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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

Next Generation Networks – Quality of Service and performance

Admission control priority levels in Next Generation Networks

ITU-T Recommendation Y.2171

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ITU-T Recommendation Y.2171

Admission control priority levels in Next Generation Networks

Summary

This Recommendation proposes three levels for admission control priority for services seeking entry into Next Generation Networks. The admission control priority indicator is intended as a guidance in the development of appropriate signalling protocol extensions, and in the development of the necessary priority enabling mechanisms.

Source

ITU-T Recommendation Y.2171 was approved on 13 September 2006 by ITU-T Study Group 13 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Admission control priority levels in Next Generation Networks

1 Scope

According to ITU-T Rec. Y.1271 [Y.1271], enhanced priority treatment is an essential requirement for the assured capabilities needed for emergency telecommunications. A critical component of enhanced priority treatment is admission control for telecommunications services seeking entry into a network particularly during emergency conditions when network resources may be depleted. Admission control in the NGN can be enabled by:

1) development of admission control priority levels based on the criticality of services seeking entry in NGNs;
2) development of necessary extensions in signalling protocols that can indicate the desired service priority levels at NGN interfaces;
3) development of admission control mechanisms that can recognize the signalled priority levels and undertake necessary action.

The scope of this Recommendation is limited to the development of priority levels for admission control. The purpose is to provide guidance for the subsequent development of the necessary signalling protocol extensions and the priority enabling mechanisms.

Administrations may require operators and service providers to take into account national regulatory and national policy requirements in implementing this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[Y.1271] ITU-T Recommendation Y.1271 (2004), *Framework(s) on network requirements and capabilities to support emergency telecommunications over evolving circuit-switched and packet-switched networks*.

[Y.1541] ITU-T Recommendation Y.1541 (2006), *Network performance objectives for IP-based services*.

[Y.2111] ITU-T Recommendation Y.2111 (2006), *Resource and admission control functions in Next Generation Networks*.

3 Definitions

This Recommendation defines the following terms:

3.1 admission control: A set of actions/policies taken by the network at session set-up phase in order to accept or reject a service based on requested performance and priority criteria and the availability of necessary resources.

3.2 emergency telecommunications: An umbrella term for telecommunications of an "extraordinary nature" under abnormal and potentially adverse network conditions.

4 Abbreviations

This Recommendation uses the following abbreviations:

CAC	Connection Admission Control
CoS	Class of Service
ET	Emergency Telecommunications
IP	Internet Protocol
ISP	Internet Service Provider
LSP	Label Switched Path
MPLS	Multi-Protocol Label Switching
MPLS-TE	MPLS Traffic Engineering
NSIS	Next Steps in Signalling
PD-FE	Policy Decision Functional Element
PE-FE	Policy Enforcement Functional Element
RACF	Resource and Admission Control Function
SCF	Service Control Function
SIP	Session Initiation Protocol
SLA	Service Level Agreement
TRC-FE	Transport Resource Control Functional Element
VoIP	Voice over IP
VPN	Virtual Private Network

5 Introduction and rationale

NGNs are expected to be truly "converged". That is, all forms of telecommunications services will be handled by such networks – control plane traffic (e.g., routing messages), emergency telecommunications, real-time voice and video services, data services, virtual private network (VPN) services, as well as traditional "best effort" traffic. In such an environment, it is important to assign priority levels and establish rules for capacity reservation and admission such that critical services are recognized and accepted for call/session set-up and admission (or simply carried in the case of non-session oriented traffic) over other services in case of network overloads or failures. As services can be expected to traverse multiple network domains, setting admission control priority levels is an important step in the development of the necessary signalling protocol extensions as well as the mechanisms for enabling preferential admission treatment of critical services.

It is critical for an NGN to recognize and admit higher priority services into the network, particularly under failure and/or congestion conditions. This can be referred to as a traditional form of connection admission control (CAC) priority classification. The need for such priority levels is most critical under emergency conditions when networks may experience loss of resources and capacity coupled with surges of communications traffic as the impacted public seeks help (in the affected areas) or information about family and friends. Priority levels can then be utilized by CAC functions to determine whether incoming calls or sessions can be admitted depending on the criticality of the service and the availability of a potentially reduced set of network resources.

Note that the priority level recommendations proposed in this Recommendation strictly relate to the relative importance of telecommunications services seeking admission into networks. They do not

reflect implementation specific priority definitions. Further, these recommended levels are independent from the Y.1541 [Y.1541] QoS classes.

6 Recommendation for admission control priority levels

Three admission control priority levels are recommended for telecommunications services seeking entry into NGN:

– Priority level 1: Traffic with this priority level receives the highest assurance for admission to the network. This level is reserved for emergency telecommunications over NGN.

– Priority level 2: Traffic with this priority level will not receive the same assurance for admission as that given to priority level 1 traffic, but will receive higher assurance for admission than that given to priority level 3 traffic. Examples include real-time services (VoIP, video), VPN and data services. The selection of this priority level is expected to be determined by appropriate service level agreements (SLA) between network operators and customers for the desired service.

– Priority level 3: Traffic with this priority level receives the least assurance for admission to the network. Examples include "traditional" Internet service provider (ISP) services (email, web surfing). The selection of this priority level is expected to be determined by appropriate SLA agreements between network operators and customers for the desired service.

Each network operator may adopt additional priority levels. The total number of admission control priority levels may be extended in the future.

The choice of priority implementation mechanisms in the transport stratum is up to the network operator.

7 Implementation example of priority levels with RACF

ITU-T Rec. Y.2111 [Y.2111] defines the functional architecture for the resource and admission control function (RACF) for NGN. RACF is intended to serve as the arbitrator between the service control function (SCF) and the transport function in the NGN for QoS-related transport control in access and core networks. Arbitration decisions will be based on transport subscription information, SLAs, network policy rules, service priority, and transport resource status and utilization information.

RACF is required to recognize and process the CAC priority levels as follows:

– Policy decision functional element (PD-FE) receives the CAC priority level (along with other relevant information) of the incoming session from the SCF and passes it to the transport resource control functional element (TRC-FE) and the policy enforcement functional element (PE-FE) over the Rt and Rw reference points respectively.

– TRC-FE determines resource availability to complete the incoming session that best meets the QoS requirements. In the event of depleted resources, the TRC-FE determines the order of session set-up/admission based on the CAC priority.

– PE-FE may recognize the priority and QoS attributes of the incoming session and map it to a pre-designated class of service (CoS) that best meets the session requirements. The CoS depends on the underlying transport stratum mechanisms.

When the RACF operates below full capacity due to component failure and/or experienced overload, it is expected to process requests for priority level 1 sessions first and throttle those for priority level 3 and priority level 2 sessions as appropriate.

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[E.106] ITU-T Recommendation E.106 (2003), *International Emergency Preference Scheme (IEPS) for disaster relief operations*.

[Y.2201] Draft ITU-T Recommendation Y.2201, *NGN release 1 requirements* (http://www.itu.int/md/T05-SG13-R-0026/en).

[E.107] Draft ITU-T Recommendation E.107, *Emergency Telecommunications Service (ETS) and interconnection framework for national implementations of ETS* (http://www.itu.int/md/T05-SG02-060503-TD-PLEN-0009/en).

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

* T1 standards are maintained since November 2003 by ATIS.

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