

# INNER RANGE. INTEGRITI INTEGRATED SYSTEMS

## APPLICATION NOTE: APERIO™ INTEGRATION.

### Contents

<b>Introduction.....</b>	<b>2</b>
Overview.....	2
Licensing.....	2
Interface.....	2
<b>Wireless Lock Configuration. ....</b>	<b>3</b>
EAC number.....	3
Poll Time.....	3
Lock Open Time.....	3
<b>Installation. ....</b>	<b>4</b>
Wiring.....	4
Installation and wiring examples.....	5
<b>Advanced Functionality.....</b>	<b>6</b>
Door Forced.....	6
DOTL.....	6
System Inputs.....	6
Door Auxiliaries.....	7
Doors in Free Access.....	7
Offline Behavior.....	7
<b>Integriti Programming.....</b>	<b>8</b>
General programming notes.....	8
Programming planning tables.....	8
Programming Details.....	9
Access Module &/or Controller Programming.....	9
Door Programming.....	10
Programming Screen Examples.....	12
Reader Programming.....	12
Door Access Control Programming.....	12

**This application note is intended to be used in conjunction with the following documents:**

- Relevant Integriti Installation Manuals. i.e. ISC / IAC / SLAM / ILAM.
- Integriti Programming Reference Manual, Rev 16 or later.
- Aperio™ Technology Installation Manual. (Published by Assa Abloy)

## Introduction.

### Overview.

The Integriti Security Management Platform includes a powerful bi-directional interface to the Assa Abloy Aperio wireless locking system.

This interface provides the full capability of the Integriti Door access control system to both fixed wired Doors & Aperio wireless doors. (Note that at present, Aperio Readers are not intended to be used with Integriti Lift access control or the Terminal Logon feature.)

With no need to wire directly down to the door when using Aperio wireless locks, installation costs are dramatically reduced. In addition, a large range of door furniture options are available within the Aperio range to appeal to end-users and architects alike.

The Integriti system manages Aperio wireless doors in the same way as a traditional wired door, utilising the same intuitive interface when configuring user access permissions without the need of further special training or programming requirements.

### Licensing.

An Aperio Smart Card Licence (P/N: 996032) is required for the number of Aperio Wireless Locks required.

### Interface.

Each Aperio Wireless Lock is paired with an Aperio Hub, providing the communication path to the host Integriti Module or Access Controller.

When used in an Integriti system, each Hub can be paired with up to 8 Locks depending on the type of Integriti Module it is connected to.

One or more Aperio Hubs can be connected to the 'Reader RS485' port on the following Integriti Controllers and LAN Modules:

- Integriti Access Controller (IAC)
- Integriti Standard LAN Access Module (SLAM)
- Integriti Intelligent LAN Access Module (ILAM)

This table shows the number of Aperio Wireless Locks supported on the 'Reader RS485' port of each of the Module types and the minimum module firmware version required for Aperio integration.

See 'Installation' for additional details.

Module Type	Aperio Wireless Locks supported	Minimum Module Firmware Version
SLAM	2	V2.1.0*
ILAM	8	V2.1.1*
IAC	8	V4.1.3

\*Control Module Firmware (ISC or IAC) must be V4.1.3 or later.

Note that when the 'Aperio' Reader type is selected for a Reader, only Aperio Hubs can be connected to the 'Reader RS485' port on that Module. Other Serial Reader types cannot be connected to that port.

i.e. Only one type of Serial Reader is allowed on a Module.

If required, the Module may still use on-board and Unibus Doors and Readers alongside Aperio.

## Wireless Lock Configuration.

Configuration of the Aperio hardware (Locks and Hubs) is done using the Aperio software and hardware according to the documentation supplied by Assa Abloy.

When configuring the Aperio hardware, the following information must be taken into account.

### EAC number.

In the process of pairing locks to hubs, the Aperio software will assign an EAC number to the lock, which uniquely identifies the lock in this installation as well as the hub which it is paired to.

This number is how locks are referenced in the Integriti system. Hubs aren't directly referenced in Integriti as they are inferred from the EAC number.

This table shows the lock/hub relationship of the EAC number:

These numbers are used in Integriti programming to associate an Aperio Lock with a Reader address.

Lock	Hub							
	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	8
2	17	18	19	20	21	22	23	24
3	33	34	35	36	37	38	39	40
4	49	50	51	52	53	54	55	56
5	65	66	67	68	69	70	71	72
6	81	82	83	84	85	86	87	88
7	97	98	99	100	101	102	103	104
8	113	114	115	116	117	118	119	120

### Poll Time.

A poll time is configurable in the Aperio system for each lock-hub pairing. The frequency of this polling can affect the battery life of battery powered Aperio devices.

The poll time has an important influence on the responsiveness of certain system inputs and door free-access in Integriti. See *"Doors In Free Access"* in *'Advanced Functionality'* for more details.

### Lock Open Time.

It is important to note that the Integriti Door Auxiliary state may not represent the actual Aperio hub state.

The Aperio door unlock time (Lock open time) is set in the Aperio system and is not controlled by Integriti.

It is recommended to check that the unlock time in Integriti matches the time configured in the Aperio Programming Application, and if required, alter one of the settings to ensure a match.

## Installation.

There would typically be one Aperio 'Installation' per host Integriti Module consisting of one or more hubs and one or more locks (up to the maximum number of Aperio doors supported on the host module).

A number of host modules (IACs, ILAMs and SLAMs) may co-exist on any site. A lock is always paired to a single hub, and a hub may be paired to a number of locks depending on the number supported by the host Module.

Up to 2 Hubs can be connected to a SLAM or up to 8 on an ILAM or IAC. When used on an Integriti system, a Hub can support up to 8 Wireless Locks.

If a Hub is paired with more than one Lock, then the number of Hubs that can be connected to the Integriti Module will be reduced accordingly.

e.g. A SLAM can have 2 Hubs paired with 1 Lock each, or 1 Hub paired with 2 Locks.

An ILAM or IAC might have 8 Hubs paired with 1 Lock each, 4 Hubs paired with 2 Locks each, etc.

Hubs must be installed where they will be in RF wireless range of the lock/s to which they are paired and within the maximum recommended cabling distance from the host Integriti Module.

*Refer to the Aperio Technology Installation Manual for details.*

Two installation and wiring examples are provided on the following page.

## Wiring.

Hubs are wired in parallel as per the manufacturer's installation manual and connected to the Reader RS485 port of the host Integriti Module.

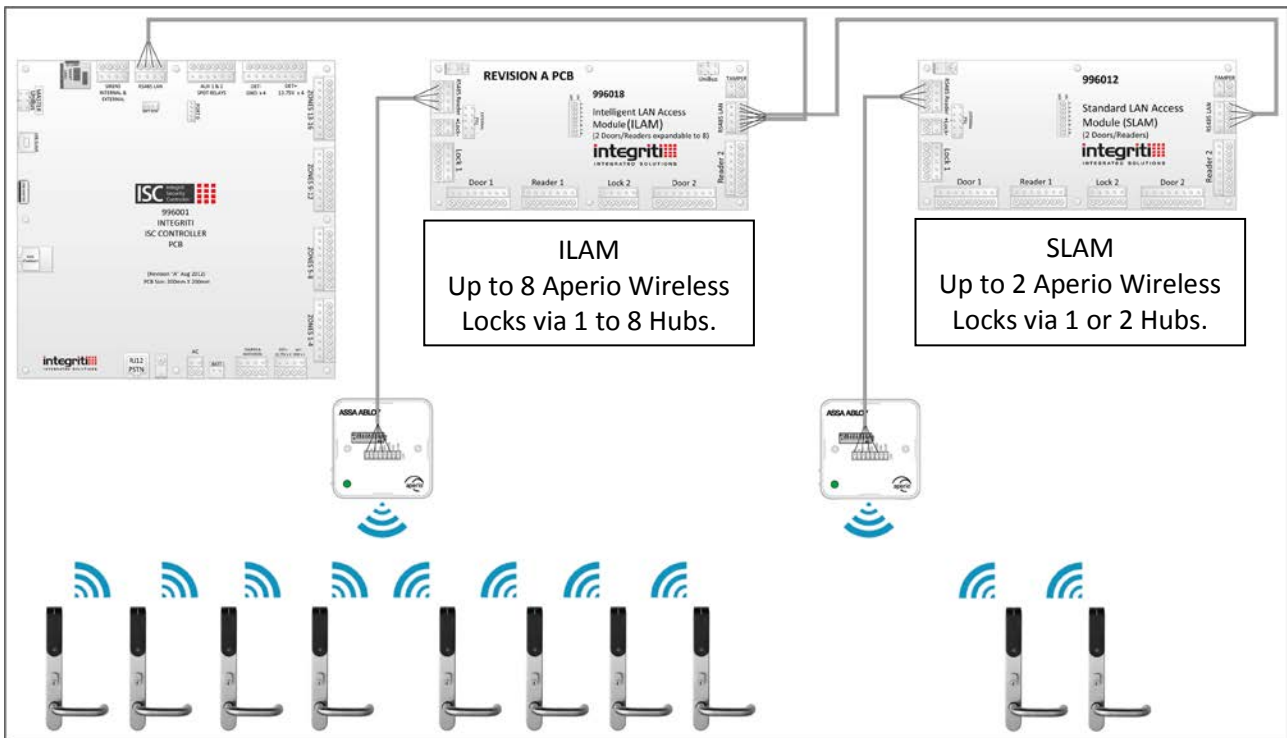
Please observe the following key points when connecting Hubs:

1. The RS-485 bus should be wired with a twisted-pair cable with characteristic impedance between 90 Ohm and 120 Ohm. The same cable types as recommended for the Integriti RS-485 LAN are suitable. *See the Integriti Security Controller (ISC) or Integriti Access Controller (IAC) Installation Manuals for details.*
2. Do not exceed the manufacturer's recommended maximum bus length. Check that the DC supply voltage at the furthest Hub is within specification.
3. Do not exceed the maximum numbers of Hubs & Locks allowed on the host Module. *See the table under 'Interface' in the Introduction.*
4. If there is more than one communication hub connected to a host Integriti Module they should be connected in a daisy chain (not as a star) on the RS-485 bus so that all RS485 'A' connectors are connected together and all RS485 'B' connectors are connected together.
5. Both ends of the RS-485 bus must be terminated. The communication hub at each end of the bus must have switch 8 of the DIP switch in position ON. All other communication hubs must have switch 8 of the DIP switch in position OFF. If the host Integriti Module is at one end of the bus, then it must be terminated instead of an Aperio Hub. This is done by fitting the 'Reader RS485' port termination link. SLAM/ILAM = LK1. IAC = LK12.
6. Pull up and pull down-resistors should be enabled once per bus. This means that one communication hub on the bus should have switches 6 and 7 of the DIP switch in position ON.

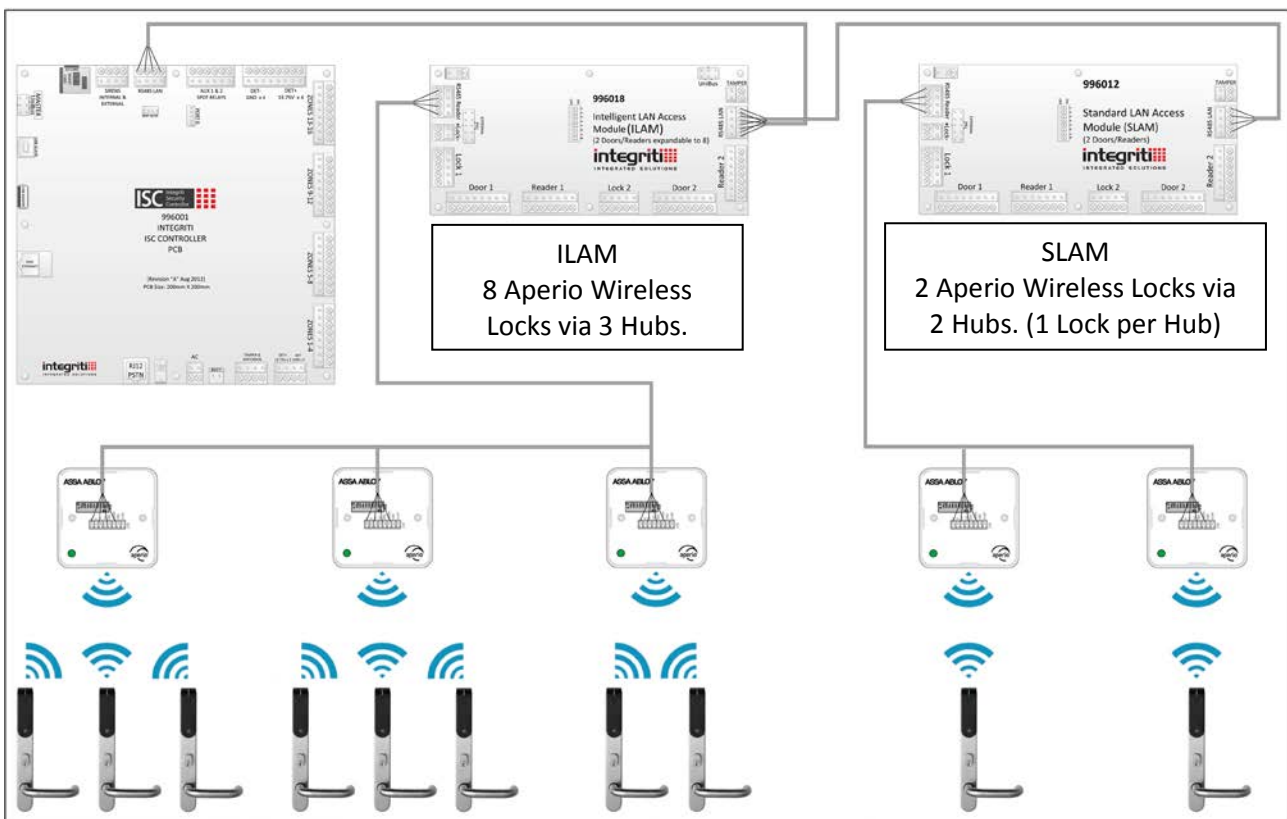
## Installation and wiring examples.

Both examples show the maximum number of Aperio Wireless locks allowed for each Module type. Note that Aperio connections for an IAC are the same as an ILAM.

### Example 1. 1 Hub per Module.



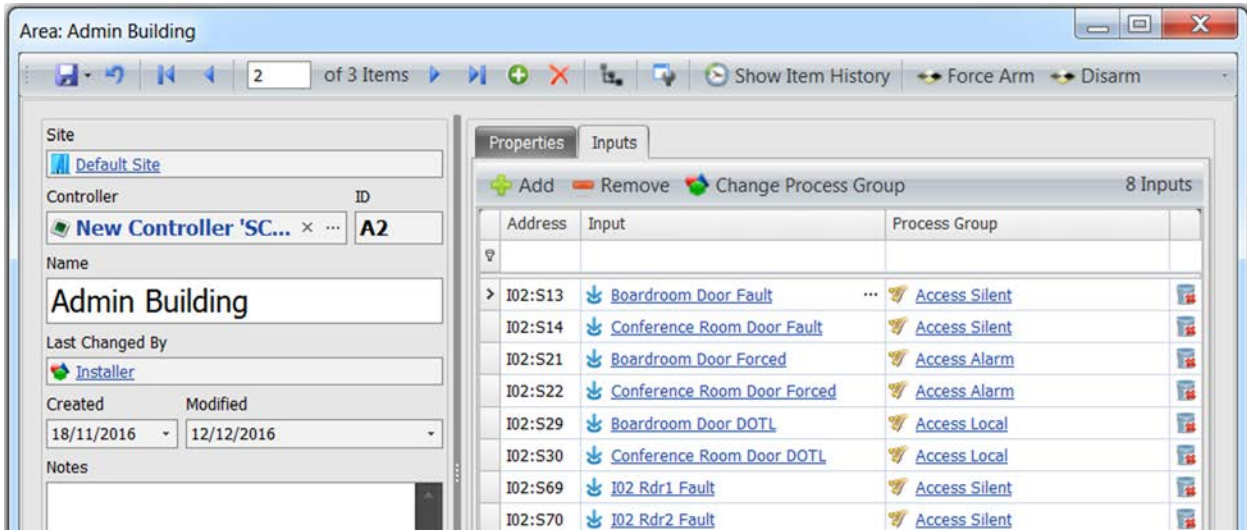
### Example 2. Multiple Hubs per Module.



## Advanced Functionality.

### Door Forced.

Integriti doesn't process a mechanical Tamper or Door Forced from Aperio, but can generate a Door Forced alarm based on the Door state in the Controller and the state of the reed from the Aperio lock. To do this, the Integriti "Enable Reed Input" option must be selected for this Door and the "Door Forced" System Input for that Door must be monitored. (i.e. Assigned to an Area with an appropriate Process Group)



**IMPORTANT NOTE:** When the Controller sees that the Aperio Door was unlocked and the reed was unsealed then resealed (Door opened & closed) it will set the Door state to "locked" regardless of whether the lock open time in the Aperio lock is expired or not. The Aperio Lock does not automatically cancel its local "lock open timer" and relock when the Door is closed, so the Door can still be opened again. Therefore, it is possible that a User might immediately open the Door again which could result in a false Door Forced alarm. The solution to this problem is to set the Door Forced Debounce Time in the door to be greater than or equal to the Aperio devices unlock time. *See the 'Programming details' section.*

### DOTL

Integriti can perform DOTL processing on Aperio locks which have a reed sense, so the DOTL time may be programmed and the DOTL System Input monitored. *See Area programming screen image above.*

The DOTL processing is done in Integriti, so does not affect the Aperio lock itself.

Note that the Aperio lock has no mechanism to signal a DOTL warning on behalf of the Integriti system, so a separate warning device will need to be utilized and programmed to be controlled by an Integriti output.

### System Inputs

Aperio devices can trigger a number of system inputs on the host Module based on the state of the Aperio system. These inputs can be assigned to an Area with an appropriate Process Group for monitoring &/or reporting as required. An example is shown in the Area programming screen image above.

System Input	Input IDs *	Description
Door Forced	Rnn:S03 & S04 Inn:S21-S28 C01:S42-S49	<i>See details above.</i>
DOTL	Rnn:S05 & S06 Inn:S29-S36 C01:S50-S57	<i>See details above.</i>

Door Fault	Rnn:S01 & S02 Inn:S13-S20 C01:S34-S41	If communications is lost between the lock and the hub or the hub and the Module, an alarm on the “Door Fault” System Input for that Aperio Door will be triggered. e.g. If the 1 <sup>st</sup> Door on a SLAM R06 is Aperio and comms is lost to this Door, R06:S01 will be in alarm until comms is restored (dependent on the poll time). If RS485 comms is lost to a hub, all Doors paired to that hub will have an alarm on their Door Fault System Input in a matter of seconds.
Reader Fault	Rnn:S19 & S20 Inn:S69-S77 C01:S90-S97	If an Aperio device detects it has a low battery an alarm on the “Reader Fault” System Input for that Aperio Door will be triggered. e.g. If the 1 <sup>st</sup> reader on SLAM R06 has a low battery condition, this would be R06:S19. Note that it may take more than 24 hours to detect a low battery.

\* Rnn:Snn = SLAM      Inn:Snn = ILAM      C01:Snn = IAC

### Door Auxiliaries

Although a Lock Auxiliary number is not required for an Aperio Door, the associated Door Auxiliary on the Module is still reserved by the Integriti system for the Aperio Door, so cannot be used for other purposes. As per normal Integriti operation, controlling the Door Auxiliary by other means is disallowed for Door Auxiliaries.

### Doors in Free Access

Aperio doors can be placed into free-access (office mode) in the Integriti system either manually, via time period or by some other action. However, the Aperio Door will only be updated to match the state in the Controller once a poll has occurred and this is dependent on the poll time set in the Aperio configuration.

NOTE: Aperio V3 Series Locks have a more frequent heartbeat poll (approx. 10 seconds) and will therefore respond faster to Door ‘Free Access’ and ‘Secure’ commands from the Integriti system. If these operations are implemented, always test that they operate as expected when commissioning the system.

The current state of the Aperio Door cannot be monitored, so the Integriti system does not know if the Integriti Door state and the state of the associated Aperio Lock actually match. This means that a Door that appears to be in free access in the Integriti system, might in fact be locked and vice-versa.

If Door Forced processing is enabled, this could result in false Door Forced alarms. Increasing the poll rate will reduce the impact of this time of uncertainty, but may have an adverse impact on the battery life of the lock.

### Offline Behavior

Offline access works as expected on both the SLAM and the ILAM, with each module making an access granted or denied where appropriate and passing this to the Aperio system.

In the case of the SLAM, the card cache is used and in the case of the ILAM an offline access database is used.

If the Aperio lock is offline to the hub or the hub is offline to the Integriti Module, behavior reverts to the Aperio system’s published behavior. This can allow access through doors correctly configured using Aperio programming tools, with a backup / override card.

# Integriti Programming.

## General programming notes.

1. The Reader number and the Module Door number must be the same. e.g. If Reader 3 is configured as an 'Aperio' type, then the 'Location' must be set to "Outside Door 3", the Integriti Door assigned to Door 3 must be the Door controlled by that Reader and the 'Hardware Type' for Door 3 must be set to "Aperio".
2. This page can be copied and the tables below used to plan the Module programming. Note the pre-filled mandatory settings. These must be programmed as shown. Shaded rows indicate the limit of Aperio Doors on a SLAM.

## Programming planning tables.

Integriti Module (ID / Name):								
ILAM / IAC	SLAM	Readers			Door Access Control			
		Module Reader No	Reader Type	Aperio EAC Address	Location	Module Door No	Integriti Door (Name / No)	Hardware Type
		1	Aperio		Outside Door 1	1		Aperio
		2	Aperio		Outside Door 2	2		Aperio
		3	Aperio		Outside Door 3	3		Aperio
		4	Aperio		Outside Door 4	4		Aperio
		5	Aperio		Outside Door 5	5		Aperio
		6	Aperio		Outside Door 6	6		Aperio
		7	Aperio		Outside Door 7	7		Aperio
8	Aperio		Outside Door 8	8		Aperio		

Integriti Module (ID / Name):								
ILAM / IAC	SLAM	Readers			Door Access Control			
		Module Reader No	Reader Type	Aperio EAC Address	Location	Module Door No	Integriti Door (Name / No)	Hardware Type
		1	Aperio		Outside Door 1	1		Aperio
		2	Aperio		Outside Door 2	2		Aperio
		3	Aperio		Outside Door 3	3		Aperio
		4	Aperio		Outside Door 4	4		Aperio
		5	Aperio		Outside Door 5	5		Aperio
		6	Aperio		Outside Door 6	6		Aperio
		7	Aperio		Outside Door 7	7		Aperio
8	Aperio		Outside Door 8	8		Aperio		

Integriti Module (ID / Name):								
ILAM / IAC	SLAM	Readers			Door Access Control			
		Module Reader No	Reader Type	Aperio EAC Address	Location	Module Door No	Integriti Door (Name / No)	Hardware Type
		1	Aperio		Outside Door 1	1		Aperio
		2	Aperio		Outside Door 2	2		Aperio
		3	Aperio		Outside Door 3	3		Aperio
		4	Aperio		Outside Door 4	4		Aperio
		5	Aperio		Outside Door 5	5		Aperio
		6	Aperio		Outside Door 6	6		Aperio
		7	Aperio		Outside Door 7	7		Aperio
8	Aperio		Outside Door 8	8		Aperio		



## Programming Details

Please read the ‘Advanced Functionality’ section before commencing programming.  
Some Integriti software programming screen examples are shown at the end of this section.

### Access Module &/or Controller Programming

- Reader Module (2 Door) (SLAM)
- Intelligent Reader Module (ILAM)
- Integriti Access Controller (IAC)

Category	Options	Description
Module Name		Program a name of up to 32 characters in length. Use this feature to describe the location and/or purpose of the Module. This will help to identify Modules that have Aperio Doors connected.
Readers. (Programmed separately for each Reader)	<u>Reader Type</u> Aperio	Select the “Aperio” type of Reader for each Reader number that will be an Aperio Wireless Lock.  Notes: <ol style="list-style-type: none"> <li>1. When a Serial Reader type such as Aperio is selected, any other Serial Readers on the Module must be of the same type.</li> <li>2. Readers 3 and 4 of the SLAM and Readers 9 to 16 of the ILAM or IAC cannot be Aperio readers.</li> </ol>
	<u>EAC Address</u>	The ‘EAC Address’ of this Reader in the Aperio installation. Enter a number from 1 to 120 to identify each Aperio Wireless Lock and the Hub that it is connected to.  Each Lock<>Hub pairing in an Aperio installation has a unique EAC number. <i>See ‘Wireless Lock Configuration’ for the EAC addresses for each Lock&lt;&gt;Hub pair.</i>
	<u>Reader Purpose</u> Control a Door	Reader Purpose defines how the Reader will be used.  Select “Control a Door” for Aperio Readers.
	<u>Reader Location</u>  None Outside Door 1 Outside Door 2 Outside Door 3...etc.	Determines which Door the Reader is associated with, and the location of the Reader in relation to the Door; Inside or Outside.  Aperio Readers are always Entry Readers, and are therefore located ‘Outside’ the nominated Door.  For “Aperio” Reader type, the Door number used in the Reader Location setting must match the Reader number. e.g. If Reader 3 is an ‘Aperio’ type, then its ‘Location’ must be set to “Outside Door 3”.  Reader is not associated with a Door. Reader is located Outside the 1 <sup>st</sup> Door. Reader is located Outside the 2nd Door. Reader is located Outside the 3rd Door.  Note: Options for Doors 3 to 8 are not relevant to SLAM.

	<u>Card Format.</u>  Direct Entry Wiegand 26Bit Wiegand (H10301) etc.	This option allows the Card Format to be selected for the Reader.  Select the Card Format that matches the Card Reader data format in the Aperio device.  If the required format is not in the list, additional Card Formats can be added via Card Format programming.  <i>See the table under “Card Formats” in the ‘Access Control’ section of the Integrati Programming Reference Manual for the full list of default card formats and their details.</i>
Door Access Control (Programmed separately for each Reader)	<u>Door assignment.</u>	Select the Integrati Door to be associated with each Door on this Module/Controller. The Door nominated will be controlled and monitored by this Module/Controller.
	<u>Door Hardware.</u>  Hardware Type - Aperio  Lock Number  Enable Reed Input	This setting defines the location of the Door hardware I/O. e.g. Lock Relay, monitoring inputs, status outputs, etc.  For Aperio Doors, simply select the “Aperio” type.  Leave at the default setting. Not required for Aperio.  Reed Switch. Allow Door Reed Switch logic for this Door. The state of the Reed Switch in an Aperio Lock will be utilized in functions such as Forced Door, DOTL, Interlocking, etc.
Offline Operation	<u>Card Cache Time</u>  None 1 Hour 4 Hours 8 Hours 1 Day 2 Days 4 Days 1 Week 2 Weeks 1 Month 2 Months 4 Months	Select the period for which a Cached Card will be retained in the Cache from the last time it was used.  NOTES: 1. Applicable to SLAM only. 2. If the Card Cache functionality is required, check that the “Disable SLAM Cache” option under ‘Door Access Control’ has not been enabled.
	<u>Offline Function.</u>  None Use Cached Credentials	Determines which card credentials the reader will process in offline mode.  No Card access when Module is offline. Allow access to Cards stored in the local Cache when Module is offline.
Connectivity	<u>Serial Reader Settings</u>	Not required for Aperio. Serial Channel settings are configured automatically and do not need to be programmed if the Aperio Reader type is selected.

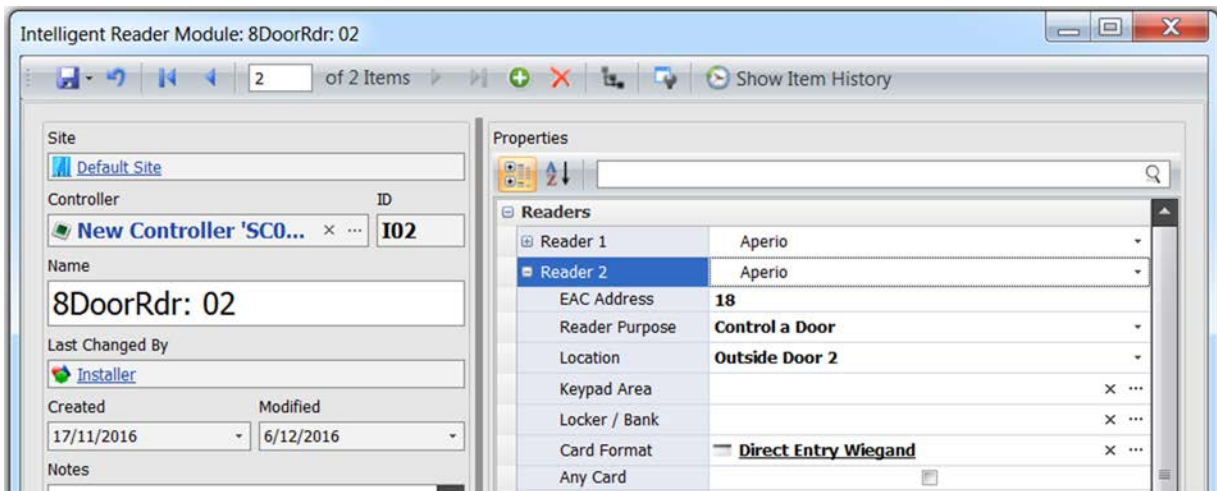
### Door Programming.

Category	Options	Description
Door Name		Program a text name of up to 32 characters in length. The Door Name would typically include the location and possibly the type of the Door.
	<b>DOOR PROGRAMMING</b>	
Module		Select the Module that the Door Reader and hardware are connected to.

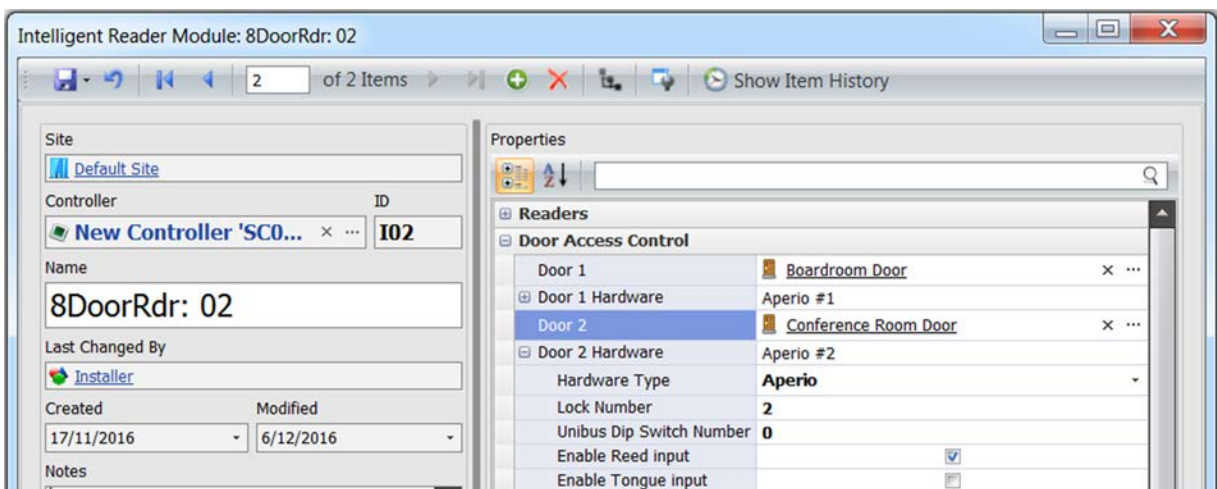
Relay	No Lock Lock 1... Lock 2... Lock 3... etc,	Not required for Aperio Wireless Locks. Leave this option at the default setting.
Hardware options	Hardware Type Enable Reed Input	A 'Hardware Options' button is provided beside the Relay selection field. This allows the Installer to view &/or program relevant hardware options for the Module selected above if required.  Details of these options can be found in Module programming above.
Door Type	Entry Door	Select the Door Type or Qualified Door Type for use with this Door. For Aperio Wireless Locks, the default "Entry Door" type is normally used unless a Qualified Door Type is required.
Outside Settings	<u>Reader</u>  None R1... R2... ...	Select the Module Reader to be used for the Outside Reader.  For Aperio, select from Reader 1 or 2 if on a SLAM, or Reader 1 to 8 if on an ILAM or IAC.  The list indicates which Reader ports are present and which board and Reader port each Reader number is associated with. e.g. R1 Aperio EAC Address: 17 R2 Aperio EAC Address: 18 ...
	<u>Reader Details</u>	A button is provided beside the Reader selection field to allow the Installer to view &/or program relevant Reader options if required. The button opens a dialog showing the Reader Details for the relevant Reader based on the Module and Reader already selected.  Details of all the Reader options can be found in Module programming above.
Inside Settings		Inside settings are not relevant to Aperio Doors.
Door Options	Enable Reed Input	This option allows Aperio reed switch monitoring for this Door to be enabled. This option may have already been enabled via the Module programming options.  The "Reed" Input for this Door will be used.
	<b>ADVANCED DOOR CONFIGURATION</b>	
Advanced Door Configuration	Door Unlock Time	Determines how long the Door lock auxiliary remains On when the Door is accessed. This time should be set to the same value as the "Lock open time" in the Aperio Lock.
	Disability Unlock Time	Not supported for Aperio Doors.
	Door Open Too Long (DOTL) Time.	Determine how long a door may remain open until a DOTL warning or alarm is generated. <i>See "DOTL" in 'Functionality' for details.</i>
Debounce	Force Debounce.	This option will shunt the reed/tongue for this time after the door is unlocked. For Aperio Doors this option may need to be programmed to prevent false alarms if the Door Forced System Input is monitored. <i>See "Door Forced" in 'Functionality' for details.</i>

## Programming Screen Examples.

### Reader Programming.



### Door Access Control Programming.



#### **Acknowledgement:**

'Aperio' is a trademark of Assa Abloy AB. Stockholm, Sweden.

#### **Disclaimer:**

While every effort has been made to ensure the accuracy of this manual, the manufacturer assumes no responsibility or liability for any errors or omissions. Due to ongoing development, this manual is subject to change without notice.