

Encompass® 4 Reader

Wiegand Translator

16-0088-001 Rev B 1/19

This document describes the Wiegand data translation feature for the Encompass 4 reader. This feature allows for translation of various tag protocols into one of five different Wiegand formats.



Table of Contents

Wiegand Formats	3
ATA/eATA ASCII Data Format	5
SeGo/eGo Tag ID Data Format	5
IAG Toll Data Format.....	7

List of Tables

Table 1 – 26-bit Wiegand Fields	3
Table 2 – 32-bit LSU Fields	3
Table 3 – 34-bit Cardkey Fields.....	3
Table 4 – 35-bit HID Fields.....	4
Table 5 – 37-bit McGann Fields.....	4
Table 6 – ATA/eATA Toll Data Fields	5
Table 7 – Default ATA/eATA Toll Identifier Translations.....	5
Table 8 – 8-Byte SeGo/eGo Tag ID Fields.....	6
Table 9 – IAG Read Response Data Fields	7
Table 10 – IAG Read-Only Fields.....	8

Wiegand Formats

The E4 can be configured to translate reads of various tags into one of the Wiegand formats described in Tables 1 through 5.

Table 1 26-bit Wiegand Fields

Bit	No. of Bits	Maximum Value	Description
1	1	1	Even parity over bits 2 through 13
2-9	8	255	Facility Code or Site ID
10-25	16	65,535	Card ID or Serial Number
26	1	1	Odd parity over bits 14-25

Table 2 32-bit LSU Fields

Bit	No. of Bits	Maximum Value	Description
1	1	1	Even parity over bits 2 through 16
2-17	16	65,535	Card ID (Serial Number)
18-21	4	15	Issue Number (defaults to all zeros)
22-31	10	1,023	Facility Code (Site ID)
32	1	1	Odd parity over bits 17 through 31

Table 3 34-bit Cardkey Fields

Bit	No. of Bits	Maximum Value	Description
1	1	1	Fixed to a value of 1
2-17	16	65,535	Card ID (Serial Number) – Bits Reversed*
18-20	3	7	Issue Number (defaults to all zeros)
21-33	13	8,191	Facility Code (Site ID) – Bits Reversed*
34	1	1	Fixed to a value of 0

* Note: For 34-bit Cardkey, bits are reversed for the Card ID and Facility Code fields

Table 4 35-bit HID Fields

Bit	No. of Bits	Maximum Value	Description
1	1	1	Odd parity over bits 2 through 35 (calculate this parity last)
2	1	1	Even parity over bits* (calculate this parity first)
3-14	12	4,095	Facility Code (Site ID)
15-34	20	1,048,575	Card ID (Serial Number)
35	1	1	Odd parity over bits** (calculate this parity after Even parity above)

* Bit 2 Even parity over bits: 3,4,6,7,9,10,12,13,15,16,18,19,21,22,24,25,27,28,30,31,33,34

** Bit 35 Odd parity over bits: 2,3,5,6,8,9,11,12,14,15,17,18,20,21,23,24,26,27,29,30,32,33

Table 5 37-bit McGann Fields

Bit	No. of Bits	Maximum Value	Description
1	1	1	Even parity over bits 2 through 18
2-15	14	16,383	Facility Code (Site ID)
16-36	21	2,097,151	Card ID (Serial Number)
37	1	1	Odd parity over bits 19 through 36

ATA/eATA ASCII Data Format

The ATA/eATA ASCII data format consists of four fields ([Table 6](#)). Only the first two fields are used by the translator. This ASCII format is standard for all ATA toll applications.

Table 6 ATA/eATA Toll Data Fields

Field	Description	Format	No. of 6-bit ASCII Characters
1	Toll Identifier (Typically alpha with decimal as the last character – i.e. “KTA.”, “OTA.”, etc.)	Alphanumeric	4
2	Serial Number	Numeric (0 – 9)	8
3	CRC (not used by translator)	Hexadecimal	2
4	Security Characters (not used by translator)	6-bit	6

When the translation feature is enabled, the reader will generate the specified Wiegand output data based on the first two ATA data fields.

The numeric Serial Number field will be directly translated to the Wiegand Card ID number output. If the toll Serial Number exceeds the maximum Card ID range for the Wiegand output selected, the reader will truncate the Serial Number.

The pre-defined default translations for the ATA Toll Identifiers are illustrated [Table 7](#).

Table 7 Default ATA/eATA Toll Identifier Translations

Toll Identifiers	Translated Wiegand Facility Code	Authority
HCTR	1	HCTRA Harris County Toll Road Authority – “EZ TAG”
DNT	2	North Texas Tollway Authority (NTTA) – “TollTag”
TEX	2	TxDOT – “TxTag”
OTA	3	Oklahoma Turnpike Authority – “PikePass”
KTA	4	Kansas Turnpike Authority – “K-TAG”
FDOT	5	FTE – Florida Turnpike – “SunPass, SunTrax”
LEE	5	Lee County – “LeeWay”
OOCE	5	Central Florida Expressway Authority – “E-Pass”
NCTA	6	NCDOT - North Carolina Turnpike Authority – “NC QuickPass”
All Others	15	

If the reader is configured to output a fixed Wiegand Facility Code (#863hhhh), that setting will override the Wiegand Facility Code settings defined in [Table 7](#) and the translator will only generate the Card ID and parity bits.

These configuration settings are stored in NVM until a reset is issued.

SeGo/eGo Tag ID Data Format

The SeGo/eGo Tag ID consists of 8 hexadecimal bytes subdivided into four data fields as defined in [Table 8](#). The translator uses two of these fields, the Ownership Code (bytes 2 & 3), and the Tag ID Serial Number (bytes 4 – 6).

Table 8 8-Byte SeGo/eGo Tag ID Fields

Field	Bytes	Range of Values	Description
1	0, 1	0000 to FFFF	ISO Code E022 (for tags with eGo enabled), tag configuration and partial CRC for tags without eGo enabled. (This field is not used by the translator)
2	2, 3	0000 to FFFE	Ownership Code
3	4 – 6	000000 – FFFFFFFF	Serial Number
4	7	00 to FF	CRC (Not used by the translator)

The reader uses these two fields to generate the Wiegand Facility Code and Card ID output. The SeGo Tag ID-to-Wiegand translations are defined as follows:

Wiegand Facility Code = Decimal value of the Ownership Code, bytes 2 & 3 (16 bits).

Wiegand Card ID = Decimal value of the SeGo Serial Number, bytes 4 – 6 (24 bits).

If the decimal value of the SeGo/eGo Ownership Code exceeds the maximum Facility Code range for the Wiegand output selected, the reader will truncate the Facility Code.

If the reader is configured to output a fixed Wiegand Facility Code (#863hhhh), that setting will override the Wiegand Facility Code being calculated from the SeGo Ownership Code, and the reader will only generate the Card ID and parity bits.

If the SeGo/eGo Serial Number exceeds the maximum Card ID range for the Wiegand output selected, the reader will truncate the Serial Number.

These configuration settings are stored in NVM until a reset is issued.

IAG Toll Data Format

The read-only portion of the IAG Tag response consists of 12 hexadecimal bytes subdivided into 15 data fields as defined in [Table 9](#).

Table 9 IAG Read Response Data Fields

IAG Read Response									Data Payload
Fields	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
	Read Only Partition								
Data	Header (3 Bits)			Tag Type (3 Bits)			App ID * (3 Bits)		XXH
Data	App ID	Group ID (7 Bits)							XXH
Data	Agency ID (7 Bits)						SN (MSB)	XXH	
Data	Serial Number (24 Bits)								XXH
Data	Serial Number								XXH
Data	Serial Number (LSB)						V. Class	XXH	
Data	Vehicle Class (11 Bits)								XXH
Data	Vehicle Class		Revenue Type (4 Bits)				C. S.*	M. L.	XXH
Data	M. L.	Agency Data 1 (3 Bits)			ISTHA Class (4 Bits)				XXH
Data	Agency Data 2 (24 Bits)								XXH
Data	Agency Data 2								XXH
Data	Agency Data 2								XXH
	Read/Write Partition								
Data	Reader ID (12 Bits)								XXH
Data	Reader ID				TM Date (9 Bits)				XXH
Data	TM Date					TM Time (17 Bits)			XXH
Data	TM Time								XXH
Data	TM Time					Agency ID (7 Bits)			XXH
Data	Agency ID					Plaza ID (7)			XXH
Data	Plaza ID				Lane ID (5 bits)				XXH
Data	Lane ID	Date (9 Bits)							XXH
Data	Date		Time (17 Bits)						XXH
Data	Time								XXH
Data	Time			Vehicle Class (11 bits)					XXH
Data	Vehicle Class					Future (4 Bits)			XXH
Data	Future		Agency Data (30 Bits)						XXH
Data	Agency Data								XXH
Data	Agency Data								XXH
Data	Agency Data								XXH

Table 9 IAG Read Response Data Fields

IAG Read Response									Data Payload
Fields	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
Data	Txn Number (16 Bits)								XXH
Data	Txn Number								XXH
CRC	CRC								XXH
CRC	CRC								XXH
Antenna						Antenna Number			0XH

The translator uses two of these fields, the Agency ID and Serial Number, as illustrated in [Table 10](#).

Table 10 IAG Read-Only Fields

Field	Number of Bits	Range of Values	Description
1	7	00 to 7F	Agency ID
2	24	000000 – FFFFFFFF	Serial Number

The reader uses the two IAG fields shown in [Table 10](#) to generate the Wiegand Facility Code and Card ID output respectively. Definitions for the IAG-to-Wiegand translations are defined as follows:

Wiegand Facility Code = Decimal value of the Agency ID.

Wiegand Card ID = Decimal value of the IAG Serial Number.

If the reader is configured to output a fixed Wiegand Facility Code (#863hhhh), that setting will override the Facility Code being calculated from the IAG Agency ID, and the reader will only generate the Card ID and parity bits.

If the IAG Serial Number exceeds the maximum Card ID range for the Wiegand output selected, the reader will truncate the Serial Number.

These configuration settings are stored in NVM until a reset is issued.

IAG Read Response Example

Response:

5026ECC11E01FCB21200010587052DBAAAD1607852D89687D54E03060001AAFB5983

Where:

5026 IAG Read Record Type 2 bytes in Hex

NOTE: Due to overlap of byte boundaries by Tag Data Fields, all further breakdown will be in binary.

Hex Tag Data:

MSB ECC11E01FCB21200 010587052DBAAAD1 607852D89687D54E 03060001AAFB5983 LSB
 32 Bytes Tag Data * 8 bits/byte -> 256 bits
 32 Bytes/8 bytes per line -> 4 lines
 256 bits/4 lines -> 64 bits/line from MSB to LSB

MSB 1110110011000001000111100000000111111001011001000010010000000000
 000000010000010110000111000001010010110110111010101010101011010001
 0110000001111000010100101101100010010110100001111101010101001110
 00000011000001100000000000000000110101010111110110101100110000011 LSB

Response breakdown goes from MSB to LSB, starting with the header field and ending with the CRC.

Fields (# Bits):	Bit Pattern	:	Decimal
Read Only Partition			
Header (3 bits):	111	:	7
Tag Type (3 bits):	011	:	3
App ID (3 bits):	001	:	1
Group ID (7 bits):	1000001	:	65
Agency ID (7 bits):	0001111	:	15
Serial Number (24 bits):	000000001111111001011001	:	65113
Vehicle Class (11 bits):	00001001000	:	72
Revenue Type (4 bits):	0000	:	0
Commission Status (1 bit):	0	:	0
Mounting Location (2 bits):	00	:	00
Agency Data 1 (3 bits):	000	:	000
ISTHA Class (4 bits):	0001	:	1
Agency Data 2 (24 bits):	000001011000011100000101	:	362245
Read Write Partition			
Reader ID (12 bits):	001011011011	:	731
TM Date (9 bits):	101010101	:	341
TM Time (17 bits):	01011010001011000	:	46168
Agency ID (7 bits):	0001111	:	15
Plaza ID (7 bits):	0000101	:	5
Lane ID (5 bits):	00101	:	5
Date (9 bits):	101100010	:	354
Time (17 bits):	01011010000111110	:	46142
Vehicle Class (11 bits):	10101010011	:	1363
Future (4 bits):	1000	:	8
Agency Data (30 bits):	00001100000110000000000000000001	:	50724865
Transaction Number (16 bits):	1010101011111011	:	43771
CRC (16 bits):	0101100110000011	:	22915

For more information:

Sales Support
800.923.4824

Technical Support
505.856.8007

transcore.com



TRANSCORE®
Trusted Transportation Solutions

© 2017-2019 TransCore LP. All rights reserved. TRANSCORE is a registered trademark and is used under license. All other trademarks listed are the property of their respective owners. Contents subject to change. Printed in the U.S.A.