Sharing MIFARE® Classic and Plus cards between sites

Overview Document

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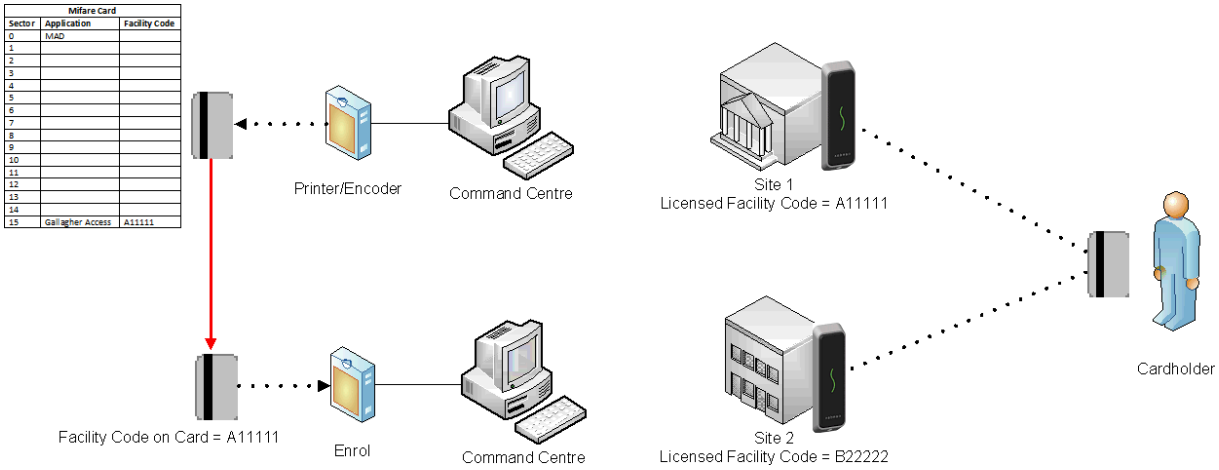
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1 Introduction

Many organisations require cardholders to carry a single card which will allow them access to multiple sites. The scenarios presented below describe how to encode and use one MIFARE® access card across multiple Gallagher Command Centre sites with Command Centre v7.00 onwards.

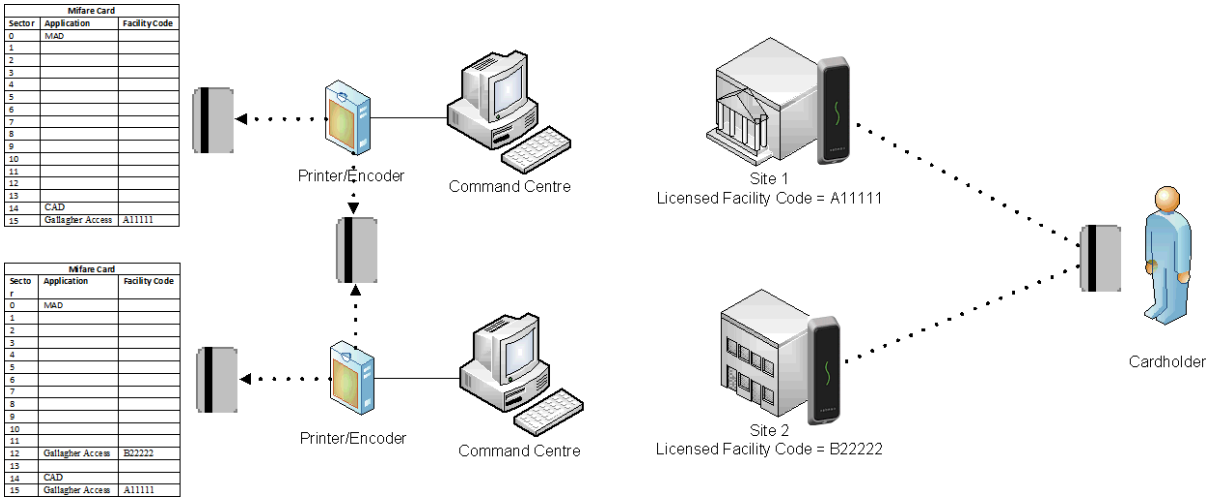
Scenario 1

The site issuing the MIFARE® Classic or Plus cards encodes their Gallagher data to the cards and the other sites create a card type that corresponds to the Facility Code encoded on the cards. If MIFARE® Plus cards are used, the issuing site must give their MIFARE® Plus/DESFire Key Seed to the other sites (if the default site key is not being used). This may not be an appropriate solution for sites that require a higher level of security.



Scenario 2

MIFARE® cards will be used on two or more sites that have a common MIFARE® Plus/DESFire Key Seed e.g. the default MIFARE® key. Each site encodes cards with their Gallagher data to a different sector using the common MIFARE® key and their own Facility Code.



Scenario 3

MIFARE® Plus cards will be used on two or more sites. This solution involves multiple independent Gallagher access applications written to the same card. Each site has a unique MIFARE® Plus/DESFire Key Seed and each site encodes the cards with their Gallagher data to a different sector (application) using their own MIFARE® key and Facility Code.

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2 The Gallagher Card Application Directory (CAD)

For Scenarios 2 and 3, it will be necessary to support multiple applications on a single access card.

Readers presented with a card containing multiple Gallagher applications must determine which application is the correct one for the site based on the site's Facility Code and MIFARE® Plus/DESFire Key Seed.

To optimise reader performance, from Command Centre v7.00 all MIFARE® cards are encoded with a lookup table that maps the Facility Codes on the card to the access applications on the card. This lookup table is named the 'Card Application Directory' (CAD).

The CAD

MIFARE® card	CAD read key	Default sector*	Application ID	Maximum No. of entries
Classic	Same as MAD A key	14	0x4811	12
Plus	Same as MAD A key	14	0x4811	12

* If sector 14 is not available, the CAD will be encoded to the first unused sector (starting from sector 1 upwards).

Notes:

- The MAD is the MIFARE® Application Directory. The MAD is always encoded on sectors 0 and 16.
- MIFARE® Plus cards that will be used for multiple applications should not be encoded with the Random ID's feature enabled.

MIFARE® Classic and Plus card example

Next is an an example of the MAD and CAD sectors on a MIFARE® Classic or Plus card, showing which sectors contain Gallagher applications and the Facility Codes encoded on each sector.

MAD (Sector 0)

Sector	Application ID
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	0x4812 (Gallagher Access)
13	0x4812 (Gallagher Access)
14	**0x4811 (CAD)**
15	0x4812 (Gallagher Access)

CAD (default sector 14)

Entry	Facility Code	Sector
0	A11111	15
1	B22222	13
2	C33333	12
3		
4		
5		
6		
7		
8		
9		
10		
11		

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Scenario 1 (refer to Diagram 1 on page 2):

1. Site 1 and Site 2 use the same MIFARE® Plus/DESFire Key Seed.
2. Site 1 issues MIFARE® cards encoded with the MIFARE® Plus/DESFire Key Seed and their Facility Code, (e.g. A11111).
3. Site 2 creates a Card Type with Facility Code A11111 and enrols cardholders with cards using Card Type A11111 and the same card numbers as Site 1.
4. If MIFARE® Plus cards are being used and the MIFARE® Plus/DESFire Key Seed used is not the default site key, a key change Admin card needs to be encoded and presented to each T Series reader to change the readers' MIFARE® key (refer to the *Admin Cards* section later).
   Notes:
   - This step is only required for T Series readers communicating over the Cardax IV protocol.
   - Any MIFARE® Plus cards encoded prior to the key change will need to be re-encoded with the new key.
5. Readers on either site will read the single access application on the card.

Scenario 2 (refer to Diagram 1 on page 2):

1. Site 1 and Site 2 use the same MIFARE® Plus/DESFire Key Seed.
2. Site 1 issues MIFARE® cards encoded with the MIFARE® Plus/DESFire Key Seed and their Facility Code, (e.g. A11111).
3. Site 2 re-encodes the MIFARE® cards to a different sector/application with the same MIFARE® Plus/DESFire Key Seed and their Facility Code, (e.g. B22222).
4. Site 1 and Site 2 encodes their own Facility Code list (and if necessary key change) Admin card (refer Admin Cards section later) and presents them at their Cardax IV connected T Series readers to update the list of Facility Codes on the readers. This will ensure the correct card sector/application is read.

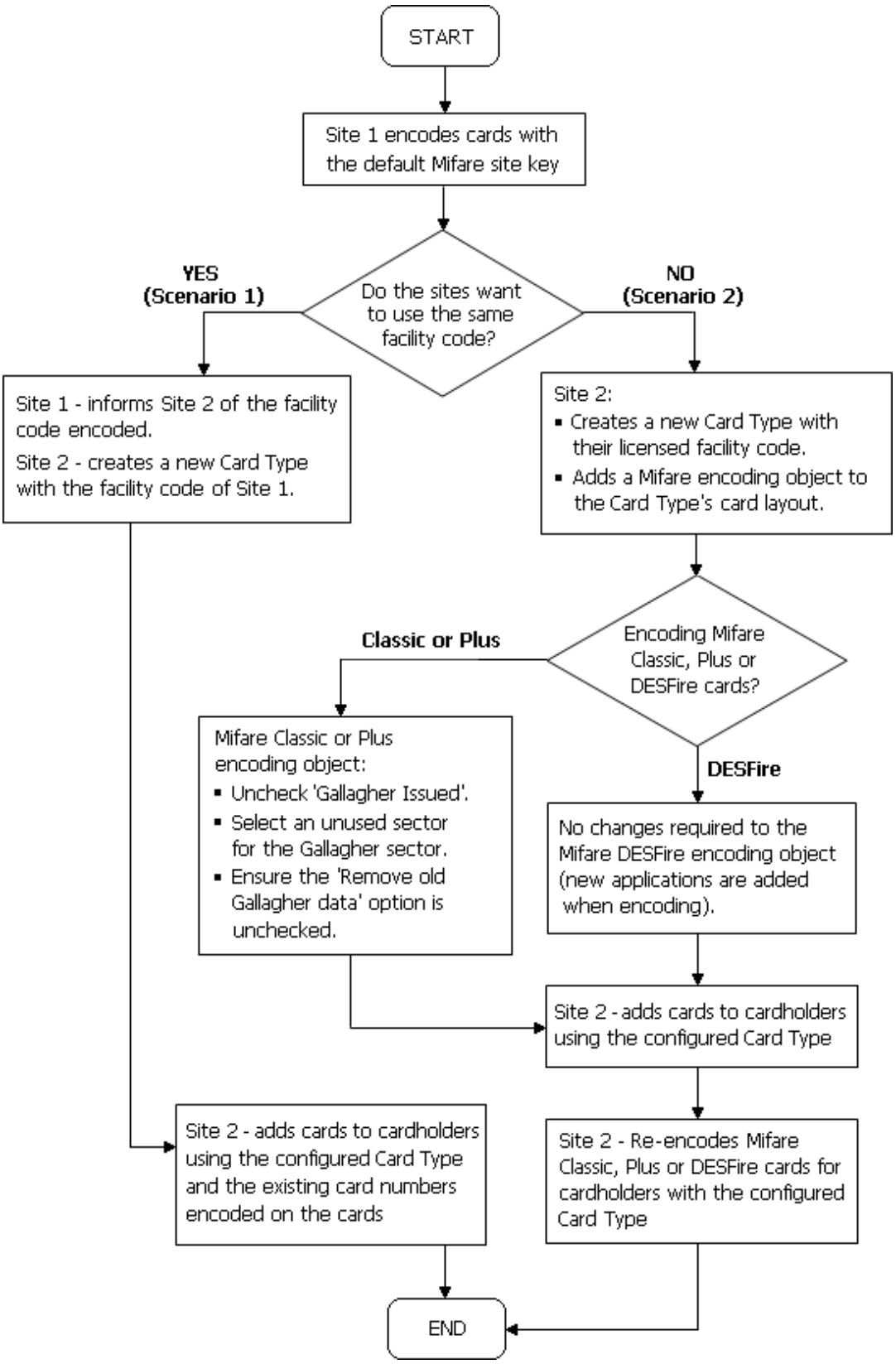
Scenario 3 (refer to Diagram 2 on page 2):

1. Site 1 issues MIFARE® Plus cards encoded with their own unique MIFARE® Plus/DESFire Key Seed and Facility Code, (e.g. A11111).
2. Site 1 provides Site 2 with the MIFARE® Plus MAD write key (from Server Properties – Card Security -- Advanced) to enter into the encoding objects properties (refer User Guide).
3. Site 2 re-encodes the MIFARE® cards to a different sector/application with their own unique MIFARE® Plus/DESFire Key Seed and Facility Code, (e.g. B22222).
4. Site 1 and Site 2 encode their own Key Change and Facility Code List Admin card (refer *Admin Cards* section later) and presents them at their T Series readers to change the MIFARE® Plus/DESFire Key Seed and list of Facility Codes on the readers. This will ensure the correct card sector/application is read.
   Note: This step is only required for T Series readers communicating over the Cardax IV protocol.

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3 Diagram 1 – Encoding MIFARE® Classic or Plus cards

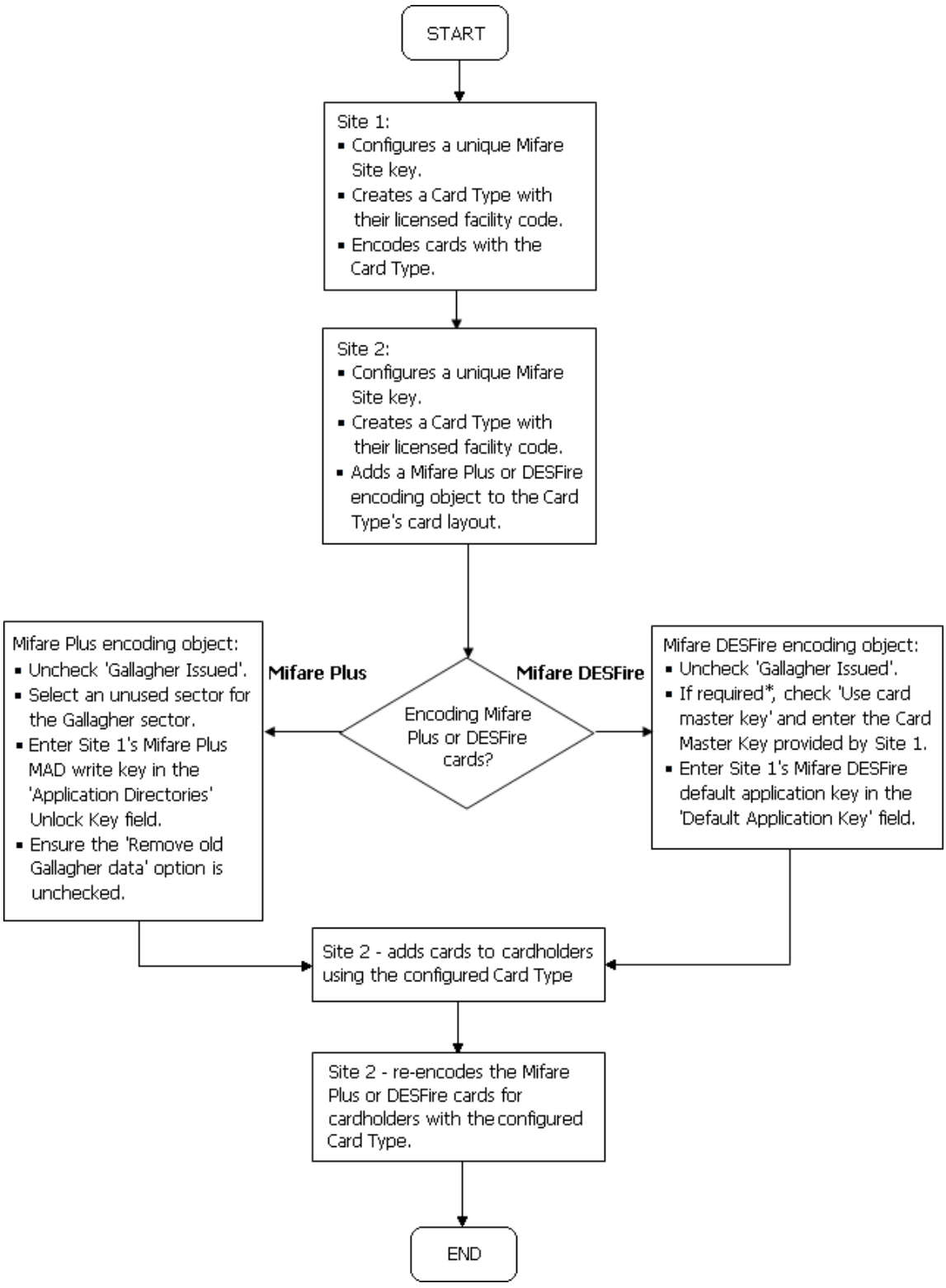
Scenario 1 or Scenario 2 - Sites use the same MIFARE® Plus/DESFire Key Seed.



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4 Diagram 2 – Encoding MIFARE® Plus cards

Scenario 3 - Sites use a different MIFARE® Plus/DESFire Key Seed.



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5 Admin Cards

Admin cards are only required for Cardax IV connected T-series readers.

Key change Admin Cards allow a site to change the MIFARE® Plus/DESFire Key Seed of readers to allow them to read MIFARE® Plus cards encoded with their unique MIFARE® Plus/DESFire Key Seed.

Facility code list Admin Cards will load a list of allowed facility codes on to a reader, enabling the reader to quickly locate the correct application on the card for their site.

Admin cards are configured and encoded from the Command Centre Server Properties – Card Security – General property page. Refer to the Command Centre User Guide for further information regarding configuring and encoding Admin Cards.

If Allow Admin card update at readers is enabled, when readers are presented with an Admin Card they will read and update their MIFARE® Plus/DESFire Key Seed and/or Facility Code list, and will indicate this has occurred as follows:

- White LED flashes and three beeps from the readers will indicate the Admin Card has been read and the new MIFARE® Plus/DESFire Key Seed and/or Facility Code list have been received.

For Scenario 2:

- Site is using the default MIFARE® Plus/DESFire Key Seed
- Site is using access cards encoded with multiple applications

1. Create Card Types for any non-licenced Facility Codes.
2. Enable Update Facility Code list on Server Properties – Card Security – General page.
3. Encode the Facility Code list Admin Card.
4. Enable Allow Admin Card update at readers.
5. Present Admin card at Cardax IV connected T Series readers.
6. New Facility Codes automatically sent to HBUS readers.
7. Disable **Allow Admin Card update at readers**.

For Scenario 3:

- Site is using a unique MIFARE® Plus/DESFire Key Seed
- Site is using access cards encoded with multiple applications

1. Create Card Types for any non-licenced Facility Codes.
2. Enter unique MIFARE® Plus/DESFire Key Seed on Server Properties – Card Security – General page.
3. Enable Add MIFARE® Plus/DESFire Key Seed to the Admin Card.
4. Enable **Update Facility Code list**.
5. Encode Key change and Facility Code list Admin Card.
6. Enable Allow Admin Card update at readers.
7. Present Admin card at Cardax IV connected T Series readers.
8. New MIFARE® Plus/DESFire Key Seed automatically sent to HBUS readers over the network.
9. New Facility Codes automatically sent to HBUS readers.
10. Disable **Allow Admin Card update at readers**.

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6 Reader process for reading cards

T Series readers can be loaded with a list of Facility Codes (using an appropriately encoded Admin Card) which will be compared to the cards list of Facility Codes in the CAD to find the correct application for the site.

The readers' process for reading a MIFARE® Classic or Plus access control card that has a CAD encoded:

1. Read the MAD Sector.
2. Locate the CAD application in the MAD.
3. Read the CAD sector referenced by the MAD.
4. Scan the CAD until a Facility Code is found that matches a Facility Code in the readers list of Facility Codes.
5. Read the application sector referenced by the CAD.
6. If the application sector cannot be read, scan the card for another Gallagher application that can be read.

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