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Automatic Code Gapping (Stage 1)

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Revision History

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Note

This specification is an extract of TIA TR45.2 PN-4410, December 1999.

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1 INTRODUCTION

Automatic Code Gapping (ACG) is intended to provide a Network Entity, such as a SCP or SCF, the ability to turn off selected types of traffic that may be passing through its domain of operation. The purpose for ACG may be load related or in response to a traffic engineering command as from a Service Management System (SMS). This document provides a general description of ACG as it applies to 3G network operations. Specific applications will be defined in other documents or later versions of this document.

1.1 ASSUMPTIONS

1. The terms used in this document are generic and refer to typical 3G network applications. The specific operation of ACG for future applications, such as Wireless Number Portability (WNP), is not defined here.
2. An ACG control is initiated at an NE by an information flow from an SCF NE. The SCF can request that a new control be installed, the information on an existing control be updated, or that an ACG control be removed. Both *SCF Overload Control* and *Service Management System* initiated ACG controls can be installed, updated and removed. A new control replaces the existing control. The SCF provides the information needed to administer ACG controls:
3. The ACG Directive (ACGDIR) is a *unidirectional transaction*. If the local NE fails to invoke ACG as directed, and continues to send blocked messages to the controlling NE, the controlling NE may opt to resend the ACGDIR, if resources permit, or may simply ignore input from the local NE. Since ACG is often the result of an overload condition at the (SCF/SCP) NE, resending of commands may only intensify the condition.

1.2 ORGANIZATION

This document is organized as follows:

- Stage 1 descriptions (3G network capabilities)

X NETWORK CAPABILITIES

X.1 AUTOMATIC CODE GAPPING (ACG)

Automatic Code Gapping (ACG) is used to reduce the rate at which a network entity (NE), typically an MSC, sends service request messages to a service control function (SCF) NE such as a SCP. ACG controls can be applied automatically by the SCF when it is in overload. ACG controls can also be applied manually for purposes of SCF system management. The SCF can specify that ACG controls be applied to query messages destined for a specific Point Code and Subsystem Number or for an SCCP Global Title.

Applicability to Network Configurations

ACG is applicable to SS7 network configurations.

X.1.1 Normal Operation

Invocation

An ACG control is initiated at an NE by an information flow from an SCF NE. The SCF can request that a new control be installed, the information on an existing control be updated, or that an ACG control be removed. Both *SCF Overload Control* and *System Management* initiated ACG controls can be installed, updated and removed. A new control replaces the existing control.

The SCF provides the information needed to administer ACG controls:

Destination Address

The destination address to which the ACG control applies. The destination address can be a Point Code and Subsystem Number or a Global Title.

For a Global Title, the SCF NE specifies:

- a. **Translation Type:** the Global Title Translation value
- b. **Global Title address:** Global Title address digits
- c. **Digit Length:** the number of most significant Global Title address digits examined by the NE under ACG control

Control Type

The Control Type is the reason the ACG control is requested (i.e., *SCF Overload*, *System Management*). This information allows the NE under ACG control to set priorities among gapped messages, the *System Management case* having greater priority.

X.1.2 Gap Duration

Gap Duration

The Gap Duration is the length of time that an ACG control is to remain in force before it is removed by the NE under ACG control. The Gap Duration values are shown in the following table:

Gap Duration (Seconds)
1
2
4
8
16
32
64
128
256
512
1024
2048
Stop All Messages

Table 1: Gap Duration Levels

X.1.3 gap interval

Gap Interval

The Gap Interval is the minimum amount of time that the NE under ACG control must wait before sending another query message to the SCF NE. When an ACG control is initiated by an *SCF Overload Control*, the Gap Interval can have a number of possible levels having the average values listed in the table below. When the ACG control is initiated for *System Management*, the Gap Interval can have a number of possible levels having the average values listed in the table below.

Average Gap Interval (Seconds)	
SCF Overload Control	Service Management
0	Remove Gap Control
0.1	0.1
0.25	0.25
0.5	0.5
1	1.0
2	2.0
3	5.0
4	10.0
6	15.0
8	30.0
11	60.0
16	120.0
22	300.0
30	600.0
42	Infinity
58	
81	
112	
156	
217	
300	
Remove Gap Control	

Table 2: Control Gap Intervals

Controls specified with an infinite gap or an infinite duration (Stop All Calls) are supported as long as they do not apply to the same control. If both are specified for the same control, the NE gives the Gap Interval preference and sets the Gap Duration for 4096 seconds.

X.1.4 GAP TREATMENT

Gap Treatment

Specifies how gapped messages are to be treated. If omitted, processing continues.

X.1.5 Normal Operation with Successful Outcome

Normal Operation with Successful Outcome

When an ACG control is applied at an NE, the NE sets a gap duration timer and a gap interval timer based on the ACG control information received from the SCF. All subsequent queries to the destination address designated by the SCF are blocked until the gap timer expires.

When the gap timer has expired or the control has a gap interval of zero, the next non-HLR based function query message to the designated destination address is not blocked but is processed normally. The message to the SCF includes an indication that there is an ACG control in effect. The indication that an ACG control was encountered indicates the control on which the NE is acting. Only one control is indicated (i.e., *SCF Overload Control* or *System Management*).

This cycle continues until either the gap duration timer expires or the NE is requested to remove the control via an SCF NE message.

While the average values for the gap intervals are given in Table 2, the actual gap intervals to be used are chosen randomly by the NE according to a uniform distribution. In the case of *SCF Overload* controls, the actual gap interval is chosen from a uniform distribution that lies between 90 percent and 110 percent of the average values listed in Table 2. In the case of *Service Management* controls, the actual gap interval is chosen from a uniform distribution that lies between 50 percent and 150 percent of the average values listed in Table 2. This random selection is repeated when the gap timer is reset.

X.1.6 Call Detail Record

Call Detail Record

If the NE under ACG control is an MSC and a call is blocked or given denial treatment due to an ACG control, the MSC should record the following information:

- a. Calls refused or diverted due to an ACG control.

See *TIA/EIA-124* for the specific information to be included for each element.

X.1.7 Exception Procedures or Unsuccessful Outcome

Invocation

None identified.

X.1.8 Alternate Procedures

None identified.

X.1.9 Interactions With Other Network Services

None identified