SKYETEK PROTOCOL V3

REFERENCE GUIDE

VERSION 041813

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Version 041813

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1 About this Document

The purpose of this document is to give users a full working knowledge of SkyeTek Protocol v3. This document includes information regarding the format of STPv3 commands and responses, a full list of all commands and responses and their dependences, as well as a full list of error and response codes. Using this document, a user should be able to send any supported command to SkyeTek modules, and accurately parse the response.

SkyeTek Protocol v3 is used by the following SkyeTek modules:

- SkyeModule M2
- SkyeModule M4
- SkyeModule M7
- SkyeModule M9
- SkyeModule M10

1.1 Revision History

Revision	Author	Changes
101212	Josh Peifer	Initial Release
041813	Josh Peifer	Added new NXP Icode tag types

2 Definition of Terms

Following is an alphabetical list of terms and acronyms used in this document

AFI – Application Field Identifier

CRC – Cyclical Redundancy Check

HMAC – Hash Message Authentication Code

LSB – Least Significant Byte

MSB – Most Significant Byte

RF – Radio Frequency

STP – SkyeTek Protocol

3 SkyeTek Protocol v3 Overview

The SkyeTek Protocol defines the data exchange between a host controller and a SkyeTek RFID radio module. This document covers version 3 of the protocol (STPv3), released June 30, 2006. The protocol specifies how a host controller can address, configure, and command a radio module to read from and write to RFID tags or smart labels. This document describes the format of messages exchanged between a SkyeTek reader module and a host device. The content of these messages depends on the type of radio module; you must use this document with the reference guide for the specific reader module.

The SkyeTek Protocol specifies only the data communication layer. The hardware interface layer is a function of the hardware settings and method of connection of the specific radio module. (Refer to the reference guide for your specific module for hardware interface specifications.)

Table 3-1 Reader Module Support

Module	STP Version
SkyeModule M7, M9, M10	3
SkyeModule M2, M4	3
SkyeModule M1	2
SkyeModule M1-Mini	2

3.1 Communications Modes

The SkyeTek Protocol supports both ASCII format and binary format communications. The host initiates every request or response sequence, and determines which format is used.

3.1.1 ASCII Mode

ASCII mode uses ASCII characters for all requests and responses. All commands are split into two bytes with each byte an ASCII representation of the two nibbles of binary data. Requests must start and end with a carriage return <CR>. Responses start with a line feed <LF> and end with a carriage return and line feed <CR><LF>. See Chapter 4, “STPv3 Request Formats,” on page 13 for more information about ASCII mode formats.

3.1.2 Binary Mode

In binary mode, commands are sent as plain binary bytes. Every request and response must begin with a start of frame <STX> byte and include a message length field that indicates the number of bytes in the request and response. See Chapter 4, “STPv3 Request Formats,” on page 13 for more information about binary mode formats.

3.2 Multiple-Byte Fields

All multiple byte fields in STPv3 commands and responses are sent most significant byte (MSB) first. However, data bytes from memory locations (e.g. for commands such as Read/Write Tag Data and Read/Write Tag Config) match the memory layout of the specific tag. For example, Mifare 1k/4k and Ultralight, the data is read or written LSB to MSB. Other tags do not have byte ordering within a memory block. Since SkyeModule readers consistently read and write the data in the same order, the exact byte ordering does not affect the correct function of the command or response.

3.3 Selecting Tags

STPv3 lets you use two different techniques to select tags: Normal State and Selected State.

In Normal State, you must specify a tag ID (TID) and TID length with each command. Commands will not function without this tag information.

Selected State lets you select a tag once by issuing a Select Tag command with the correct tag ID and the RF_F flag set. This places the tag in the Selected State and makes it the target for all tag commands as long as those commands keep the RF_F flag set. While the tag is in the Selected State, you do not have to provide a TID with each subsequent command.

For more information about tag selection, see:

RF_F,” on page 19

“Select Tag (0x0101),” on page 28

Chapter 7, “Tag Types and Codes,” on page 70

4 STPv3 Request Formats

4.1 General Format

STPv3 requests use the following general formats. This chapter discusses each field in more detail.

Table 4-1 Request Format: ASCII Mode (in bytes)

Msg. Len.	Flags	Com-mand	RID	Tag Type	TID Len.	TID	AFI	Ses-sion	Addr.	Num. Blocks	Data Len.	Data	CRC
n/a	4	4	8	4	2	32 (max)	2	2	4	4	4	2 K (max)	4

Table 4-2 Request Format: Binary Mode (in bytes)

Msg. Len.	Flags	Com-mand	RID	Tag Type	TID Len.	TID	AFI	Ses-sion	Addr.	Num. Blocks	Data Len.	Data	CRC
2	2	2	4	2	1	16 (max)	1	1	2	2	2	1K (max)	2

Required fields (must be present at all times)
Optional fields (depending on the command and flags)
Required fields (depending on the command)

NOTE – The message length byte is a two-byte field used in binary mode to indicate the length of the request message. This field is mandatory for binary mode *only* and is not supported in ASCII mode.

4.2 Binary Mode Timing Limitations

Be sure to consider binary timing limitations when planning how quickly your application sends command requests to your SkyeTek reader.

- A 5 ms timeout period follows each byte sent to the reader in binary mode.
- If another byte arrives during the timeout period, the reader treats the byte as another part of the request packet.
- If the timeout period expires, the reader considers the request packet complete and sends the request.
- Your application must send the next byte of a request within the 5 ms timeout to prevent the reader from sending an incomplete request.

- Your application must delay more than 5 ms to avoid sending a new request before the timeout has expired, which would cause the reader to include the new request with the previous one.

4.3 Request Fields Descriptions

4.3.1 Message Length

- Specifies the number of bytes in the request.
- The response contains a separate Message Length field.
- Mandatory for binary mode only—not used for ASCII mode.
- Two bytes long

4.3.2 Flags Field

- Changes command behavior by turning flags on or off.
- See "Flag Descriptions" on page 18 for detailed descriptions of each flag. (Table 4-3 summarizes the available flags.)
- Flags may act singularly or in combination with other flags.
- Two bytes long

4.3.3 Command Field

- Specifies the command being sent to the reader.
- See Chapter 5, "Command Descriptions" on page 22 for detailed descriptions of each command.
- Two bytes long

4.3.4 Reader ID Field (RID)

- Specifies a particular reader module to which the request is directed.
- Required for sending commands to reader modules that are assigned a Reader ID.
- Requires setting the Reader ID Flag (see "RID_F" on page 20).
- Requires that the request includes the Reader ID.
- If the Reader ID sent in the request does not match the Reader ID assigned to the reader module, the reader cannot respond to the request.
- Four bytes long

4.3.5 Tag Type Field

- Specifies the type of tag with which the reader module should communicate.
- Required only if a tag command is sent in the host request. (See Chapter 7, “Tag Types and Codes”, on page 70 for a complete list of tags supported by STPv3.)
- Consult the reference guide and *Tag Support Matrix* for your SkyeModule reader for additional tag information about specific tags.
- Exact format depends on the type of tag.
- Two bytes long

4.3.6 TID Length Field

- Specifies the length of the Tag ID that is included in the request.
- Requires setting the Tag ID Flag (see “TID_F” on page 20) and this TID Length field must be included in the request.
- One byte long

4.3.7 Tag ID Field (TID)

- Specifies a tag ID to which the host command will be directed.
- Requires setting the Tag ID flag and that the request includes the Tag ID (see “TID_F” on page 20).
- The number of bytes in this field must be specified in the TID Length field (see “TID Length Field” on page 15).
- Variable length with a maximum of 16 bytes.

4.3.8 AFI Field

- Specifies an Application Field Identifier (AFI) used to detect a tag in the field that belongs to a specific family of tags.
- Valid only for tag types that support AFI functionality.
- Requires AFI Flag (see “AFI_F” on page 19) must be set in the flags field to use this functionality, and this field must be present in the host request.
- One byte long

4.3.9 Session Field

- Specifies a session number to be used with a series of commands.
- Commands in the same session must specify the same session number in this field.
- Multiple sessions are permitted.
- Valid only for tags that support sessions.
- The Session field (see "Session_F" on page 21) must be present when the Session_F flag is set.
- One byte long

4.3.10 Address Field

- Specifies an address to be used by the command field in the host request.
- What this field addresses depends on the command field in the host request. It may be a specific address in the tag memory or an address that gets translated into a specific tag memory address.
- This field is not used for all commands and depends entirely on the command field in the host request.
- Two bytes long

4.3.11 Number of Blocks Field

- Specifies the amount of data to be written by or read from the reader module. (The location of the data is specified by the Address field.)
- Note that the number of blocks is not equal to the number of bytes of data. How many bytes exist in a block depends on the command, tag type, and address fields.
- Two bytes long

4.3.12 Data Length Field

- Specifies the exact number of bytes contained in the data field.
- Required only when data field is present.
- Requires setting the Data Flag in the Flags field (see " Data_F" on page 21).
- Two bytes long

4.3.13 Data

- Contains the data being sent with the command.
- Requires that the Data Length field is present.
- Not required for all host requests, depending on command.
- Requires setting the Data Flag (see " Data_F" on page 21) in the Flags field.
- Variable length with a maximum of 1 KB, depend on the command, tag type, address, and number of blocks fields.
- All STPv3 commands and responses are sent MSB first. However, data bytes from memory locations may be sent MSB first or LSB first, depending on the memory layout of the specific tag. Mifare 1k/4k and Ultralight tags are sent LSB first, for example.

4.3.14 CRC

- Specifies inclusion of a check value to protect against bit errors during transmission.
- Uses the CRC_CCITT polynomial ($x^{16} + x^{12} + x^5 + 1 = 0x8408$) in a forward CRC calculation across all fields in the request or response, not including the initiator and terminator bytes, STX, CR, LF, etc.
- Optional for ASCII mode.
- Mandatory for binary mode.
- Requires setting the CRC Flag in the Flags field of the host request (see "CRC_F" on page 20).
- Two byte field

NOTE – For more information on implementing the SkyeTek CRC, please see the included Application Note "SkyeTek CRC"

4.4 Flag Descriptions

This section describes the flags used in the two-byte Flags field. Each flag is a single bit within the Flag field. The numbers in the table below represent the bit number of each flag.

For example, if the flag field was 0x0021, the flags asserted are Loop_F (bit 1) and CRC_F (bit 6.)

Table 4-3 Flags Field Summary

#	Flag	Description
1	Loop_F	Enable Loop mode
2	Inventory_F	Inventory tags in the RF field
3	Lock_F	Lock tags or blocks of tag memory
4	RF_F	Keep RF on after command execution
5	AFI_F	Use Application Field Identifier (AFI) field to select tags
6	CRC_F	CRC required for Request / Response
7	TID_F	Tag ID (TID) present in the Request
8	RID_F	Reader ID (RID) present in the Request / Response
9	Encryption_F	Encrypt / Decrypt data for Writes / Reads
10	HMAC_F	Write / Verify HMAC for Reads / Writes
11	Session_F	Use the Session Field to select tags
12	Data_F	Data field is present in the Request
13	RFU	Reserved for Future Use
14	RFU	Reserved for Future Use
15	RFU	Reserved for Future Use
16	RFU	Reserved for Future Use

4.4.1 Loop_F

- Lets the reader select and continuously scan for tag IDs in the detection field.
- Valid for the Select Tag command only. (See “Select Tag (0x0101)” on page 28 for more information.)
- See “Select Tag (0x0101)” on page 28 for more information about how other flags affect the functionality of Loop_F.
- Sends the Select Tag Pass response only when the tag is present in the field. The Select Tag Fail response is never sent in Loop mode.

4.4.2 Inventory_F

- The reader reads all the tags in the field (anti-collision sequence).
- Valid for the Select Tag command only. (See "Select Tag (0x0101)" on page 28 for more information.)
- The Loop_F flag affects the functionality of the Inventory flag. When Loop_F is set, the reader scans for all the tags in the field once and for any tags entering the field until Loop_F (Inventory Mode) is turned off.

4.4.3 Lock_F

- Allows locking (protecting) of the entire tag or sections of tag memory.
- Valid only with a Write Tag Data command. (See section 5.2.3 on page 30 for more information.)

4.4.4 RF_F

- Keeps the RF field on after command execution.
- Provides Selected State functionality, which lets you select a tag once by issuing a Select Tag command with the correct tag ID and the RF_F flag set. This places the tag in the Selected state and makes it the target for all subsequent tag commands as long as those commands also have the RF_F flag set.
- While the tag remains in the Selected State, you do not have to provide a TID with each command. (See "Select Tag (0x0101)" on page 28 for more information.)
- Valid for any command that communicates with a tag.

4.4.5 AFI_F

- Allows addition of an Application Field Identifier (AFI) byte in tag commands.
- Setting the AFI_F *flag* lets you use the AFI *field* to specify which application-specific tags will respond to the tag command issued. See "AFI Field" on page 15 for more information.
- Valid only with tag commands and tags that support AFI functionality.

4.4.6 CRC_F

- Specifies that a CRC field is present in the request and response frames.
- The 16-bit CRC is calculated over all the fields except the delimiter fields (STX in binary mode and CR and LF in ASCII mode)
- See “CRC” on page 17 for more information.

4.4.7 TID_F

- Specifies that the tag ID (TID) must be included in the request. Using this flag in a command targets the command at the tag with that specific TID.
- Valid for any tag command and for some security commands.
- If you set TID_F, you must also specify the TID Length (see “TID Length Field” on page 15) and the TID (see “Tag ID Field (TID)” on page 15).
- The following flags affect the use of the TID flag:

4.4.8 RF_F

- Places the tag in the Selected State if included in a Select command.
- TID_F is not necessary for tags in the Selected State.

4.4.9 RID_F

- Specifies that the reader ID (RID) is included in the request. A reader responds only to commands that contain a RID field that matches the reader’s internal ID.
- If you set RID_F, you must also specify the RID field (see “Reader ID Field (RID)” on page 14).
- Valid for all commands.

4.4.10 Encryption_F

- Enables the encryption included with the SkyeTek Crypto Libraries.
- Valid for Read Tag Data and Write Tag Data commands using the specified encryption function and key.
- If specified for a Write Tag Data command, the data to be written to the tag is encrypted before being sent over the air interface.
- If specified for a Read Tag Data command, the data to be read from the tag is decrypted before being reported back to the host.

4.4.11 HMAC_F

- Enables the keyed-hash message authentication code (HMAC) functionality included with the Skyetek Crypto Libraries.
- Valid for Read Tag Data and Write Tag Data commands using the specified hash function and key.
- If specified for a Write Tag Data command, the reader automatically calculates the HMAC over the data passed in and then adjusts the command to write the HMAC to the tag after the data.
- If specified for a Read Tag Data command, the reader automatically verifies the HMAC over the read data.

4.4.12 Session_F

- Specifies that the Session field will be used with the Select command.
- Requires that you also specify a valid session number in the Session field (see "Session Field" on page 16).

4.4.13 Data_F

- Specifies that a data length (see "Data Length Field" on page 16) and data (see "Data" on page 17) are included in the request.
- Valid for all Write commands (Write System, Store Default, Write Tag Data) and any commands that need to pass data or parameters to the tag or reader (with the exception of some tag locking commands, in which case the presence of data depends on the specific tag type).

5 Command Descriptions

This chapter describes the commands available in STPv3 and provides detailed descriptions. The command field specifies the actual command sent by the host. The field is two bytes long in binary mode and four bytes long in ASCII mode. This field includes the target for the host request and the specific command for that target. Options in various fields affect the command's functionality.

- "Available Commands" on page 23 below summarizes the available commands and associated fields for each.
- "Command Field Descriptions (2 Bytes)" on page 28 provides a detailed description for each command.

5.1 Available Commands

See “Command Field Descriptions (2 Bytes)” on page 28 for full descriptions of each command.

Legend:	
M	Mandatory
O	Optional
-	Not Used

Table 5-1 Available Commands and Associated Fields

Command Name	Code	Message Length (binary mode only)	Flags	RID	Tag Type	TID Length	TID	AFI	Session	Address	Number of Blocks	Data Length	Data	CRC (optional for ASCII mode, mandatory for binary mode)
Select Tag	0x01 01	M	M	O	M	O	O	O	O	-	-	-	-	O/M
Read Tag Data	0x01 02	M	M	O	M	M	O	-	-	M	M	-	-	O/M
Write Tag Data	0x01 03	M	M	O	M	M	M	O	-	M	M	M	M	O/M
Activate Tag Type	0x01 04	M	M	O	M	-	-	-	-	-	-	-	-	O/M
De-activate Tag Type	0x01 05	M	M	O	M	-	-	-	-	-	-	-	-	O/M
Set Tag to Reader Data Rate	0x01 06	M	M	O	M	-	-	-	-	-	-	M	M	O/M
Get Tag Info	0x01 07	M	M	O	M	O	O	-	-	-	-	-	-	O/M
Get Lock Status	0x01 08	M	M	O	M	M	O	-	-	M	M	-	-	O/M
Kill Tag	0x01 09	M	M	O	M	M	M	-	-	-	-	M	M	O/M

Command Name	Code	Message Length (binary mode only)	Flags	RID	Tag Type	TID Length	TID	AFI	Session	Address	Number of Blocks	Data Length	Data	CRC (optional for ASCII mode, mandatory for binary mode)
Revive Tag	0x01 0A	M	M	O	M	-	-	-	-	-	-	M	M	O/M
Erase Tag	0x01 0B	M	M	O	M	M	M	-	-	M	M	-	-	O/M
Format Tag	0x01 0C	M	M	O	M	M	M	-	-	-	-	-	-	O/M
Set Reader to Tag Data Rate	0x01 0D	M	M	O	M	-	-	-	-	-	-	M	M	O/M
Read Tag Configuration	0x01 0E	M	M	O	M	M	O	-	-	M	M	-	-	O/M
Write Tag Configuration	0x01 0F	M	M	O	M	M	M	O	-	M	M	M	M	O/M
Authenticate Tag	0x02 01	M	M	O	M	M	M	-	O	M	-	M	M	O/M
Send Tag Password	0x02 02	M	M	O	M	M	M	-	-	-	-	M	M	O/M
Initialize Secure Memory	0x02 03	M	M	-	M	O	O	-	M	-	-	-	-	O/M
Setup Secure Memory	0x02 04	M	M	-	M	O	O	-	M	-	-	-	-	O/M
Get Application IDs	0x03 01	M	M	-	M	O	O	-	M	-	-	-	-	O/M
Select Application	0x03 02	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Create Application	0x03 03	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Delete Application	0x03 04	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Get File IDs	0x04 01	M	M	-	M	O	O	-	M	-	-	-	-	O/M
Create File	0x04 03	M	M	-	M	O	O	-	M	-	-	M	M	O/M

Command Name	Code	Message Length (binary mode only)	Flags	RID	Tag Type	TID Length	TID	AFI	Session	Address	Number of Blocks	Data Length	Data	CRC (optional for ASCII mode, mandatory for binary mode)
Get File Settings	0x04 04	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Change File Settings	0x04 05	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Read File	0x04 06	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Write File	0x04 07	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Delete File	0x04 08	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Clear File	0x04 09	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Increment Value File	0x04 0A	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Decrement Value File	0x04 0B	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Limited Credit Value File	0x040C	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Get Value	0x040D	M	M	-	M	O	O	-	M	-	-			O/M
Commit Transaction	0x040E	M	M	-	M	O	O	-	M	-	-			O/M
Abort Transaction	0x040F	M	M	-	M	O	O	-	M	-	-			O/M
Read Records	0x0410	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Write Record	0x0411	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Change Key Settings	0x0412	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Get Key Settings	0x0413	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Get Key Version	0x0414	M	M	-	M	O	O	-	M	-	-	M	M	O/M

Command Name	Code	Message Length (binary mode only)	Flags	RID	Tag Type	TID Length	TID	AFI	Session	Address	Number of Blocks	Data Length	Data	CRC (optional for ASCII mode, mandatory for binary mode)
Change Key	0x0415	M	M	-	M	O	O	-	M	-	-	M	M	O/M
Enable EAS	0x05 01	M	M	O	M	M	M	-	-	-	-	-	-	O/M
Disable EAS	0x05 02	M	M	O	M	M	M	-	-	-	-	-	-	O/M
Scan EAS	0x05 03	M	M	O	M	-	-	-	-	-	-	-	-	O/M
Write AFI	0x05 04	M	M	O	M	M	M	-	-	-	-	M	M	O/M
Read AFI	0x05 05	M	M	O	M	M	M	-	-	-	-	-	-	O/M
Write DSFID	0x05 06	M	M	O	M	M	M	-	-	-	-	M	M	O/M
Read DSFID	0x05 07	M	M	O	M	-	-	-	-	-	-	-	-	O/M
Credit Value	0x05 08	M	M	O	M	-	-	-	M	-	-	-	-	O/M
Debit Value	0x05 09	M	M	O	M	-	-	-	M	-	-	-	-	O/M
Store Key	0x06 01	M	M	O	M	-	-	-	-	M	-	-	M	O/M
Load Key	0x06 02	M	M	O	M	-	-	-	-	M	-	-	-	O/M
Load Defaults	0x11 01	M	M	O	-	-	-	-	-	-	-	-	-	O/M
Reset Device	0x11 02	M	M	O	-	-	-	-	-	-	-	-	-	O/M
Bootload	0x11 03	M	M	O	-	-	-	-	-	-	-	-	-	O/M
Read System Parameter	0x12 01	M	M	O	-	-	-	-	-	M	M	-	-	O/M
Write System Parameter	0x12 02	M	M	O	-	-	-	-	-	M	M	M	M	O/M

Command Name	Code	Message Length (binary mode only)	Flags	RID	Tag Type	TID Length	TID	AFI	Session	Address	Number of Blocks	Data Length	Data	CRC (optional for ASCII mode, mandatory for binary mode)
Store Default System Parameter	0x13 01	M	M	O	-	-	-	-	-	M	M	M	M	O/M
Retrieve Default System Parameter	0x13 02	M	M	O	-	-	-	-	-	M	M	-	-	O/M
Authenticate Reader	0x14 01	M	M	O	-	-	-	-	-	-	-	-	M	O/M
Enable Debug	0x14 02	M	-	-	-	-	-	-	-	-	-	-	-	O/M
Disable Debug	0x14 03	M	-	-	-	-	-	-	-	-	-	-	-	O/M
Get Debug Messages	0x14 04	M	-	-	-	-	-	-	-	-	-	-	-	O/M
Enter Payment Scan Mode	0x14 05	M	-	-	-	-	-	-	-	-	-	-	-	O/M

5.2 Command Field Descriptions (2 Bytes)

5.2.1 Select Tag (0x0101)

The Select Tag command obtains the tag ID of a tag that is in the field of the reader. For UHF tags, the reader returns the Electronic Product Code (EPC,) not the TID. The command behaves differently depending on the flag combinations included with the command.

- If the tag type is set to Auto Detect, the reader scans for any supported type of tag in the RF field.
- If you specify a specific air-interface protocol or tag in the Tag Type field, the reader scans only for tags that match.

The following flags affect the functionality of the Select Tag command:

- **Loop_F** *only:* The reader continuously reads the first tag of the tag type specified and reports back the tag ID. The Select Tag Fail response is never sent in Loop mode.
- **Inventory_F** *only:* The reader reads all tags of the tag type specified and reports all tag IDs followed by an Inventory Complete message when no more tags are in the field. Inventory_F is not valid with the TID_F.
- **TID_F** *only:* Sends the Select Tag Pass response only when the tag with the TID provided is present in the field.
- **RF_F** *and* **TID_F:** The reader tries to find the tag ID specified in the field and put it into the *Selected State*. This state means that all future tag commands are targeted at this tag and will not need to specify a TID. The Selected State lasts as long each new command keeps the RF_F flag set.
- **AFI_F** *only***:** Only tags with an AFI field that matches the passed-in AFI respond, according to the Select Tag functionality defined for the previous flags in this list.
- **Loop_F** *and* **TID_F:** The reader continuously tries to locate the tag matching the tag ID specified in the field. The reader reports a Select Tag Pass if it finds the TID. This continues until loop mode is exited.
- **Loop_F** *and* **Inventory_F:** The reader reads all the tags in the field and then continuously scans for any tags that enter the field and reports back their tag IDs.

The RID and CRC fields are consistently used throughout SkyeTek Protocol and cannot be documented for specific commands.

Mandatory Request Fields: Tag Type

Optional Request Fields: RID, TID Length, TID, CRC, AFI

Unused Fields: Address, Number Blocks, Data Length, and Data

Valid Flags: CRC_F, Inventory_F, Loop_F, RF_F, RID_F, Session_F, TID_F, AFI_F

Invalid Flags: Data_F, Encryption_F, HMAC_F, Lock_F

Response Formats:

Standard response where Data Length is the tag ID length, Data is the tag ID, and the Tag Type specified in the request is *not* Auto (O = optional):

Message Length	Response Code	RID (O)	Data Length	Data	CRC (O)

Standard response where data length is the tag ID length, Data is the tag ID, and the Tag Type specified in the request is Auto (O = optional):

Message Length	Response Code	RID (O)	Tag Type	Data Length	CRC (O)

Standard response is a TID flag is specified or a failure occurs (O = optional):

Message Length	Response Code	CRC (O)

5.2.2 Read Tag Data (0x0102)

The Read Tag Data command reads data from RFID tags. The data read can be either the tag's user memory or EPC ID. The amount of data returned in the response varies by tag type and the size of each block on the tag. In general, the reader starts reading from the specified address and reads the specified number of blocks. The size of each block is tag-type dependent.

The following flags affect the functionality of the Read Tag Data command:

- **TID_F** *only*: The reader reads the specified number of blocks starting at the specified address for the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *with or without* **TID_F:** The reader reads the specified number of blocks starting at the specified address for a tag currently in the Selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Address, Number of Blocks

Optional Request Fields: CRC, RID

Unused Fields: AFI, Data, Data Length, Session

Valid Flags: RF_F, CRC_F, TID_F, RID_F, Encryption_F, HMAC_F

Invalid Flags: AFI_F, Data_F, Inventory_F, Lock_F, Loop_F, Session_F

Response Formats:

Standard response where Data Length is the total number of bytes read and Data is the data read from the tag (O = optional):

Message Length	Response Code	RID (O)	Data Length	Data	CRC (O)

Standard response when an error occurs (O = optional):

Message Length	Response Code	CRC (O)

5.2.3 Write Tag Data (0x0103)

The Write Tag Data command writes data to the memory (including one time programmable memory) of a tag. The Write Tag data command is also used to lock blocks on RFID tags. The reader starts writing from the specified address and writes the specified number of blocks. The size of each block is tag-type dependent. Blocks can only be locked one block at a time.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader writes the specified number of blocks starting at the specified address for the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only or with* **TID_F:** The reader writes the specified number of blocks starting at the specified address for a tag currently in the selected state.
- **Lock_F** *only or with* **TID_F** *or* **RF_F** *or both* **TID_F** *and* **RF_F:** The reader locks the specified block at address. The number of blocks field is always one. The data field contains parameters specific to some lock commands (for example block locking functionality).
- **Encryption_F** *only or with* **TID_F** *or* **RF_F** *or both* **TID_F** *and* **RF_F:** The reader encrypts all data using the SkyeTek Crypto Libraries before writing the data to the tag using a prior encryption algorithm and key specified. This functionality allows the tag to be used as a transport mechanism for secure data.
- **HMAC_F** *only or with* **TID or RF_F** *or both* **TID_F** *and* **RF_F** *(not used with* **Lock_F):** The reader computes an HMAC over all data using the SkyeTek Crypto Libraries and append it to the end of the data and write this HMAC to the tag using a prior specified hashing algorithm and specified key.

Mandatory Request Fields: Tag Type, TID Length plus TID (or RF_F flag Selected State), Address, Number of Blocks, Data Length, and Data

Optional Request Fields: CRC, RID

Unused Fields: AFI, Session

Valid Flags: CRC_F, Data_F, Encryption_F, HMAC_F, Lock_F, RF_F, RID_F, TID_F,

Invalid Flags: AFI_F, Inventory_F, Loop_F, Session_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.4 Activate Tag Type (0x0104)

The Activate Tag type command activates a tag to be used in a Select command. Tags can be included into the Select sequence.

Functionality for this command is to be determined by future development.

5.2.5 DeActivate Tag Type (0x0105)

The Deactivate tag type command deactivates a tag to be used in a Select command. Tags can be excluded from the Select tag order.

Functionality for this command is to be determined by future development.

5.2.6 Set Tag to Reader Data Rate (0x0106)

The Set Tag to Reader Data Rate specifies the bit rate for communications from reader to tag over the air interface. The tag type field specifies the tag type for which the communications data rate is being set. The data field contains a parameter that specifies the data rate for that particular tag or tag type. The data field is product and reader specific and defined in product documentation.

Mandatory Request Fields: Tag Type, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: TID Length, TID, AFI, Session, Address, Number of Blocks

Valid Flags: CRC_F, Data_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, RF_F, AFI_F, TID_F, Session_F, Encryption_F, HMAC_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.7 Get Tag Info (0x0107)

The Get Tag Info command returns the following information about the tag: starting block, maximum blocks, and bytes per block. If the TID is specified, the reader will attempt to access the tag for information if the tag supports this feature (only for ISO15693 tags).

The following flags affect the functionality of the command:

- **TID_F**: The reader will attempt to access the tag for information if the tag supports this feature (only for ISO15693 tags). If the tag does not respond, the reader will return the information known about the tag type specified.

Mandatory Request Fields: Tag Type

Optional Request Fields: RID, TID Length, TID, CRC

Unused Fields: Address, AFI, Number of Blocks, Session

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: AFI_F, Data_F, Encryption_F, HMAC_F, Inventory_F, Lock_F, Loop_F, Session_F

Response Formats:

Standard response (for a tag that supports the Get Tag Info command) where Data Length is the total number of data bytes, Data consists of 3 parameters (2 bytes each)— starting block, max block, and bytes per block (O = optional):

Message Length	Response Code	RID (O)	Data Length	Data	CRC (O)

Standard response when there was an error (O = optional):

Message Length	Response Code	CRC (O)

5.2.8 Get Lock Status (0x0108)

The Get Lock Status command returns information about whether a specific block is locked. If the block is locked, the data value will be 0x01. If the block is not locked, the data value will be 0x00. The returned data is always 1 byte. The address specified is the block at which you want the lock status for. The number of blocks field is always 0x01.

The following flags affect the functionality of the command:

- **TID_F** *only*: The reader reads the lock status of a block at the specified address for the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only or with* **TID_F:** The reader reads the lock status of a block at the specified address for the tag currently in the selected state.

Mandatory Request Fields: Tag Type, TID Length plus TID (not required if RF_F flag is set for Selected State), Address, Number of Blocks

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, Encryption_F, HMAC_F, AFI_F, Session_F, Data_F

Response Formats:

Standard response where Data Length is always one byte and Data is 0x00 to indicate not locked or 0x01 to indicate locked (O = optional):

Message Length	Response Code	RID (O)	Data Length	Data	CRC (O)

Standard response when there was an error (O = optional):

Message Length	Response Code	CRC (O)

5.2.9 Kill Tag (0x0109)

The Kill Tag command permanently disables the tag. A few tags allow the tag to be revived with a special password. If the tag requires a special password or specific data to be killed, the data field is present in the request, otherwise the data value is 1 byte and always 0x00.

The following flags affect the functionality of the command:

- **TID_F** *only*: The reader kills the tag with the tag ID specified. If the tag is not in the field, the reader returns a fail message.

Mandatory Request Fields: Tag Type, TID Length, TID, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Address, Number of Blocks

Valid Flags: CRC_F, TID_F, RID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F

Response Formats:

Standard response where the response code is either pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.10 Revive Tag (0x010A)

The Revive Tag command re-enables a tag that was previously killed. This feature is available only for tags that support this command.

Mandatory Request Fields: Tag Type, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Address, TID Length, TID, Number of Blocks

Valid Flags: CRC_F, RID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, RF_F, AFI_F, TID_F, Encryption_F, HMAC_F, Session_F

Response Formats:

Standard response where the response code is either pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.11 Erase Tag (0x010B)

The Erase Tag command erases a block of memory or EPC code of a tag. The reader erases the data on the tag starting at the block specified by the address field and erases the number of blocks specified by the number of blocks field.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader erases the specified number of blocks starting at the specified address for the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only or with* **TID_F:** The reader erases the specified number of blocks starting at the specified address for a tag currently in the selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Address, Number of Blocks

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session, Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Session_F, Encryption_F, HMAC_F, Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.12 Format Tag (0x010C)

The Format Tag command formats the entire memory contents or EPC of a tag, a block of memory, or EPC code of a tag. There are no address or number of block fields in this command.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader formats the tag matching the tag ID specified. If the tag is not in the field, the reader will return a fail message.
- **RF_F:** The reader formats the currently in the selected state.

Mandatory Request Fields: Tag Type, TID Length plus TID (TID and TID Length not required if RF_F flag is set for Selected State)

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session, Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Session_F, Encryption_F, HMAC_F, Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.13 Set Reader to Tag Data Rate (0x010D)

The Set Reader to Tag Data Rate command specifies the bit rate for communications from reader to tag over the air interface. The tag type field specifies the tag type for which the communications data rate is being set. The data field contains a parameter that specifies the data rate for that particular tag or tag type. The data field is product and tag specific and defined in product documentation.

Mandatory Request Fields: Tag Type, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: TID Length, TID, AFI, Session, Address, Number of Blocks

Valid Flags: CRC_F, Data_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, RF_F, AFI_F, TID_F, Session_F, Encryption_F, HMAC_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.14 Read Tag Configuration (0x010E)

Read Tag Configuration reads from the configuration zone on a tag. (The configuration zone is a special region of memory that uses a block size of one to allow reading and writing of individual configuration bytes.)

- Exact format depends on the type of tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Address, Number of Blocks, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session

Valid Flags: CRC_F, Data_F, Encryption_F, HMAC_F, RF_F, RID_F, TID_F

Invalid Flags: AFI_F, Inventory_F, Lock_F, Loop_F, Session_F

5.2.15 Write Tag Configuration (0x010F)

Write Tag Configuration writes to the configuration zone on a tag. (The configuration zone is a special region of memory that uses a block size of one to allow reading and writing of individual configuration bytes.)

- Exact format depends on the type of tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Address, Number of Blocks, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session

Valid Flags: Lock_F, RF_F, CRC_F, TID_F, RID_F, Encryption_F, HMAC_F, Data

Invalid Flags: AFI_F, Inventory_F, Loop_F, Session_F

5.2.16 Authenticate Tag (0x0201)

The Authenticate Tag command authenticates a tag block or sector to the reader and the reader to the tag block or sector.

- The Tag Type field specifies the type of tag to authenticate.
- The Address field specifies the block or sector to authenticate.
- The data field contains parameters such as key type, key value, or location. Exact format depends on the type of tag. Consult the reference guide for your SkyeModule reader for details.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader authenticates a sector of a tag matching the tag ID by the starting address. If the authentication passes, further access to that block is

allowed, and the RF stays on for one command (if RF_F is not turned on for the next command). If the tag is not in the field, the reader returns a fail message.

- **RF_F** *only or with* **TID_F:** The reader authenticates a sector of a tag in the selected state at the starting address specified. If the authentication passes, further access to that block is allowed. The RF stays on.

Mandatory Request Fields: Tag Type, TID Length plus TID (TID and TID Length not required if RF_F flag is set for Selected State), Address, Data Length, and Data

Optional Request Fields: RID, Session, CRC

Unused Fields: AFI, Number of Blocks

Valid Flags: CRC_F, RID_F, Session_F, TID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, RF_F, AFI_F, Encryption_F, HMAC_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.17 Send Tag Password (0x0202)

The Send Tag Password command sends the password to the tag before performing reads and writes.

- The data field contains parameters such as key type, key value, or location. Exact format depends on the type of tag. Consult the reference guide for your Skyemodule reader for details.
- Certain tags require valid passwords to be sent before read and write commands are performed. The reader sends the password specified in the data field to the tag specified by the tag ID and returns a pass or fail command based on the status of the Send Tag Password command.

Mandatory Request Fields: Tag Type, TID Length, TID, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session, Address, Number of Blocks

Valid Flags: CRC_F, RID_F, TID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, RF_F, AFI_F, Session_F, Encryption_F, HMAC_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.18 Initialize Secure Memory (0x0203)

The Initialize Secure Memory command sets up a supported memory tag to use the Secure Memory reader functionality.

- The tag must be selected with a session.
- The request and response Data fields use ASN.1 BER (Tag Length Value) encoding, although you do not need knowledge of the ASN.1 BER standard to use the command. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F,

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F, TID_F

5.2.19 Setup Secure Memory (0x0204)

The Setup Secure Memory command changes a memory tag that has already been initialized for use by the Secure Memory reader functionality.

- The tag must be selected with a session.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F, TID_F

5.2.20 Get Application IDs (0x0301)

The Get Application IDs command returns a list of all application identifiers that are present on the tag.

- The tag must be selected with a session.
- The format and value range of the application identifiers vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F

5.2.21 Select Application (0x0302)

The Select Application command specifies an application ID used to select an application on a tag to which additional commands will be sent.

- The tag must be selected with a session.
- The format and value range of the application identifiers vary by tag. Consult your SkyeModule reader reference guide for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.22 Create Application (0x0303)

The Create Application command creates a new application on a tag.

- The tag must be selected with a session.
- The format and value range of the application identifiers vary by tag. Consult the reference guide for your SkyeModule reader for details.
- You must specify a three bytes application ID, application key settings, and the number of keys to be available for this application.
- You must select the master application (000000) with valid authentication before executing this command

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.23 Delete Application (0x0304)

The Delete Application command deletes the specified application ID on a tag.

- The tag must be selected with a session.
- The format and value range of the application identifiers vary by tag. Consult the reference guide for your SkyeModule reader for details.
- Some tags may require that you select a master application and perform authentication before you use this command.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.24 Get File IDs (0x0401)

The Get File IDs command returns a list of valid file IDs on a specific application.

- The tag must be selected with a session.
- The format and value range of the application identifiers vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F

5.2.25 Create File (0x0403)

The Create File command creates a specific file on an application, such as a new standard data file, value file, or record file.

- The format and value range of the application identifiers and parameters vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.26 Get File Settings (0x0404)

The Get File Settings command gets the current settings for a file.

- The command takes a file identifier and returns the file details.
- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.27 Change File Settings (0x0405)

The Change File Settings command changes the current settings for a file.

- The command takes a file identifier and new the file details to change.
- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.28 Read File (0x0406)

The Read File command reads the actual contents of a file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.29 Write File (0x0407)

The Write File command writes data onto a specified file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.30 Delete File (0x0408)

The Delete File command deletes the specified file from an application.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.31 Clear File (0x0409)

The Clear File command clears the content of specified record file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.32 Increment Value File (0x040A)

The Increment Value File command increments a current value by one for a value file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.33 Decrement Value File (0x040B)

The Decrement Value File command decrements a current value by one for a value file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.34 Limited Credit Value File (0x040C)

The Limited Credit Value File command credits back part of a value that was debited within the same transaction.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.35 Get Value (0x040D)

The Get Value command gets the current value of a value file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F

5.2.36 Commit Transaction (0x040E)

The Commit Transaction command commits the current transaction for a transactional data file or record file.

- This command does not take any arguments or return any data.
- Note using this command on some tags causes an error if you attempt to commit when there is no pending transaction.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F

5.2.37 Abort Transaction (0x040F)

The Abort Transaction command aborts the current transaction for a transactional data file or record file.

- This command does not take any arguments or return any data.
- For some tags, aborting a transaction when no transaction is pending causes an error.

Mandatory Request Fields: Tag Type, Session

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RF_F, Session_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Data_F

5.2.38 Read Records (0x0410)

The Read Records command read from record files.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.39 Write Record (0x0411)

The Write Record command writes a record to a record file.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.
- Note for some tags a transaction must be committed.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: CRC

Unused Fields: AFI, Address, Number of Blocks, TID, TID Length

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.40 Change Key Settings (0x0412)

The Change Key Settings command changes key settings.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.41 Get Key Settings (0x0413)

The Get Key Settings command gets either the application, file, or master key settings depending on the tag.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.42 Get Key Version (0x0414)

The Get Key Version command takes the key number and returns its version number.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.43 Change Key (0x0415)

The Change Key command changes the security key.

- The tag must be selected with a session.
- The format and value range of the file identifiers and details vary by tag. Consult the reference guide for your SkyeModule reader for details.

Mandatory Request Fields: Tag Type, Session, Data, Data Length

Optional Request Fields: TID, TID Length, CRC

Unused Fields: AFI, Address, Number of Blocks

Valid Flags: CRC_F, RF_F, TID_F, Session_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F

5.2.44 Enable EAS (0x0501)

The Enable EAS command enables the EAS bit on the tag specified.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader enables or activates the EAS functionality on tag matching the tag ID specified in the TID field.
- **RF_F** *only or with* **TID_F:** The reader enables or activates the EAS functionality on a tag in selected state.

Mandatory Request Fields: Tag Type, TID Length plus TID (TID and TID Length not required if RF_F flag is set for Selected State)

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RID_F, RF_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Session_F, Encryption_F, HMAC_F, Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.45 Disable EAS (0x0502)

The Disable EAS command disables the EAS bit on the tag specified.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader disables or inactivates the EAS functionality on tag matching the tag ID specified in the TID field.
- **RF_F** *only or with* **TID flag:** The reader disables or inactivates the EAS functionality on a tag in selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State)

Optional Request Fields: RID, CRC

Unused Fields: AFI, Session, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, RID_F, RF_F, TID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Session_F, Encryption_F, HMAC_F, Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.46 Scan EAS (0x0503)

The Scan EAS command scans for activated EAS codes in the field and returns a Scan EAS Pass command code if the electronic article surveillance (EAS) bit is set.

The following flags affect the functionality of the command:

- **Loop_F** *only:* The reader continuously scans for tags with the EAS bit set and reports a Scan EAS Pass code each time it finds a valid tag with EAS in the field.

Mandatory Request Fields: Tag Type

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, TID Length, TID, AFI, Session, Address, Number of Blocks, Data Length, and Data

Valid Flags: CRC_F, Loop_F, RID_F, RF_F

Invalid Flags: Inventory_F, Lock_F, AFI_F, TID_F, Session_F, Encryption_F, HMAC_F, Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.47 Write AFI (0x0504)

The Write AFI command writes the AFI value specified to the tag's AFI field in memory. The data length and data fields are always present and are always one byte.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader writes the AFI value to the tag with the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only or with* **TID_F:** The reader writes the AFI value to the tag currently in selected state.

- **Lock_F** *only:* The reader locks the AFI field. The number of blocks field is always one. The data field contains parameters specific to some lock commands (for example block locking functionality).

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Address, Number of Blocks

Valid Flags: RF_F, CRC_F, TID_F, RID_F, Lock_F, Data_F

Invalid Flags: Loop_F, Inventory_F, AFI_F, Encryption_F, HMAC_F, Session_F

Response Formats:

Standard response where the response code is either pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.48 Read AFI (0x0505)

The Read AFI command reads the AFI value of a tag's AFI field in memory and reports it back to the host.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader reads the AFI value of the tag with the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only:* The reader reads the AFI value of the tag currently in selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State)

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Address, Number of Blocks, Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Session_F, Data_F

Response Formats:

Standard response where the Data Length is 1 byte and the Data field contains the AFI value (O = optional):

Message Length	Response Code	Data Length	Data	CRC (O)

Standard response when there is a fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.49 Write DSFID (0x0506)

The Write DSFID command writes the Data Storage Format Identifier (DSFID) value specified to the tag's DSFID field in memory. The data length and data fields are always present and are always one byte.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader writes the DSFID value to the tag with the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only:* The reader writes the DSFID value to the tag currently in selected state.
- **Lock_F:** The reader locks the DSFID field. The number of blocks field is always one. The data field contains parameters specific to some lock commands (for example block locking functionality).

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Address, Number of Blocks

Valid Flags: RF_F, CRC_F, TID_F, RID_F, Lock_F, Data_F

Invalid Flags: Loop_F, Inventory_F, AFI_F, Encryption_F, HMAC_F, Session_F

Response Formats:

Standard response where the response code is either pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.50 Read DSIFD (0x0507)

The Read DSFID command reads the Data Storage Format Identifier (DSFID) value of a tag's DSFID field in memory and reports it back to the host.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader reads the DSFID value of the tag with the tag ID specified. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only:* The reader reads the DSFID value of the tag currently in selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State)

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Address, Number of Blocks; Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response where the Data Length is 1 byte and the Data field contains the DSFID value (O = optional):

Message Length	Response Code	Data Length	Data	CRC (O)

Standard response when there is a fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.51 Credit Value (0x0508)

The Credit Value command reads a value from a tag's memory, increments it by one, and rewrites it back to the tag memory. This command is valid only for tags that support a credit command.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader credits the value stored on the tag if the passed in TID matches the tag in the field. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only:* The reader credits the value of the tag currently in selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Address

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Number of Blocks, Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response where the Data Length is 1 byte and the Data field contains the new value post credit (O = optional):

Message Length	Response Code	Data Length	Data	CRC (O)

Standard response when there is a fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.52 Debit Value (0x0509)

The Debit Value command reads a value from a tag's memory, decrements it by one, and rewrites it back to the tag memory. This command is only valid for tags that support a credit command.

The following flags affect the functionality of the command:

- **TID_F** *only:* The reader debits the value stored on the tag if the passed in TID matches the tag in the field. If the tag is not in the field, the reader returns a fail message.
- **RF_F** *only:* The reader debits the value of the tag currently in selected state.

Mandatory Request Fields: Tag Type, TID Length, TID (TID and TID Length not required if RF_F flag is set for Selected State), Address

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Number of Blocks; Data Length, and Data

Valid Flags: RF_F, CRC_F, TID_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response where the Data Length is 1 byte and the Data field contains the new value post debit (O = optional):

Message Length	Response Code	Data Length	Data	CRC (O)

Standard response when there is a fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.53 Store Key (0x0601)

The Store Key command stores an authentication or encryption key in a target EEPROM. The tag type specifies the type of key to be stored and implies one of three non volatile memory key storage locations: transceiver EEPROM, reader EEPROM, or SAM. A reader stores the key specified at the address on EEPROM or the SAM specified depending on the tag type specified. The tag type can also be a SkyeTek AFE which specifies a key to be used with the SkyeTek Crypto Libraries.

Mandatory Request Fields: Tag Type, Address, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: AFI, Number of Blocks, Session, TID Length, TID

Valid Flags: CRC_F, RID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, and Session_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.54 Load Key (0x0602)

The Load Key command loads an authentication or encryption key from transceiver EEPROM, reader EEPROM, or SAM and uses it for tag security or SkyeTek Crypto Library functions. In general, the same key is used unless a new key is specified by loading a new key through the Load Key command.

Mandatory Request Fields: Tag Type, Address

Optional Request Fields: RID, CRC

Unused Fields: Session, AFI, Number of Blocks, TID Length, TID, Data Length, and Data

Valid Flags: CRC_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.55 Load Defaults (0x1101)

The Load Defaults command resets the reader's default settings to factory defaults for all system parameters. This command can break communications if a user-set default value is not the same as the factory default value.

Mandatory Request Fields: none

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Address, Session, AFI, Number of Blocks, TID Length, TID, Data Length, and Data

Valid Flags: CRC_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F, Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.56 Reset Device (0x1102)

The Reset Device command issues a software reset. This forces the reader to load its system parameter settings from EEPROM, re-initialize peripherals, and start executing code as though a hard reset was performed.

Mandatory Request Fields: none

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Address, Session, AFI, Number of Blocks, TID Length, TID, Data Length, and Data

Valid Flags: CRC_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.57 Bootload (0x1103)

The Bootload command puts the reader into bootloader mode to prepare it for firmware updates.

Mandatory Request Fields: none

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Address, Session, AFI, Number of Blocks, TID Length, TID, Data Length, and Data

Valid Flags: CRC_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.58 Read System Parameter (0x1201)

The Read System Parameter command reads the current value of the system parameter specified by address. The number of blocks field indicates the number of bytes expected in the system parameter value. In most cases, this value is 0x01.

Mandatory Request Fields: Address, Number of Blocks

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Session, AFI, TID Length, TID, Data Length, and Data **Valid Flags:** CRC_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F, and Data_F

Response Formats:

Standard response where the Data Length is the number of bytes in the response and the Data field contains the system parameter value (O = optional):

Message Length	Response Code	Data Length	Data	CRC (O)

Standard response when there is a fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.59 Write System Parameter (0x1202)

The Write System Parameter command writes a system parameter value to the reader. The changed setting takes place immediately. For example, writing to the Baud Rate system parameter immediately changes the baud rate and force further communications with the reader to be done using the new baud rate. The Write System Parameter command setting writes the new system parameter value specified by the data field to the system parameter specified by address. The number of blocks field indicates the number of bytes expected in the system parameter value. In most cases, this value is 0x01.

Mandatory Request Fields: Address, Number of Blocks, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Session, AFI, TID Length, TID

Valid Flags: CRC_F, RID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.60 Store Default System Parameter (0x1301)

The Store Default System Parameter command writes a system parameter value to the reader's EEPROM as the new default. The new default setting is loaded next time the reader is reset or power cycled. The Store Default System Parameter setting stores the new system parameter value specified by the data field to the system parameter value specified by address. The number of blocks field indicates the number of bytes expected in the system parameter value. In most cases, this value is 0x01.

Mandatory Request Fields: Address, Number of Blocks, Data Length, and Data

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Session, AFI, TID Length, TID

Valid Flags: CRC_F, RID_F, Data_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F

Response Formats:

Standard response when there is a pass or fail (O = optional):

Message Length	Response Code	CRC (O)

5.2.61 Retrieve Default System Parameter (0x1302)

The Retrieve Default System Parameter command reads the current value of the default system parameter specified by the address. This value can differ from the current setting as it is the default setting that is stored in EEPROM. The number of blocks field indicates the number of bytes expected in the system parameter value. In most cases, this value is 0x01.

Mandatory Request Fields: Address, Number of Blocks

Optional Request Fields: RID, CRC

Unused Fields: Tag Type, Session, AFI, TID Length, TID, Data Length, and Data

Valid Flags: CRC_F, RID_F

Invalid Flags: Loop_F, Inventory_F, Lock_F, TID_F, RF_F, AFI_F, Encryption_F, HMAC_F, Session_F, Data_F

Response Formats:

Standard response where the Data Length is the number of bytes in the response and the Data field contains the default system parameter value:

Message Length	Response Code	Data Length	Data	CRC (O)

Standard response when there is a fail (O = optional):

Message Length	Response Code	CRC (O)

6 SPTv3 Response Formats

6.1 General Formats

STPv3 uses the following general formats for responses:

Table 6-1 Response Format: ASCII Mode (bytes)

Message Length	Response Code	RID	Tag Type	Data Length	Response Data	CRC
n/a	4	8	4	4	2K Max.	4

Table 6-2 Response Format: Binary Mode (bytes)

Message Length	Response Code	RID	Tag Type	Data Length	Response Data	CRC
2	2	4	2	2	1K Max.	2

Required fields (must be present at all times)
Optional fields (depending on the command and flags)
Required fields (depending on the command)

NOTE – The message length byte is a two-byte field used in binary mode to indicate the length of the request message. This field is mandatory for binary mode *only* and is not supported in ASCII mode.

6.2 Response Codes

Response codes indicate the result of the operation performed by the reader, based on the host request. Table 6-3 lists the STPv3 response codes.

- The response code is a two-byte field and is mandatory for all the response messages sent from the reader module to the host.
- The response code for a Pass (successful execution of a command) is the same as the command code.
- The response code for a Fail (error) consist of the command code with the MSB set. For example, the response code for Select Tag Pass is 0x0101, while the response for code for Select Tag Fail is 0x8101.
- Error codes that generate more than a simple command pass/fail response are described in greater detail.

Table 6-3 Response Codes

Response Code	Response Name	Description
0x01 01	Select Tag Pass	
0x01 02	Read Tag Data Pass	
0x01 03	Write Tag Data Pass	
0x01 04	Activate Tag Type Pass	
0x01 05	De-activate Tag Type Pass	
0x01 06	Set Tag to Reader Data Rate Pass	
0x01 07	Get Tag Info Pass	
0x01 08	Get Lock Status Pass	
0x01 09	Kill Tag Pass	
0x01 0A	Revive Tag Pass	
0x01 0B	Erase Tag Pass	
0x01 0C	Format Tag Pass	
0x01 0D	Set Reader to Tag Data Rate Pass	
0x01 0E	Read Tag Configuration Pass	
0x01 0F	Write Tag Configuration Pass	
0x01 C1	Enter Select Tag Loop	
0x02 01	Authenticate Tag Pass	

Response Code	Response Name	Description
0x02 02	Send Tag Password Pass	
0x02 03	Initialize Secure Memory Pass	
0x02 04	Setup Secure Memory Pass	
0x03 01	Get Application IDs Pass	
0x03 02	Select Application Pass	
0x03 03	Create Application Pass	
0x04 01	Get File IDs Pass	
0x04 03	Create File Pass	
0x04 04	Get File Settings Pass	
0x04 05	Change File Settings Pass	
0x04 06	Read File Pass	
0x04 07	Write File Pass	
0x04 08	Delete File Pass	
0x04 09	Clear File Pass	
0x04 0C	Limited Credit Value File Pass	
0x04 0D	Get Value Pass	
0x04 0E	Commit Transaction Pass	
0x04 0F	Abort Transaction Pass	
0x04 10	Read Records Pass	
0x04 11	Write Record Pass	
0x04 12	Change Key Settings Pass	
0x04 13	Get Key Settings Pass	
0x04 14	Get Key Version Pass	
0x04 15	Change Key Pass	
0x05 01	Enable EAS Pass	
0x05 02	Disable EAS Pass	
0x05 03	Scan EAS Pass	

Response Code	Response Name	Description
0x05 04	Write AFI Pass	
0x05 05	Read AFI Pass	
0x05 06	Write DSFID Pass	
0x05 07	Read DSFID Pass	
0x06 01	Store Key Pass	
0x06 02	Load Key Pass	
0x11 01	Load Defaults Pass	
0x11 03	Entering Bootloader Mode	
0x12 01	Read System Parameter Pass	
0x12 02	Write System Parameter Pass	
0x13 01	Store Default System Parameter Pass	
0x13 02	Retrieve Default System Parameter Pass	
0x14 02	Enable Debug Pass	
0x14 03	Disable Debug Pass	
0x80 01	Invalid Tag Type	Invalid tag type for the command specified
0x80 02	No Tag In Field	
0x80 03	Collision Detected	Multiple tags in the field have the same tag ID
0x80 04	Tag Data Integrity Check Failed	Response from the tag failed the CRC check
0x80 05	Tag Block(s) Locked	Locked block prevented write operation
0x80 06	(Tag) Not Authenticated	Tag operation failed because tag not authenticated
0x80 07	Specified Tag Not in Field	Specified tag not found in the field
0x80 0B	Tag to Reader Data Rate Not Supported	Bit rate not supported by reader, tag, or both
0x80 0C	Reader to Tag Data Rate Not Supported	Bit rate not supported by reader, tag, or both

Response Code	Response Name	Description
0x80 0D	Decrypt Tag Data Fail	Data read from the tag corrupted or improperly decrypted
0x80 0E	Invalid Signature (HMAC)	HMAC written to tag did not match the data and the key
0x80 0F	Invalid Key For Authentication	Key number does not exist or is not valid for authentication with a specific reader or tag
0x80 10	No Application Present	Application specified could not be found
0x80 11	File Not Found	Specified file was not found on the application
0x80 12	No File Selected	Command requires a file but none was selected
0x80 13	Invalid Key Number	Key number does not exist or is out of the range of valid keys
0x80 14	Invalid Key Length	Key length not valid for the tag type, command, or reader
0x81 01	Select Tag Fail	
0x81 02	Read Tag Data Fail	
0x81 03	Write Tag Data Fail	
0x81 04	Activate Tag Type Fail	
0x81 05	De-activate Tag Type Fail	
0x81 06	Set Tag to Reader Data Rate Fail	
0x81 07	Get Tag Info Fail	
0x81 08	Get Lock Status Fail	
0x81 09	Kill Tag Fail	
0x81 0A	Revive Tag Fail	
0x81 0B	Erase Tag Fail	
0x81 0C	Format Tag Fail	
0x81 0D	Set Reader to Tag Data Rate Fail	
0x81 0E	Read Tag Configuration Fail	
0x81 0F	Inventory Complete	
0x81 0F	Write Tag Configuration Fail	

Response Code	Response Name	Description
0x81 C1	Exit Select Tag Loop	
0x82 01	Authenticate Tag Fail	
0x82 02	Send Tag Password Fail	
0x82 03	Initialize Secure Memory Fail	
0x82 04	Setup Secure Memory Pass Fail	
0x83 01	Get Application IDs Fail	
0x83 02	Select Application Fail	
0x83 03	Create Application Fail	
0x84 01	Get File IDs Fail	
0x84 03	Create File Fail	
0x84 04	Get File Settings Fail	
0x84 05	Change File Settings Fail	
0x84 06	Read File Fail	
0x84 07	Write File Fail	
0x84 08	Delete File Fail	
0x84 09	Clear File Fail	
0x84 0C	Limited Credit Value File Fail	
0x84 0D	Get Value Fail	
0x84 0E	Commit Transaction Fail	
0x84 0F	Abort Transaction Fail	
0x84 10	Read Records Fail	
0x84 11	Write Record Fail	
0x84 12	Change Key Settings Fail	
0x84 13	Get Key Settings Fail	
0x84 14	Get Key Version Fail	
0x84 15	Change Key Fail	
0x85 01	Enable EAS Fail	

Response Code	Response Name	Description
0x85 02	Disable EAS Fail	
0x85 03	Scan EAS Fail	
0x85 04	Write AFI Fail	
0x85 05	Read AFI Fail	
0x85 06	Write DSFID Fail	
0x85 07	Read DSFID Fail	
0x86 01	Store Key Fail	
0x86 02	Load Key Fail	
0x90 01	Unknown Error	An error occurred but it could not be identified
0x90 02	Invalid Command	Command does not exist or is invalid for the reader
0x90 03	Invalid CRC	Invalid CRC sent in the request to the reader
0x90 04	Invalid Message Length	Number of bytes sent to the reader not valid for the command or for the message length passed in
0x90 05	Invalid Address	Invalid address specified for the command valid
0x90 06	Invalid Flags	Flags specified invalid for the command specified
0x90 07	Invalid ASCII Byte	Non-ASCII byte value sent in an ASCII mode command
0x90 08	Invalid Number of Blocks	Number of blocks field in the request invalid for the command specified
0x90 09	Invalid Data Length	Length of data specified in the request invalid for the command specified
0x90 0F	No Antenna Detected	No antenna was attached to the reader
0x9010	Invalid Encoding	The ASN.1 encoding used for the command is invalid. (Applies to any command that can use ASN.1 encoding in the data field.)
0x9011	Invalid Argument	An argument in the command is missing or in the wrong format. Check the command format to ensure the argument is correctly coded.

Response Code	Response Name	Description
0x9012	Invalid Session	The session number specified for the command is invalid or applies to a session that is no longer valid. (Applies to any command that can use sessions.)
0x90 13	Command Not Implemented	Command not yet implemented for this version of the protocol.
0x91 01	Load Defaults Fail	
0x91 02	Cannot Reset Device	
0x91 03	Failed to Enter Bootloader Mode	
0x92 01	Read System Parameter Fail	
0x92 02	Write System Parameter Fail	
0x93 01	Store Default System Parameter Fail	
0x93 02	Retrieve Default System Parameter Fail	
0x94 02	Enable Debug Fail	
0x94 03	Disable Debug Fail	

7 Tag Types and Codes

Table 7-1 lists the tags types recognized by STPv3 and the corresponding Tag Type code for each tag type.

NOTE – Each SkyeModule reader supports a subset of the tags listed below. Consult the *Tag Support List* (provided with your SkyeModule reader documentation) for the specific tags supported by your reader.

Table 7-1 Tag Types Recognized by STPv3

Air Interface	Manufacturer	Tag Type	Code
Any	Any	Auto Detect (any tag)	0x00 00
ISO15693	Any	Auto Detect (any ISO15693 tag)	0x01 00
ISO15693	Texas Instruments	Auto Detect (any TI 15693 tag)	0x01 10
ISO15693	Texas Instruments	Tag-it HF-I Plus	0x01 11
ISO15693	Texas Instruments	Tag-it HFI Pro	0x01 12
ISO15693	Texas Instruments	Tag-it HFI Standard	0x01 13
ISO15693	NXP	Auto Detect (any NXP 15693 tag)	0x01 20
ISO15693	NXP	ICODE SLI (1k bits)	0x01 21
ISO15693	NXP	ICODE SLI-S (2K bits)	0x01 22
ISO15693	NXP	ICODE SLI-L (2K bits)	0x01 23
ISO15693	NXP	ICODE SLIX (1K bits)	0x01 2A
ISO15693	NXP	ICODE SLIX-S (2K bits)	0x01 2B
ISO15693	NXP	ICODE SLIX-L (512 bits)	0x01 2C
ISO15693	ST Microelectronics	Auto Detect (any ST 15693 tag)	0x01 30
ISO15693	ST Microelectronics	LRI 64	0x01 31
ISO15693	ST Microelectronics	LRI 512	0x01 32
ISO15693	ST Microelectronics	LRI 2k	0x01 33
ISO15693	ST Microelectronics	LRIS 2k	0x01 34
ISO15693	EM Microelectronic	Auto Detect (any EM 15693 tag)	0x01 40
ISO15693	EM Microelectronic	EM4006	0x01 41

Air Interface	Manufacturer	Tag Type	Code
ISO15693	EM Microelectronic	EM4034	0x01 42
ISO15693	EM Microelectronic	EM4035 (Crypto)	0x01 43
ISO15693	EM Microelectronic	EM4135	0x01 44
ISO15693	Infineon AG	Auto Detect (any Infineon 15693 tag)	0x01 50
ISO15693	Infineon AG	My-D 2K	0x01 51
ISO15693	Infineon AG	My-D 2KS	0x01 52
ISO15693	Infineon AG	My-D 10K	0x01 53
ISO15693	Infineon AG	My-D 10KS	0x01 54
ISO15693	Infineon AG	My-D Light	0x01 55
ISO15693	Fujitsu	Auto Detect (any Fujitsu ISO15693 tag)	0x01 60
ISO15693	Fujitsu	MB89R118	0x01 61
ISO15693	TagSys	Auto Detect (any TagSys ISO15693 tag)	0x01 70
ISO15693	TagSys	C370	0x01 71
ISO14443A	Any	Auto Detect (any ISO14443A tag)	0x02 00
ISO14443A	NXP	Auto Detect (any NXP 14443A tag)	0x02 10
ISO14443A	NXP	Mifare Ultralight	0x02 11
ISO14443A	NXP	Mifare Classic 1k	0x02 12
ISO14443A	NXP	Mifare Classic 4k	0x02 13
ISO14443A	NXP	Mifare DESfire	0x02 14
ISO14443A	NXP	Mifare Pro X	0x02 15
ISO14443A	Innovision	Auto Detect (any Innovision 14443A tag)	0x02 20
ISO14443A	Innovision	Jewel	0x02 21
ISO14443A	Infineon AG	Auto Detect (any Infineon 14443A tag)	0x02 40
ISO14443A	Infineon AG	SLE66R35	0x02 41
ISO14443A	Infineon AG	SLE55R01	0x02 42
ISO14443A	Infineon AG	SLE55R02	0x02 43
ISO14443A	Infineon AG	SLE55R04	0x02 44
ISO14443A	Infineon AG	SLE55R08	0x02 45

Air Interface	Manufacturer	Tag Type	Code
ISO14443A	Infineon AG	SLE55R16	0x02 46
ISO14443A	Verayo	Auto Detect (any Verayo 14443A tag)	0x02 50
ISO14443A	Verayo	M4H	0x02 51
ISO14443A	Verayo	M1HW	0x02 52
ISO14443A	Kovio	Auto Detect (any Kovio 14443A tag)	0x02 60
ISO14443A	Kovio	Kovio 2K	0x02 61
ISO14443A	Kovio	Kovio Barcode	0x02 62
ISO14443B	Any	Auto Detect (any ISO14443B tag)	0x03 00
ISO14443B	Atmel	Auto Detect (any Atmel 14443B tag)	0x03 10
ISO14443B	Atmel	CryptoRF (1k bits)	0x03 11
ISO14443B	Atmel	CryptoRF (2k bits)	0x03 12
ISO14443B	Atmel	CryptoRF (4k bits)	0x03 13
ISO14443B	Atmel	CryptoRF (8k bits)	0x03 14
ISO14443B	Atmel	CryptoRF (16k bits)	0x03 15
ISO14443B	Atmel	CryptoRF (32k bits)	0x03 16
ISO14443B	Atmel	CryptoRF (64k bits)	0x03 17
ISO14443B	Atmel	AT88RF001 (256 bits)	0x03 18
ISO14443B	Atmel	AT88RF020	0x03 19
ISO14443B	Samsung	Auto Detect (any Samsung 14443B tag)	0x03 30
ISO14443B	Samsung	S3C89K8 (8k bits)	0x03 31
ISO14443B	Samsung	S3C89V5 (16k bits)	0x03 32
ISO14443B	Samsung	S3C89V8 (8192)	0x03 33
ISO14443B	Samsung	S3CC9G4 (4096)	0x03 34
ISO14443B	Samsung	S3CC9GC (72kB)	0x03 35
ISO14443B	Samsung	S3CC9GW (144 kB)	0x03 36
ISO14443B	Samsung	S3CC9W4 (4 kB)	0x03 37
ISO14443B	Samsung	S3CC9W9 (32 kB)	0x03 38
ISO14443B	ST Micro	Auto Detect (any ST Micro 14443B tag)	0x03 50

Air Interface	Manufacturer	Tag Type	Code
ISO14443B	ST Micro	SRIX4K	0x03 51
ISO14443B	ST Micro	SRI176	0x03 52
ISO14443B	ST Micro	SRI512	0x03 53
ISO18092 (0x07)	Any (NFC IP-1)	Auto Detect (any ISO18092 tag)	0x07 00
ISO21481 (0x08)	Any (NFC IP-1)	Auto Detect (any ISO21481 tag)	0x08 00
HF Proprietary	Any	Auto Detect (any HF Proprietary tag)	0x09 00
HF Proprietary	Texas Instruments	Tag-it HF	0x09 01
HF Proprietary	NXP	Icode1	0x09 02
HF Proprietary	NXP	HF SL1 SL2 ICS10	0x09 03
HF Proprietary	NXP	LTO - NXP	0x09 04
HF Proprietary	Atmel	LTO - Atmel	0x09 05
HF Proprietary	Sony	FeliCA	0x09 06
HF Proprietary	Inside Contactless	PicoTag 2k	0x09 07
HF Proprietary	Inside Contactless	PicoTag 16k	0x09 08
HF Proprietary	Inside Contactless	PicoTag 2kS	0x09 09
HF Proprietary	Inside Contactless	PicoTag 16kS	0x09 10
HF Proprietary	HID / Inside	HID I-Class	0x09 11
HF Proprietary	TagSys	GemWave C210	0x09 12
HF Proprietary	TagSys	GemWave C220	0x09 13
HF Proprietary	TagSys	GemWave C240	0x09 14
HF Proprietary	ST Microelectronics	SR176	0x09 15
HF Proprietary	NXP	I Code UID ICS11	0x09 17
HF Proprietary	NXP	I Code UID ICS12	0x09 17
EPC Class 1 Gen 1 (C1G1)	Any	Auto Detect (any EPC C1G1 tag)	0x81 00
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Any	Auto Detect (any ISO18000-6C tag)	0x82 00

Air Interface	Manufacturer	Tag Type	Code
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Impinj	Auto Detect (any Impinj ISO18000-6C tag)	0x82 10
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Impinj	Monza	0x82 11
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	NXP	Auto Detect (any NXP ISO18000-6C tag)	0x82 20
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	NXP	G2XL	0x82 23
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	NXP	G2XM	0x82 24
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Alien	Auto Detect (any Alien ISO18000-6C tag)	0x82 50
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Alien	Higgs	0x82 51
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Alien	Higgs 3	0x82 52
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Hitachi	Hibiki I	0x82 71
ISO18000-6C (EPC Class 1 Gen 2)(C1G2)	Hitachi	Hibiki II	0x82 72
ISO18000-6B	Any	Auto Detect (any ISO18000-6B tag)	0x83 00
ISO18000-6B	NXP	NXP 18000-6B Auto Detect	0x83 10
ISO18000-6B	NXP	UCode 1.19 (256 bits)	0x83 11

Air Interface	Manufacturer	Tag Type	Code
ISO18000-6B	Fujitsu	MB97R8010	0x83 21
ISO18000-6B	Fujitsu	MB97R8020	0x83 22
EM IPX	EM Microelectronic	Auto Detect (any EM tag)	0x85 00
EM4X22 Auto	EM Microelectronic	Auto Detect (any EM4x22 tag)	0x85 10
EM4122	EM Microelectronic	EM4122	0x85 12
EM4X44 Auto	EM Microelectronic	Auto Detect (any EM4x44 tag)	0x85 20
EM4444	EM Microelectronic	EM4444	0x85 25