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NICC Document

Provisional manual rate control procedures for overload control on Next Generation Network interconnection

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Contents

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Foreword

This NICC Document (ND) has been produced by NICC.

Introduction

This specification has been updated because of the publication of specification ND1653 [i3] (see the Overview section of this document) and because NICC has moved away from the concept the origainl Release Structure defined in original versions of ND1610.

1 Scope

This document defines a static mechanism for controlling the processing load that can be presented across an interconnect boundary between NGNs for services that are supported by the SIP. The mechanism is entirely generic. These static controls are not applicable to services that do not use SIP.

Note: Services that use SIP-I (such as generic ISDN and POTS) should use the UK definition of Adaptive ACC and not the static controls described here.

2 References

2.1 Normative References

[1] ETSI TR 182 015: “Architecture for Control of Processing Overload in Next Generation Networks".

2.2 Informative references

[i1] ETSI ES 283 039-2 " NGN Congestion & Overload Control; Part 2: Core GOCAP and NOCA Entity Behaviours"

[i2] SR 001 262 (V2.0.0): " ETSI drafting rules Section 23:- Verbal Forms For The Expression Of Provisions ".

[i3] ND1653 “Overload Control for SIP in UK Networks”.

3 Definitions and Abbreviations

3.1 Definitions

The key words “**shall**”, “**shall not**”, “**must**”, “**must not**”, “**should**”, “**should not**”, “**may**”, “**need not**”, “**can**” and “**cannot**” in this document are to be interpreted as defined in the ETSI Drafting Rules [i2].

3.2 Abbreviations

ACC	Automatic Congestion Control
CP	Communications Provider
ETSI	European Telecommunication Standards Institute
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part of C7 signalling
ND	NICC Document
NGN	Next Generation Network
NICC	Network Interoperability Consultative Committee
PSTN	Public Switched Telephone Network
SIP	Session Initiation Protocol
TDM	Time Division Multiplex
UK	United Kingdom

4 Overview

To ensure the integrity of a network, processes must be implemented to manage overload. In a single network or interconnected networks managed by a single CP, management of overload may be achieved by careful use of dimensioning, static controls and/or proprietary overload controls. Such controls are out of scope for NICC specifications.

It must be possible for a CP to protect their network against load that originates outside that network. For existing TDM networks using UK ISUP or NGNs interconnecting using SIP-I, the UK ISUP Adaptive ACC (AACC) is available and mandated to provide overload control. AACC is not available when NGNs are interconnected using SIP and hence a different overload control mechanism is required.

The architecture for the control of processing overload in NGNs is described in [1]. An adaptive overload control mechanism was developed by ETSI [i1] but since then IETF developed SIP signalling specific overload control schemes which became the basis for NICC to develop and publish the UK SIP scheme [i3].

This document defines a static rate control mechanism applied to sources of traffic in order to protect a target from overload control, which may be used until [i3] is deployed. The rate control algorithm described in [i3] would be suitable as an implementation of the approach defined herein, even though such a control architecture would not be ND1653 compliant because the maximum rates of traffic at sources would not be mastered by the target and communicated in the required way.

5 Overload Control

The document describes a static mechanism for controlling the processing load that can be presented across an interconnect boundary between NGNs for services that are supported by the SIP. The mechanism is entirely generic, but should be thought of as a stop gap until adaptive rate limiting schemes have been standardised. Services that use SIP-I (such as generic ISDN and PSTN) should use the UK definition of Adaptive ACC and not the static controls described here. These static controls are not applicable to services that do not use SIP. The architecture of SIP service interconnect is shown in Figure 1. The objective of this mechanism is to prevent either of the Edge Session Control Functions (ESCFs) from receiving more than a previously agreed work load from the other.

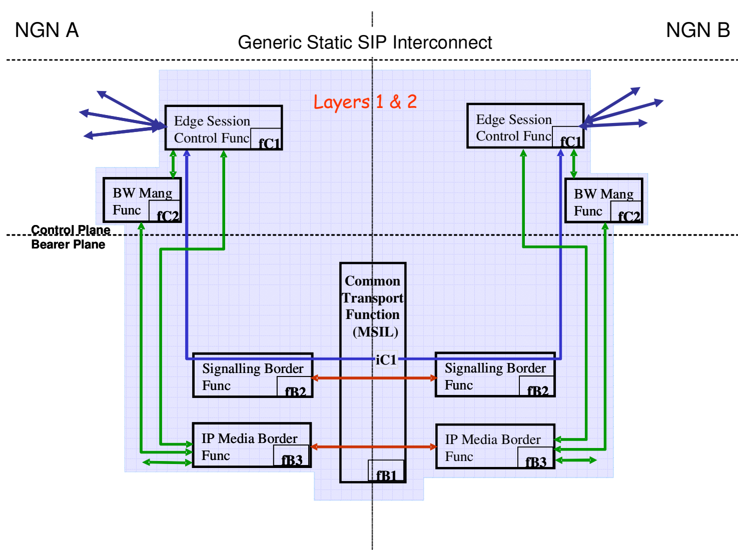

Figure 1: Generic SIP based service architecture

5.1 Control Description

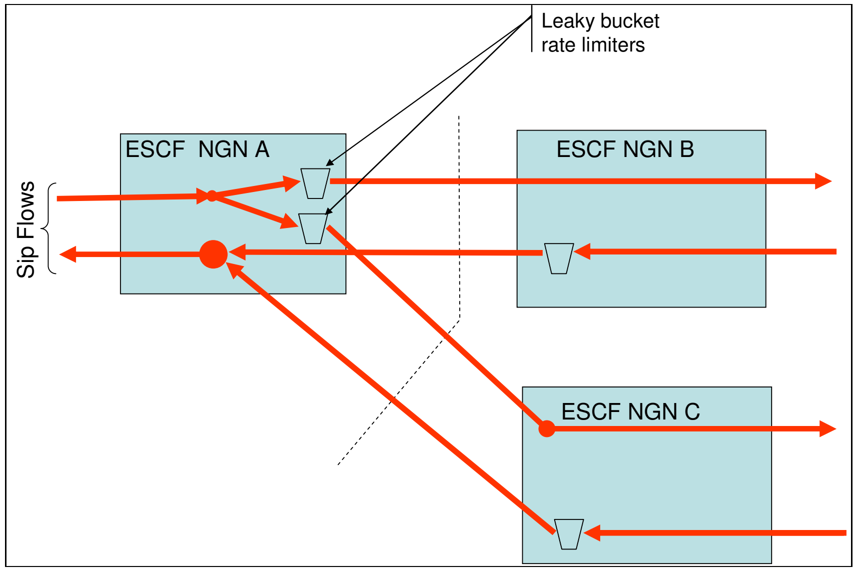

Figure 2: Disposition of rate limiters to protect ESCFs from traffic entering a network via interconnect (lower layers omitted).

Each ESCF **shall** implement rate control of certain SIP methods towards each associated ESCF on the other side of an interconnect as shown in Figure 2. The rate control **shall** be a floating point leaky bucket supporting multiple thresholds and splash amounts as described in Figure 4. The rate control **shall** apply to the following SIP methods:

- INVITE
- REGISTER
- NOTIFY.

In operation, each occurrence of the specified SIP methods is offered to the rate limiter. Those messages that are admitted by the leaky bucket **shall** be forwarded across the interconnect boundary. Those messages (including emergency comms) that are rejected by the leaky bucket **shall not** be forwarded across the interconnect boundary. The fate of messages rejected by the restrictor is not described here.

For each of specified SIP Methods, the interconnecting operators **shall** agree a splash value, which **should** be proportional to the effort required to process that method (including any subsequent signalling). Interconnecting operators **shall** also agree the restrictor leakrate. The leakrate **should** be selected so that the sum of the leakrates at each ESCF pointing towards a particular target ESCF is less than the portion of the capacity of that ESCF devoted to servicing the interconnect traffic. The threshold ranges and the significance of the priority levels **should** be defined in any service specification that uses this overload control mechanism.

While the deployment of rate limiters as described above will be sufficient to limit the workload flowing across the interconnect, an operator **should** also consider restricting the rate of requests to the ESCF from other sources within their own network. Operators **should** also consider the using rate limiters to restrict the volume of signalling sent from the ESCF to individual processing elements in their own network.

5.2 Supporting multiple SIP services

If the physical realisation of an ESCF is used to support more than one SIP based service across an interconnect then the following should be taken into account.

If the SIP services are similar, then the signalling flows for these services between the same ESCF pairs **may** share the same leaky bucket. If the services are very different, (e.g. if the splash parameters are significantly different, the priority schemes are incompatible, or there is a requirement to protect one service from another) then the capacity of the physical ESCF **shall** be partitioned into logically separate virtual ESCF, each protected by dedicated leaky buckets. These two approaches are shown in Figure 3.

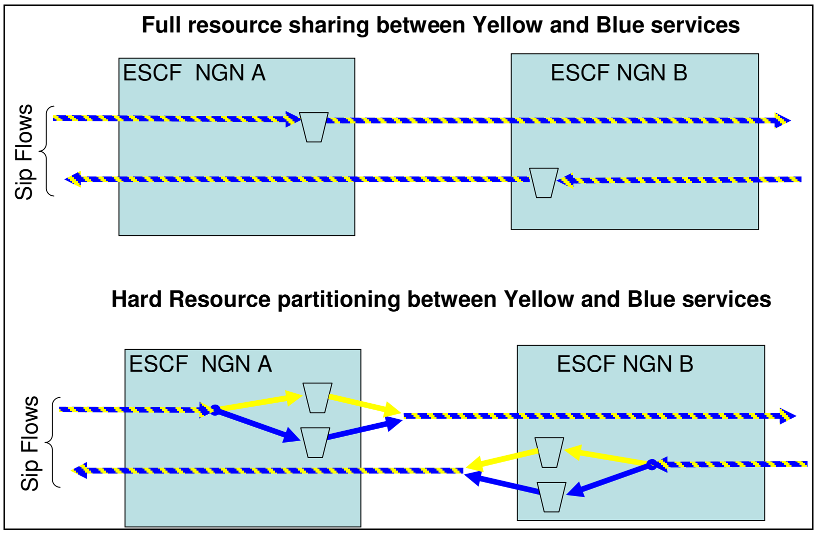

Figure 3 Supporting multiple SIP services over the same physical realisation of the ESCF

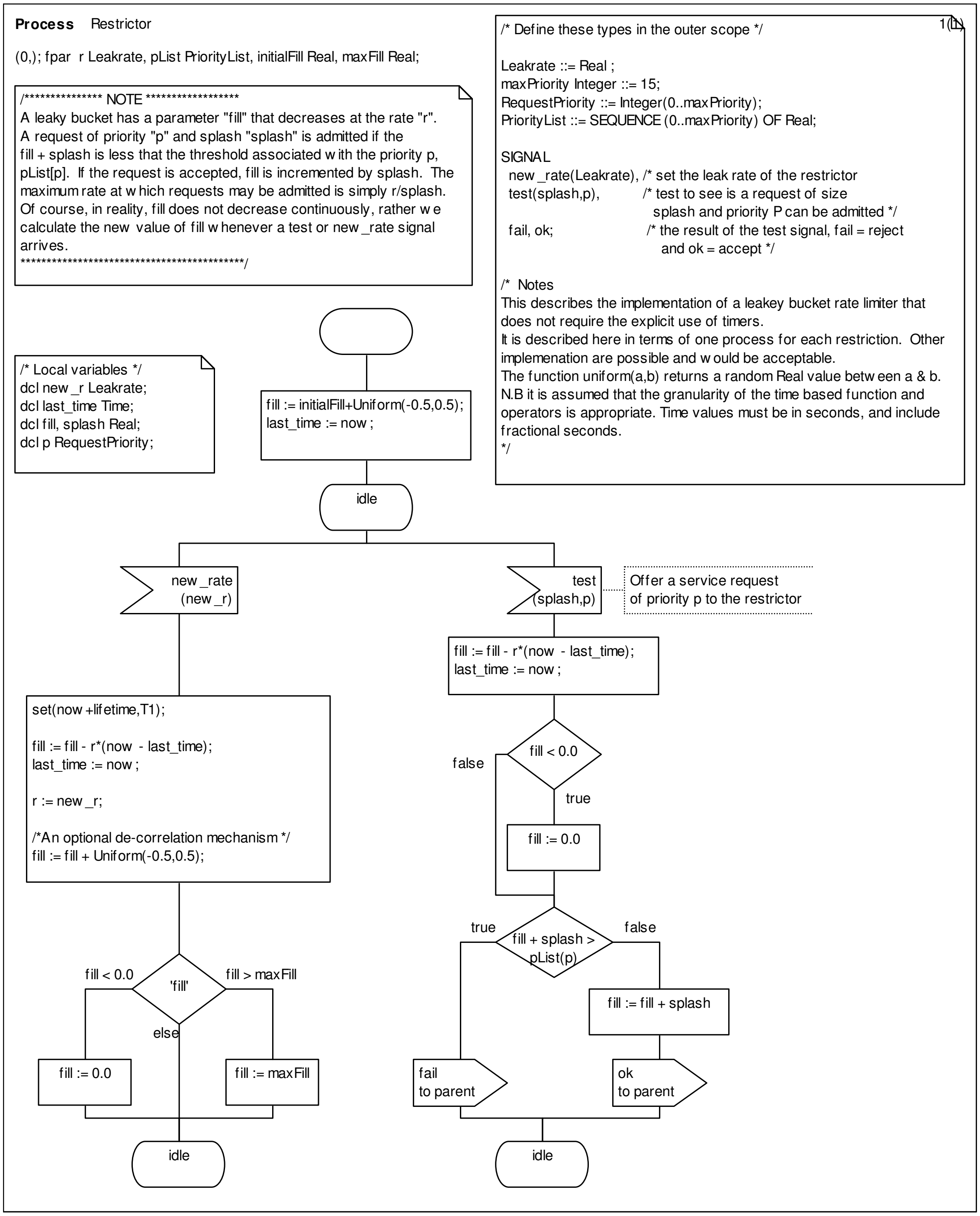

Figure 4: A multi-priority leaky bucket rate limiter

History

Document history		
1.1.1	November 2007	Initial issue
2.1.1	17th August 2020	Second issues to enable compatibility with the published ND1653.