ATIS-1000086

ATIS Standard on -

LTE and IMS Parameters for Supporting NS/EP Priority Services in NGN

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LTE and IMS Parameters for Supporting NS/EP Priority Services in NGN

Alliance for Telecommunications Industry Solutions

Approved April 15, 2019

Abstract

This Technical Report provides guidelines for provisioning relevant Long-Term Evolution (LTE) and IP Multimedia System (IMS) parameters and values (e.g., QoS/Priority Values), such that National Security / Emergency Preparedness (NS/EP) Priority Services communications receive the highest probability of delivery over other service traffic in Next Generation Networks (NGNs).

Foreword

The Alliance for Telecommunications Industry Solutions (ATIS) serves the public through improved understanding between carriers, customers, and manufacturers. The Packet Technologies and Systems Committee (PTSC) develops and recommends standards and technical reports related to services, architectures, and signaling, in addition to related subjects under consideration in other North American and international standards bodies. PTSC coordinates and develops standards and technical reports relevant to telecommunications networks in the U.S., reviews and prepares contributions on such matters for submission to U.S. International Telecommunication Union Telecommunication Sector (ITU-T) and U.S. ITU Radiocommunication Sector (ITU-R) Study Groups or other standards organizations, and reviews for acceptability or per contra the positions of other countries in related standards development and takes or recommends appropriate actions.

The mandatory requirements are designated by the word *shall* and recommendations by the word *should*. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages. The word *may* denotes a optional capability that could augment the standard. The standard is fully functional without the incorporation of this optional capability.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, PTSC, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, PTSC, which was responsible for its development, had the following leadership:

M. Dolly, PTSC Chair (AT&T)

V. Shaikh, PTSC Vice-Chair (Perspecta Labs Inc.)

T. Moresco, Technical Editor (Perspecta Labs Inc.)

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1   Scope, Purpose, & Application

1.1 Scope

National Security / Emergency Preparedness (NS/EP) Priority Services requires priority treatment during network congestion. This treatment is required end-to-end (originating/ transit /terminating/) and from invocation to release in the IP-based Next Generation Network (NGN).   Several parameters have been defined within Long-Term Evolution (LTE), IP Multimedia System (IMS) and supporting protocol standards applicable for providing network priority to NS/EP communications in the NGN environment. Examples include the LTE Allocation and Retention Priority (ARP), Access Class (AC), Multimedia Priority Service Identifier (MPS-Identifier), and Resource Priority Header (RPH). National specific values and/or the rules for their use need to be identified and reserved in order to effectively support NS/EP Next Generation Network Priority Service (NS/EP NGN-PS). At a minimum, operational rules need to be specified such that the values reserved for NS/EP priority communications are unique, where possible, and provide priority treatment over all other services.

This ATIS standard provides operational guidance on protocol parameters and values (e.g., QoS/Priority Values) relevant to NS/EP Priority Services support in NGN. It provides guidance on the national specific values and/or the rules for their use, such that NS/EP priority communications receive the highest probability of delivery over other service traffic.

1.2 Purpose

The purpose of this ATIS standard is to provide the best opportunity for interoperability and a common user experience regardless of the network or networks involved, i.e., end-to-end in the multiple service provider and equipment vendor public network environment.

1.3 Application

This ATIS standard is applicable to the support of NS/EP Priority Services in the evolved public IP-based NGN infrastructure.

1.4 ETS Relationship

This ATIS standard makes use of the terms and definitions described in [ATIS-1000057] and the description of the NS/EP Priority Services under the umbrella of Emergency Telecommunication Service (ETS).

National Security / Emergency Preparedness Next Generation Network Priority Service (NS/EP NGN-PS), Legacy Government Emergency Telecommunication Service (GETS), and Wireless Priority Service (WPS) are all facets of the U.S.A. instantiation of the international standard for Emergency Telecommunications Service (ETS) [E.107]. The relationship of the terms is portrayed in Figure 1.1.
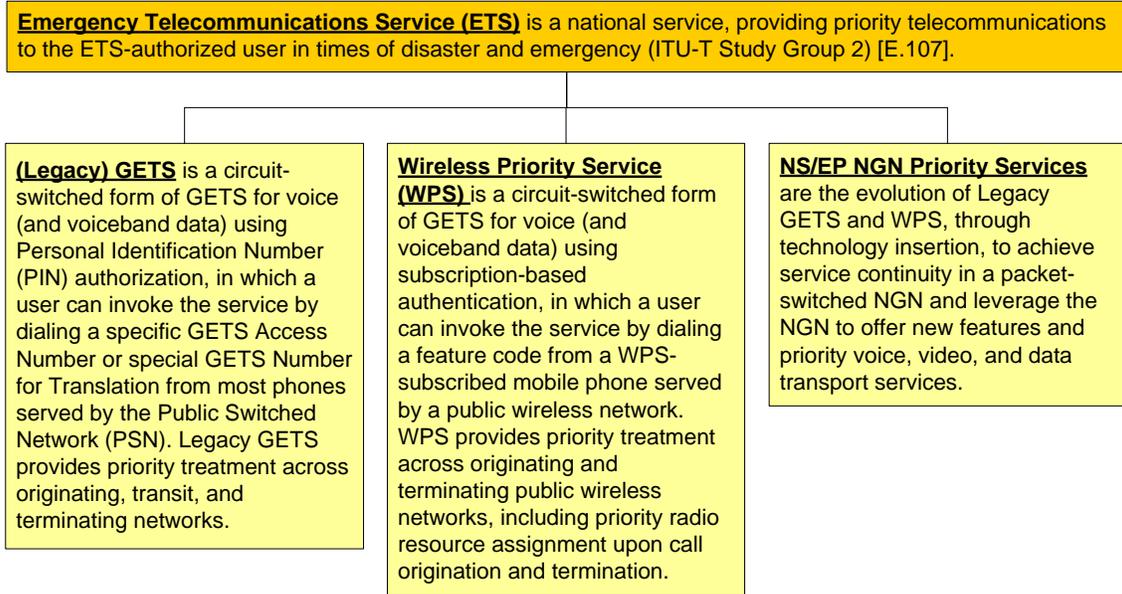
Emergency Telecommunications Service (ETS) is a national service, providing priority telecommunications to the ETS-authorized user in times of disaster and emergency (ITU-T Study Group 2) [E.107].

(Legacy) GETS is a circuit-switched form of GETS for voice (and voiceband data) using Personal Identification Number (PIN) authorization, in which a user can invoke the service by dialing a specific GETS Access Number or special GETS Number for Translation from most phones served by the Public Switched Network (PSN). Legacy GETS provides priority treatment across originating, transit, and terminating networks.	Wireless Priority Service (WPS) is a circuit-switched form of GETS for voice (and voiceband data) using subscription-based authentication, in which a user can invoke the service by dialing a feature code from a WPS-subscribed mobile phone served by a public wireless network. WPS provides priority treatment across originating and terminating public wireless networks, including priority radio resource assignment upon call origination and termination.	NS/EP NGN Priority Services are the evolution of Legacy GETS and WPS, through technology insertion, to achieve service continuity in a packet-switched NGN and leverage the NGN to offer new features and priority voice, video, and data transport services.

Figure 1.1 - Relationship of Concept and Terms.

2   References

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ATIS[1]

[ATIS-1000057]   ATIS   Technical   Report   ATIS-1000057,   Service   Requirements   for   Emergency Telecommunications Service (ETS) in Next Generation Network (NGN), February 2014.

[ATIS-1000065]   ATIS Standard ATIS-1000065.2015, Emergency Telecommunications Service (ETS) Evolved Packet Core (EPC) Network Element Requirements, February 20, 2015.

[ATIS-1000066]   ATIS Standard ATIS-1000066.2016, Emergency Telecommunications Service (ETS) Network Element Requirements for IMS-based Next Generation Network (NGN) Phase 2, August 24, 2016.

[ATIS-1000113]   ATIS Standard ATIS-1000113.2015, Signaling System No. 7 (SS7) – Integrated Service Digital Network (ISDN) User Part, January 2015.

[ATIS-1000679]   ATIS Standard ATIS-1000679.2015, Interworking between Session Initiation Protocol (SIP) and ISDN User Part, April 2015.

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[1] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS). < http://www.atis.org >

3GPP[2]

[TS 22.011]	3GPP TS 22.011, Service accessibility.
[TS 23.002]	3GPP TS 23.002, Network architecture.
[TS 23.203]	3GPP TS 23.203, Policy and Charging Control Architecture.
[TS 23.228]	3GPP TS 23.228, IP Multimedia Subsystem (IMS); Stage 2.
[TS 23.272]	3GPP TS 23.272, Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2.
[TS 23.401]	3GPP TS 23.401, General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access.
[TS 24.008]	3GPP TS 24.008, Mobile radio interface Layer 3 specification; Core network protocols; Stage 3.
[TS 24.229]	3GPP TS 24.229, IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3.
[TS 24.301]	3GPP TS 24.301, Non-Access Stratum (NAS) protocol for Evolved Packet System (EPS) – Stage 3.
[TS 25.413]	3GPP TS 25.413, UTRAN Iu interface Radio Access Network Application Part (RANAP) signaling.
[TS 29.018]	3GPP TS 29.018, General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface layer 3 specification.
[TS 29.060]	3GPP TS 29.060, GPRS Tunneling Protocol (GTP) across the Gn and Gp interface.
[TS 29.061]	3GPP TS 29.061, Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN).
[TS 29.118]	3GPP TS 29.118, Mobility Management Entity (MME) - Visitor Location Register (VLR) SGs interface specification.
[TS 29.128]	3GPP TS 29.128, Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) interfaces for interworking with packet data networks and applications.
[TS 29.153]	3GPP TS 29.153, Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks.
[TS 29.154]	3GPP TS 29.154, Interworking between the 3GPP CS domain with BICC or ISUP as signaling protocol and external SIP-I networks.
[TS 29.201]	3GPP TS 29.201, Representational State Transfer (REST) reference point between Application Function (AF) and Protocol Converter (PC).
[TS 29.212]	3GPP TS 29.212, Policy and charging control over Gx reference point.
[TS 29.213]	3GPP TS 29.213, Policy and charging control signaling flows and Quality of Service (QoS) parameter mapping.
[TS 29.214]	3GPP TS 29.214, Policy and charging control over Rx reference point.
[TS 29.215]	3GPP TS 29.215, Policy and Charging Control (PCC) over S9 reference point; Stage 3.
[TS 29.217]	3GPP TS 29.217, Policy and Charging Control (PCC); Congestion reporting over Np reference point.
[TS 29.219]	3GPP TS 29.219, Policy and charging control: Spending limit reporting over Sy reference point.
[TS 29.228]	3GPP TS 29.228, IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signaling flows and message contents.

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[2] These documents are available from the Third Generation Partnership Project (3GPP) at < http://www.3gpp.org/specs/specs.htm >.

[TS 29.229]	3GPP TS 29.229, Cx and Dx interfaces based on the Diameter protocol; Protocol details.
[TS 29.230]	3GPP TS 29.230, Diameter applications; 3GPP specific codes and identifiers.
[TS 29.238]	3GPP TS 29.238, Interconnection Border Control Functions (IBCF) - Transition Gateway (TrGW) interface, Ix interface; Stage 3.
[TS 29.272]	3GPP TS 29.272, Mobile Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol.
[TS 29.273]	3GPP TS 29.273, Evolved Packet System (EPS); 3GPP EPS AAA interfaces.
[TS 29.274]	3GPP TS 29.274, Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C) – Stage 3.
[TS 29.275]	3GPP TS 29.275, Proxy Mobile IPv6 (PMIPv6) based Mobility and Tunnelling protocols; Stage 3.
[TS 29.277]	3GPP TS 29.277, Optimised handover procedures and protocol between EUTRAN access and non-3GPP accesses (S102); Stage 3.
[TS 29.281]	3GPP TS 29.281, General Packet Radio System (GPRS) Tunnelling Protocol User Plane (GTPv1-U).
[TS 29.328]	3GPP TS 29.328, IP Multimedia (IM) Subsystem Sh interface; Signalling flows and message contents.
[TS 29.329]	3GPP TS 29.329, Sh interface based on the Diameter protocol; Protocol details.
[TS 29.332]	3GPP TS 29.332, Media Gateway Control Function (MGCF) - IM Media Gateway; Mn interface.
[TS 29.333]	3GPP TS 29.333, Multimedia Resource Function Controller (MRFC) - Multimedia Resource Function Processor (MRFP) Mp interface; Stage 3.
[TS 29.336]	3GPP TS 29.336, Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications.
[TS 29.337]	3GPP TS 29.337, Diameter-based T4 Interface for communications with packet data networks and applications.
[TS 29.338]	3GPP TS 29.338, Diameter based protocols to support Short Message Service (SMS) capable Mobile Management Entities (MMEs).
[TS 29.344]	3GPP TS 29.344, Proximity-services (ProSe) function to Home Subscriber Server (HSS) aspects; Stage 3.
[TS 29.345]	3GPP TS 29.345, Inter-Proximity-services (Prose) function signalling aspects; Stage 3.
[TS 29.468]	3GPP TS 29.468, Group Communication System Enablers for LTE (GCSE_LTE); MB2 reference point; Stage 3.
[TS 36.331]	3GPP TS 36.331, Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification.
[TS 36.413]	3GPP TS 36.413, Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP).
[TS 36.423]	3GPP TS 36.423, Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP).
[TS 48.008]	3GPP TS 48.008, Signalling transport mechanism Specification for the Base Station System - Mobile Services Switching Centre (BSS - MSC) interface.

3GPP2[3]

[A.S0008]   3GPP2 A.S0008-D v1.0, Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network, March 2013.

[A.S0014]   3GPP2 A.S0014-D v4.0, Interoperability Specification (IOS) for cdma2000 Access Network Interfaces - Part 4 (A1, A1p, A4, and A5 Interfaces), August 2012.

ETSI[4]

[ETSI TS 183 017] ETSI TS 183 017, DIAMETER protocol for session based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF); Protocol Specification, February 2010.

GSMA[5]

[GSMA IR.92]   GSMA PRD IR.92, IMS Profile for Voice and SMS, Version 6.0, May 2012.

[GSMA IR.94]   GSMA PRD IR.94, IMS Profile for Conversational Video Service, Version 3.0, July 2012.

FCC[6]

[FCC 47 CFR § 64 app B]   FCC Code of Federal Regulations, Part 47, Section 64, Appendix B.

IETF[7]

[RFC 4412]   IETF RFC 4412, Communications Resource Priority for the Session Initiation Protocol (SIP), February 2006.

[RFC 5865]   IETF RFC 5865, A Differentiated Services Code Point (DSCP) for Capacity-Admitted Traffic, May 2010.

[RFC 7944]   IETF RFC 7944, Diameter Routing Message Priority, August 2016.

ITU[8]

[H.248.1]   ITU-T Recommendation H.248-1, Gateway control protocol: Version 3, March 2013.

[H.248.52]   ITU-T Recommendation H.248.52, Gateway control protocol: QoS support packages, June 2008.

[H.248.81]   ITU-T Recommendation H.248-1, Gateway control protocol: Guidelines on the use of the international emergency preference scheme (IEPS) call indicator and priority indicator in ITU-T H.248 profiles, May 2011.

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[3] These documents are available from 3GPP2 at < http://www.3gpp2.org/public_html/specs/ >.

[4] This document is available from the European Telecommunications Standards Institute (ETSI) at < http://www.etsi.org/getastandard/home.htm >.

[5] These documents are available from GSMA at < http://www.gsma.com/ >.

[6] This document is available from the Federal Communications Commission (FCC). < http://www.fcc.gov/ >

[7] This document is available from the Internet Engineering Task Force (IETF). < http://www.ietf.org >

[8] This document is available from the ITU Telecommunication Standardization Sector (ITU-T). < https://www.itu.int/en/ITU-T >

3   Definitions, Acronyms, & Abbreviations

For a list of common communications terms and definitions, please visit the *ATIS Telecom Glossary*, which is located at < http://www.atis.org/glossary >.

3.1 Definitions

Emergency Telecommunications Service (ETS) is a national service, providing priority telecommunications to the ETS-authorized user in times of disaster and emergency (ITU-T Study Group 2) [E.107].

End-to-end priority treatment [ATIS-1000057] refers to mechanisms and features that support an increased probability of completion of a call/session invoked by a Service User. The priority treatment applies to call/session establishment (origination, progression, and termination). In addition to the establishment phase, the end-to-end priority treatment ensures that the call/session continues with the specified Quality of Service (QoS) until the call/session is released.

Government Emergency Telecommunications Service (GETS) [ATIS-1000057] is one facet of the U.S.A. instantiation of ETS using public telecommunications networks, offered by the government to authorized users for NS/EP purposes. GETS is a circuit-switched form of ETS for voice (and voiceband data) using PIN authorization, in which a user can invoke the service by dialing a GETS-AN or GETS-NT from most phones served by the Public Switched Network (PSN). GETS provides priority treatment across originating, transit, and terminating networks.

NS/EP NGN Priority Services (NS/EP NGN-PS) [ATIS-1000057] are the evolution of Legacy GETS and WPS to achieve service continuity in the packet-switched NGN and leverage the NGN to offer new features and priority multimedia services.

Priority Treatment [ATIS-1000057] refers to mechanisms and features that support a greater probability of service success when NS/EP NGN-PS are invoked by a Service User.

Wireless Priority Service (WPS) [ATIS-1000057] is a circuit-switched form of ETS for voice (and voiceband data) using subscription-based authentication, in which a user can invoke the service by dialing a feature code from a WPS-subscribed mobile phone served by a public wireless network. WPS provides priority treatment across originating and terminating public wireless networks, including priority radio resource assignment upon call origination and termination.

3.2 Acronyms & Abbreviations

1XRTT	Single-Carrier Radio Transmission Technology
3GPP	3rd Generation Partnership Project
AA-Request	(Diameter) Authentication/Authorization Request
AC	Access Class
ACB	Access Class Barring
AF	Application Function
AP	Application Protocol
ARP	Allocation and Retention Priority
ATIS	Alliance for Telecommunications Industry Solutions
AVP	Attribute-Value Pair
CDMA	Code Division Multiple Access
CFR	(FCC) Code of Federal Regulations

CPC	Calling Party's Category
CS	Circuit Switched
CSFB	Circuit Switched Fallback
DRMP	Diameter Routing Message Priority
DSCP	DiffServ Code Point
DSL	Digital Subscriber Line
eMLPP	enhanced Multi-Level Precedence and Pre-emption
EMM	EPS Mobility Management
eNodeB	E-UTRAN Node B, also known as Evolved Node B
EPC	Evolved Packet Core
EPS	Evolved Packet System
ETS	Emergency Telecommunication Service
ETSI	European Telecommunications Standards Institute
FE	Functional Entity
GBR	Guaranteed Bit Rate
GCSNA	Generic Circuit Services Notification Application
GERAN	GSM EDGE Radio Access Network
GETS	Government Emergency Telecommunications Service
GPRS	General Packet Radio Service
GSMA	GSM (Groupe Spéciale Mobile) Association
GTP	GPRS Tunnelling Protocol
HSS	Home Subscriber Server
IAM	Initial Address Message
IE	Information Element
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISUP	ISDN User Part
LTE	Long-Term Evolution
MG	Media Gateway
MGC	Media Gateway Controller
MGCF	Media Gateway Control Function
MIP	Mobile IP
MME	Mobility Management Entity
MPS	Multimedia Priority Service
MSC	Mobile Switching Center
MTP	Message Transfer Part

NGN	Next Generation Network
NGN-PS	Next-Generation Network Priority Services
NS/EP	National Security and Emergency Preparedness
PCC	Policy and Charging Control
PCEF	Policy and Charging Enforcement Function
PCI	Preemption Capability Indicator
PCRF	Policy and Charging Rules Function
PDB	Packet Delay Budget
PDN	Packet Data Network
PELR	Packet Error Loss Rate
PMIP	Proxy MIP
PS	Packet Switched
PS	Priority Services
PSN	Public Switched Network
PVI	Preemption Vulnerability Indicator
QCI	QoS Class Identifier
QoS	Quality of Service
RAN	Radio Access Network
RANAP	Radio Access Network Application Part
RAT	Radio Access Technology
RNC	Radio Network Controller
RNS	Radio Network System
RPH	Resource-Priority Header
RRC	Radio Resource Control
SDF	Service Data Flow
SGs	Interface between MME and VLR
SGsAP	SGs Application Protocol
SGSN	Serving GPRS Support Node
S-GW	Serving Gateway
SGW	Signaling Gateway
SIM	Subscriber Identity Model
SIP	Session Initiation Protocol
SPR	Subscriber Profile Repository
SRB	Signaling Radio Bearer
SS7	Signaling System 7
SUpl	Service User Priority Level

TCAP	Transaction Capabilities Application Part
TS	Technical Specification
UE	User Equipment
URI	Uniform Resource Identifier
USIM	Universal Subscriber Identity Model
UTMS	Universal Mobile Telecommunication System
UTRAN	UMTS (Universal Mobile Telecommunication System) Terrestrial Radio Access Network
VLR	Visitor Location Register
WPS	Wireless Priority Service

4 Reference Architectural Model

This section provides the architectural models used as references to identify the LTE and IMS parameters used on the various vertical and horizontal interfaces for supporting NS/EP NGN-PS.

4.1 Reference End-to-End Architecture

The IP-based NGN is comprised of as shown in Figure 4.1:

- Access networks, e.g., LTE, DSL consisting of various functional elements and interfaces
- IMS core networks consisting of various functional elements and interfaces
- IP transport networks (managed IP networks)

For an end-to-end priority (NS/EP NGN-PS) call/session, priority mechanisms need to be supported over various interfaces and protocols, priority processing within functional elements spanning across various network domains, across network boundaries, and within IP transport network. An end-to-end NS/EP NGN-PS call/session transverses each of the three network domains and requires priority treatment in each of these domains:

- An LTE access network (RAN and EPC) provides priority mechanisms, e.g., Access Class Barring, priority signaling, priority paging, etc., for NS/EP NGN-PS.
- An IMS Core network provides priority mechanism, e.g., policy control, priority call control signaling, priority access to subscription stored in databases, prioritized interconnection, etc., for NS/EP NGN-PS.
- A managed IP network provides prioritized transport for NS/EP NGN-PS traffic, e.g., via specialized DSCP marking for NS/EP NGN-PS.
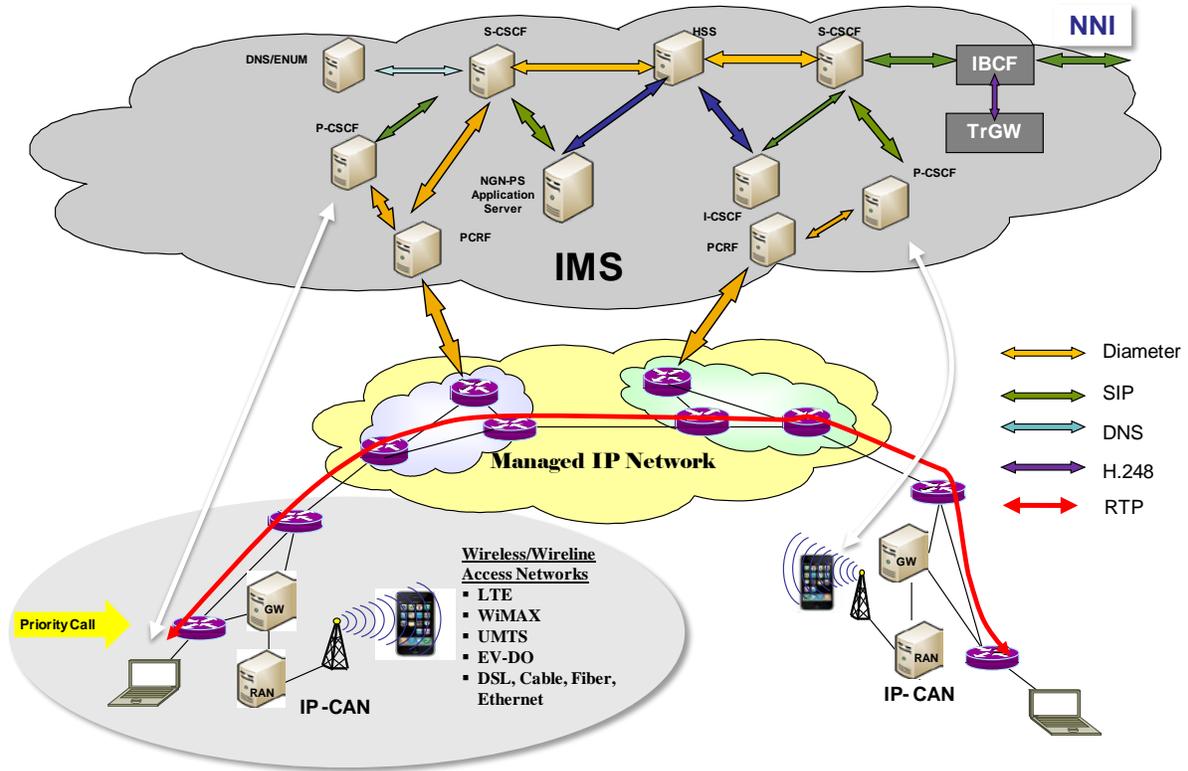
Figure 4.1 - Priority in IP-based Network – End-to-End Scenario.

4.2 Reference 3GPP Architecture for LTE Access

Figure 4.2 shows the architecture for 3GPP LTE access to the EPC, and interconnection with the GERAN/UTRAN, 1XRTT RAN, IMS Core Network, and Wireline Access network. Functional entities associated with the LTE RAN or the EPC are shown with a wider outline. Functional entities and interfaces associated with 1XRTT are blue.
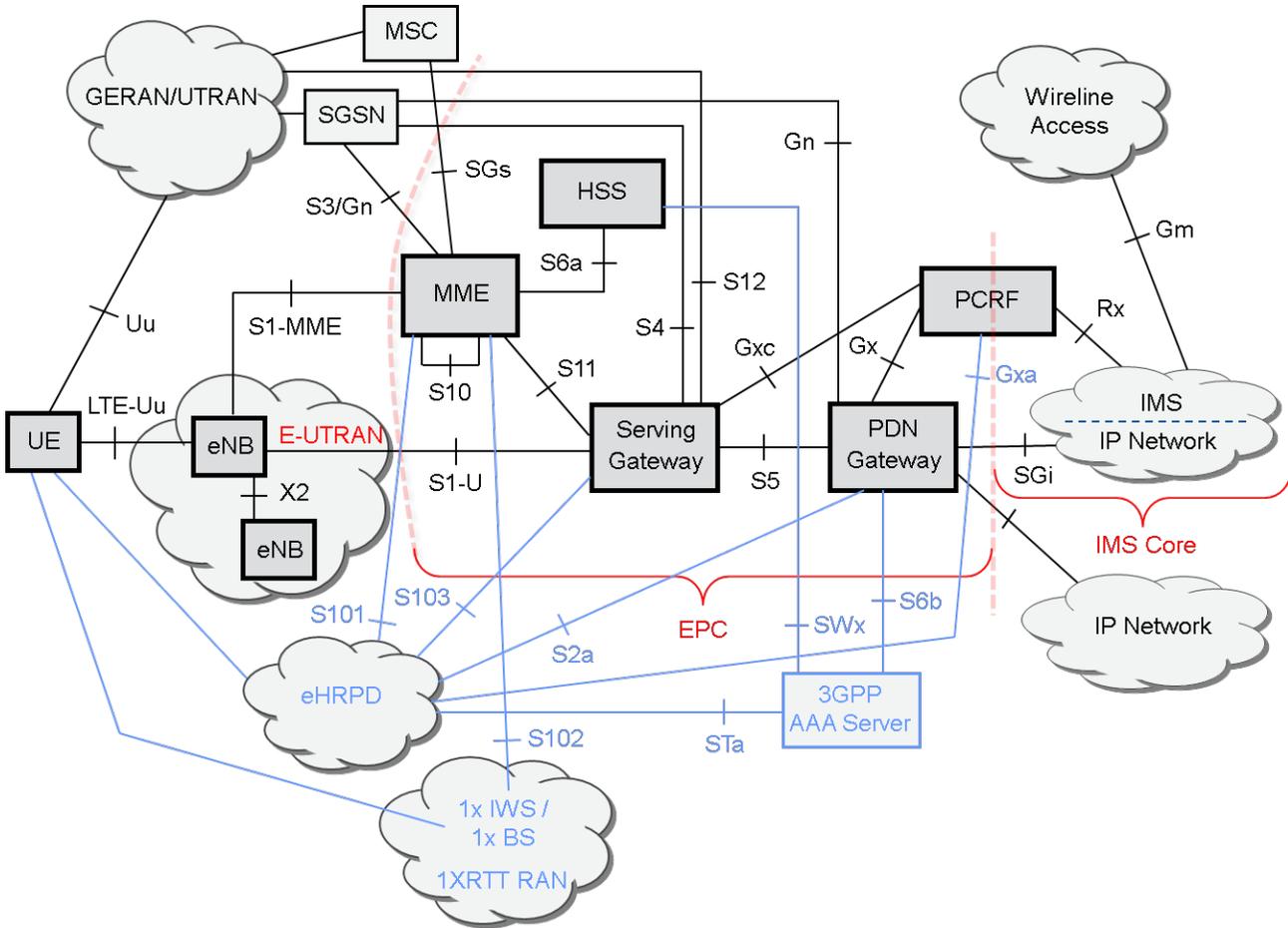
Figure 4.2 - 3GPP architecture for LTE access to the EPC, and interconnection with the GERAN/UTRAN, 1XRTT RAN, the IMS Core Network, and the Wireline Access network.

NOTE: The Gm application interface to IMS Core is applicable for both wired and wireless access.

The 3GPP architecture for LTE access to the IMS in Figure 4.2 shows the E-UTRAN, EPC (including the PCC FEs), and the IMS Core Network.

5   NS/EP Related Protocol Parameters

5.1   EPC, QoS, and PCC Related Parameters

5.1.1   EPC Related Parameters

5.1.1.1 Access Class

Access Class	
Description	All UEs are members of one out of ten randomly allocated mobile populations, defined in [TS 22.011] as Access Classes 0 to 9. The population number is statically provisioned in the SIM/USIM on the UE. In addition, UEs may be members of one or more out of 5 special categories (Access Classes 11 to 15), also held in the SIM/USIM. A UE establishing an RRC Connection for a mobile terminating call is not barred access to the cell by Access Class Barring (ACB), unless timer T302 is running. For RRC Connection establishment for other accesses, the UE performs the ACB test specified in Subclause 5.3.3.11 of [TS 36.331]. The ability for the eNodeB to selectively exempt a particular AC from ACB is found in Subclause 5.3.3.2 of [TS 36.331].
Applicable Interfaces	LTE-Uu
Reference Normative Standard	[TS 22.011], [TS 23.401], [TS 36.331], [ATIS-1000065]
NS/EP Values	A unique access class assignment for exclusive use for MPS is required since Release 10 as per Subclause 4.4a of [TS 22.011]. NS/EP NGN-PS builds on this requirement and allocates AC 14 for exclusive use for NS/EP NGN-PS as per [ATIS-1000065]. As such, the E-UTRAN can be configured to give preferential access to NS/EP NGN-PS subscribed UEs, while barring non-NS/EP NGN-PS subscribed UEs. ACB is a critical component in the suite of capabilities needed to provide priority to NS/EP NGN-PS. It is therefore advantageous for Service Users to use their NS/EP NGN-PS subscribed UE whenever possible and resort to a borrowed UE only when their NS/EP NGN-PS subscribed UE is not available.

5.1.1.2 EstablishmentCause and RRC Establishment Cause

EstablishmentCause and RRC Establishment Cause	
Description	The "EstablishmentCause" IE in the "RRCConnectionRequest" message specified in [TS 36.331] and the "RRC Establishment Cause" IE in the "Initial UE Message" message in [TS 36.413] provide the reason for requesting the establishment of an RRC connection. An "EstablishmentCause"/"RRC Establishment Cause" marked as "highPriorityAccess" indicates that the access request is originated from a UE operating as AC 11-15, and is therefore entitled to priority treatment in accessing the RAN and EPC.
Applicable Interfaces	Uu and S1-AP
Reference Normative Standard	[TS 23.401], [TS 24.301], [TS 29.272], [TS 36.331], [TS 36.413], [ATIS-1000065]
NS/EP Values	An NS/EP NGN-PS subscribed UE is assigned AC 14 in addition to one value of AC 0-9. It therefore uses an Establishment Cause of "highPriorityAccess" as specified in Annex D1 Table D.1.1 of [TS 24.301]. The "highPriorityAccess" value of the "Establishment Cause" provides for priority allocation of SRB1 resources at the eNodeB to support the transmission of control plane messages (RRC and piggybacked NAS) to the eNodeB [36.331]. It also provides exemptions to certain "Overload Action" IE values from the MME towards the eNodeB as provided within the "Overload Response" IE in the "Overload Start" message [TS 36.413].

EstablishmentCause and RRC Establishment Cause	
	The "highPriorityAccess" value of the "RRC Establishment Cause" provides for priority handling of the "Initial UE Message" at the MME [TS 36.413]. It also triggers the inclusion of priority markings and treatments in S6a signaling towards the HSS [TS 29.272], specifically the inclusion of the "DRMP" AVP in the "Update-Location-Request" command.

5.1.1.3 Paging Priority

Paging Priority	
Description	Beginning with 3GPP Release 10, the priority marking of the S1-AP "Paging" message is defined in Subclauses 8.5 and 9.1.6 of [TS 36.413] by including the "Paging Priority" IE, and results in the priority handling of the "Paging" message in times of congestion at the MME and eNodeB.
Applicable Interfaces	S1-AP
Reference Normative Standard	[TS 23.401], [TS 29.118], [TS 29.274], [TS 36.413], [A.S0008], [ATIS-1000065]
NS/EP Values	NS/EP NGN-PS priority is achieved by setting the "Paging Priority" IE to the "PrioLevel1" value when a) A GTP-C "Downlink Data Notification" message [TS 29.274] arrives at the MME from the S-GW containing an ARP associated with an NS/EP NGN-PS EPS bearer; or b) A GTP-C "Create Bearer Request" or GTP-C "Update Bearer Request" message [TS 29.274] arrives at the MME from the S-GW containing an ARP associated with an NS/EP NGN-PS call/session; or c) For the case of CSFB to the UTRAN, an SGs "SGsAP-Paging-Request" message [TS 29.118] arrives containing the "eMLPP Priority" IE with "call priority" bits set to the value 7-SUpl, where SUpl is the Service User Priority Level; or d) For the case of CSFB to 1xRTT, an S102 "A21-1x Air Interface Signaling" message [A.S0008] arrives containing the "GCSNA Status" IE with "Call Priority" bits set to the value SUpl, where SUpl is the Service User Priority Level. If due to congestion the MME cannot transmit all S1-AP "Paging" message, or the eNodeB cannot handle all received "Paging" messages, the "Paging Priority" determines the relative importance of a message to ensure that "Paging" messages associated with NS/EP NGN-PS calls/sessions are not delayed or dropped prior to "Paging" messages associated with non-NS/EP NGN-PS calls. See [ATIS-1000065] for more details and expected behavior when a second "Downlink Data Notification" message arrives during paging.

5.1.1.4 MPS-Priority AVP

MPS-Priority AVP containing the "MPS-EPS-Priority" bit and the "MPS-CS-Priority" bit	
Description	The "MPS-Priority" AVP is the means by which indication of subscription to NS/EP NGN-PS service is transferred from the HSS to MME. This parameter is specific to MPS. As per [TS 29.272], the "Update-Location-Answer" command contains the "Subscription-Data" AVP which contains the "MPS-Priority" AVP.

MPS-Priority AVP containing the "MPS-EPS-Priority" bit and the "MPS-CS-Priority" bit	
Applicable Interfaces	S6a
Reference Normative Standard	[TS 23.401], [TS 29.272]
NS/EP Values	The contents of the "MPS-Priority" AVP include two fields, each of size one bit, as follows: • "MPS-EPS-Priority" bit: marks a UE as subscribed to NS/EP NGN-PS services in the EPS. • "MPS-CS-Priority" bit: marks a UE as subscribed to NS/EP NGN-PS services in the CS domain. Prior to the download of the "MPS-Priority" AVP, knowledge of subscription to NS/EP NGN-PS can be based only on the presence of the "highPriorityAccess" value of the "EstablishmentCause"/"RRC Establishment Cause" IE. However, other services are also entitled to use the "highPriorityAccess" value, so this indication is not sufficient to verify subscription to NS/EP NGN-PS. Following the download of the "MPS-Priority" AVP, the MME has verified that the UE has subscription to NS/EP NGN-PS.

5.1.1.5 MPS EPS Priority

MPS EPS Priority	
Description	Beginning with 3GPP Release 10, the "MPS EPS Priority" is stored in the SPR and is used to mark a UE as subscribed to MPS services in the EPS. This parameter is specific to MPS. The PCRF receives the "MPS EPS Priority" from the SPR at the time of Attach using the Sp Interface [TS 23.203], a yet unspecified interface as of Release 14. Note this is different from the "MPS-EPS-Priority" bit within the "MPS-Priority" AVP described in Section 5.1.1.4. However, both of these parameters are described in the same section of [ATIS-1000065].
Applicable Interfaces	Sp
Reference Normative Standard	[TS 23.203], [ATIS-1000065]
NS/EP Values	Use of this parameter is not specified for NS/EP NGN-PS use in [ATIS-1000065], or [ATIS-1000066]. NS/EP NGN-PS solutions for Advance Priority are achieved via other means [ATIS-1000065]. In the case of Advance Priority HSS, assignment of an NS/EP NGN-PS ARP to the Default Bearer serves as an indicator to the PCRF that the UE is entitled to Advance Priority. In the case of Advance Priority SPR, the "IMS Signalling Priority" IE described in Section 5.1.1.7 serves as an indicator that the UE is entitled to Advance Priority.

5.1.1.6 MPS Priority Level

MPS Priority Level	
Description	Beginning with 3GPP Release 10, the "MPS Priority Level" is stored in the SPR and is used to indicate the Service User Priority Level. This parameter is specific to MPS.
	The PCRF receives the "MPS Priority Level" from the SPR at the time of Attach using the Sp Interface [TS 23.203], a yet unspecified interface as of Release 14.
	Note, it is not specified how this parameter interacts with the value of the "Reservation-Priority" AVP sent over the Rx Interface [TS 29.214], which is also specified to contain the priority level of an MPS call/session.
Applicable Interfaces	Sp
Reference Normative Standard	[TS 23.203]
NS/EP Values	Use of this parameter is not specified for NS/EP NGN-PS use in [ATIS-1000065], or [ATIS-1000066].
	Instead, NS/EP NGN-PS uses the Service User Priority Level contained in the "Reservation-Priority" AVP.

5.1.1.7 IMS Signaling Priority

IMS Signaling Priority	
Description	Beginning with 3GPP Release 10, the "IMS Signalling Priority" is stored in the SPR and is used to indicate that the user is subscribed to Advance Priority. This parameter is specific to MPS.
	If set, the "IMS Signalling Priority" indicates the IMS Signalling Bearer and the Default Bearer are assigned ARP appropriate for MPS at the time of the establishment of the PDN connection for IMS.
Applicable Interfaces	Sp
Reference Normative Standard	[TS 23.203], [ATIS-1000065]
NS/EP Values	If the PCRF receives the "IMS Signalling Priority" from the SPR at the time of Attach, it marks the user as subscribed to Advance Priority SPR as per [ATIS-1000065] and is entitled to Advance Priority.

5.1.1.8 CS Fallback Indicator

CS Fallback Indicator	
Description	The "CS Fallback Indicator" IE is used to indicate that fallback to a circuit-switched (CS) domain (i.e., CS Fallback) is needed. It is used for both CS Fallback to UTRAN/GERAN and CS Fallback to 1XRTT.
	CS Fallback enables the provisioning of voice and other CS-domain services by reuse of CS infrastructure when the UE is otherwise served by the E-UTRAN. A CS Fallback enabled terminal, connected to the E-UTRAN, disconnects from the E-UTRAN, changes Radio Access Technology (RAT), and may use the GERAN / UTRAN to connect to the CS domain.
	If the UE is EMM-IDLE, an "Initial Context Setup Request" message defined in Subclause 9.1.4.1 of [TS 36.413] is sent from the MME to the eNodeB, which contains the "CS Fallback Indicator" IE as defined in Subclause 9.2.3.21 of [TS 36.413].

CS Fallback Indicator	
	If the UE is EMM-CONNECTED, a "UE Context Modification Request" message, defined in Subclause 9.1.4.8 of [TS 36.413], is used instead of the "Initial Context Setup Request" message. It also contains the "CS Fallback Indicator" IE. The "CS Fallback Indicator" IE is of type ENUMERATED and may take the "CS Fallback required" or "CS Fallback High Priority" value. For an NS/EP NGN-PS subscribed UE with a subscription to CS domain priority, the "CS Fallback High Priority" value of the "CS Fallback Indicator" IE signals the eNodeB to handle the request for CS domain service with priority, including preferential treatment in times of congestion. In all cases, [TS 23.272] provides that the eNodeB may use the "CS Fallback High Priority" marking to determine whether PS Handover or Release with Redirection is used to transfer the UE to the RAT supporting CS domain service.
Applicable Interfaces	S1-MME
Reference Normative Standard	[TS 23.272], [TS 36.413]
NS/EP Values	"CS Fallback High Priority"

5.1.1.9 CSFB Information

CSFB Information	
Description	Beginning with 3GPP Release 9, the "CSFB Information" IE is used in CS Fallback scenarios where PS Handover support is available, and selected by the eNodeB. The "CSFB Information" IE, defined in Subclause 9.2.1.28 of [TS 25.413], is of type ENUMERATED and may be assigned either the "CSFB" or "CSFB High Priority" value. The "CSFB High Priority" value is the means by which the Source eNodeB signals the Target Radio Network System (RNS) that the CSFB request is entitled to priority treatment within the Radio Access Network (RAN) supporting the CS domain. The following sequence of messages transmits the "Source RNC to Target RNC Transparent Container" IE that contains the "CSFB Information" IE: • The eNodeB sends an S1-AP "Handover Required" message (Subclause 9.1.5.1 of [TS 36.413]) to the MME; • The MME sends a GPRS Tunnelling Protocol (GTP) v1-C or v2-C "Forward Relocation Request" message (Subclause 7.5.6 of [TS 29.060] for GTPv1-C and Subclause 7.3.1 of [TS 29.274] for GTPv2-C) to the Serving GPRS Support Node (SGSN); and • The SGSN sends a Radio Access Network Application Part (RANAP) "Relocation Request" message (Subclause 9.1.10 of [TS 25.413]) to the RNS. The "Source RNC to Target RNC Transparent Container" IE is defined in Subclause 9.2.1.28 of [TS 25.413]. It is carried in the "UTRAN Transparent Container" IE, as specified in Subclause 8.48 of [TS 29.274] for GTPv2-C and Subclause 7.7.38 of [TS 29.060] for GTPv1-C.
Applicable Interfaces	S1-MME, S3, Iu, Gn
Reference Normative Standard	[TS 25.413], [TS 29.060], [TS 29.274]
NS/EP Values	"CSFB High Priority"

5.1.1.10   releaseCause

releaseCause	
Description	Beginning with 3GPP Release 10, the "releaseCause" IE, defined in Subclause 6.2.2 of [TS 36.331], is used in CS Fallback scenarios when "Release with Redirection" is selected by the eNodeB. The eNodeB identifies the need for CS Fallback upon receipt of an "Initial Context Setup Request" message or a "UE Context Modification Request" message from the MME containing a "CS Fallback Indicator" IE which may be set to either the "CS Fallback required" value or "CS Fallback High Priority" value. For NS/EP NGN-PS calls, the "CS Fallback Indicator" IE is always set to the "CS Fallback High Priority" value. Once "Release with Redirection" is chosen by the eNodeB to satisfy the CS Fallback request from the MME, an NS/EP NGN-PS indication can only be provided from the E-UTRAN to the UTRAN via the UE. A Radio Resource Control (RRC) "RRCConnectionRelease" message defined in Subclauses 5.3.8 and 6.2.2 of [TS 36.331] is sent by the eNodeB to the UE to signal the UE to redirect to a UTRAN/GERAN NodeB. The "RRCConnectionRelease" message includes the "releaseCause" IE, and the E-UTRAN signals the UE of the priority nature of the redirection by setting the "releaseCause" IE to the "cs-FallbackHighPriority" value. As defined in [TS 23.272] the "cs-FallbackHighPriority" value signals the UE that the CSFB procedure should be given priority treatment in the UTRAN/GERAN. The same indicator is used for Mobile Originated and Mobile Terminated CSFB, as the release procedure is the same in both cases.
Applicable Interfaces	LTE-Uu
Reference Normative Standard	[TS 23.272], [TS 36.331]
NS/EP Values	"cs-FallbackHighPriority"

5.1.1.11   eMLPP Priority

eMLPP Priority	
Description	If a CS domain call is received by the MSC with priority, the "eMLPP Priority" IE is included by the MSC in the "SGsAP-Paging-Request" message [TS 29.118]. The "eMLPP Priority" is defined in Subclause 18.4.4 of [TS 29.018] which extends the "eMLPP Priority" defined in Subclause 3.2.2.56 of [TS 48.008] by the inclusion of information element length indication. The priority of a call is coded in "call priority" using 3 bits as defined in Table 10.5.8 in Subclause 10.5.1.11 of [TS 24.008]. Note that this "call priority" is not the same as the "Call Priority" described in Section 5.1.1.12.
Applicable Interfaces	SGs
Reference Normative Standard	[TS 24.008], [TS 29.018], [TS 29.118], [TS 48.008]
NS/EP Values	The mapping of Service User Priority Level to eMLPP Priority Level and the coding of the TS 24.008 "call priority" field is shown in Table 5.1.

Table 5.1 - Mapping of Service User Priority Level to eMLPP Priority Level and TS 24.008 call priority.

Service User Priority Level	eMLPP Priority Level	TS 24.008 call priority
1 (highest)	B	6
2	0	5
3	1	4
4	2	3
5 (lowest)	3	2

5.1.1.12   Call Priority

Call Priority	
Description	In support of Mobile Terminated CSFB to 1xRTT (cdma2000), the S102 Interface [TS 29.277] carries the "A21-1x Air Interface Signaling" message defined by 3GPP2 in Section 5.1.6.1 of [A.S0008] which carries a "GCSNA Status" IE that itself contains the "Call Priority" field defined by 3GPP2 in Section 5.2.4.15 of [A.S0008]. The "Call Priority" field, as described in Section 4.2.15 of [A.S0014], is a 4-bit field with 16 possible values with range 0-15, with "0" the highest priority and "15" the lowest priority. Note that this "Call Priority" is not the same as the "call priority" described in Section 5.1.1.11.
Applicable Interfaces	S102
Reference Normative Standard	[TS 29.277], [A.S0008], [A.S0014], [ATIS-1000065]
NS/EP Values	Table 5.2 summarizes the mapping of the Service User Priority Level to the "Call Priority" field. Only "Call Priority" values 1 through 5 inclusive are used by NS/EP NGN-PS.

Table 5.2 - Mapping of Service User Priority Level to Call Priority.

Service User Priority Level	Call Priority
	0 (Reserved)
1 (highest)	1
2	2
3	3
4	4
5 (lowest)	5
	7-15 (Reserved)

5.1.2   QoS Related Parameters

5.1.2.1 Allocation, Retention and Preemption (ARP)

ARP	
Description	The Allocation Retention Priority (ARP) as per Subclause 4.7.3 of [TS 23.401] and Subclause 6.1.7.3 of [TS 23.203] includes three sub fields: • *Priority Level:* an integer from 1 to 15, where 1 is the highest priority; • *PVI (Preemption Vulnerability Indicator):* marks a bearer as being allowed to be preempted; and • *PCI (Preemption Capability Indicator):* marks a bearer request as capable of preempting an existing established bearer. The ARP provides an indication of the priority to be applied in three situations: 1. *In the allocation (establishment or modification) of an EPS bearer:* When the system cannot fulfill all requests, higher priority ones are accepted while lower priority ones are rejected. 2. *In "exceptional" cases when an EPS bearer needs to be dropped:* When handover occurs and the target cell cannot support all the EPS bearers previously supported by the source cell, the priority indicates which ones should be supported and which should be dropped. 3. *In the preemption of an EPS bearer:* When a new bearer (either an initial allocation or handover), marked as capable of preempting, is established by preempting an existing bearer marked vulnerable to preemption, only a bearer with a lower priority level may be chosen to be preempted. Once successfully established, a bearer's ARP does not impact packet forwarding treatment. The QCI, described in Section 5.1.2.2 provides an index into a set of parameters controlling forwarding treatment. There is no relationship between the ARP Priority Level and the Priority associated with a QCI according to the 3GPP specification. The ARP for Default Bearer downloaded to the MME at the time of Attach. Subsequent PCC procedures (can also be applied at the time of Attach, if so configured) may alter this subscription-based ARP. The PCRF may directly alter the ARP (or any other QoS) parameter of the Default Bearer. The ARP for a SDF is provided by the PCRF to the PCEF in a PCC rule. The PCEF is responsible for assigning PCC rules to an EPS Bearer. This may the Default Bearer, or an already established Dedicated Bearer, or may be a new Dedicated Bearer established by the PCEF. Thus the PCRF has only indirect control of the ARP (or any other QoS) parameter assigned to any Dedicated Bearer.
Applicable Interfaces	S1, X2, S3, S4, S5, S6a, S8, S10, S11, Gn, Gx, Gxa, Gxc
Reference Normative Standard	[TS 23.203], [TS 23.401], [TS 29.274], [ATIS-1000065]
NS/EP Values	For NS/EP NGN-PS subscribed UEs, as per [ATIS-1000065], the HSS will provision the ARP of the Default bearer to contain the highest Priority Level (the lowest numeric value) among the set of ARP values reserved by the Service Provider for use by NS/EP NGN-PS and to contain a Pre-emption Vulnerability set to the "not-pre-emptable" value. For Dedicated Bearers established for NS/EP NGN-PS services, as per [ATIS-1000065], the Pre-emption Capability is set to "shall-not-trigger-pre-emption" and the Pre-emption Vulnerability is set to "not-pre-emptable." Allowed values for the Priority Level of the ARP are chosen from the set allowed in [TS 23.401] for intra-domain use.

ARP
At the S-GW, when the UE is idle and needs to be paged, the ARP of the bearer on which an IP packet arrives is included in the GTP-C "Downlink Data Notification" message [TS 29.274]. When the ARP is from the list associated with NS/EP NGN-PS, the inclusion of the NS/EP NGN-PS "ARP" value conveys NS/EP NGN-PS priority indication. See [ATIS-1000065] for more details and special cases associated with transmission of a second "Downlink Data Notification" message. Refer to [FCC 47 CFR § 64 app B] for information on NS/EP user priority.

5.1.2.2 Quality of Service (QoS) Class Identifier (QCI)

QCI	
Description	As specified in Subclause 6.1.7.2 of [TS 23.203], QCI is an integer which maps to four parameters: • *Resource Type (GBR or non-GBR)*: Guaranteed Bit Rate (GBR) does not imply an absolute guarantee, equivalent for example to an allocated circuit switched connection. Instead there is a statistical guarantee to meet an agreed bit rate requirement, under the assumption that there is no drastic changes in radio link conditions. For a GBR bearer, network resources are allocated at the time of admission, while for non-GBR bearers no such allocation occurs at the time of admission. • *Packet Error Loss Rate (PELR)*: The PELR provides an upper bound on RLC SDUs that are not successfully delivered over the radio link. It provides for the appropriate configuration of RLC and HARQ parameters. The PELR is an upper bound on non-congestion related packet losses in the upstream and downstream directions. Thus, the overall loss rate experienced by the end user can be significantly higher than the PELR during times of high network congestion. • *Packet Delay Budget (PDB)*: The PDB defines an upper bound for the time that a packet may be delayed between the UE and the PCEF in the upstream or downstream directions with a confidence level of 98 percent. In the case of a GTP-based S5/S8 Interface, the PCEF is the PDN-GW; in the case of a PMIP-based S5/S8 Interface, the PCEF is the S-GW. The PDB supports the configuration of scheduling and link layer functions, and is the primary objective of the scheduler. Packets are not automatically dropped when they exceed the PDB limit. • *Priority*: Priority is used to differentiate multiple SDFs from the same UE and also to differentiate among SDFs from different UEs. The Priority determines, during times of congestion when the PDB of all SDFs cannot be satisfied, which SDFs are given access to network resources. It is expected that when such periods of congestion persist for an extended time, other mechanisms, for example, the dropping of established EPS Bearers will be employed to reestablish conditions in which the QoS of the remaining established EPS Bearers can be maintained. There are no QCI values defined by 3GPP for exclusive use by MPS.
Applicable Interfaces	S1, X2, S3, S4, S5, S8, S10, S11, Gx, Gxa, Gxc, Uu
Reference Normative Standard	[TS 23.203], [TS 23.401], [GSMA IR.92], [GSMA IR.94], [ATIS-1000065]

QCI	
NS/EP Values	QCI usage is specified for NS/EP NGN-PS in [ATIS-1000065] which assumes a pre-Release 12 system for which only nine QCIs are specified in [TS 23.203]. For NS/EP NGN-PS Voice, consistent with [GSMA IR.92], QCI=1 is required. For NS/EP NGN-PS Video carried via a GBR bearer, consistent with [GSMA IR.94], QCI =2 is required. For NS/EP NGN-PS Video carried via a non-GBR bearer, no specific QCI is required in [ATIS-1000065]. For the NS/EP NGN-PS Data Transport Service, a non-GBR bearer is used, but it specifically cannot be QCI=5 or QCI=9; it is recommended in [ATIS-1000065] to be QCI=6. Refer to [FCC 47 CFR § 64 app B] for information on NS/EP user priority.

5.1.3 PCC Related Parameters

5.1.3.1 MPS-Identifier AVP

MPS-Identifier AVP	
Description	The "MPS-Identifier" AVP is specified in [TS 29.214] as an AVP of type OctetString in the Diameter "AA-Request" command sent from the AF to the PCRF. This parameter is specific to MPS.
Applicable Interfaces	Rx
Reference Normative Standard	[TS 23.203], [TS 29.212], [TS 29.213], [TS 29.214], [ATIS-1000065], [ATIS-1000066]
NS/EP Values	The PCRF recognizes that a request over the Rx Interface is associated with NS/EP NGN-PS by virtue of receiving the "MPS-Identifier" AVP and takes the following actions. The PCRF ensures that the Default and IMS Signaling Bearers are configured for NS/EP NGN-PS [TS 23.203]. If upgrades are required, the PCRF requests them from the PCEF. The PCRF derives the ARP / QCI (as per [TS 29.213]) to support the requested media through a Service Provider specific mapping algorithm. The PCRF signals the PCC rule to support the requested media to the PCEF in the "Re-Auth-Request" command defined in [TS 29.212]. See [ATIS-1000065] and [ATIS-1000066] for exemptions to this general rule in which the PCC rule is not signaled at this time. The following value is standardized in ATIS [ATIS-1000066]: • "NGN GETS" defined for the NS/EP NGN-PS Voice and NS/EP NGN-PS Video services.

5.1.3.2 Reservation-Priority AVP

Reservation-Priority AVP	
Description	The "Reservation-Priority" AVP is used on the Rx Interface as specified in [TS 29.214]. In [TS 29.214] the "Reservation-Priority" AVP is reused from European Telecommunications Standards Institute (ETSI) TS 183 017 [ETSI TS 183 017] which defines 15 values for priority from PRIORITY-ONE (1) to PRIORITY-FIFTEEN (15). DEFAULT (0) is the lowest level of priority and

Reservation-Priority AVP	
	the priority associated with the reservation if no "Reservation-Priority" AVP is specified. In the Rx Interface "AA-Request" command, the "Reservation-Priority" AVP is carried at the session level. It is also carried within the media component level for each media. For a voice call, the "AA-Request" command carries two instances of the "Reservation-Priority" AVP, one at the session level and one at the media level. For a video call, the "AA-Request" command carries three instances of the "Reservation-Priority" AVP, one at the session level, a second for the audio media, and a third for the video media.
Applicable Interfaces	Rx
Reference Normative Standard	[TS 29.214], [ETSI TS 183 017], [ATIS-1000066]
NS/EP Values	NS/EP NGN-PS does not reserve a set of values of the "Reservation-Priority" AVP for exclusive use by NS/EP NGN-PS, but recommends values 11-15 of the "Reservation-Priority" AVP for non-exclusive use by NS/EP NGN-PS. The specific "Reservation-Priority" AVP value is derived from the Service User Priority Level as specified in [ATIS-1000066], and the "MPS-Identifier" AVP (See Section 5.1.3.1) marks the request as associated with NS/EP NGN-PS. The Rx Interface "AA-Request" command includes both the "MPS-Identifier" AVP and the "Reservation-Priority" AVP. For NS/EP NGN-PS Voice, [TS 29.214] specifies that both instances of the "Reservation-Priority" AVP are set equal to the Service User Priority Level. If the "AA-Request" command associated with NS/EP NGN-PS Voice is triggered by a SIP message containing the ets.x and wps.y namespaces in the RPH header field, the Service User Priority Level is known from the wps.y. If the "AA-Request" command does not include the "wps.y" namespace, for example, in the case of a SIP Invite arriving at the P-CSCF within the originating network, a configured Default Service User Priority Level is used to determine the "Reservation-Priority" AVP. See [ATIS-1000066] for details. Note, for NS/EP NGN-PS Video, [TS 29.214] does not provide a clear specification on differentiation of the "Reservation-Priority" AVP for the audio and video media components. Table 5.3 below shows the mapping of Service User Priority Level to the Reservation-Priority AVP Value.

Table 5.3 - Mapping of Service User Priority Level to Reservation-Priority AVP Value.

Service User Priority Level	Reservation-Priority AVP Value
1	15
2	14
3	13
4	12
5	11

5.2 Diameter Interface Parameters

5.2.1 Session-Priority AVP

Session-Priority AVP	
Description	The Session-Priority AVP, specified in [TS 29.229], and used on the Cx, Dx, Sh, and Dh interfaces beginning in 3GPP Release 8, identifies an NS/EP NGN-PS call/session and indicates to the receiving FE the need for priority handling of signaling messages for that NS/EP NGN-PS call/session. The Session-Priority AVP is of type ENUMERATED, with values ranging from PRIORITY_0 (0) as the highest priority to PRIORITY_4 (4) as the lowest priority. For NS/EP NGN-PS calls/sessions, the Service User's priority level maps to the Session-Priority AVP.
Applicable Interfaces	Cx/Dx, and Sh/Dh
Reference Normative Standard	[TS 29.228], [TS 29.229], [TS 29.238], [TS 29.239], [ATIS-1000066.2016]
NS/EP Values	Table 5.4 below summarizes the mapping of the Service User Priority Level to the Session-Priority AVP value.

Table 5.4 - Mapping of Service User Priority Level to Session-Priority AVP Value.

Service User Priority Level	Session-Priority AVP Value
1	0
2	1
3	2
4	3
5	4

NOTE: Support for the Session-Priority AVP could be omitted, assuming universal support for the corresponding DRMP AVP. However, the Session-Priority AVP may be retained for backwards compatibility reasons. If the DRMP AVP is supported by all Diameter-capable FEs, then the Session-Priority AVP could be deprecated.

5.2.2 DRMP AVP

DRMP AVP	
Description	The Diameter Routing Message Priority (DRMP) AVP, as defined in IETF RFC 7944 and added in 3GPP Release 13 specifications, is used on the Cx, Dx, Sh, Dh, Rx, Gx, and other Diameter interfaces to indicate the relative priority of Diameter commands. The DRMP AVP contains a value that may be used by Diameter nodes for routing, resource allocation, and overload abatement decisions. It is allowed to be carried in Diameter request commands as well as Diameter answer commands, and permits the answer command to have a different priority than the priority carried in the request command. By default, the priority information in the request command applies to the answer command, i.e., if the DRMP AVP is not provided in a Diameter response command, the Diameter node provides priority treatment consistent with the value previously specified in the Diameter request command. The DRMP AVP is type ENUMERATED, with values ranging from PRIORITY 0 (0) as the highest priority to PRIORITY 15 (15) as the lowest priority.

DRMP AVP	
	For NS/EP NGN PS calls/sessions, the DRMP AVP value is derived from the Service User Priority Level.
Applicable Interfaces	Cx, Dh, Dx, Gdd, Gx, Gxx, MB2-C, Np, Ns, Nt, PC4a, PC6, PC7, REST, Rx, S6a, S6b, S6c, S6d, S6m, S6n, S6t, S7a, S7d, S9, S9a, S13, S13', S15, Sd, SGd, Sh, St, STa, SWa, SWd, SWm, SWx, Sy, T4, T6a, T6ai, T6b, T6bi, and T7
Reference Normative Standard	[TS 29.128], [TS 29.153], [TS 29.154], [TS 29.201], [TS 29.212], [TS 29.214], [TS 29.215], [TS 29.217], [TS 29.219], [TS 29.228], [TS 29.229], [TS 29.272], [TS 29.273], [TS 29.328], [TS 29.329], [TS 29.336], [TS 29.337], [TS 29.338], [TS 29.344], [TS 29.345], [TS 29.468], [RFC 7944], [ATIS-1000065], and [ATIS-1000066]
NS/EP Values	Table 5.5 below summarizes the mapping of the Service User Priority Level to the DRMP AVP value.

Table 5.5 - Mapping of Service User Priority Level to DRMP AVP Value.

Service User Priority Level	DRMP AVP Value
1	0
2	1
3	2
4	3
5	4

5.3 Call Control Signaling

5.3.1 IP/NGN

5.3.1.1 SIP Resource-Priority Header

SIP Resource-Priority Header	
Description	SIP may indicate a request for a NS/EP NGN-PS call/session from the UE via the digits in the Request-URI. Within the IMS Core Network, SIP uses the Resource-Priority Header (RPH) to indicate a request for priority network resources. The RPH is part of the SIP INVITE request and many other SIP messages applied throughout the active phase of the NS/EP NGN-PS call/session. It is not included in messages sent to and from the UE.
	For NS/EP NGN-PS, the RPH contains:
	• the ets namespace, which is used to indicate an NS/EP NGN-PS call/session and is encoded as ets.x, where x=0; and
	• the wps namespace, which is used to indicate the Service User's Priority Level and is encoded as wps.y, where y (assuming values 0 to 4) corresponds to Service User's Priority Level 1 to 5.
	When the wps namespace is included in the RPH, the ets namespace is also always included.
	The request for an NS/EP NGN-PS call/session is recognized by the presence of the RPH ets namespace in the SIP message and afforded priority for resource reservation/assignment and priority treatment.

SIP Resource-Priority Header	
Applicable Interfaces	ISC, Mw, Mr, Mg, Mi, Mm, Mj, Mk, Mx, Mr'/Cr
Reference Normative Standard	[ATIS-1000066.2016], [RFC 4412], [TS 23.002], [TS 23.228], [TS 23.203], [TS 24.229]
NS/EP Values	ets namespace: encoded as ets.x, where x=0 wps namespace: encoded as wps.y, where y can have values 0 through 4 Table 5.6 below shows the mapping between Service User's Priority Level and y value in the wps namespace.

Table 5.6 - Mapping of Service User Priority Level to y value in wps namespace.

Service User Priority Level	y value in wps namespace
1	0
2	1
3	2
4	3
5	4

5.3.2 PSTN/SS7

5.3.2.1 ISUP Calling Party's Category (CPC)

CPC	
Description	The ISUP IAM's Calling Party's Category (CPC) parameter is used to indicate that the call is authorized to receive priority treatment when routed to Public Switched Networks (PSNs) in support of NS/EP NGN-PS calls/sessions. For an NS/EP NGN-PS call/session routed to a PSN, the ISUP IAM sent by the MGCF/SGW is coded with the CPC parameter value of "NS/EP Call" [ATIS-1000679.2015].
Applicable Interfaces	A1
Reference Normative Standard	[ATIS-1000066-2016], [ATIS-1000679.2015], [ATIS-1000113.2005]
NS/EP Values	"NS/EP Call"

5.3.2.2 ISUP Precedence

Precedence	
Description	The ISUP IAM's Precedence parameter indicates the relative processing priority to be applied to SS7 IAM routed to PSNs in support of NS/EP NGN-PS calls/sessions. NS/EP NGN-PS calls/sessions are identified in PSN by encoding of the ISUP IAM's Calling Party's Category (CPC) parameter with the value "NS/EP Call" (see Section 5.3.2.1). The Precedence parameter reflects the Service User's priority level as indicated by the y value of the wps.y namespace in the SIP RPH routed to PSN in support of NS/EP NGN-PS calls/sessions. For an NS/EP NGN-PS call/session routed to a PSN, the ISUP IAM sent by the MGCF/SGW is coded with the Precedence parameter, if included,

Precedence	
	value of 0 through 4, corresponding to the Service User priority level [ATIS-1000679.2015].
Applicable Interfaces	A1
Reference Normative Standard	[ATIS-1000066-2016], [ATIS-1000679.2015], [ATIS-1000113.2005]
NS/EP Values	Table 5.7 below shows the mapping between the Service User's priority level and the ISUP Precedence value.

Table 5.7 - **Mapping of Service User Priority Level to ISUP Precedence Value.**

Service User Priority Level	ISUP Precedence Value
1	0
2	1
3	2
4	3
5	4

5.4 SS7 Transport

5.4.1 MTP Message Priority

MTP Message Priority	
Description	The MTP Message Priority of the ISUP IAM is used to indicate that priority treatment is required when routed to PSNs in support of NS/EP NGN-PS calls/sessions. The MTP Message Priority parameter is set to 1 as specified in [ATIS-1000111-2015] Table A.1/T1.111.5 - Annex A - Priority Assignments For ISUP Messages.
	For an NS/EP NGN-PS call/session routed to a PSN, the MTP message priority of the ISUP IAM sent by the MGCF/SGW is set to 1 [ATIS-1000679.2015].
	Per [ATIS-1000066-2016] Section 4.2.17 it is an objective that priority treatment be provided to any queries and responses associated with an NS/EP NGN-PS call/session (e.g., number portability or supplementary services). Therefore, the MTP Message Priority parameter of the associated TCAP messages should be set to 2 as specified in [ATIS-1000111-2015] Table A.2/TI.111.5 - Annex A - Priority Assignments For SCCP Messages.
Applicable Interfaces	A1
Reference Normative Standard	[ATIS-1000066-2016], [ATIS-1000679.2015], [ATIS-1000111-2015]
NS/EP Values	1 for MTP 2 for TCAP

5.5 IP Transport

5.5.1 IP DiffServ Code Point (DSCP)

IP DiffServ Code Point (DSCP)	
Description	Each FE is configured with an IP header DiffServ Code Point (DSCP) value to be used for the IP packets it generates to carry signaling (e.g., SIP, Diameter, H.248) and bearer (e.g., voice) related to an NS/EP NGN-PS call/session. The DSCP is used to provide priority treatment where DiffServ is used. In general, NS/EP NGN-PS signaling and bearer packets can be identified by specific information in the packet header (e.g., a specific DSCP value).
Applicable Interfaces	IMS interfaces: SIP: ISC, Mw, Mr, Mr', Mg, Mi, Mm, Gm, Mj, Mk, Mx; Diameter: Cx, Dx, Sh, Dh, Rx, Gx; H.248: Mn, Mp, Ix EPC interfaces: S1, X2, S3, S4, S5, S6a, Gx/Gxx, S8, S9, S10, S11, S12, SGi, SGs, and Rx
Reference Normative Standard	[TS 23.002], [TS 23.228], [TS 23.272], [TS 24.229], [TS 29.061], [TS 29.212], [TS 29.214], [TS 29.215], [TS 29.229], [TS 29.230], [TS 29.238], [TS 29.272], [TS 29.274], [TS 29.275], [TS 29.281], [TS 29.328], [TS 29.329], [TS 29.332], [TS 29.333], [TS 36.413], [TS 36.423], [ATIS-1000065], [ATIS-1000066], [H.248.1], [H.248.52], [RFC 4412], [RFC 5865]
NS/EP Values	101100 (44) (VOICE-ADMIT)

5.6 Gateway Control

5.6.1 H.248.1 Priority Indicator

H.248.1 Priority Indicator	
Description	For an NS/EP NGN-PS call/session, the H.248.1 Priority indicator carries the priority level information between the controller (e.g., Media Gateway Controller (MGC)) and gateway (e.g., Media Gateway (MG)) as defined in [H.248.1]. It supports 16 levels of priority; Priority 0 is the lowest priority and a Priority 15 is the highest priority. The Priority indicator, which carries the Service User's Priority Level, uses 5 of the 16 priority levels to provide the gateway with information about certain precedence handling of bearer packets. The controller can also use the Priority indicator to autonomously control the traffic precedence in the MG in a smooth way in certain situations (e.g., during a restart), when a large number of contexts must be handled simultaneously. The Priority indicator (Section 6.1.1 of [H.248.1]) is encoded as per Annex A of [H.248.1] (priority). The H.248.1 Priority indicator is mandatory whenever an NS/EP NGN-PS call/session is indicated and is not dependent upon the presence of a priority level in the call control signaling.
Applicable Interfaces	Mn, MP, Ix

H.248.1 Priority Indicator	
Reference Normative Standard	[H.248.1], [H.248.81], [TS 29.332], [TS 29.238], [TS 29.333] [ATIS-1000066.2016]
NS/EP Values	NS/EP NGN-PS uses values 11-15 of the Priority indicator. Table 5.8 below shows the mapping of Service User Priority Level to the H.248.1 Priority indicator.

Table 5.8 - Mapping of Service User Priority Level to H.248.1 Priority Indicator.

Service User Priority Level	H.248.1 Priority Indicator
1	15
2	14
3	13
4	12
5	11