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**3RD GENERATION  
PARTNERSHIP  
PROJECT 2  
"3GPP2"**

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## ***Automatic Call Gapping (Stage 1)***

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## REVISION HISTORY

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Revision	Date	Remarks
1.0	July, 2000	Initial publication.
2.0	December, 2000	Second publication

## 2 TIA/EIA-664 Modifications

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This section provides Stage 1 features descriptions for ACG according to the structure of *TIA/EIA-664*.

### X Network Capabilities

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(New section for TIA/EIA-664)

#### X.1 Automatic Code Gapping (ACG)

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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). ACG controls can be applied automatically by the SCF when it is in overload. ACG controls can also be applied by an SCF for purposes of service 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

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ACG is applicable to SS7 network configurations.

##### X.1.1 Normal Operation

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###### Invocation

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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.

###### **Destination Address**

The destination address to which the ACG control applies 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*, *Service Management System Initiated*). This information allows the NE under ACG control to set priorities among gapped messages.

**Gap Duration**

The Gap Duration is the length of time 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
Infinity

**Table 1: Gap Duration Levels**

## 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 22 possible levels having the average values listed in the table below. An *SCF Overload Control* is initiated and updated based on SCF congestion levels. When the ACG control is *Service Management System Initiated*, the Gap Interval can have 16 possible levels having the average values listed in the table below. Service Management System controls are initiated independently of SCF load.

An average gap interval of "0" is used to indicate that subsequent query messages (matching the designated gap criteria) should be permitted. This value may be used to gap messages that satisfy broad gap criteria while still allowing the sending of queries that satisfy more selective criteria within the broader range (e.g., to allow queries with a Global Title Address of 800-888-8888 while still applying ACG controls on other 800-888 values).

Average Gap Interval (Seconds)	
SCF Overload Control	Service Management
Remove Gap Control	Remove Gap Control
0	0
0.10	0.10
0.25	0.25
0.5	0.50
1	1
2	2
3	5
4	10
6	15
8	30
11	60
16	120
22	300
30	600
42	Stop All Queries
58	
81	
112	
156	
217	
300	

**Table 2: Control Gap Intervals**

Controls specified with an infinite gap duration or a gap interval value of *Stop All Queries* are supported as long as they do not apply to the same control. If both are specified for the same control, the Gap Interval is given preference and the Gap Duration is set for 4096 seconds.

## Gap Treatment

When a message is blocked due to encountering an ACG control, the default fault handling specified for that query is applied.

## **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 interval timer expires.

When the gap interval timer has expired or the control has a gap interval of zero, the next query message to the designated destination address is not blocked but is processed normally and the gap interval timer is reinitialized. 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 *Service Management System Initiated*).

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 System Initiated* 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.

## **ACG Control Precedence**

If multiple ACG controls apply to a given query, then the sequences defined below shall be used to determine which control applies. The first matching ACG control encountered shall be the one that applies to the query message.

### **Global Title Destination Address**

- a. Search all *Service Management System Initiated* controls in the order of larger to smaller number of digits (Global Title Address digit length) for any zero-gap control intervals.
- b. If a match is not detected, search the combined *Service Management System Initiated* and *SCF Overload* controls in the order of larger to smaller number of digits (Global Title Address digit length). A *Service Management System Initiated* control has precedence over an *SCF Overload* control of the same digit length.

### **Point Code and Subsystem Number Destination Address**

- a. Search all *Service Management System Initiated* controls for any zero-gap control intervals that apply to the Point Code and Subsystem Number destination address.
- b. If a match is not detected, search the combined *Service Management System Initiated* and *SCF Overload* controls for a control that applies to the Point Code and Subsystem Number. A *Service Management System Initiated* control has precedence over an *SCF Overload* control.

## **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.1.2 Exception Procedures or Unsuccessful Outcome**

### **Invocation**

None identified.

**X.1.3 Alternate Procedures**

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None identified.

**X.1.4 Interactions With Other Network Services**

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None identified.