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Foreword

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1 Scope

The present document defines the stage 2 service description for a Generic Access Network (GAN) . It describes the GAN system concepts, documents the reference architecture, functional entities, network interfaces, and high-level procedures.

GAN supports two modes of operation:

- GAN A/Gb mode
- GAN Iu mode

GAN A/Gb mode supports an extension of GSM/GPRS mobile services that is achieved by tunnelling Non Access Stratum (NAS) protocols between the MS and the Core Network over an IP network and the A and Gb interfaces to the MSC and SGSN, respectively.

GAN Iu mode supports an extension of UMTS mobile services that is achieved by tunnelling Non Access Stratum (NAS) protocols between the user equipment (MS) and the Core Network over an IP network and the Iu-cs and Iu-ps interfaces to the MSC and SGSN, respectively.

Both GAN modes are complements to traditional GERAN/UTRAN/E-UTRAN radio access network coverage.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 23.002: "Network architecture".
- [2] 3GPP TS 23.009: "Handover procedures".
- [3] 3GPP TS 23.271: "Location Services (LCS); Functional description; Stage 2".
- [4] 3GPP TS 23.122: "Non-Access-Stratum functions related to Mobile Station (MS) in idle mode".
- [5] 3GPP TS 23.236: "Intra-domain connection of Radio Access Network (RAN) nodes to multiple Core Network (CN) nodes".
- [6] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".
- [7] 3GPP TS 26.071: "AMR speech codec; General description".
- [8] 3GPP TS 29.234, v11.2.0: "3GPP system to Wireless Local Area Network (WLAN) interworking, Stage 3".
- [9] 3GPP TS 33.234, v.12.1.0: "3G security; Wireless Local Area Network (WLAN) interworking security".
- [10] 3GPP TS 43.020: "Security related network functions".
- [11] 3GPP TS 48.004: "Base Station System - Mobile-services Switching Centre (BSS-MSC) interface; Layer 1 specification".

- [12] 3GPP TS 48.006: "Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS-MSC) interface".
- [13] 3GPP TS 48.008: "Mobile Switching Centre - Base Station System (MSC-BSS) interface; Layer 3 specification".
- [14] 3GPP TS 48.014: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Gb interface Layer 1".
- [15] 3GPP TS 48.016: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Network Service".
- [16] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; BSS GPRS protocol".
- [17] 3GPP TS 43.059: "Functional stage 2 description of Location Services (LCS) in GERAN".
- [18] 3GPP TS 45.008: "Radio subsystem link control".
- [19] IETF RFC 793: "Transmission Control Protocol".
- [20] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".
- [21] Void.
- [22] Void.
- [23] Void.
- [24] Void.
- [25] Void.
- [26] Void.
- [27] Void.
- [28] Void.
- [29] Void.
- [30] IETF RFC 4186: "Extensible Authentication Protocol Method for Global System for Mobile Communications (GSM) Subscriber Identity Modules (EAP-SIM)".
- [31] Void.
- [32] IETF RFC 5996: "Internet Key Exchange Protocol Version 2 (IKEv2)".
- [33] Void.
- [34] Void.
- [35] Void.
- [36] IETF RFC 2486: "The Network Access Identifier".
- [37] IETF RFC 768: "User Datagram Protocol".
- [38] IETF RFC 4187: "Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA)".
- [39] IETF RFC 791: "Internet Protocol".
- [40] 3GPP TS 25.331: "Radio Resource Control (RRC) protocol specification".
- [41] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".
- [42] Void.

- [43] 3GPP TS 23.003: "Numbering, addressing and identification".
- [44] 3GPP TS 43.129: " Packet-switched handover for GERAN A/Gb mode; Stage 2".
- [45] 3GPP TS 25.410: "UTRAN Iu Interface: general aspects and principles".
- [46] 3GPP TS 25.411: "UTRAN Iu interface layer 1".
- [47] 3GPP TS 25.412: "UTRAN Iu interface signalling transport".
- [48] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".
- [49] 3GPP TS 25.414: "UTRAN Iu interface data transport & transport signalling".
- [50] 3GPP TS 25.415: "UTRAN Iu interface user plane protocols".
- [51] 3GPP TS 25.419: "UTRAN Iu-BC interface: Service Area Broadcast Protocol (SABP)".
- [52] 3GPP TS 25.450: "UTRAN Iupc interface general aspects and principles".
- [53] 3GPP TS 22.011: "Service accessibility".
- [54] IETF RFC 4867, April 2007: "RTP Payload Format and File Storage Format for the Adaptive Multi-Rate (AMR) and Adaptive Multi-Rate Wideband (AMR-WB) Audio Codecs".
- [55] 3GPP TS 33.210: "Network Domain Security (NDS); IP network layer security".
- [56] IETF RFC 4303: "IP Encapsulating Security Payload (ESP)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

AP-ID: The AP-ID (Access Point-ID) is the physical identity (e.g. MAC address) of the generic IP access network point through which the MS is accessing GAN service. This identifier is provided by the MS (obtained via broadcast from the AP) to the GANC via the Up interface, when it requests GAN service. The AP-ID may be used by the GANC to support location services. The AP-ID may also be used by the service provider to restrict GAN service access via only authorized APs.

GERAN/UTRAN Mode: MS mode of operation where the NAS layers communicate through either the GERAN RR or the UTRAN RRC entities.

GERAN/UTRAN/E-UTRAN Mode: MS mode of operation where the NAS layers communicate through either the GERAN RR, the UTRAN RRC or the E-UTRAN RRC entities.

GAN A/Gb Mode: MS mode of operation where the NAS layers communicate through the GA-CSR and GA-PSR entities.

GAN Iu Mode: MS mode of operation where the NAS layers communicate through the GA-RRC CS and GA-RRC PS entities.

GAN Mode: This term is used when a procedure applies to both GAN A/Gb mode and GAN Iu mode (e.g., see clause 8.1, 'Mechanism of Mode Selection in Multi-mode terminals').

Generic Access Network: access network providing access to A/Gb or Iu interfaces via an IP network

Generic Access Network Controller: network node that connects to the MSC and SGSN via the A-interface and Gb interface (GAN A/Gb mode) or the Iu-cs interface and Iu-ps interface (GAN Iu mode) and enables access via a generic IP network.

Three different logical roles for the GANC are defined in this specification: Provisioning GANC, Default GANC and Serving GANC.

default GANC: logical role of a GANC in the HPLMN, which redirects an MS performing the GAN Registration Procedure to a preferred Serving GANC within the HPLMN or VPLMN. The Serving GANC and Default GANC may be the same entity, in which case no redirection is required.

discovery procedure: process by which the MS discovers the Default GANC in the HPLMN.

CS handover: mobile station engaged in a call (a CS domain service) moves between 3GPP access networks and GAN.

handover in: mobile station moves from 3GPP access networks to GAN.

handover out: mobile station moves from GAN to 3GPP access networks.

PS handover: A mobile station with one or more ongoing PS domain services moves between a GAN cell and a GERAN/UTRAN cell.

provisioning GANC: logical role of a GANC in the HPLMN of an MS. When an MS performs the Discovery Procedure to this GANC, the MS is provided the address of the Default GANC in the HPLMN.

redirection: process by which a Default or Serving GANC redirects an MS to an alternative Serving GANC. This alternative GANC is likely to become the Serving GANC for the MS.

registration procedure: process by which an MS requests the Generic Access Service from a GANC.

rove in: mobile station reselects from 3GPP access networks to GAN.

rove out: mobile station reselects from GAN to 3GPP access networks.

roving: action of re-selection between 3GPP access technology and GAN for a mobile station in idle mode.

seamless: free from noticeable transitions (i.e. no end-user action is required; speech interruptions are short; service interruptions are short; incoming calls are not missed; packet sessions are maintained; services work identically).

serving GANC: logical role of the GANC in a PLMN which provides an MS with the Generic Access service.

suitable cell: this is a cell on which an MS may camp. It must satisfy criteria which are defined for A/Gb mode in 3GPP TS 43.022 and for Iu mode in 3GPP TS 25.304.

user equipment: generally referred to as 'mobile station' in this document.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Up Interface between MS and GANC

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AAA	Authentication, Authorization and Accounting
AKA	Authentication and Key Agreement
AP	Access Point
AS	Access Stratum
BSC	Base Station Controller
BSS	Base Station Subsystem
BSSGP	Base Station System GPRS Protocol
BSSMAP	Base Station System Management Application Part
CC	Call Control
CGI	Cell Global Identification
CM	Connection Management
CN	Core Network

CS	Circuit Switched
CTM	Cellular Text Telephone Modem
DNS	Domain Name System
DTM	Dual Transfer Mode
E-UTRAN	Evolved UTRAN
EAP	Extensible Authentication Protocol
ETSI	European Telecommunications Standards Institute
FCC	US Federal Communications Commission
FQDN	Fully Qualified Domain Name
GA-CSR	Generic Access - Circuit Switched Resources
GAD	Geographical Area Description
GAN	Generic Access Network
GANC	Generic Access Network Controller
GA-PSR	Generic Access - Packet Switched Resources
GA-RC	Generic Access - Resource Control
GA-RRC	Generic Access - Radio Resource Control
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMM/SM	GPRS Mobility Management and Session Management
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
GSN	GPRS Support Node
HLR	Home Location Register
HPLMN	Home PLMN
IETF	Internet Engineering Task Force
IKE	Internet Key Exchange
IMEISV	International Mobile station Equipment Identity and Software Version number
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
LA	Location Area
LAI	Location Area Identity
LLC	Logical Link Control
MAC	Medium Access Control
MAC	Message Authentication Code
MM	Mobility Management
MS	Mobile Station
MSC	Mobile Switching Center
MTP1	Message Transfer Part layer 1
MTP2	Message Transfer Part layer 2
MTP3	Message Transfer Part layer 3
NAS	Non-Access Stratum
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PLMN	Public Land Mobile Network
PS	Packet Switched
PSAP	Public Safety Answering Point

NOTE: A PSAP is an emergency services network element that is responsible for answering emergency calls.

PSTN	Public Switched Telephone Network
P-TMSI	Packet - TMSI
QoS	Quality of Service
RA	Routing Area
RAC	Routing Area Code
RAI	Routing Area Identity
RAT	Radio Access Technology
RLC	Radio Link Control
RNC	Radio Network Controller
RTCP	Real Time Control Protocol
RTP	Real Time Protocol
SCCP	Signalling Connection Control Part
SEGW	SEcurity GateWay