Engineering Rules

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Engineering Rules

This section provides SGSN-specific (2G, 3G, S4-SGSN related) common engineering rules or limit guidelines for the current release. These limits are hardcoded into the SGSN system and are not configurable. The limits are documented here because they should be considered prior to configuring an SGSN for network deployment.

Generic platform and system rules or limits can be found in the "Engineering Rules" appendix in the *System Administration Guide*.

Service Rules

The following engineering rules define the limits for the various services configured on the SGSN (system):

Note Maintaining a large number of services increases the complexity of management and may impact overall system performance. Therefore, we recommend that you limit the number of services that you configure and that you talk to your Cisco Service Representative for optimization suggestions and additional information on service limits.

Table 1: Service Rules for the SGSN

Features	Limits	Comments
Maximum number of (all) services (regardless of type) configurable per SGSN (system).	256	This limit includes the number of GPRS services, SGSN services, SGTP services, IuPS Services, and MAP Services.

Features	Limits	Comments
Max. number of eGTP services supported by a GPRS/SGSN service.	1	When configured for S4-SGSN. The same eGTP service should be associated with both the GPRS and the SGSN service.
Max. number of HSS peer services supported by a single GPRS or SGSN service.	1	When configured for S4-SGSN.
Max. number of Gs services supported by a single GPRS or SGSN service.	1	Although the limit is 1 Gs Service configured per GPRS Service or SGSN Service, SGSN service can access multiple Gs Services using Operator Policies.
Max. number of MAP services supported by a single GPRS (2G) or SGSN (3G) service.	1	Although the limit is 1 MAP Service configured per GPRS Service or SGSN Service, the GPRS or SGSN service can access multiple MAP Services using Operator Policies.
Max. number of Gs services supported on an SGSN (system)	12	
Maximum number of LACs per Gs service	128	
Max. number of MAP Service configurations supported by a single SCCP network.	1	
Max. number of SGTP services supported by a single GPRS or SGSN service.	1	Although the limit is 1 SGTP Service configured per GPRS Service or SGSN Service, the GPRS or SGSN service can access multiple SGTP Services using Operator Policies.

SGSN Connection Rules

The following limitations apply to both 2G and 3G SGSNs.

Table 2: Connection Rules for the SGSN

Features	Limits	Comments
Maximum number of entry authentication triplets (RAND, SRES, and KC) and quintuplets stored per MM context	5	5 (unused) + 5 (used) Triplets/Quituplets
Maximum number of logically connected SMSCs	no limit	Limit would be based on the number of routes if directly connected. No limit if GT is used.
Maximum number of logically connected HLRs	no limit	Limit would be based on the number of routes if directly connected. No limit if GT is used.
Maximum number of logically connected EIRs	1	SGSN will be connected to only 1 EIR.
Maximum number of logically connected MSCs	see comment	System supports a max of 128 LACs per Gs service and a max of 12 Gs service.
Maximum number of concurrent PDP contexts per active user	11	
Maximum number of logically connected GGSNs per Gn/Gp interface	20000	
Maximum number of packets buffered while other engagement Maximum number of packets buffered in suspended state Maximum number of packets buffered during RAU	see comment	- Minimum of 2KB/subscriber. - Maximum of 10KB/subscriber -- if buffers are available in the shared pool*. (*SGSN provides a common buffer pool for 2G and 3G subscribers of 10M per session manager buffers to be shared by all subscribers "belonging" to that session manager.) - Additional 2G subscriber buffer pool in BSSGP.

Operator Policy Rules

The following engineering rules apply for the entire system when the system is configured as an SGSN.

The limits listed in the table below are applicable for a standalone SGSN application . Limits may be lower when using a PSC1 or in combo nodes, such as SGSN+GGSN.

Table 3: Operator Policy Limits Applicable to the SGSN

Features	Limits	Comments
Maximum number of Operator Policies	1000	Includes the 1 default policy.
Maximum number of Call-Control Profiles	1000	
Maximum number of APN Profiles	1000	
Maximum number of IMEI Profiles	1000	
Maximum number of APN Remap Tables	1000	
Maximum number of APN remap entries per APN Remap Table	300	
Maximum number of IMSI ranges under SGSN mode	1000	
Maximum number of IMEI ranges per operator policy	128	
Maximum number of APN profile associations per operator policy	128	
Maximum number of Call-Control Profiles per Operator Policy	1	
Maximum number of APN remap tables per Operator Policy	1	
Maximum number of EIR Profiles	16	
Maximum number of congestion-action-profiles	16	
Call-Control Profiles		
Maximum number of equivalent PLMN for 2G and 3G	15	Mandatory to configure the IMSI range. Limit per call-control profile.
Maximum number of equivalent PLMN for 2G	15	Limit per call-control profile.
Maximum number of equivalent PLMN for 3G	15	Limit per call-control profile.
Maximum number of static SGSN addresses	256	Limit per PLMN.
Maximum number of location area code lists	5	

Features	Limits	Comments
Maximum number of LACs per location area code list	100	
Maximum number of allowed zone code lists	10	
Maximum number of allowed zone code lists	no limit	For Release 12.2
Maximum number of LACs per allowed zone code list	100	
Maximum number of integrity algorithms for 3G	2	
Maximum number of encryption algorithms for 3G	3	
APN Profiles		
Maximum number of APN profiles	1000	
Maximum number of gateway addresses per APN profile	16	

SS7 Rules

SS7 Routing

Table 4: SS7 Routing Rules for SGSN

Features	Limits	Comments
Maximum number of SS7 routing domains supported by an SGSN	12	
Maximum number of SS7 routes supported by an SGSN	2048	This includes the self point code of the peer-server.
Maximum number of routes possible via a link-set	2048	
Maximum number of routes possible via peer-server	2048	This includes one route for the peer-server and 2047 indirect routes.
Maximum number of different levels of priority for link sets used in a single route set	16	

SIGTRAN

Table 5: SIGTRAN Rules for SGSN

Features	Limits	Comments
Maximum number of peer servers per LinkMgr	512	
Maximum number of peer servers per SS7RD	256	
Maximum number of PSPs per peer server	12	
Maximum number of ASPs per SS7RD	12	
Maximum number of SCTP endpoints per ASP	2	
Maximum number of of SCTP endpoints per PSP	2	
Maximum number of SCTP endpoints per PSP (dynamically learnt)	5	

Broadband SS7

Table 6: Broadband SS7 Rules for SGSN

Features	Limits	Comments
Maximum number of MTP3 linksets	512	
Maximum number of MTP3 linksets per SS7RD	256	
Maximum number of MTP3 links per linkset	16	
Maximum number of MTP3 links per combined linkset	256	

SCCP

Table 7: SCCP Rules for SGSN

Features	Limits	Comments
Maximum number of SCCP networks	12	
Maximum number of destination point codes (DPCs)	2048	
Maximum number of SSNs per DPC	3	

GTT

Table 8: GTT Rules for SGSN

Features	Limits	Comments
Maximum number of associated GTTs	16	
Maximum number of actions per association	15	
Maximum number of address maps	4096	
Maximum number of out-addresses per address map	20	

SGSN Interface Rules

The following information relates to the virtual interfaces supported by the SGSN:

System-Level

Table 9: System Rules on the SGSN

Features	Limits	Comments
Maximum supported size for IP packets (data)	1480	
Maximum recovery/reload time	17 mins.	

3G Interface Limits

Table 10: 3G Interface Rules for SGSN

Features	Limits	Comments
Maximum number of RNCs	See comment	Supports upto 256 directly connected RNC and 1024 indirectly connected through gateways.
Maximum number of RNCs controlling the same RA	no limit	
Maximum number of RAIs per SGSN	16K	16K is the recommended max RAI per SGSN, however, there is no hard limit imposed. Adding more RAIs may lead to memory issues.
Maximum number of RAIs per RNC	2.5K	
Maximum number of GTPU addresses per SGTP service	12	

2G Interface Limits

Table 11: 2G Interface Rules - Gb over Frame Relay

Features	Limits	Comments
Maximum number of NSEs	2048	Limit is total of FR + IP
Maximum number of RAIs per SGSN	16K	16K is the recommended max RAI per SGSN, however, there is no hard limit imposed. Adding more RAIs may lead to memory issues.
Maximum number of RAIs per NSE	2.5K	
Maximum number of NSEs controlling the same RA	no limit	
Maximum number of NSVCs per NSE	128	
Maximum number of BVCs per NSE	max / SGSN is 64000	Whether or not Gb Flex is enabled.
Maximum number of cell sites supported	64,000	

Table 12: 2G Interface Rules - Gb over IP

Features	Limits	Comments
Maximum number of NSEs	2048	Limit is total of FR + IP
Maximum number of Local NSVLs per SGSN	4	
Maximum number of Peer NSVLs per NSE	128	
Maximum number of RAIs per SGSN	16K	16K is the recommended max RAI per SGSN, however, there is no hard limit imposed. Adding more RAIs may lead to memory issues.
Maximum number of RAI per NSE	2.5K	
Maximum number of NSE controlling the same RA	no limit	
Maximum number of NSVCs per NSE	512	
Maximum number of BVCs per NSE	max / SGSN is 64000	
Maximum number of cell sites supported	64000	
Maximum number of 802.1q VLANs per Gb interface	1024	
Maximum number of RAIs per SGSN	2.5K	2.5k is the recommended max RAI per SGSN, however, there is no hard limit imposed. Adding more RAIs may lead to memory issues

Engineering Rules