SIEMENS

Access Control

SiPass integrated

System Limits and Capabilities

MP 2.80

A6V11144328

07.09.2020

Smart Infrastructure

Copyright

Edition: 07.09.2020

Document ID: A6V11144328

1 System Limits and Capabilities

The following limits relate to the SiPass integrated system in general:

Technical data

Technical data	
Client-Server Architecture	Yes
Events per second	45 (continuously, 24/7) **Note:** Burst traffic speeds above 45 events per second are achievable, but not sustainable for long periods of time.
Number of events shown in Audit Trail messages per Second*	35-40
Maximum UTC time difference between client and server computers	Less than 5 minutes

***Note:** The Audit Trail displays the events that are relevant to the SiPass integrated Operator. The actual number of events happening in background can be more than this number.

SiPass integrated Server System

SiPass integrated Server System Requirements	
Operating System	Windows Server 2019
	Windows Server 2016
	Windows 10 (Professional, Enterprise)
DBMS	SQL 2019 Express
	SQL 2019
	SQL 2017 Express
	SQL 2017
RAM	**Minimum:** 8 GB
Hard Disk Drive	Recommended: 1 TB or more
Processor	**Intel Core i5 or higher** **(Recommended: 5th Generation or above)**
Network	Ethernet 100/1000 Mbit
Screen Resolution	1920 x 1080

Note:

The SQL server Express Edition database applications have been limited by Microsoft. As the database transactions increase, the performance of database application will decrease. As a general rule of thumb, a SiPass integrated Server used in conjunction with these versions of SQL should not exceed 10,000 users, 100 doors, or more than 5 workstation clients. Whilst some trade-offs can be made between these numbers or lower traffic sites can quite happily exist, larger installations should purchase the full SQL Server database license to ensure the integrity of their system at all times.

SiPass Workstation Client System

Operating System	Windows 10 (Professional, Enterprise) (64-bit)
	Windows Server 2019
	Windows Server 2016
Hard Disk Drive	160 GB
Processor	**Intel Core i5 or higher (Recommended i5 5th Generation)**
RAM	**Recommended:** 8 GB
Network	Ethernet 100/1000 Mbit
Screen Resolution	1920 x 1080
Maximum number of Site Plans that can be opened at one time	20

Note:

It is recommended that larger facilities install computers with higher grade specifications and networks that have appropriate communications speeds.

Database Details

The following values outline the SiPass database details:

Database Details	
Database Import	Yes
Database Export	Yes
Automatic Change Propagation	Instantaneous
No. of User Definable Fields	1024
User Definable Field Types	Numeric, String, Boolean, Date, or Lookup
Number of credentials per cardholder	5
Extended Door Open (ADA)	Yes (configurable per door)

Cardholder Limit Matrix for Various Controller Configurations

When determining the number of cardholders that can be configured, approximately 10% of RAM and Flash memory has been considered to be made available for other applications and database configurations.

Controller Type	RAM DB Backup	RAM Application	Flash DB Backup	Credentials*	DB Size	App. Memory Used	Access Rules	Database Reload Time (m:ss)
ACC	-	40M	12M(5)	400000	11.2M	27.5M	1 AG	2:43
ACC	-	40M	12M(5)	270000	10.8M	24.7M	5 AG	2:55
ACC	-	40M	12M(5)	220000	11.0M	25.2M	10 AG	3:22
ACC	-	40M	12M(5)	180000	10.8M	23.8M	15 AG	3:40
ACC	-	40M	12M(5)	155000	10.9M	23M	20 AG	4:09
ACC-G2	-	70M	32M	700000	21M	69.5M	1 AG	2.29
ACC-G2	-	70M	32M	500000	18M	65M	1 AG/1 WG (1)	
ACC-G2	-	70M	32M	500000	20M	65M	5 AG	2:36
ACC-G2	-	70M	32M	440000	22M	66M	10 AG	3:02
ACC-G2	-	70M	32M	380000	22.8	65M	15 AG	3:44
ACC-G2	-	70M	32M	340000	24M	64M	20 AG	3:53
ACC-AP	-	70M	32M	700000	21M	69.5M	1 AG	2.29
ACC-AP	-	70M	32M	500000	18M	65M	1 AG/1 WG (1)	
ACC-AP	-	70M	32M	500000	20M	65M	5 AG	2:36
ACC-AP	-	70M	32M	440000	22M	66M	10 AG	3:02
ACC-AP	-	70M	32M	380000	22.8	65M	15 AG	3:44
ACC-AP	-	70M	32M	340000	24M	64M	20 AG	3:53
SR35	12.5M	28.5M	-	100000 (2)	2.8M	14M	1 AG	1:41
SR35	12.5M	28.5M	-	100000	4M	17M	5 AG	2:43
SR35	12.5M	28.5M	-	100000	5M	18.7M	10 AG	3:56
SR35	12.5M	28.5M	-	85000 (4)	5.1M	19M	15 AG	5:21
SR35	12.5M	28M	-	60000 (4)	4.1M	15.5	20 AG	5:10
SR34	6.3M	11.8M	-	40000 (3)	1.1M	9.4M	1 AG	0:41

* 500000 cardholders if they all have a single card

Acronym/Terminology Descriptions	
Term	**Description**
ACC	Advanced Central Controller
ACC-G2	2nd Generation Controller and Granta MK3
ACC-AP	IP-based Door Controller
SR34 / SR35	ACC-Lite versions

Notes:

- (1)SiPass integrated has been modified, so that if it is configured with a single Access Group, and a single Work Group, then the `eNetAdvAddCardholder_No_AR` command will be configured. This means that the same capacity is obtained, as when a single Access Group is configured.
- (2)The SR-35 is hard-coded to a maximum of 100,000 cardholders.
- (3)The SR-34 is hard-coded to a maximum of 40,000 cardholders.
- (4)The SR35 is limited by the time it takes to reload the database (max. 6 min.), when multiple Access Groups are assigned to cardholders.
- (5)This value is relevant for an ACC with Compact Flash Card installed.

If the Access Group as the base unit;

Adding a Time Frame is added to a single Access Rule, is the equivalent of adding an additional 4 Access Groups.

Hence, a single Access Group with a Time Frame will be the equivalent of 5 Access Groups being assigned to a cardholder.

If a cardholder has two Access Groups assigned, and both have different timeframes, then this will be the equivalent of ten Access Groups. However, if they both have the same timeframe, it would be the equivalent of six Access Groups.

The following definitions indicate the relationship between the Access Rule type, and the Access Group.

Example:

Consider the maximum cardholders for ten Access Groups.

This same maximum cardholder value is valid if all the cardholders were configured with five Venue Bookings.

Similarly, ten Access Groups per cardholder is equivalent to configuring eighteen Access Points per cardholder.

Recommended Calculation Equation:

Venue Booking = AG / 2

Access Point = (AG * 2) – 2

Work Group = AG

Access Level = AG

Bank Floor = AG

Intrusion Zone = AG / 2

Point Group = AG / 2

Note:

These values are optimised when the same Rule Type is used for all Access Rules. If different Access Rules with different Rule Types are configured, then a new Access Rule will need to be allocated in memory for each Rule Type,

This may reduce the maximum number of Cardholders.

Further, if a different Time Schedule is assigned to points of the same Rule Type, a different Access Rule will be required for each different Time Schedule, which again may reduce the maximum number of Cardholders.

Absolute Maximum System Capacities

The following values outline the absolute maximum system capacities:

	System	ACC	ACC-Lite		ACC-G2	ACC-AP
			SR35	SR34		
Max. Cardholders*	Unrestricted[1]	400,000[1]	100,000	40,000	500,000	500,000
Max. Access Levels	65,535	65,535	40,000	20,000	65,535	65,535
Max. Access Groups	65,535	65,535	40,000	20,000	65,535	65,535
Max. Readers per Access Level	65,535	250	80	80	250	250
Max. Access Levels Per Card	65,535	1,000	1,000	500	1,000	1,000
Max. Antipassback Areas	16 ACCs per cluster	16 ACCs per cluster, 250 areas per cluster	16 mixed ACC/ACC-Lite per cluster	16 mixed ACC/ACC-Lite per cluster	16 ACCs per cluster, 250 areas per cluster	16 ACC-APs per cluster, 250 areas per cluster
Max. Intrusion Areas	500 per ACC	500	128	128	500	128
Max Wireless Hubs per Controller **	--	--	--	--	--	15
Max. Controllers (per system)	750					
Max. System Operators	65,535					
Max. System Workstations	140					
Max. Time Schedules	65,535					
Max. Definable Holidays	1000					
Max. Workgroups	65,535					
Max. Clients	140					
Max Web Clients***	30					

*The maximum number of cardholders is based upon an entire system (there is a maximum cardholder database size for each controller). Keep in mind that an average search time, when searching for all cardholders in SiPass integrated, is approximately 1 second per 5000 cardholders. More targeted searches (e.g. workgroups) will yield much quicker results. The maximum number of controllers is dependent upon the following factors: Network Speed, Network Configuration, Activity at each controller (e.g. volume of access attempts and alarms being triggered), Server PC specifications.

**Aperio Wireless Hub is supported by ACC-AP only.

*** The max. web clients value refers to the max, number of concurrent web client logins. Note that this value is the absolute maximum and its performance may be affected by the number of SiPass clients configured in the system.

Biggest Number for a Card

The card numbers added to SiPass integrated (with a character length of 20) must not go above the number *18,446,744,073,709,551,615* (the biggest 64-bit number when converted to a bit string).

Absolute Maximum Controller Capacities

The following values outline the absolute maximum controller capacities:

	ACC / ACC-G2	ACC-Lite / ACC-X	ACC-AP
Maximum Readers Per Controller	96 * (Refer to the following page for a description of FLN load ratings)	ACC-Lite: 16 ACC-32: 32 ACC-16: 16 ACC-8: 8 ACC-4: 4	18#
Maximum Wireless Readers Per Controller	--	--	32 **
Max. Monitoring Points (Inputs) per Controller	768	128	128
Max. Controlled Points (Outputs) per Controller	384	64	64

* 96 readers per ACC is the practical limit. However, each Access Level can have readers from different ACCs and can have upto 250 Reader Points (as mentioned in the table above).

** Depending on the number of Aperio Hubs and the number of Wireless Locks, the configuration can be done as below:

- Up to 15 Aperio Hubs can be connected to one ACC-AP
- Up to 8 Wireless Locks can be created under each hub
- Up to 32 wireless Aperio Lock devices can be paired across all the Aperio Hubs connected to one ACC-AP FLN.

18 Readers per ACC-AP = 16 on MFI + 2 on DRIe

It is recommended that if you choose to backup the database using onboard flash, that you do not exceed 150,000 cardholders per ACC, or 40,000 for the ACC-Lite.

Note:

Be aware (as outlined on the front page) that as one system limit is increased, the ability for other parameters to be maximized decreases. For example, a system with 100,000 cardholders should not be designed to co-exist with 65,535 access groups as both these parameters require database storage. A more sensible approach would be to have a system with 100,000 cardholders and 400 well designed access groups that serve the needs of these cardholders.

Bandwidth Calculations for Server to Client Communications

Client-Server Bandwidth 100MB Link: (Assuming one client per link)

- Normal Operational Bandwidth (bytes/second) = 0.1 %
- Peak Operational Bandwidth (bytes/second) = 0.25%

Client-Server Bandwidth 128KB Link: (Assuming one client per link).

Note: It is recommended that 128KB connections only be used in instances where client traffic is expected to be low (this means minimal database changes are made, no use of graphic maps is required, cardholder photographs are not used etc.). Otherwise, performance degradation may be observed, particularly during peak times, as the figures below indicate.

- Normal Operational Bandwidth (bytes/second) = 76 %
- Peak Operational Bandwidth (bytes/second) = 1000%

To serve as an example, normal operation is a standard workstation client receiving audit trail messages from the SiPass integrated server. Peak operation may exist when audit trail is being received by a workstation client, at the same time a cardholder record is being retrieved for display on the screen.

Note: The network connection from SiPass integrated client to SiPass integrated server should be low latency, so as to achieve optimal client performance. The average latency should be less than 10 milliseconds (typical value for local Ethernet with perhaps 1-2 router hops).

Running the SiPass integrated client on a WAN link, typically with high latency, will result in a slower performance than in a low latency LAN.

For instance, comparing just latency, a client operation that takes x seconds with a network latency of 10ms, will take about 6 times as long to perform if the network latency is 60ms instead.

There are parameters like Site Configuration, Site Database, Network Environment (settings / bandwidth / performance / errors), and others that could also affect the client performance.

If the SiPass integrated client on a WAN link is perceived to be under performing, then a CITRIX Terminal Server approach is the recommended method of connecting the SiPass integrated client to the SiPass server.

Latency vs Time table for various SiPass integrated Client Operations

SiPass integrated Client Operation	Latency (ms) vs Time (sec)				
	10ms	20ms	40ms	60ms	100ms
Time taken to print a card	2 sec	4 sec	7 sec	11 sec	18 sec
Time taken to open an empty cardholder dialog	2 sec	5 sec	9 sec	12 sec	21 sec
Time taken to search for an existing cardholder record	6 sec	8 sec	14 sec	17 sec	30 sec
Time taken to save one existing cardholder with a modified access group	1 sec	3 sec	4 sec	7 sec	13 sec

Note: These are typical values of a database with 10,000 cardholders.

Capacities and Features of the ACC

The following values outline the capacities and features of the Advanced Central Controller (ACC):

	ACC	ACC-Lite		ACC-G2	ACC-AP
		SR35	SR34		
Networking Protocols	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP
Required Network Speed	56 KB minimum, 10 MB Ethernet recommended	56 KB minimum, 10 MB Ethernet recommended	56 KB minimum, 10 MB Ethernet recommended	56 KB minimum, 10 MB Ethernet recommended	10 MB Ethernet recommended
Dial-up Controller Communications	Yes	No	No	Yes	No
Redundant Controller Communications	Yes, via modem	No	No	Yes, via modem	No
Embedded Processor	Yes (PPC)	Coldfire	Coldfire	ARM	ARM
Scalable Memory	No	No	No	No	No
Controller Operating System	Nucleus RTOS	eCos	eCos	Linux	Linux
Support for Static IP Address	Yes	Yes	Yes	Yes	Yes
Database Flash Memory	6MB (Onboard) Or 12MB (CF Card)	8MB Battery backed RAM	4MB Battery backed RAM	32MB (Onboard)	32MB (Onboard)
RAM	64MB RAM	16 MB SD RAM	8 MB SD RAM	128MB SD RAM	128MB SD RAM
Onboard Ethernet 10/100	Yes	2-port switch	2-port switch	2-port switch	Yes
Communications Encryption	AES	AES	AES	AES	AES

	ACC	ACC-Lite		ACC-G2	ACC-AP
		SR35	SR34		
Peer-to-peer communication between controllers	Yes	Yes	Yes	Yes	Yes
Controller Sub-bus FLN (load splitting)	6	1	1	6	1
Local Input	1	0 (case tamper)	0 (case tamper)	Case tamper + local input	Case tamper + 0 to 2 depending on door configuration .
Local Output	1	1	1	1	0 to 2 Open Collector outputs, depending on door configuration .

Maximum Number of Devices per FLN

Maximum number of devices per FLN (Load Recommendation):

Field Level Network Device	Load Rating
Multi Function Interface (MFI) #	4
Single Reader Interface (SRI)	1
Dual Reader Controller (DRI)	2
OSDP Reader (OSDP)	1
OSDP Readers (OSDP FLN) *	8
Input Point Module (IPM)	4
Output Point Module (OPM)	4
OPM for Elevator Floor Control Only	2
Eight Reader Interface (ERI)	8
Eight Input / Output Module (8IO)	2
DC12 (Door Central)	2
DC22 (Door Central)	2
Intrusion Arming Terminal (IAT-010)	1

Note:

The Maximum load rating recommended per FLN on an ACC = 16. Any combination of devices can be used, but should not exceed a combined total of 16. For example, 4xDRIs + 1xIPM + 1xOPM could all be connected to the same FLN as the combined load rating of these devices is 16.

FLN 3a and 3b should be counted as a single FLN for load rating purposes.

The load rating OF MFI changes depending on the door set selected. For example, 4 dual reader doors will have a load rating of 8.

*** The recommended number of OSPD Readers on one OSDP FLN is 8.** However, up to 16 readers can be configured; in which case, the polling rate will be reduced to 1 poll per second per reader.

Bandwidth Calculations for AC5100 to SiPass integrated Server (for a security network with up to 100 ACCs configured):

For 100MB Ethernet link:

- Standard Operation = 0.08% bandwidth of 100M per ACC
- Peak Operation = 1% bandwidth per ACC

Note: Communications to/from an ACC are limited to at most 50 Ethernet packets of up to 1500 bytes, which is 50 packets x 1500 bytes = 750,000 bits/sec in one direction, and approximately 50,000 bits/sec in the reverse direction.

For 128KB remote link:

Note: It is recommended that 128KB (or slower) connections only be used in instances where ACC traffic is expected to be low (this means a small number of access attempts, few alarms, etc.). Otherwise, performance degradation may be observed, particularly during peak times, as the figures below indicate. Note that these peaks would be observed during initialization etc., and very heavy traffic only and the operation of an ACC is still suitable for remote modem connection.

- Standard Operation = 128% bandwidth
- Peak Operation = 240% bandwidth

Audit Trail Messages

The following values outline the number of Audit Trail messages that can be buffered on different devices while in the Offline Mode (disconnected from the ACC).

Field Level Network Device	Number of Messages
DRI	350
SRI	350
ERI	2800
DRI / SRI (When using CSN32 or smaller HID card formats)	470
DRI / SRI (If all access is via REX entry)	570
DRI / SRI (Door forced)	570
The ERI has 8 times more storage space available.	

Note: Since DRIe is a virtual device embedded in the ACC-AP Controller, Offline Mode is not supported and hence, DRIe is not listed in the above table.

The following values outline the number of Audit Trail messages that can be buffered in the ACC when disconnected from the server.

Audit Trail Message	Number of Messages
ACC without Compact Flash memory (Will not survive a power cycle)	100,000
ACC-Lite / ACC-x (Will survive a power cycle)	24.000
ACC-G2 (Will survive a power cycle)	200,000
ACC-AP (Will survive a power cycle)	200,000

Reporting

The following values outline the SiPass integrated reporting capabilities:

History Log Reporting	Yes, Customizable log entries
Database Reporting	Yes
Mustering Reporting	Yes
T&A Export	Yes, Tab Delimited, CSV formats
Reports by Email	Yes
Report Export	Yes (Add export types)
Scheduled Reporting	Yes
Event Triggered Reporting	Yes
Batch Reporting	Yes
Interactive Reporting	Yes
Unused Card Reporting	Yes

When running some reports, the amount of data returned can be quite large, and can lead to performance issues while the server transfers the report data to the client. For this reason, SiPass Reporting offers a paging mechanism, where the report data consists of several pages on the server, but only one page is returned at a time to the client. While the maximum paging size allowed is 300,000 records, the performance could be improved by using a smaller page size than the allowed maximum. A paging size of 10,000 is recommended for performance reasons.

To open larger audit trail archives (with a 64-bit Operating System and SQL server), more of memory and CPU power is required.

Alarm Management

The following values outline the SiPass integrated alarm capabilities:

Multimedia Alarms	Yes
Alarm Instructions	multi-media compatible
Graphic Map Capabilities	Real-time
Alarm Sounds	Yes
Alarm Priority Levels	1000, configurable
Alarm Forwarding	SMS, Email, Pager

Miscellaneous

The following data / values outline details of support, compatibility and approvals for SiPass integrated:

Foreign Language Support	Yes, English, Chinese, Czech, Netherlands, French, German, Hebrew, Italian, Polish, Portugese, Russian and Spanish **Note:** Only one language per system.
Mifare Smart Card Compatibility	Yes, Encode and Read
Mifare Smart Card Formats Supported	MIFARE (1KB or 4KB memory), DESFire EV1
Remote Diagnostics	Yes*
UL Approvals	Yes*
CE Approvals	Yes*
C-Tick Approvals	Yes*
Supported Image Capture Devices	Falcon, Winnov, USB Cameras
Supported Image Verification Devices	Falcon, Winnov
Signature Capture Devices	Topaz HSB (USB) signature pads
Maximum Resolution of Cardholder image	4500x4000

* Refer to the individual documentation for the certification relating to that device.

Advanced Access Control Features

The following values outline the SiPass integrated capabilities:

Visitor Management	Yes
Guard Tour	Up to 100 defined tours, 30 stop points per tour, 20 concurrent active tours, up to 500 guards
DVR Management	Siemens SISTORE, DVR API
Anti-Passback	Across multiple controllers
Timed Re-entry	0-1440 minutes (1 day)
Event Scheduling	Host and controller based routines 65,000 programmable controller based event routines, 1,000 maximum recommended limit for simultaneous triggering
Occupancy Restrictions	Yes
Elevator Control	Yes
Time Scheduling	Max 65,000 time schedules
Reader Interface Module (RIM) Offline Mode Capability	100 offline cards per RIM device. If one ERI or DRI has more than one card technology, only 100 cards can be saved to the RIM device (not 100 cardholders). For example, if one cardholder has two cards sent to the same RIM, it will be counted as two cards.
Manual Override	Yes
Image Verification	Yes
Image / Photo Capture	Using video capture card input, or USB camera device, or IP camera as per supported device list. See section *Directly-connected IP Camera Compatibility* in *SiPass integrated MP2.65 Release Notes* for more information.
Integrated Badge Creation	Yes
Individual Operator Partitioning	Yes
Operator Preference Customization	Yes
Online Help System	HTML help system

Note that there are numerous brands of USB camera devices available in the market. A limited number of brands like Logitech and Creative have been tested and are confirmed to be compatible with the SiPass integrated system. However, majority of brands have been untested.

Be aware that there is a physical four card limit on the video streams that can be displayed on any PC, including the SiPass Workstation client and Server PC. This will usually depend upon the PC hardware itself and should be considered in the design and use of an integrated security systems with both access control and video streaming on the same PC.

Low-level Elevator Control per ACC / ACC-G2

The following table describes the capacity of the Low-level elevator control per ACC / ACC-G2:

Maximum Number of Floors	256 (16 per OPM)
Maximum Number of OPMs per FLN	8 (if used only for elevator control purposes only)
Maximum Number of Elevator Cars	48 per ACC (8 DRIs per FLN)
Maximum Number of Elevator Banks	16, A bank is a group of elevators that services the same floors for the same purpose. For example a group of 4 passenger elevators that serviced the first 6 floors including the ground floor.

Note:

- Multiple ACCs can be combined for the control of an elevator system(s). This means that the capacity of SiPass integrated to handle elevators is virtually unlimited. The above table represents the limits per ACC to control an elevator system.
- An Elevator Bank must be controlled by a single ACC.
- The maximum values detailed above need to be adjusted to adjust between the number of elevator floors being controlled, and the number of elevator cars carrying passengers. For example, a building that has sixteen elevator cars could service up to 32 floors per car. This would require the installation of 8 x DRIs for access control within the elevator car and 32 X OPMs to service the 32 floors. (2 OPMs per car).

High-Level Lift Bank Limit

Banks	64
Lifts per bank	8*
Floors per bank	128
Double Decker Cars	Supported, upper car is addressed as 129-255. **

* **Note**: more than 8 lift cars per bank may be configured in SiPass integrated, but the Group Status Report only supports reporting 8 lifts in an 8 bit bitmask. It will work with more than 8 lifts per bank, but the EMS will need to copy in the bitmask from the first 8 lifts.

** The upper car has an address equal to the lower car + 128. E.g. lower deck has an address of 3, the upper car will 128 + 3 = 131.

Advanced Security Programming (ASP) limitations per controller

The following values outline the capacities and features of the Advanced Central Controller (ACC):

Entity	ACC / ACC-G2	ACC-AP	ACC-Lite	Comments
Timer	2000	2000	100	
Counter	2000	2000	100	
Flag	5000	5000	100	
Activity	200	200	50	20 flows per activity

Note:

The ACC/ ACC-Lite/ACC-G2/ACC-AP have been tested only for the above mentioned limits. There can be side-effects such as memory consumption of the controller and increase in process time per controller if higher limits than mentioned above are used.

Issued by
Siemens Switzerland Ltd
Smart Infrastructure
Global Headquarters
Theilerstrasse 1a
CH-6300 Zug
+41 58 724 2424
www.siemens.com/buildingtechnologies