ATIS-0100011

PRIORITY FOR NS/EP SERVICES IN NGN/IP ENVIRONMENT – ROLE OF TSP

TECHNICAL REPORT

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ATIS-0100011, *Priority for NS/EP Services in NGN/IP Environment – Role of TSP*

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Technical Report on

PRIORITY FOR NS/EP SERVICES IN NGN/IP ENVIRONMENT – ROLE OF TSP

Secretariat

Alliance for Telecommunications Industry Solutions

Approved February 2007

Abstract

This document provides guidance regarding the applicability and usage of the Telecommunications Service Priority (TSP) codes for National Security/Emergency Preparedness (NS/EP) in an Next Generation Network (NGN)/IP (Internet Protocol) environment.

FOREWORD

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The Quality of Service (QoS) Task Force was responsible for the development of this document.

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Priority for NS/EP Services in NGN/IP Environment – Role of TSP

1 SCOPE &PURPOSE

This document provides guidance regarding the applicability and usage of the Telecommunications Service Priority (TSP) codes for National Security/Emergency Preparedness (NS/EP) in an Next Generation Network (NGN)/IP (Internet Protocol) environment.

2 REFERENCES

[1] T1.211-2001 (R2006), *Information Interchange - Structure and Coded Representation of National Security and Emergency Preparedness (NS/EP) Telecommunications Service Priority (TSP) Codes for the North Telecommunications System*.[1]

[2] "Service Vendor Handbook for the Telecommunications Service Priority (TSP) Program", *NCS Handbook 3-1-2*. [2]

[3] T1.TR.79-2003, *Overview of Standards in Support of Emergency Telecommunications Service (ETS)*.[1]

[4] FCC 88-341, *FCC Report and Order Authorizing TSP Program*.[3]

[5] ATIS-0100003, *User Plane Priority Levels for IP Networks and Services*.[1]

[6] ITU-T Recommendation Y.2171, *Admission Priority Levels in Next Generation Networks*.[4]

[7] ATIS-0100006, *Service Restoration Priority Levels in IP Networks*.[1]

[8] IETF RFC 4412, *Communications Resource Priority for the Session Initiation Protocol (SIP)*, February 2006.[5]

[9] IETF I-D, *QoS NSLP QSPEC Template*, work in progress.[5]

[10] IETF I-D, *Y.1541 QOSM – Y.1541 QoS Model for Networks Using Y.1541 QoS Classes*, work in progress.[5]

[11] IETF RFC 3270, *MPLS Support of Differentiated Services*.[5]

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[1] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005. < https://www.atis.org/docstore/default.aspx >

[2] This document can be obtained from at < http://ncs.gov/library/issuances/NCSH%203-1-2.pdf >.

[3] This can be obtained from < http://tsp.ncs.gov/forms/REPTORD.doc >.

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

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

[12] "QoS Support in MPLS Networks", *MPLS/Frame Relay Alliance White Paper*.[6]

[13] IETF RFC 3564, *Requirements for Support of DiffServ-aware MPLS Traffic Engineering*.[5]

[14] IETF RFC 4090, *Fast Re-route Extensions to RSVP-TE for LSP Tunnels*.[5]

3 Definitions

3.1 Circuit: In the context of this document, a circuit is defined as a physical facility that is capable of transporting telecommunications services (e.g., NS/EP). Provisioning is required to set up a circuit prior to the transport of the desired service(s). Examples of circuits include DS3 facilities, OC-3 facilities, etc.

4 Abbreviations and Acronyms

CT	Class Type
DS-TE	DiffServ-Aware MPLS Traffic Engineering
ETS	Emergency Telecommunications Service
GETS	Government Emergency Telecommunications Service
IP	Internet Protocol
LSP	Label Switched Path
NGN	Next Generation Network
NS/EP	National Security/Emergency Preparedness
NSIS	Next Steps in Signaling
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RPH	Resource Priority Header
SIP	Session Initiation Protocol
SS7	Signaling System 7
TSP	Telecommunications Service Priority Telecommunications Service Priority

5 Telecommunications Service Priority – An Introduction

The Telecommunications Service Priority (TSP) system requires and authorizes service providers to provision and restore/repair circuits associated with National Security/Emergency Preparedness (NS/EP) on a priority basis over non-TSP circuits [1]. The TSP system has two components [2] -- 1) provisioning; and 2) restoration:

1. A *provisioning* priority is obtained to facilitate priority installation of new telecommunications circuits. Provisioning on a priority basis becomes necessary when an end user has an urgent requirement for a new NS/EP circuit that must be installed

[6] This is available from the IP/MPLS Forum website < http://www.ipmplsforum.org/tech/MPLSQOSWPMay2003.pdf >.

immediately (e.g., an emergency) or by a specific due date (e.g., essential) that can be met only by a shorter than standard service vendor provisioning timeframe.

2. A TSP code indicating a priority for *restoration* is assigned to a new or existing telecommunications circuit to ensure that restoration of a TSP circuit takes place before non-TSP circuit restoration. Priority restoration should be assigned to a new circuit when interruptions may have a serious, adverse effect on the supported NS/EP function. TSP restoration priorities must be requested and assigned before a circuit outage occurs.

In the Public Switched Telephone Network (PSTN), the use of TSP is illustrated by the following two examples:

1. *Private Line Service*: A private line DS3 circuit could be requested to support NS/EP services. If a TSP provisioning priority is granted by the NCS Office of Priority Telecommunications, the provisioning of such a circuit must be afforded the service provider's "best effort" to complete the installation. Orders subject to TSP must be worked with higher priority than the provisioning of other non-TSP circuits.

   When TSP restoration is applicable to the circuit, restoration in the event of failure must take into account the TSP classification to ensure that "best efforts" are made to restore the circuit as soon as possible. Restoration efforts for TSP circuits are to have priority over non-TSP circuits. TSP codes do not apply to automated restoration processes such as SONET ring rerouting of all DS3 circuits provisioned on it. In this example, all DS3s on the ring are re-routed regardless of their TSP priority. If however, no automated restoration mechanisms are available, then the TSP circuit receives priority for manual repair over non-TSP circuits.

2. *GETS*: The Government Emergency Telecommunications Service (GETS) is a restricted service that permits individuals authorized by the NCS to make prioritized calls. This service differs from the private line service in that no physical circuits are being considered for provisioning. Rather, the GETS is assigned a signaling priority whereby the Signaling System 7 (SS7) recognizes the initiation of a GETS call, and provides preferential treatment to the GETS call over a non-GETS call for admission into the PSTN. Another feature that enhances priority treatment for GETS calls is exemption from Network Management controls. Thus, TSP codes do not apply in the signaling priority assignments, although SS7 links per the TSP Report and Order [4] are exempt from TSP and may have priority over TSP.

These two examples provide an illustration as to how TSP rules/codes apply directly and indirectly. The NS/EP private line circuit provisioning (and restoration/repair) is a direct application of TSP. The priority for provisioning this circuit is done according to TSP codes over other circuits, as is the assignment of TSP codes for circuit repair.

By contrast, GETS is an NS/EP application. Other non-NS/EP mechanisms are required to ensure the automated preferential treatment for NS/EP applications. For GETS, the SS7 message priority is not dictated by TSP codes. Rather, the SS7 message priority for GETS ensures that such calls are recognized and treated preferentially over non-GETS calls in the PSTN.

6 ROLE OF TSP IN AN NGN/IP ENVIRONMENT

In the new environment of NGN/IP networks, the role of TSP can be examined by using the same two examples stated above.

6.1 Physical Facilities

As in the PSTN case, NS/EP services can request the use of physical circuits in NGN/IP networks. For example, DS3 or OC-3 circuits can be requested for designated NS/EP use. As above, direct TSP rules and codes apply for provisioning such circuits, as well as in the case for manual repair if automated restoration means are not available.

6.2 Emergency Telecommunications Service (ETS)

The evolution of the GETS in the PSTN to a broader class of services in NGN/IP environments - known as *Emergency Telecommunications Service (ETS)* - will require enhancements for automated preferential treatment. ETS encompasses real-time Voice over IP (VoIP) calls, as well as other forms of telecommunications traffic – data, video, and multimedia [3]. As in the case with GETS in the PSTN, TSP codes do not apply directly here. Rather, as in the case for GETS in the PSTN, priority rules and mechanisms will be needed in NGN/IP environments in order to facilitate preferential admission and restoration policies. Specifically, priority agreements will be needed to classify ETS as a preferred service over other services, signaling extensions will need to be developed to communicate the high priority of ETS and -- finally -- priority-enabling mechanisms will be required that recognize the signaled priority and provide desired actions.

6.2.1 Priority Classification

In NGN/IP networks, three admission control/resource allocation priority levels have been established for all services [5], [6] – 1) "High"; 2) "Normal"; and 3) "Best Effort". The "High" priority level is exclusively reserved for ETS calls over all other calls.

In NGN/IP networks, three service restoration priority levels have been established for all services under the assumption that automated restoration methods will be able to support multiple levels of restoration priorities [7] – 1) "High"; 2)"Normal"; and 3)"Best Effort". ETS is included in the "High" priority level for services that require automated restoration.

6.2.2 Priority Signaling

The priority levels established for ETS above need to be signaled to various network elements such that appropriate preferential treatment is enacted. In the IETF, two signaling protocols that signal service priority levels are as follows:

1. *SIP Resource Priority Header (RPH)* [8]: The IETF Session Initiation Protocol (SIP) working group has established a Resource Priority Header for SIP messaging that indicates the priority nature of ETS. All ETS calls in IP environments are designated with an "ets"

namespace with five priority sub-divisions that convey levels of importance in the application layer (within SIP elements). Incoming ETS calls/sessions are assigned the "ets" designation in the RPH header. In the transport layer, ETS calls/sessions are recognized by the presence of the "ets" namespace RPH value in the SIP message, and accorded the "High" priority described above for resource reservation/assignment such that preferential treatment can be enacted. A similar namespace designation of "wps" accompanied by five priority sub-division values is available for calls in wireless/3GPP networks.

2. *Next Steps in Signaling (NSIS)* [9], [10]: The NSIS Working Group is standardizing a transport layer signaling protocol for the transport of upper layer signaling. Reservation and restoration priority attributes are included in the list of parameters that will be supported by NSIS.

6.2.3 Priority Mechanisms

Priority enabling mechanisms in the transport layer of NGN/IP networks should be able to recognize the signaled "High" priority values of incoming ETS calls/sessions and provide appropriate action. Two examples of mechanisms under consideration are as follows:

1. *Diffserv-Aware MPLS Traffic Engineering*: Combining DiffServ and MPLS-based Traffic Engineering can lead to true Quality of Service (QoS) in IP packet backbones [11], [12]. To achieve this functionality, networks have to be carefully engineered with traffic engineering applied on a per-class basis; this is the essence of *DiffServ-Aware MPLS Traffic Engineering (DS-TE)* [13]. An aggregated grouping of Traffic Trunks based on the class of service requirements such that they share the same bandwidth reservation is called *Class Type (CT)*. Up to eight Class Types are allowed. Each CT has a priority attribute – ETS CT tunnels can be assigned/reserved with a "High" priority requirement.
2. *MPLS Fast Re-route* [14]: This capability supports extensions to establish back-up Label Switched Path (LSP) tunnels for automated re-routing of tunnels that have been disrupted by failures. Priority for these tunnels is supported – tunnels with ETS traffic can be assigned "High" priority for re-routing in case of failures.

7 RECOMMENDATION FOR TSP USE IN NGN/IP NETWORKS

The recommendation for TSP code usage in NGN/IP networks is stated as follows:

- A request for a physical circuit dedicated for NS/EP (e.g., private line) requires the use of TSP codes for provisioning and manual repair per current practice. Once provisioned, if this circuit can be restored via automated capabilities under failure conditions (e.g., circuit provisioned over a SONET ring), then TSP codes do not apply for the automated restoration process. If manual repair is necessary, then priority for repair is dictated by TSP codes per current practice.
- A request for an NS/EP service such as ETS that requires signaling procedures for call/session setup does not require the use of TSP codes. In such cases, the service request is established by signaling the "High" priority for call/session setup and service restoration in case of failure conditions. NS/EP services are classified with the highest available priority for admission control and service restoration. Signaling protocol extensions and underlying transport mechanisms that can support these classifications are under consideration and development.