ATIS-1000057

SERVICE REQUIREMENTS FOR EMERGENCY TELECOMMUNICATIONS SERVICE (ETS) IN NEXT GENERATION NETWORK (NGN)

TECHNICAL REPORT

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ATIS-1000057, *Service Requirements for Emergency Telecommunications Service (ETS0 in Next Generation Networks (NGN)*

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Technical Report on

Service Requirements for Emergency Telecommunications Service (ETS) in Next Generation Network (NGN)

Alliance for Telecommunications Industry Solutions

Approved February 2014

Abstract

This Technical Report describes service requirements and use case examples for Emergency Telecommunication Service (ETS) in Next Generation Network (NGN).

Foreword

As a leading technology and solutions development organization, the Alliance for Telecommunications Industry Solutions (ATIS) brings together the top global information and communications technology (ICT) companies to advance the industry's most-pressing business priorities. 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. ITU-T and U.S. 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 it approved this document, PTSC, which is responsible for the development of this Standard, had the following leadership:

M.Dolly, PTSC Chair (AT&T)
V. Shaikh, PTSC Vice Chair (Applied Communication Sciences)
M.Dolly, PTSC SAC Chair (AT&T)
R. Singh, Technical Editor (Applied Communication Sciences)

The Signaling, Architecture, and Control (SAC) Subcommittee was responsible for the development of this document.

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Service Requirements for Emergency Telecommunications Service (ETS) in Next Generation Network (NGN)

1 Scope, Purpose, & Application

1.1 Scope

This Technical Report (TR) describes service requirements and use case examples for Emergency Telecommunication Service (ETS) in Next Generation Network (NGN). It provides descriptions of the various services (such as voice, video, and data) for which priority capabilities can be provided under the ETS umbrella. This includes service requirements from an ETS user's perspective, methods of invocation of ETS, procedures for ETS authentication, and example use cases.

1.2 Purpose

The purpose of this document is to provide high-level service requirements and use cases examples from the context of the end users that can then be used as a reference point to specify the more detailed network and protocol requirements.

1.3 Application

This TR is applicable to Emergency Telecommunication Service (ETS) in Next Generation Network (NGN).

2 Normative References

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

2.1 ATIS References

[ATIS-1000010] ATIS-1000010.2006 (R2011), *Support of Emergency Telecommunications Service in IP Networks*.[1]

[ATIS-1000023] ATIS-1000023.2013, *ETS Phase 1 Network Element*.[2]

[ATIS-1000011] *ETS Packet Priority for IP NNI Interfaces – Use of Existing DiffServ Per Hop Behaviors*.[3]

[1] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=25485 >.

[2] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=25575 >.

[3] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=22765 >.

[ATIS-1000020] *ETS Packet Priority for IP NNI Interfaces – Requirements for a Separate Expedited Forwarding Mechanism*.[4]

[ATIS-1000049] *Standard for End-to-End NGN GETS Call Flows*.[5]

[ATIS-0100003] *User Plane Priority Levels for IP Networks and Services*.[6]

2.2 ITU-T References[7]

[ITU-T Y.2171] ITU-T Recommendation Y.2171, *Admission Control Priority Levels in NGN*.

2.2 IETF References[8]

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

[RFC 3260] IETF RFC 3260, *New Terminology and Clarifications for Diffserv*.

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

[RFC 3031] IETF RFC 3031, *Multiprotocol Label Switching Architecture*.

[RFC 3270] IETF RFC 3270, *Multi-Protocol Label Switching (MPLS) Support of Differentiated Services*.

2.3 3GPP[9]

[TS 23.203] 3GPP TS 23.203, *Policy and Charging Control Architecture* (Release 11).

2.4 Other

[GSMA IR.94] GSM Association, PRD IR.94, *IMS Profile for Conversational Video Service, Version 3.0*, July 4, 2012.[10]

3 Definitions, Acronyms, & Abbreviations

3.1 Definitions

3.1.1 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].

3.1.2 End-to-end priority treatment 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

[4] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=22934 >.

[5] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=26039 >.

[6] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=11476 >.

[7] This document is available from the International Telecommunications Union. < http://www.itu.int/ITU-T/ >

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

[9] This document is available from the Third Generation Partnership Project (3GPP) at < http://www.3gpp.org/specs/specs.htm >.

[10] This document is available from the GSM Association (GSMA) at < http://www.gsma.com >.

priority treatment ensures that the call/session continues with the specified Quality of Service (QoS) until the call/session is released.

3.1.3 Government Emergency Telecommunications Service (GETS) is one facet of the U.S.A. instantiation of ETS using public telecommunications networks, offered by the government[11] 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.

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

3.1.5 NS/EP NGN-PS Data Transport service is a Service Provider NS/EP service that provides priority transport of non-GBR data traffic. Invocation and revocation of the service is supported either via SIP-based interactions with an IMS Core Network or via HTTPS-based interactions.

3.1.6 NS/EP NGN-PS GBR Data service is a Service Provider NS/EP service that provides priority transport of GBR data traffic. Invocation and revocation of the service is supported either via SIP-based interactions with an IMS Core Network or via HTTPS-based interactions.

3.1.7 NS/EP NGN-PS Voice service is a Service Provider NS/EP voice service supported by an IMS-based Core Network.

3.1.8 NS/EP NGN-PS Video service is a Service Provider NS/EP video service supported by an IMS-based Core Network.

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

3.1.10 Service is a telecommunications capability provided to a user that can be accessed via a UE connected to a service provider's network. Examples of services include making a telephone call, engaging in a video session, getting a map and directions from a server, or getting priority on establishment of a telephone call.

3.1.11 Service Provider (initial capital letters) is a public telecommunications service provider authorized by the government to provide NS/EP NGN-PS.

When "service provider" (without initial capital letters) is used, it refers to the normal provider of telecommunications services.

3.1.12 Service User (initial capital letters) is an individual authorized by the government to use ETS (Legacy GETS, WPS, or NS/EP NGN-PS) and to whom a user priority level assignment has been granted by the government.

3.1.13 User Equipment (UE) is a device allowing a user access to network services.

3.1.14 Wireless Priority Service (WPS) 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. For the purpose of this document, examples of a UE include a mobile station, a SIP phone, a notebook computer, a Personal Computer (PC), an IP-based Private Branch eXchange (PBX), and an IP-based application server.

[11] NOTE: The Department of Homeland Security Office of Emergency Communications (DHS/OEC) is the government agency responsible for granting ETS privileges to individuals.

3.2 Acronyms & Abbreviations

AAA	Authentication, Authorization, and Accounting
AN	Access Number
ATIS	Alliance for Telecommunications Industry Solutions
CSCF	Call Session Control Function
DN	Directory Number
ETS	Emergency Telecommunications Service
FC	Feature Code
FE	Functional Entity
GETS	Government Emergency Telecommunication Service
HSS	Home Subscriber Server
IETF	Internet Engineering Task Force
NGN	Next Generation Network
NS/EP	National Security / /Emergency Preparedness
NT	Number Translation
QCI	QoS Class Identifier
QoS	Quality of Service
UE	User Equipment
WPS	Wireless Priority Service

4 ETS Relationships

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 4.1.

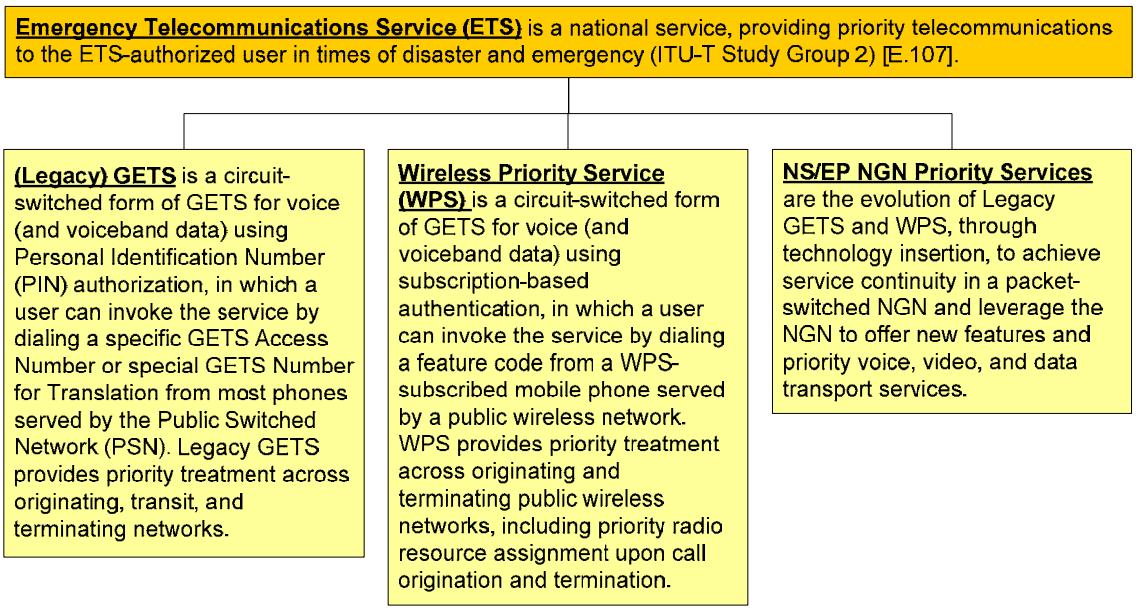

Figure 4.1: Relationship of Concept and Terms

5 General Overview

NS/EP NGN-PS provides priority treatment to increase the probability of a Service User's NS/EP NGN-PS Voice, Video, and Data services being successful over a Service Provider's public network infrastructure. Some form of priority treatment is applied to the NS/EP NGN-PS service invocation and session establishment, and continues to be applied until the NS/EP NGN-PS service is released by the Service User. The priority treatment may be applied before the invocation if needed to give a greater probability of success in receiving, recognizing, and processing the invocation.

The priority treatment consists of mechanisms applicable to various aspects (e.g., signaling, control, routing, and bearer/media traffic handling) that are essential for a greater probability of successful establishment and continuation of NS/EP NGN-PS. To increase the probability of successful invocation and establishment, it is desirable that the processing of a Service User's request with NS/EP NGN-PS invocation be provided some priority treatment immediately after its recognition as NS/EP NGN-PS-related, even if such priority treatment is given prior to the authorization as an NS/EP NGN-PS call/session or data request (with relevant security considerations). Such pre-authorization priority treatment allows the Service User's NS/EP NGN-PS invocation and service request to successfully reach, during congestion, the authorization processing functions that may reside in the originating network or another network. Without such priority treatment, a Service User's NS/EP NGN-PS invocation and service request may fail even before it can be authorized. For example, priority treatment should be provided to the routing of a Service User's NS/EP NGN-PS invocation and service request to the NS/EP NGN-PS authorization system, and priority treatment should be provided to the process of credentials collection required for the Service User/UE authorization.

For an LTE access network, NS/EP NGN-PS specifies priority treatment for mobility and session control signaling in a number of cases prior to the actual user service invocation. This Advance Priority treatment is provided to a UE associated with an NS/EP NGN-PS subscription with the Service Provider, and is intended to offer significant advantages to the end user when calls are placed from such a UE. This Advance Priority treatment for signaling is not intended to carry over to the bearer established for the media flow. For an LTE access network, NS/EP NGN-PS also specifies priority treatment for media establishment after invocation but before authorization to support PIN collection in NS/EP NGN-PS calls/sessions requiring PIN collection for authorization.

NS/EP NGN-PS includes NS/EP NGN-PS-specific network functions that fall into the following broad categories:

- *Service Invocation*: An NS/EP NGN-PS service invocation is a user or application interaction with FEs [e.g., UE, Call Session Control Function (CSCF), PCRF, Home Subscriber Server (HSS), Authentication, Authorization, and Accounting (AAA), etc.] that results in subsequent service being given priority

treatment. A Service Provider network recognizes an NS/EP NGN-PS invocation based on the presence of an NS/EP NGN-PS-unique identifier entered by the Service User (e.g., for NS/EP NGN-PS Voice, a destination of the form 710-XXX-XXXX or a *272 feature code preceding a Numbering Plan Area (NPA)-NXX-XXXX destination number) in the service request received by the network from the UE. In the case of voice calls, a Service User enters an identifier in the form of dialed digits (e.g., 710 or *272) that generally will be recognized first in the IMS (or other) Core Network. However, for NS/EP NGN-PS Voice and the other NS/EP NGN-PS services, other identifiers may also be specified, and may be recognized elsewhere (e.g., NS/EP NGN-PS Data Transport service may be invoked at a web server that is not part of an IMS Core Network). In some cases, subscription arrangements permit priority treatment for signaling to improve the probability of an NS/EP NGN-PS invocation being successfully sent to the Core Network. Such signaling priority treatment is independent of NS/EP NGN-PS invocation, and if NS/EP NGN-PS are not invoked, then subsequent priority treatment is not given for that session.

- *Authorization*: A Service Provider network authorizes a Service User's NS/EP NGN-PS invocation and service request. Authorization for NS/EP NGN-PS Voice and Video services is expected to take place in an IMS-based Core Network. Authorization for NS/EP NGN-PS data services may take place in an IMS-based Core Network, but other arrangements may also be possible. Indication of the authorization status may be used in the Access Network.
- *End-to-End Priority Treatment*: The process of providing priority treatment in all parts of the path, from one endpoint to the other endpoint(s). End-to-end priority treatment includes priority treatment in the origination network and the termination network, as well as any transit networks in between.
- *Invocation-to-Release Priority Treatment*: The process of providing priority treatment to all phases of a call/session, from invocation until release, including all steps in between. The combination of End-to-End Priority Treatment and Invocation-to-Release Priority Treatment includes both pre- and post-authorization treatment and has the following aspects:
    1. Processing of the Service User's NS/EP NGN-PS invocation in FEs and application servers;
    2. Admission control and allocation of network resources (including bearer resources) in origination, termination, and transit networks, including wireless handoffs;
    3. Transport of signaling and media packets;
    4. Priority processing within FEs; and
    5. Processing of the Service User's release of an NS/EP NGN-PS service session.
- *Network Interconnection and Protocol Interworking*: A Service User's NS/EP NGN-PS invocation and session establishment involves transport and processing, and the end-to-end signaling and media path may traverse multiple Service Provider networks.

A Service User may select either or both of two service enrollment mechanisms: 1) NGN-PS Credentials (e.g., PIN); or 2) Service Provider subscription. These approaches differ in their accounting, as well as in the calling privileges provided to the Service User.

The NGN-PS Credentials (e.g., PIN) approach assigns the user a unique 12 digit number intended to be kept secure by the user.

The Service Provider subscription approach authorizes the user to subscribe to NS/EP NGN-PS as offered by a government-approved Service Provider. In this approach, the user is assumed to have an existing (or to enter into a) service arrangement with the Service Provider for non-NS/EP NGN-PS service as part of meeting other needs independent of NS/EP NGN-PS. The Service Provider offers NS/EP NGN-PS subscription as a feature addition to the user's basic service arrangement. When invoked on a call/session, NS/EP NGN-PS service provides an NS/EP NGN-PS call/session priority treatment as specified in this TR. However, the basic call/session privileges and features available to the user are determined by the user's non-NS/EP NGN-PS service arrangement with the Service Provider. Some NS/EP NGN-PS invocation scenarios may involve initial NS/EP NGN-PS call/session authorization by subscription, and then subsequent authorization by Credentials. In such cases, calling privileges after Credentials authorization are determined by the authorized NGN-PS Credentials database calling privileges (versus the subscription calling privileges) in progressing the NS/EP NGN-PS call/session. In addition, the NGN-PS Credentials database calling privileges include some unique NS/EP NGN-PS capabilities/features that are not present in conventional subscription services.

6 NS/EP NGN-PS Overview

The NS/EP NGN-PS services addressed in this TR are:

- NS/EP NGN-PS Voice;
- NS/EP NGN-PS Video;
- NS/EP NGN-PS Guaranteed Bit Rate (GBR) Data; and
- NS/EP NGN-PS Data Transport (non-GBR).

These services are for Voice-Band Service (NS/EP NGN-PS Voice) and Broadband Service (NS/EP NGN-PS Video, NS/EP NGN-PS GBR Data, and NS/EP NGN-PS Data Transport). A Service User may subscribe with a Service Provider for any combination of one or more services from the NS/EP NGN-PS services set, provided the Service User has a subscription with the Service Provider for the corresponding public service(s). Similarly, a Service User may access any NS/EP NGN-PS service for which he is authorized by the government from any normal public user device that is associated with a normal user subscription for the corresponding public service, even if the UE has no associated NS/EP NGN-PS subscription with the Service Provider, provided the Service User uses the proper government-assigned credentials when invoking the service. The Service User's priority level assigned by the government applies for all NS/EP NGN-PS services authorized for the Service User.

The NS/EP NGN-PS Voice service provides continuity to the Legacy GETS and WPS services through the industry NGN transition. NS/EP NGN-PS Video and NS/EP NGN-PS GBR Data services are specified based on the same session-oriented IMS-based Core Network reference architecture used for NS/EP NGN-PS Voice, including similar signaling. However, NS/EP NGN-PS Video includes audio and video components that may involve very different network bandwidth and performance requirements from NS/EP NGN-PS Voice, and may be used in different modes from those generally thought of for voice – e.g., two-way audio conversations with two-way video, or two-way audio conversations with one-way video. NS/EP NGN-PS Video service can become part of a priority video conferencing service offered by a Service Provider.

NS/EP NGN-PS Data Transport and NS/EP NGN-PS GBR Data are first within a broader family of NS/EP NGN-PS data services. Other possible NS/EP NGN-PS data services include:

- NS/EP NGN-PS Web Service,
- NS/EP NGN-PS File Transfer,
- NS/EP NGN-PS Email,
- NS/EP NGN-PS Short Message Service (SMS) over IP, and
- NS/EP NGN-PS Instant Messaging (IM).

The scope of this TR is limited to support for the NS/EP NGN-PS Voice, NS/EP NGN-PS Video, NS/EP NGN-PS GBR Data, and NS/EP NGN-PS Data Transport services.

NS/EP NGN-PS Data Transport and NS/EP NGN-PS GBR Data services differ from the other NS/EP NGN-PS data services above in that they provide priority treatment for data transport of the user's UE data within one or more Service Provider networks. The other NS/EP NGN-PS data services provide priority treatment for the corresponding data application processing, as well as priority treatment for the transport of the corresponding data packets. NS/EP NGN-PS Data Transport service may provide priority transport to all the packets of all non-GBR data applications used by the Service User, or it may be limited in some way (e.g., supports only particular applications or transport to particular destinations). Note that NS/EP NGN-PS Data Transport and NS/EP NGN-PS GBR Data service are the same as all the other NS/EP NGN-PS services in their need for call/session establishment to be given priority treatment in signaling and processing. NS/EP NGN-PS Data Transport may differ from the other services in its use of an explicit Service User cancellation (i.e., NS/EP NGN-PS Data Transport revocation) action to stop priority treatment without releasing the underlying public data transport service. In contrast, release of an NS/EP NGN-PS GBR Data session will release the priority treatment as well as the underlying data transport. In addition, due to the need to further clarify and specify the use cases by the NS/EP users for the priority video and data services, this TR assumes very basic point-to-point NS/EP NGN-PS Video and NS/EP NGN-PS GBR Data services. Similarly, the Service Providers will also have to specify in some

detail their corresponding public services. In the future, these basic priority video and data services can be part of a more complex set of services offered by the Service Providers.

As an example of data transport, using a web browser to access a private agency server during network congestion might be more responsive with NS/EP NGN-PS Data Transport service than without. Similarly, using a web browser to access a public server during network congestion may have some performance improvement, but overall delay performance will be affected by possible congestion in the application server, which is not mitigated by the priority of NS/EP NGN-PS Data Transport service. NS/EP NGN-PS Data Transport service in this TR gives priority for data transport that does not have a GBR commitment, while NS/EP NGN-PS GBR Data service in this TR gives priority for data transport that does have a GBR commitment.

This TR focuses on the Core Network requirements for NS/EP NGN-PS. This TR supports an NS/EP NGN-PS session initiated from, or terminated to, IP-based customer equipment via the Access Network. This TR does support interconnection to the PSTN for priority voice services via interworking network elements supporting NS/EP NGN-PS capabilities.

The scope of this TR includes priority for NS/EP NGN-PS service requests when originated from any UE, whether or not the UE is associated with an NS/EP NGN-PS subscription with the Service Provider (i.e., has Subscription Credentials). The Service User may be authorized for Legacy GETS and NS/EP NGN-PS with assigned NGN-PS Credentials (e.g., a Personal Identification Number, or PIN) by the government without having an NS/EP NGN-PS subscription with a particular Service Provider or a UE equipped with Subscription Credentials. However, priority treatment of service requests originated using Subscription Credentials may be different from service requests originated using only NGN-PS Credentials. In particular, Subscription Credentials may enable pre-invocation priority signaling, whereas NGN-PS Credentials may require recognition of the invocation before applying any priority.

7 Service Descriptions

This section provides a service description of NS/EP NGN-PS Voice, Video, GBR Data, and Data Transport services from a Service User and Service Provider perspective for both normal and exception situations.

7.1 NS/EP NGN-PS Voice

7.1.1 Overview

This TR specifies three methods for a Service User to invoke NS/EP NGN-PS Voice service on a Service Provider network. Two of the methods are Credentials-based using a GETS-AN or a GETS-NT. The other method is subscription-based using a GETS-FC. All three methods invoke NS/EP NGN-PS Voice on a per call/session basis. A GETS-AN or GETS-NT invoked call/session can be initiated from any UE that can make a basic voice call/session. A GETS-FC invoked call/session can be initiated from a voice-capable UE with a user subscription for GETS-FC. In the case of a mobile UE when roaming, the registration may be through a visited Service Provider. The UE service profile is stored in the home Service Provider network and includes the subscription for NS/EP NGN-PS. For fixed wireline networks, the originating Service Provider network is the home Service Provider network. When a mobile UE originates a GETS-FC invoked call/session in a visited network, end-to-end priority treatment may depend on the visited network recognizing the GETS-FC invocation and providing priority treatment, and corresponding contractual agreements between the visited and home network Service Providers. When a Service User initiates an NS/EP NGN-PS Voice call/session using GETS-AN, the Service Provider network identifies the call/session request as an NS/EP NGN-PS call/session request based on the presence of the GETS-AN in the call/session request. The calling user is prompted by the Service Provider network for entry of a PIN for user authorization for NS/EP NGN-PS Voice service. After successful authorization, the Service User is prompted for entry of a Directory Number (DN) for routing of the NS/EP NGN-PS call/session to the desired destination. Subject to the Service User's calling privileges, the DN may be an NANP number, an E.164 international number, a GETS-NT, or a GETS-PDN. The GETS-NT can also be directly dialed to invoke GETS, as described in the following paragraph. However, a GETS-PDN can only be used as a DN in a GETS-AN invocation. Some or all of these functions may be provided by another Service Provider or an authorized third party.

When a Service User initiates an NS/EP NGN-PS Voice call/session using a GETS-NT, the Service Provider network identifies the call/session request as an NS/EP NGN-PS call/session request based on the presence of the GETS-NT in the call/session request. The calling user is prompted by the Service Provider network for entry of a PIN for user authorization for NS/EP NGN-PS Voice service. (The PIN collection/authorization can be omitted under certain circumstances.) After successful authorization and translation of the GETS-NT, the NS/EP NGN-PS call/session is routed to the desired destination.

When a Service User initiates an NS/EP NGN-PS Voice call/session using GETS-FC followed by a DN, the Service Provider network identifies the call/session request as an NS/EP NGN-PS call/session request based on the presence of the GETS-FC. The home Service Provider network authorizes the call/session request as an NS/EP NGN-PS call/session request if the user's service profile associated with the UE includes a subscription for NS/EP NGN-PS Voice service. After successful authorization, the NS/EP NGN-PS call/session is routed to the destination DN, or the NS/EP NGN-PS call/session follows the procedures for DNs described above for a GETS-AN or GETS-NT invoked call/session. In particular, if the user enters GETS-FC+GETS-AN or GETS-FC+GETS-NT, then the Service User is further authorized via a user-entered PIN, and the NS/EP NGN-PS call/session privileges of the Service User after PIN authorization take precedence over NS/EP NGN-PS call/session privileges associated with the GETS-FC subscription in progressing the NS/EP NGN-PS call/session.

In addition to the general NS/EP NGN-PS network functions, NS/EP NGN-PS Voice includes:

- **Service Invocation**: A Service Provider network recognizes an NS/EP NGN-PS voice invocation based on the presence of a GETS-AN, GETS-NT, or GETS-FC in the call/session request received from the UE.
- **Authentication and Authorization**: A Service Provider network authenticates and authorizes a Service User's NS/EP NGN-PS voice call/session request based on how the service was invoked. After the voice call/session request is authorized, the voice call/session is marked with an NS/EP NGN-PS priority indicator and the Service User's priority level.
- **End-to-End Priority Treatment**: The process of providing end-to-end priority treatment begins with the user's invocation of NS/EP NGN-PS Voice service. Service Provider networks apply some priority treatment to an NS/EP NGN-PS voice call/session request prior to its authorization. After successful authorization, the Service Provider networks involved in the NS/EP NGN-PS voice call/session establishment provide appropriate priority treatment to increase the probability of successful completion of the NS/EP NGN-PS voice call/session, and continue such treatment until the NS/EP NGN-PS voice call/session is released. End-to-end priority treatment consisting of pre- and post-authorization treatment comprises three aspects: (1) *Signaling*: the signaling of NS/EP NGN-PS-specific information in the protocols used between various network elements; (2) *Priority Treatment Mechanisms*: the priority mechanisms used in processing an NS/EP NGN-PS voice call/session request, including media bearer; and (3) *Network Interconnection and Protocol Interworking*: priority at network interconnections and for protocol interworking between technology domains of the same network.

  The three aspects of end-to-end priority treatment are described below.

  1. *Signaling*: A number of functional network elements providing application, signaling and control, and transport functions are involved in providing NS/EP NGN-PS Voice service. Signaling allows communication of NS/EP NGN-PS Voice service specific information between a UE and a Service Provider network, and between network elements (located within the same or different Service Provider networks) that are involved in providing end-to-end priority treatment. Signaling of NS/EP NGN-PS Voice specific information (e.g., NS/EP NGN-PS priority indicator and the Service User's priority level) by itself does not provide priority, but a network element uses this information to trigger priority treatment (see item 2 below) for an NS/EP NGN-PS voice call/session request. NS/EP NGN-PS Voice service related information needs to be signaled across boundaries between different Service Provider networks and between different technology domains (see item 3 below). Inclusion of an NS/EP NGN-PS priority indicator in a message indicates that the message is associated with an NS/EP NGN-PS voice call/session and is entitled to receive priority treatment. Service User's priority level indicates the government-assigned priority level of the calling Service User. For example, in a SIP message, the NS/EP NGN-PS priority indicator is represented by the presence of ets namespace in the Resource-Priority header. The Service User's priority level is represented by wps.y in the Resource-Priority header, where y = 0 to 4 corresponds to the Service User's priority level of 1 to 5. An NS/EP NGN-PS priority indicator is distinct from the Service User's priority level. Within a Service Provider network, an NS/EP NGN-PS voice call/session is marked with an NS/EP NGN-PS priority indicator and no Service User's priority level before authorization; after authorization, it is marked with

an NS/EP NGN-PS priority indicator and the Service User's priority level assigned to the calling Service User.

2. *Priority Treatment Mechanisms*: There are various mechanisms by which priority treatment may be provided to an NS/EP NGN-PS voice call/session. Some or all of these mechanisms may be supported in a Service Provider network. These mechanisms are intended to give NS/EP NGN-PS voice call/session establishment and continuation a high probability of success at a desirable QoS level during network impairment circumstances (i.e., congestion or outage) that are causing public voice calls/sessions to suffer significant service degradation. Certain mechanisms may apply depending on the type of network impairment. These mechanisms fall into the following broad categories.
    A. *Processing of NS/EP NGN-PS call/session requests in FEs*: Based on the presence of specific NS/EP NGN-PS-related information in the SIP:URI [RFC 3261] [RFC 3986] or TEL:URI [RFC 3966], or Resource-Priority Header (RPH) [RFC 4412] in SIP signaling for an NS/EP NGN-PS voice call/session request, FEs provide priority treatment to the processing of the NS/EP NGN-PS voice call/session request. A Service Provider network may have implemented SIP control mechanisms that restrict call/session setup requests during congestion. NS/EP NGN-PS voice call/session requests may be exempted from such control mechanisms and other management controls. Similarly for protocols other than SIP, priority processing capabilities apply to the FEs and associated protocols.
    B. *Admission control and allocation of transport resources*: Admission control may involve selective bandwidth allocation decisions based on the admission control priority (high, medium, or low) of the traffic flow presented to the network. Admission control priorities are specified in ATIS-0100003, *User Plane Priority Levels for IP Networks and Services* [ATIS-0100003], and ITU-T Recommendation Y.2171, *Admission Control Priority Levels in NGN* [ITU-T Y.2171]. NS/EP NGN-PS voice calls/sessions are treated with "high" admission control priority, thereby allowing them a higher probability of admission to the NGN compared to public voice traffic, which is treated with "medium" and "low" priorities. High admission control priority for NS/EP NGN-PS voice calls/sessions may allow them to queue for transport resources until available, to seize resources set aside for such calls/sessions from the engineered capacity limits, or to seize resources beyond the engineered capacity limits applied to public voice calls/sessions. Different bandwidth allocation models may be used for supporting the three admission control priorities. High admission control priority for NS/EP NGN-PS voice calls/sessions may also include allocations from resources not normally considered for public calls/sessions (e.g., paths with more hops than allowed for public voice calls/sessions). The admission control priorities are different from the Service Users' priority levels.

        The Service User's priority level may be used in call/session admission control and allocation of transport resources where the concentration of NS/EP NGN-PS demand (e.g., access to Core Network) in relation to the available resources reaches thresholds making differentiation by priority level important.

    C. *Transport of SIP and other signaling protocols and media packets for NS/EP NGN-PS calls/sessions*: A Service Provider network may provide mechanisms to increase the probability of successful transport (within specified QoS limits) of SIP and other signaling protocols and encoded Real-Time Transport (RTP) [RFC 3550] packets for an NS/EP NGN-PS voice call/session when there is congestion in the transport links and network elements. Depending on the technologies used by a Service Provider network, various mechanisms or their combinations may be used. Some example mechanisms are the use of specific Differentiated Services (DiffServ) Code Points (DSCP) [RFC 3260] [RFC 5865] and per-hop behaviors, and the use of specific Multi-protocol Label Switching (MPLS) [RFC 3031] [RFC 3270] Label-Switched Paths (LSPs).
3. *Network Interconnection and Protocol Interworking*: The origination and authentication/authorization functions of an NS/EP NGN-PS voice call/session may be located in different Service Provider networks and the end-to-end signaling and media path may traverse multiple Service Provider networks. Therefore, the Signaling of NS/EP NGN-PS Voice specific information (item 1) and the Priority Treatment (item 2) described above need to be extended across boundaries: (a) between Service Provider networks; and (b) between Service Provider networks and Legacy Service Provider networks. Similarly, there is a need to provide interworking of NS/EP NGN-PS-related information and

the priority treatment between different technology domains, even within the same Service Provider network. Interconnection and interworking apply to both the signaling and bearer traffic. In particular, the NS/EP NGN-PS priority indicator and the Service User's priority level need to be carried across network boundaries or mapped between different signaling protocols. For example, an NS/EP NGN-PS voice call/session originating in an IMS domain may terminate on a circuit-switched PSTN connection, requiring interworking between SIP and ISUP at the signaling level and between RTP/User Datagram Protocol (UDP)/IP packets and Time-Division Multiplexing (TDM) trunks at the bearer level.

For such an NS/EP NGN-PS voice call/session, Service Provider border elements [i.e., Media Gateway Control Function (MGCF)/Media Gateway (MGW)] provide priority treatment (e.g., trunk queuing, exemption from network management controls) that is applicable to Legacy GETS and WPS calls to mitigate the impact of Legacy Service Provider network congestion.

7.2 NS/EP NGN-PS Video

7.2.1 Overview

A Service User invokes NS/EP NGN-PS Video service to achieve near normal performance of video service when circumstances are causing public video service users to experience severe service degradation. NS/EP NGN-PS Video service priority treatment is intended to provide a high likelihood of successful session establishment and to sustain quality of communications during the session.

NS/EP NGN-PS Video service is based on a corresponding Service Provider's public video service. The public video service is expected to enable its subscribers to originate a request to the network to establish a video session with a destination party (within a network and inter-network). Typically, to invoke a video session, a user enters/selects a DN (or other destination identifier) and is either prompted by the UE to select video service or is able to select an icon associated with video service. For NS/EP NGN-PS Video service, service invocation methods are expected to be the same as for NS/EP NGN-PS Voice service and are based on GETS-FC, GETS-AN, and GETS-NT invocation methods. The network determines if the request can be honored with acceptable QoS for video, and the request is honored or rejected accordingly. If the network honors the request, the originating and destination parties' UEs effect appropriate session negotiations and the session is established. The network ensures the session is sustained with the acceptable QoS for video until a user releases the session.

A Service Provider's public video service is expected to be based on [GSMA IR.94].

This TR specifies three methods for a Service User to invoke NS/EP NGN-PS Video service on a Service Provider network. Two methods are NGN-PS Credentials-based using a GETS-AN or a GETS-NT. The other method is Subscription Credentials-based using a GETS-FC. All three methods invoke NS/EP NGN-PS Video on a per call/session basis. A GETS-AN or GETS-NT invoked call/session can be initiated from any UE that can make a basic video call/session. A GETS-FC invoked call/session can be initiated from a video-capable UE with a video subscription for GETS-FC.

For a mobile UE when roaming, the registration may be through a visited Service Provider. The UE service profile is stored in the home Service Provider network and includes the subscription for NS/EP NGN-PS Video service. For fixed wireline networks, the originating Service Provider network is the home Service Provider network. When a mobile UE originates a GETS-FC invoked call/session in a visited network, end-to-end priority treatment may depend on the visited network recognizing the GETS-FC invocation and providing priority treatment, and on the corresponding contractual agreements between the visited and home network Service Providers.

7.2.1.1 NS/EP NGN-PS Video Service Assumptions

Specific assumptions for NS/EP NGN-PS Video service are:

- The service provides a point-to-point conversational video capability.
- The service has a video stream in at least one direction.
- The service may or may not contain an audio component, which is specified during session establishment. If an audio component is present, it is synchronized with the video component.
- The service description applies to a conference room, handset (fixed or mobile), and desktop video.

- Priority treatment is in video session establishment signaling, processing, resource allocation, and in bidirectional media and signaling transport. The quality of the video session is sustained throughout the call/session duration with priority treatment. In addition, priority treatment may include exempting NS/EP NGN-PS Video sessions from certain restrictive network management controls.

7.2.1.2 Invocation of NS/EP NGN-PS Video Service

A Service User invokes NS/EP NGN-PS Video service on a session-basis, with priority admission. The invocation of an NS/EP NGN-PS Video service session is independent of, and not limited by, the video bit rate requested for the session. When a user is normally provided a means to control the bit rate of their requested public video service, a Service User should have corresponding control of NS/EP NGN-PS Video service bit rate.

A Service User should be able to invoke NS/EP NGN-PS Video service in a user-friendly manner as similar as possible to the corresponding public video service.

7.2.1.3 Sustaining Performance of NS/EP NGN-PS Video Service

When a Service User succeeds in establishing an NS/EP NGN-PS Video service session, the session is sustained with “near normal” quality until released by one of the connected parties. “Near normal” quality means a video quality with nearly equivalent Service Provider’s video quality-of-experience metric score as would be achieved for the same session during normal conditions. As with public video service during normal circumstances, NS/EP NGN-PS Video service, under virtually all circumstances, provides sufficient resources (e.g., bit rate) for the Service User to experience uninterrupted audio and smooth, continuous video. In addition, the audio and video appear synchronized to the Service User and the other connected party.

As with a public user during normal circumstances, a Service User with a mobile UE – under virtually all circumstances – is expected to continue to experience acceptable video service regardless of change of location of the UE. The experience is the result of priority treatment and will be irrespective of the means of NS/EP NGN-PS authorization method (i.e., NGN-PS Credentials or Subscription Credentials). If during normal conditions the mobile UE can affect handover, it will support handover with the NS/EP NGN-PS Video service even during severe congestion. If the destination UE (which may not be associated with an NS/EP NGN-PS subscription) supports mobility, and is terminating an NS/EP NGN-PS Video session, then priority treatment is supported on a handover for the destination UE, if the destination network is NS/EP NGN-PS-capable. Priority treatment is continued through and after the handover.

7.2.1.4 Release of NS/EP NGN-PS Video Service

A Service User releases an NS/EP NGN-PS Video session in the same manner as the release of a corresponding public video session. The release may be initiated by either party.

7.3 NS/EP NGN-PS GBR Data Requirements

7.3.1 Overview

A Service User invokes NS/EP NGN-PS GBR Data service to achieve near normal performance of session-based GBR service when circumstances are causing public GBR service users to experience severe service degradation. NS/EP NGN-PS GBR Data service priority treatment is intended to provide a high likelihood of successful session establishment and to sustain quality of communications during the session.

NS/EP NGN-PS GBR Data service is based on a corresponding Service Provider’s public session-based GBR service. Table 7.1, from [TS 23.203], provides examples of possible public GBR services. The public GBR service is expected to enable its subscribers to originate a request to the network to establish a GBR session with a destination party (within a network and inter-network).

For NS/EP NGN-PS GBR Data service, service invocation is based on a GETS-FC or on an HTTPS interaction between the originating UE and the Service Provider network.

To invoke NS/EP NGN-PS GBR Data service, it is assumed that the user enters/selects a DN (or other destination identifier) and is either prompted to select NS/EP NGN-PS GBR Data service or is able to select an icon associated with NS/EP NGN-PS GBR Data service. The network determines if the request can be honored with acceptable QoS for GBR, and the request is honored or rejected accordingly. If the network honors the request, the originating and destination parties' UEs effect appropriate session negotiations and the session is established. The network ensures the session is sustained with the acceptable QoS for GBR until a user releases the session.

This TR specifies two methods for a Service User to invoke NS/EP NGN-PS GBR Data service on a Service Provider network. One method is NGN-PS Credentials-based using an HTTPS interaction. The other method is Subscription Credentials-based using a GETS-FC. An HTTPS interaction invoked session can be initiated from any UE that can establish a basic GBR session. A GETS-FC invoked session can be initiated from a GBR-capable UE with a GBR subscription for GETS-FC.

For a mobile UE when roaming, the registration may be through a visited Service Provider. The UE service profile is stored in the home Service Provider network and includes the subscription for NS/EP NGN-PS GBR Data service. For fixed wireline networks, the originating Service Provider network is the home Service Provider network. When a mobile UE originates a GETS-FC invoked GBR session in a visited network, end-to-end priority treatment may depend on the visited network recognizing the GETS-FC invocation and providing priority treatment, and on the corresponding contractual agreements between the visited and home network Service Providers.

It should be noted that mass market NGN public GBR service is not yet available in Service Providers' networks. Also, note that according to [TS 23.203], QCI (QoS Class Identifier) and Priority levels do not necessarily correspond (e.g., QCI 2 has a higher priority than QCI 4, however, QCI 3 has a higher priority than QCI 2).

Table 7.1: Example GBR Services

QCI	Resource Type	Priority	Packet Delay Budget	Packet Error Loss Rate	Example Services
1	GBR	2	100 ms	10^{-2}	Conversational Voice
2		4	150 ms	10^{-3}	Conversational Video (Live Streaming)
3		3	50 ms	10^{-3}	Real Time Gaming
4		5	300 ms	10^{-6}	Non-Conversational Video (Buffered Streaming)

7.3.1.1 NS/EP NGN-PS GBR Data Service Assumptions

Specific assumptions for NS/EP NGN-PS GBR Data service are:

- The service provides a point-to-point capability.
- The service supports bi-direction and uni-direction GBR traffic.
- The service supports asymmetrical traffic.
- The service is session-based.
- Priority treatment is in establishment signaling, processing, resource allocation, and in media and signaling transport for a GBR session. The quality of the GBR session is sustained throughout the session duration with priority treatment. In addition, priority treatment may include exempting NS/EP NGN-PS GBR Data sessions from certain restrictive network management controls.

7.3.1.2 Invocation of NS/EP NGN-PS GBR Data Service

A Service User invokes NS/EP NGN-PS GBR Data service on a session-basis. The invocation of an NS/EP NGN-PS GBR Data service session is independent of, and not limited by, the GBR bit rate requested for the session. When a user is normally provided a means to control the bit rate of their requested public GBR service, a Service User should have corresponding control of NS/EP NGN-PS GBR Data service bit rate.

A Service User should be able to invoke NS/EP NGN-PS GBR Data service in a user-friendly manner as similar as possible to the corresponding public GBR service.

7.3.1.3 Sustaining Performance of NS/EP NGN-PS GBR Data Service

When a Service User succeeds in establishing an NS/EP NGN-PS GBR Data service session, the session is sustained with “near normal” quality until released by one of the connected parties. “Near normal” quality means a GBR quality with nearly equivalent Service Provider’s GBR quality-of-experience metric score as would be achieved for the same session during normal conditions. As with public GBR service during normal circumstances, NS/EP NGN-PS GBR Data service, under virtually all circumstances, provides sufficient resources – e.g., bit rate, for the Service User to experience uninterrupted GBR service.

As with a public user during normal circumstances, a Service User with a mobile UE, under virtually all circumstances, is expected to continue to experience acceptable GBR service regardless of change of location of the UE. The experience is the result of priority treatment and will be irrespective of the means of NS/EP NGN-PS authorization method (i.e., NGN-PS Credentials or Subscription Credentials). If during normal conditions the mobile UE can affect handover, it will support handover with the NS/EP NGN-PS GBR service even during severe congestion. If the destination UE (which may not be associated with an NS/EP NGN-PS subscription) supports mobility, and is terminating an NS/EP NGN-PS GBR Data session, then priority treatment is supported on a handover for the destination UE, if the destination network is NS/EP NGN-PS capable. Priority treatment is continued through and after the handover.

7.3.1.4 Release of NS/EP NGN-PS GBR Data Service

A Service User releases an NS/EP NGN-PS GBR Data session that had been invoked using a GETS-FC invocation method in the same manner as the release of a corresponding public GBR data session. The release may be initiated by either party.

A Service User releases an NS/EP NGN-PS GBR Data session that had been invoked using an HTTPS invocation method with a release operation that is similar in look and feel, and complementary, to that used in invoking the service. If the Service User invokes NS/EP NGN-PS GBR Data service with a special NS/EP NGN-PS application client on the UE, then termination of the application also causes the NS/EP NGN-PS GBR Data priority treatment to be released.

7.4 NS/EP NGN-PS Data Transport

7.4.1 Overview

A Service User invokes NS/EP NGN-PS Data Transport to achieve a high likelihood of successful data packet transport even when transport of public user data packets is severely degraded. NS/EP NGN-PS Data Transport is a generic packet priority transport service that applies independently of the specific data application being used. By invoking NS/EP NGN-PS Data Transport, a Service User requests the network to give priority treatment to all affected non-GBR data packets to and from the UE. At a minimum, the priority treatment applies to data packet transport in both directions through the Access Network of the Service Provider serving the Service User who invokes NS/EP NGN-PS Data Transport, and from the Access Network across the Service Provider’s other contiguous network segments over which the data transport is routed to its destination. It is desirable that the priority treatment applies in both directions for packet flows initiated by the Service User throughout the data packet path from source to destination. In some cases, it may not be technically feasible to ensure that packets sent from the destination to the Service User receive priority treatment throughout the data packet path unless the destination invokes (or has invoked) NS/EP NGN-PS Data Transport.

For NS/EP NGN-PS Data Transport service, service invocation is based on an NGN-PS-DT or on an HTTPS interaction between the originating UE and the Service Provider network.

When a Service User invokes NS/EP NGN-PS Data Transport, priority treatment is provided to the signaling necessary to recognize and authorize the service invocation and to all subsequent data packets transmitted and received until the Service User explicitly revokes the NS/EP NGN-PS Data Transport service or powers down their device.

Invocation of NS/EP NGN-PS Data Transport is supported both at session establishment and during normal service use. In the latter case, honoring the invocation does not cause a disruption of the service experience for the Service User – i.e., there is no need to restart the service in order to receive NS/EP NGN-PS Data Transport priority treatment.

This TR specifies three methods for a Service User to invoke NS/EP NGN-PS Data Transport service on a Service Provider network. Two methods are NGN-PS Credentials-based using an NGN-PS-DT or using an HTTPS interaction. The other method is Subscription Credentials-based using an NGN-PS-DT.

An NGN-PS Credentials-based invocation can be initiated from any UE that can establish non-GBR data transport service. For NGN-PS Credentials-based invocation, the user is requested to enter the credentials.

A Subscription Credentials-based invocation can be initiated from a UE with a subscription to NS/EP NGN-PS Data Transport service.

For all invocation/revocation methods, the user receives an indication (inband announcement or confirmation tone/display) of successful/unsuccessful invocation and successful revocation.

For a mobile UE when roaming, the registration may be through a visited Service Provider. The UE service profile is stored in the home Service Provider network and includes the subscription for NS/EP NGN-PS Data Transport service. For fixed wireline networks, the originating Service Provider network is the home Service Provider network. When a mobile UE originates an NGN-PS-DT invoked NS/EP NGN-PS Data Transport service request in a visited network, end-to-end priority treatment may depend on the visited network recognizing the NGN-PS-DT invocation and providing priority treatment, and on the corresponding contractual agreements between the visited and home network Service Providers.

7.4.1.1 NS/EP NGN-PS Data Transport Specific Assumptions

Specific assumptions for NS/EP NGN-PS Data Transport are:

- The service supports bi-direction and uni-direction non-GBR data transport.
- The service is not specific to an individual data bearer, but pertains to all the affected non-GBR data packets.
- Government and Service Provider policies permit giving priority treatment to transporting non-GBR data packets based on a Service User request without regard to the specific service or whether or not all the affected data packets are in support of an NS/EP mission.
- Priority treatment is in establishment of signaling, resource allocation and non-GBR data packet transport to the extent practicable. (It may not be feasible to economically provide priority transport end-to-end across all network segments in the service path of arbitrary data communications.)

7.4.1.2 Invocation of NS/EP NGN-PS Data Transport

The Service User invokes NS/EP NGN-PS Data Transport through a user-friendly interaction with the UE that results in the UE signaling the invocation to the Service Provider's network. For example, with use of NGN-PS Credentials, a PIN (or other NGN-PS Credential) may be entered and authorized via the NGN-PS Credentials database in a similar fashion to NS/EP NGN-PS Voice service. Alternatively, web access may be used to submit user name and PIN in a secure communication fashion. With use of Subscription Credentials, the subscription credentials are accepted when the UE attaches to or registers with the network and NS/EP NGN-PS Data Transport is indicated as allowed in the associated services profile. In this case, the NS/EP NGN-PS Data Transport can be invoked by simpler UE interaction not requiring submission of NS/EP NGN-PS Credentials, perhaps through use of a special NS/EP NGN-PS Data Transport application client on the UE. It is desired that signaling for the invocation be given priority treatment, as well as the data packets transmitted and received after successful NS/EP NGN-PS Data Transport invocation.

After data packet priority treatment is initiated, the Service User is given an indication of successful set-up and the data packet priority treatment process continues.

The Service User may invoke NS/EP NGN-PS Data Transport when initially establishing the service or during normal service use. Both types of invocation are supported. The Service User invoking NS/EP NGN-PS Data

Transport during normal service use does not experience a disruption of the service experience -- i.e., there will be no need to restart the service in order to receive NS/EP NGN-PS Data Transport priority treatment.

7.4.1.3 Sustaining Performance of NS/EP NGN-PS Data Transport

When a Service User succeeds in establishing NS/EP NGN-PS Data Transport, all applicable non-GBR data packets to and from the UE will be given priority transport to the extent practicable. (It may not be feasible to economically provide priority transport end-to-end across all network segments in the service path of arbitrary data communications.) Near normal data packet transport performance, in terms of bandwidth and packet loss, error, latency, and jitter, is achieved. Public service data packet transport performance may entail performance differences for packets of different services with different QoS requirements.

7.4.1.4 Revocation of NS/EP NGN-PS Data Transport

A Service User revokes NS/EP NGN-PS Data Transport service with a revocation operation that is similar in look and feel, and complementary, to that used in invoking the service. If the Service User invokes NS/EP NGN-PS Data Transport with a special NS/EP NGN-PS application client on the UE, then termination of the application also causes the NS/EP NGN-PS Data Transport priority treatment to be revoked.

Appendix A
(informative)

A NS/EP NGN-PS Data Transport Use Case Examples

This Appendix presents use cases for the NS/EP NGN-PS Data Transport (DT) service.

The primary purpose of the NS/EP NGN-PS DT service is to provide the Service User acceptable throughput and performance for user applications using the Default Bearer in periods of severe network congestion during which normal commercial data service is degraded. In cases when a point-to-point data call/session is needed, the NS/EP NGN-PS Data Transport service may not apply; instead, the NS/EP NGN-PS GBR Data service applies.

In most scenarios during an emergency condition, it is expected that the NS/EP NGN-PS DT service is activated in response to poor performance. In limited situations (e.g., when driving into an area where network performance is poor), it is possible to proactively invoke the NS/EP NGN-PS DT service. In all cases, basic data connectivity is required in advance of priority service invocation. This is different from the NS/EP NGN-PS Voice, Video, and GBR Data services for which invocation provides benefits during the establishment of the call/session and on-going during the call/session.

The NS/EP NGN-PS DT use cases are provided in Table A.1. Column 1 provides a use case index which is unique throughout this document. Column 2 includes a mark "S" or "NS" to indicate whether the use case is applicable to an NS/EP NGN-PS subscribed UE, or to a UE that is not subscribed to NS/EP NGN-PS (referred to as a "Public UE"), respectively. While no use case applies to both, the service technical realization may be similar. Column 3 provides a descriptive title (in italics) and presents the use case from the point of view of the Service User.

Table A.1: Use Cases for the NS/EP NGN-PS Data Transport service

Index	Applicability	Description
DTS-1	S	*Performance becomes unacceptable – NS/EP NGN-PS Data Transport service is invoked to provide acceptable QoS and throughput.* Using a browser, or any application requiring data network exchange of information with an external system, on an NS/EP NGN-PS subscribed UE, a Service User is accessing information, stored on either a public or private server accessible over the Service Provider Internet connectivity, in support of their mission. While connectivity to the server continues, download speed for the information becomes unacceptable. The Service User invokes the NS/EP NGN-PS Data Transport service to achieve acceptable QoS and throughput for subsequent downloads from the server. Invocation is done using a browser on an NS/EP NGN-PS subscribed UE. Explicit entry of NGN-PS Credentials is not required to validate the request from an NS/EP NGN-PS subscribed UE.
DTS-1 var A	S	As an alternative to DTS-1, the NS/EP NGN-PS Data Transport service may be invoked while en route to an area of known network congestion by opening the browser on the subscribed UE.
DTS-1 var B	S	As an alternative to DTS-1, the NS/EP NGN-PS Data Transport service may be configured as part of subscription as an always-on service.
DTS-2	NS	*NS/EP NGN-PS Data Transport service is invoked from a Public UE.* A Service User suffers loss of network connectivity due to device failure during a mission. This may be as simple as battery exhaust or could be physical damage to the UE during the mission. The Service User borrows a UE, which turns out to be a Public UE. An attempt is made to download some data and images using the available browser. Recognizing the extreme slowness of the download, the Service User decides to activate the NS/EP NGN-PS Data Transport service to achieve acceptable QoS and throughput for subsequent downloads. Invocation via a Public UE is done using a browser. As part of the process, the Service User provides NGN-PS Credentials to be used to validate the request.

Appendix B
(informative)

B NS/EP NGN-PS GBR Data Use Case Examples

This Appendix presents use cases for the NS/EP NGN-PS GBR Data service.

The primary purpose of the NS/EP NGN-PS GBR Data service is to provide priority in the establishment/admission of a data connection to a specified end point and to provide better throughput and higher QoS (as compared to corresponding public GBR Data service) in periods of severe, prolonged network congestion during which normal commercial data service is degraded.

The NS/EP NGN-PS GBR Data service applies for a point-to-point data call/session. When an end point is not specified at the time of establishing a service data flow – e.g., web access involving many remote servers, the NS/EP NGN-PS Data Transport service applies.

Two methods are considered to establish a point-to-point data session. A point-to-point data call/session may be established under SIP/IMS control. As part of the establishment, QoS information is agreed between the endpoints and delivered to the EPS to provide a Dedicated Bearer capable of meeting the QoS specification. It is also possible to establish an equivalent connection between two end points using an HTTPS-based mechanism without involvement of the IMS. This may be an attractive approach for a Service Provider who chooses to focus their IMS resources on voice and video conversational applications and prefers to handle data without IMS control. These two methods of invocation are different from the Service User point of view. It is therefore preferable if a single approach can be agreed across Service Providers, but may depend on specific applications.

Use cases are provided in Table B.1. The column notations, structure of the table contents, and treatment of technical considerations, are as previously described for Table A.1.

Table B.1: Use Cases for the NS/EP NGN-PS GBR Data

Index	Applicability	Description
GBR-1	S	*A point-to-point GBR data call/session fails to be established from an NS/EP NGN-PS subscribed UE – NS/EP NGN-PS GBR Data service is invoked to provide a greater probability of call/session establishment and service performance.* A Service User needs to establish a data call/session with a remote user to exchange data and images critical to the mission. The call/session is attempted and fails to be completed. The Service User decides to retry the call/session with the NS/EP NGN-PS GBR Data service to have a higher probability of establishment. Invocation is done by the Service User: a) dialing a GETS-FC prefix plus the DN of the remote user from a UE; or b) by using a browser. Explicit entry of NGN-PS Credentials is not required to validate the request from an NS/EP NGN-PS subscribed UE.
GBR-2	NS	*A point-to-point GBR data call/session fails to be established from a Public UE – NS/EP NGN-PS GBR Data service is invoked to provide a greater probability of call/session establishment and service performance.* A Service User suffers loss of network connectivity due to device failure during a mission. This may be as simple as battery exhaust or could be physical damage to the UE during the mission. The Service User borrows a Public UE. A Service User needs to establish a data call/session with a remote user to exchange data and images critical to the mission. The call/session is attempted and fails to be established. The Service User decides to retry the call/session with the NS/EP NGN-PS GBR Data service to have a higher probability of establishment. Invocation is done by the Service User: a) by dialing a GETS-AN prefix plus NGN-PS Credentials and the DN of the remote UE; or b) by using a browser.

Appendix C
(informative)

C NS/EP NGN-PS Data Transport & GBR Data Use Cases Supporting VPN Access to an Enterprise

This Appendix provides use case examples to support VPN access to an Enterprise. A general VPN variant is described, which builds on the basic NS/EP NGN-PS Data Transport service and the NS/EP NGN-PS GBR Data service. This variant is characterized by a UE establishing a VPN connection to an Enterprise.

Use cases are provided in Table C.1. The column notations, structure of the table contents, and treatment of technical considerations, are as previously described for Table A.1.

Table C.1: Use Cases for VPN Access to an Enterprise

Index	Applicability	Description
VPN-1	S	*A request to establish a connection and VPN (between an NS/EP NGN-PS subscribed UE and a VPN server) fails – the Service User then requests NS/EP NGN-PS treatment via a user-selectable option in the VPN software and retries to establish the VPN.* A Service User identifies the need to connect to an Enterprise to download data and images critical to the mission. A request to establish a connection and VPN (without any NS/EP NGN-PS) fails. The Service User decides to retry the call/session with NS/EP NGN-PS to have a higher probability of establishment. Invocation of NS/EP NGN-PS is done using a user-selectable option provided as part of the VPN client in the UE. Depending upon the VPN client and requested user application, the NS/EP NGN-PS Data Transport service, the NS/EP NGN-PS GBR Data service, or both are invoked transparently to the Service User. The VPN client on the Service User's UE then establishes a VPN between the UE and the Enterprise. NS/EP NGN-PS treatment persists until the VPN is released.
VPN-1 var A	S	As a variant of VPN-1, more than one EPS Bearer can be established, each with NS/EP NGN-PS treatment. For example, NS/EP NGN-PS treatment is provided to the Default Bearer using the NS/EP NGN-PS Data Transport service, and NS/EP NGN-PS treatment is provided to the second EPS Bearer, a Dedicated Bearer, by means of the NS/EP NGN-PS GBR Data service.
VPN-1 var B	S	As a variant of VPN-1, or a further extension of VPN-1 var A, the UE may be a special UE that requires VPN access to be established prior to transmitting/receiving any application data. In this secure mobile communications variant, the Default Bearer is given always-on NS/EP NGN-PS priority treatment via provisioning of appropriate QoS parameters in the HSS. The UE has restricted communications privileges, with access controlled by the Enterprise network. The Enterprise controls the on-demand establishment of Dedicated Bearers to satisfy the UE's communications needs.