protocol Stack - I_{ub}



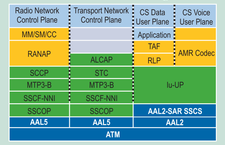
GSM/GPRS Protocol Stack - G_b



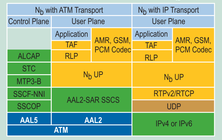
GSM/GPRS Protocol Stack - A



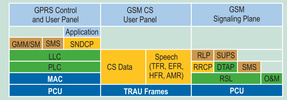
UMTS Protocol Stack - I_u-CS



UMTS R4 Protocol Stack - N_b

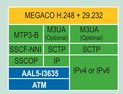


GSM/GPRS Protocol Stack - A_{bis}

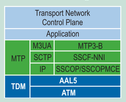


UMTS Protocol Stack - I_u-BC

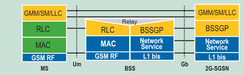
UMTS R4 Protocol Stack - M_c



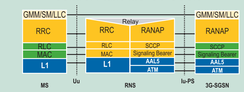
UMTS R4 Protocol Stack - N_c



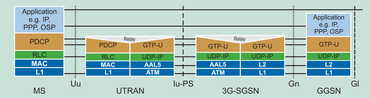
Control Plane MS -2G-SGSN



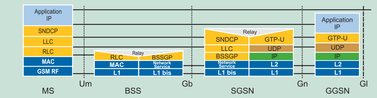
Control Plane MS -3G-SGSN



User Plane for UMTS



User Plane for GSM/GPRS



UMTS R6 Protocol Stacks

Gq	ISC	Mg, Mi, Mj, Mk, Mm, Mr, Mw			
Diameter	SDP	SDP	Mn	Wb, Wf, Wo, Wr, Wx	
SCTP	SIP	SIP	H.248	Diameter	Radius
UDP	UDP/TCP	UDP/TCP	SCTP	UDP	
IP	IP	IP	IP	IP	
L2	L2	L2	L2	DL	
L1	L1	L1	L1	L1	

IMS

Cx, Dx		Mb	Dh, Gm, ISC, Mg, Mi, Mj, Mk, Mm, Mr, Mw	
Diameter	Go	Codecs	SDP	Mn, Mp
SCTP	COPS	RTP or RTCP	SIP	MEGACO
UDP	TCP	UDP	UDP or TCP	SCTP
IP	IP	IP	IP	IP
L2	L2	L2	L2	L2
L1	L1	L1	L1	L1

Abbreviations

AAA Authorization, Authentication and Accounting
ALCAP Access Link Control Application Part
AAL2 ATM Adaptation Layer type 2
AAL5 ATM Adaptation Layer type 5
AMR Adaptive Multi-Rate Codec
AS Application Server
ASN GW Access Service Network Gateway
ATM Asynchronous Transfer Mode
BG Breakout Gateway
BGCF Breakout Gateway Control Function
BMC Broadcast/Multicast Control
BSC Base Station Controller
BSSAP Base Station System Application Part
BSSAP-LE Base Station System Application Part – Location Service Extension
BSSGP BSS GPRS Protocol
BSSLAP BSS Local Service Assistance Protocol
BSSMAP BSS Management Application Part
CAP CAMEL Application Part
Camel Customized Applications for Mobile Network Enhanced Logic
CBC Cell Broadcast Center
CC Call Control
CGN Charging Gateway
COPS Common Open Policy Service
CS Core Circuit Switch Core
CSCF Connection State Control Function
CS-MGW Circuit Switched-Media Gateway
DTAP Direct Transfer Application Part
DTAP-LE DTAP-Location Services Extension
EFR Enhanced Full Rate
EIR Equipment Identity Register
FP Frame Protocol/GERANGSM Edge Radio Access Network
GGSN Gateway GPRS Support Node
GMLC General Mobile Location Center
GMM SM GPRS Mobility Management/Session Management
GMSC Gateway MSC
GPRS General Packed Radio Service
GSM Global System for Mobile Communications
GTP GPRS Tunnel Protocol
GTP-U GTP User Plane
H.248 MeGaCo/Media Gateway Control Protocol
HA Home Agent
HSS/AuC Home Subscriber Service
IMS IP Multimedia Subsystem
IMS-MGW IP Multimedia Subsystem Media Gateway
IP Internet Protocol
Iu-UP Iu User Plane Protocol
LLC Logical Link Control
M3UA MTP3 User Adaptation Layer
MAC MediaCum Access Control
MEGACO Media Gateway Control Protocol
MGCF Media Gateway Control Function
MM Mobility Management
MSC Mobile Switching Center
MMS-SC Multimedia Message Service Center
MRFC Media Resource Function Controller
MRFP Media Resource Function Processor
MSC Mobile Switching Center
MTP Message Transfer Part
Nb UP Nb User Plane Protocol
NBAP Node B Application Part
OSP Open Settlement Protocol
PCF Policy Control Function
RRCP Radio Resource Control Protocol
RRLP Radio Resource LCS Protocol
PCM Pulse Code Modulation
PCU Packet Control Unit
P-CSCF Proxy CSCF
PDCP Packet Data Convergence Protocol
PLMN Public Land Mobile Network
PS Core Packet Switch Core
PPP Point-to-Point Protocol
PSTN Public Switched Telephone Network
RANAP Radio Access Network Application Part
RFC Request for Comments
RLC Radio Link Control
RLP Radio Link Protocol
RNC Radio Network Controller
RNSAP Radio Network Subsystem Application Part
RRC Radio Resource Control
RSL Radio Signaling Layer
RTCP Real Time Transport Control Protocol
RTP Real Time Protocol
SABP Service Area Broadcast Protocol
SCCP Signaling Connection Control Par
SCTP Stream Control Transmission Protocol
SDP Session Description Protocol
SGSN Serving GRPS Support Node
SGW Security Gateway
SLF Subscription Locator Function
SM Session Management
SMLC Serving Mobile Location Center
SMLCPP Serving Mobile Location Center Peer to Peer Protocol
SMS-SC Short Message Service Center
SNDCP Sub Network Dependent Convergence Protocol
SSCF-NNI Service Specific Co-ordination Function – Network Node Interface
SSCF-UNI Service Specific Coordination Function – User Network Interface
SSCOP Service Specific Connection Oriented Protocol
STC Signaling Transport Converter
SUPS Supplementary Services
TAF Terminal Adaption Function
TCAP Transaction Capabilities Application Protocol
TCP Transmission Control Protocol
TRAU Transcoder Rate Adapter Unit/UDPUser Datagram Protocol
UE User Equipment
UMAN Unlicenced Mobile Access Network
UMTS Universal Mobile Communications
UNC UMA Network Controller
UTRAN UMTS Terrestrial Radio Access Network
WIMAX Worldwide Interoperability for Microwave Access
WLAN Wireless Local Area Network
WLAN AP Wireless Local Area Network Access Point

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