SkyeReader 300

User Guide v1.0

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Chapter 1: Overview

The SkyeTek SkyeReader 300 is a versatile UHF desktop reader. With the SkyeReader 300 and SkyeWare software, you will be able to easily read and encode EPC C1G2 tags from your desk in very little time.

Insert picture of skyereader

Note Regarding RF Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Notice and Cautions

The users' manual or instruction manual shall caution the user that changes or modifications not expressly approved by SkyeTek, Inc. could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not in-stalled and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

About This Guide

This guide contains all of the information you need to get started with your SkyeTek SkyeReader 300.

Chapter 1: Overview – Introduces the contents of this guide, describes SkyeTek's Advanced Universal Reader Architecture, and lists the benefits of working with SkyeTek readers.

Chapter 2: Setup and Installation – Lists the contents of the SkyeReader 300 kit and guides you through initial setup and configuration of your system. Provides instructions for installing the SkyeReader Demo Application that you will use to evaluate the SkyeReader 300.

Chapter 3: SkyeWare Capabilities – Walks through each of the features of the SkyeWare application, including read range, anti-collision, tag memory, and SkyeTek Protocol.

Chapter 4: SkyeWare Configuration – Shows the user how to update firmware and configure different types of tags.

Chapter 2: Setup and Installation

Prerequisites

- Host Computer running Microsoft Windows XP or Vista
- Available USB port

Contents

Your SkyeReader 300 kits contains the following items

- The SkyeReader 300
- USB cable
- CD with SkyeWare, documentation and software libraries
- Tag Samples

Setting Up Your SkyeReader 300

To setup your SkyeReader 300, first you will need to install SkyeWare. Insert the CD that came with your kit, and an installation wizard should run automatically. (If it does not, open the main directory of the CD and run setup.exe.)

1. After the installation completes, run SkyeWare. This will display the home screen.

2. Attach your SkyeReader 300 to your computer with the supplied USB Cable.

Insert picture

3. After a few moments your computer and SkyeWare will recognize the SkyeReader and you are ready to go.

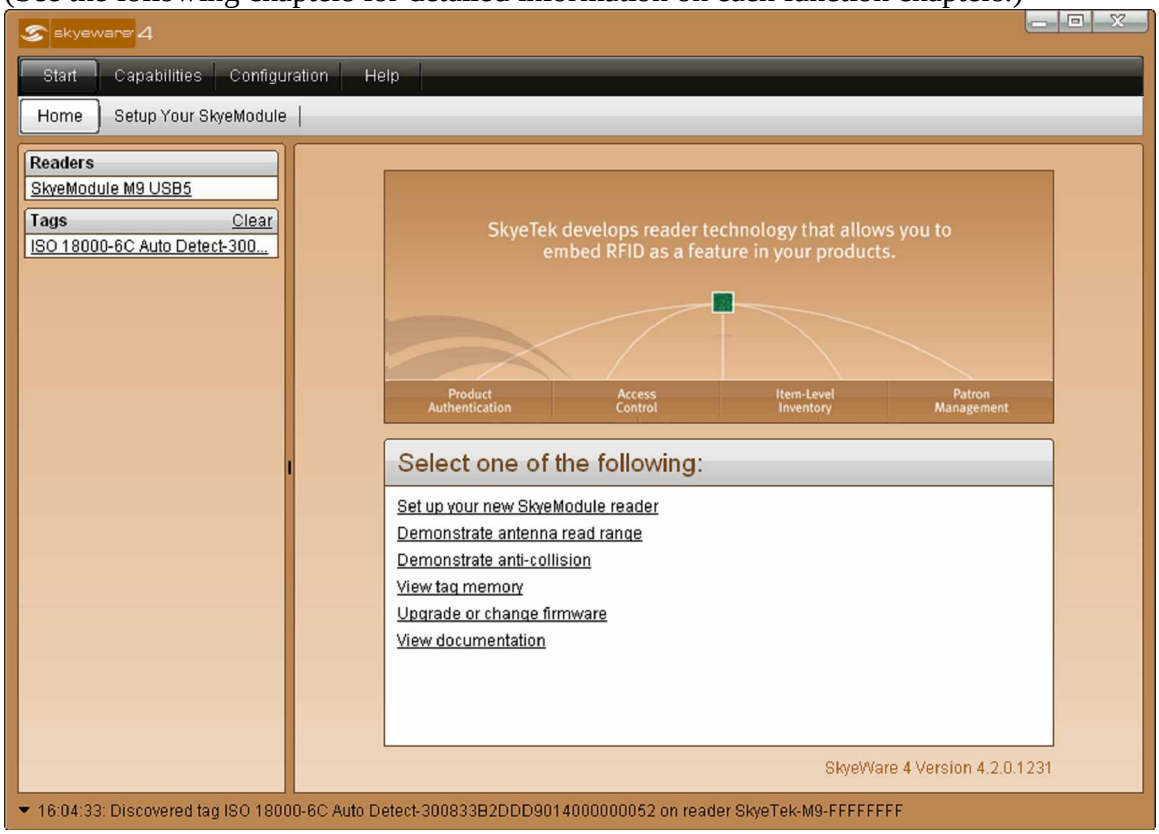
Note that any tags in the field will also be displayed.
Note also that under Readers, the display will read SkyeReader 300 USB.

4. To read a tag, place an EPC Class 1 Generation 2 tag directly on the SkyeReader. The antenna in the SkyeReader 300 is linearly polarized, which means that tag orientation will have a significant impact on performance. Align the tag as shown in the picture people.

Tag Placement

Exploring SkyeWare 4

After you install and configure your SkyeReader 300, you can use the various tab functions of SkyeWare 4 to explore the reader's capabilities.
The home screen displays function tabs that let you set up, demonstrate, configure, and test your SkyeReader 300. Use these tabs to access different functions with your reader. (See the following chapters for detailed information on each function chapters.)



SkyeWare Screen After Reader Setup

Capabilities Tab

This tab contains sub-tabs that let you perform high-level demonstrations of the basic functionality of your SkyeReader. This includes:

- Read Range—lets you test the distance at which the reader first detects a tag.
- Anti-collision—shows how the reader can distinguish multiple tags at once.
- Memory—performs basic tag memory functions (read, write, load, save).
- Protocol—lets you develop and test SkyeTek Protocol v3 commands. You can construct commands in either ASCII or Binary format, based on the tag type and selected flags. This lets you quickly and easily send commands and view responses from your reader.

See Chapter 3 "SkyeWare Capabilities" for more information.

Configuration Tab

Sub-tabs for this tab let you quickly update firmware and configure tag settings:

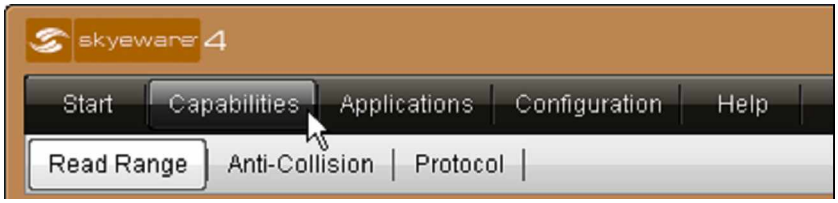
- Firmware—allows you to reload or upgrade SkyeReader 300 firmware.
- Tag—lets you configure tag formation.

See Chapter 4, “SkyeWare Configuration” for more information.

Chapter 3: SkyeWare Capabilities

Overview

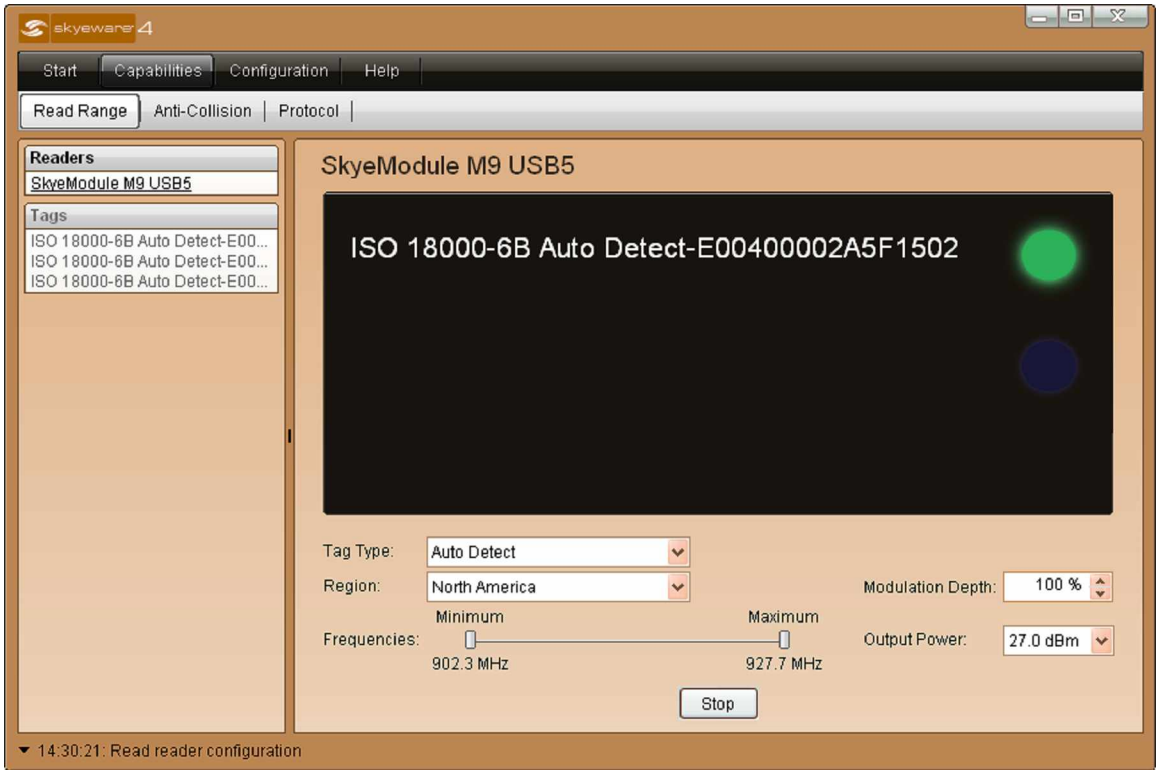
The SkyeWare 4 Capabilities tab gives you high-level evaluation tools that demonstrate basic features of your SkyeReader. SkyeWare 4 recognizes the reader and firmware and adjusts the demonstration functions accordingly. This chapter discusses each demonstration function.



SkyeWare 4 Capabilities Tab

Read Range

The Read Range demonstration lets you check the range at which the antenna can detect individual tags of different types. To access this screen, click on the Capabilities tab, then the Read Range sub-tab.



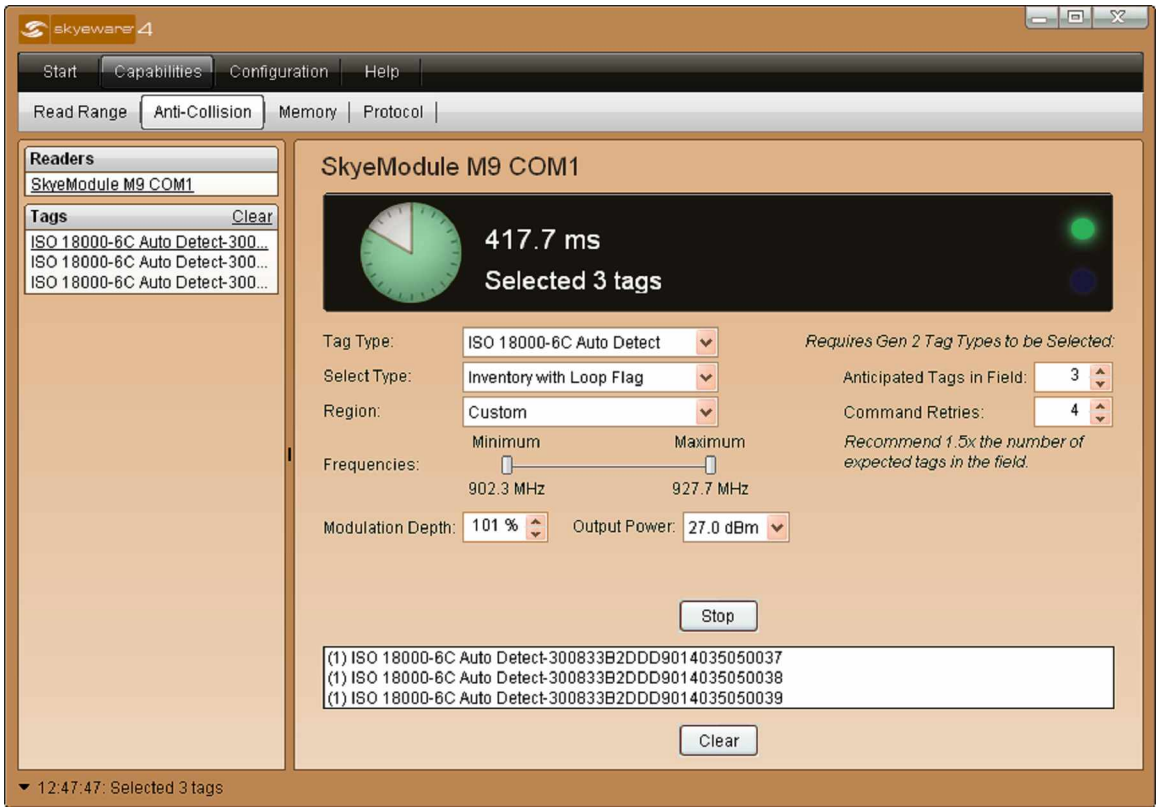
How to Use:

1. (Optional) Select a specific tag type from the pull-down menu. (The default value is Auto Detect, which detects all tags.)
2. Adjust the radio settings to improve the read range:
    a. Select a compliance region from the Region pull-down menu.
    b. Click and drag the Minimum or Maximum sliders in the Frequency field to adjust the detection range.
    c. Use the up or down arrows in the Modulation Depth field to adjust the percentage for the modulation depth in increments of 10—or—type a number between 0 and 100 directly into the field.
    d. Select a power level region from the Output Power pull-down menu. (Possible values range from 9-24 dBm in 3 dBm increments.)
3. Place a single tag in the read field.
4. Click on the Start button.
5. Move the tag around in the field. As the reader detects the tags, it displays the tag information and flashes the green light. A tag error flashes the red light.
6. Click on the Stop button to stop the test.

Anti-Collision

The Anti-Collision demonstration lets you test the reader's ability to detect multiple tags, also known as inventory mode. This capability indicates how quickly the reader can read multiple tags held in the read field at the same time while performing the appropriate anti-collision functions. You can also set the reader to continuously detect tags as you move them in and out of the detection field.

To access this screen, click on the Capabilities tab, then the Anti-Collision sub-tab.



Anti-Collision Demonstration Function

How to Use:

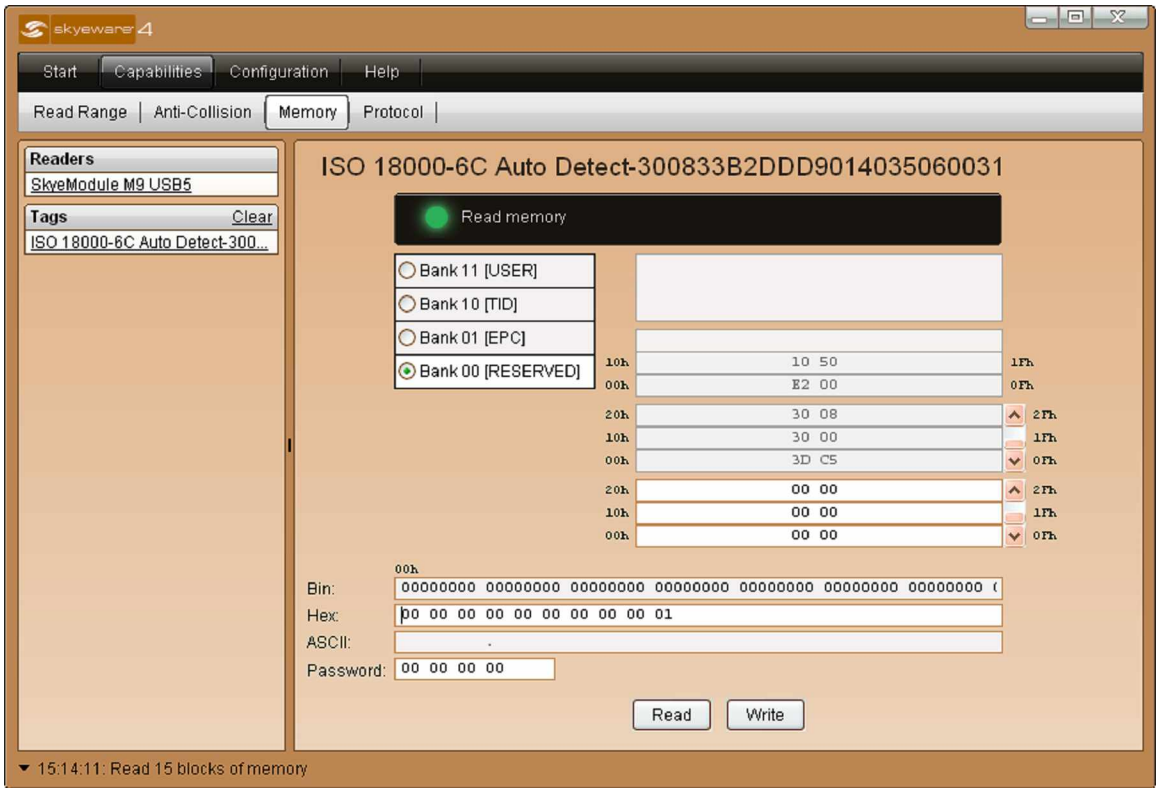
1. (Optional) To limit this function to specific tags, select a tag type from the pull-down menu. (The default value is Auto Detect, which detects all tags.)
2. In the Select Type field, use the pull-down menu to select either Inventory or Inventory with Loop Flag.
   - Inventory instructs the reader to scan once for all tags in the field.
   - Inventory with Loop Flag places the reader in loop mode, which scans continuously for any new tags entering the detection field. The reader continues reading tags in this fashion until you exit the demonstration or click Stop.
3. Adjust the radio settings to improve the read range:
   a. Select a compliance region from the Region pull-down menu.

b. Click and drag the Minimum or Maximum sliders in the Frequency field to adjust the detection range.
c. Use the up or down arrows in the Modulation Depth field to adjust the percentage for the modulation depth in increments of 10—or—type a number between 0 and 100 directly into the field.
d. Select a power level region from the Output Power pull-down menu. (Possible values range from 9-24 dBm in 3 dBm increments.)

4. (Optional for C1Gen2 tags) Adjust the inventory settings to improve the read range:
    a. Use the up or down arrows in the Anticipated Tags in Field field to match the number of tags you want to detect. This automatically adjusts the Command Retries field to a corresponding number.)
    b. Use the up or down arrows in the Command Retries field to match the number set the number of times the reader will repeat the command before timing out. (This automatically adjusts the Anticipated Tags in Field field to a corresponding number.)
5. Hold multiple tags in the read field.
6. Click the Start button once. SkyeWare 4 displays the detected tags in the data display area. When complete, SkyeWare 4 also displays a green light and the length of time required for the inventory and anti-collision process. A tag error flashes the red light.
7. (Optional) If you selected Inventory with Loop Flag:
    a. Move additional tags into the detection field and observe the reader's ability to detect them. (The reader rereads any tags that you leave in the detection area.)
    b. Click on the Stop button to end the loop.
8. When you finish testing, clear the data area by clicking the Clear button at the bottom of the screen.

Memory

The Memory demonstration lets you check your reader's ability to read and write to tag memory. To access this screen, click on the Capabilities tab, then the Memory sub-tab.



Memory Demonstration Function

How to Use:

1. Place a tag or tags in the read field. The SkyeReader 300 automatically reads the tag memory. The green Select tag light indicates the tag is successfully detected, and the green Read memory light and progress indicator that the memory is being read.

Note – The specific fields displayed for the tag memory display depend on the memory layout of the tag you use for this demonstration.

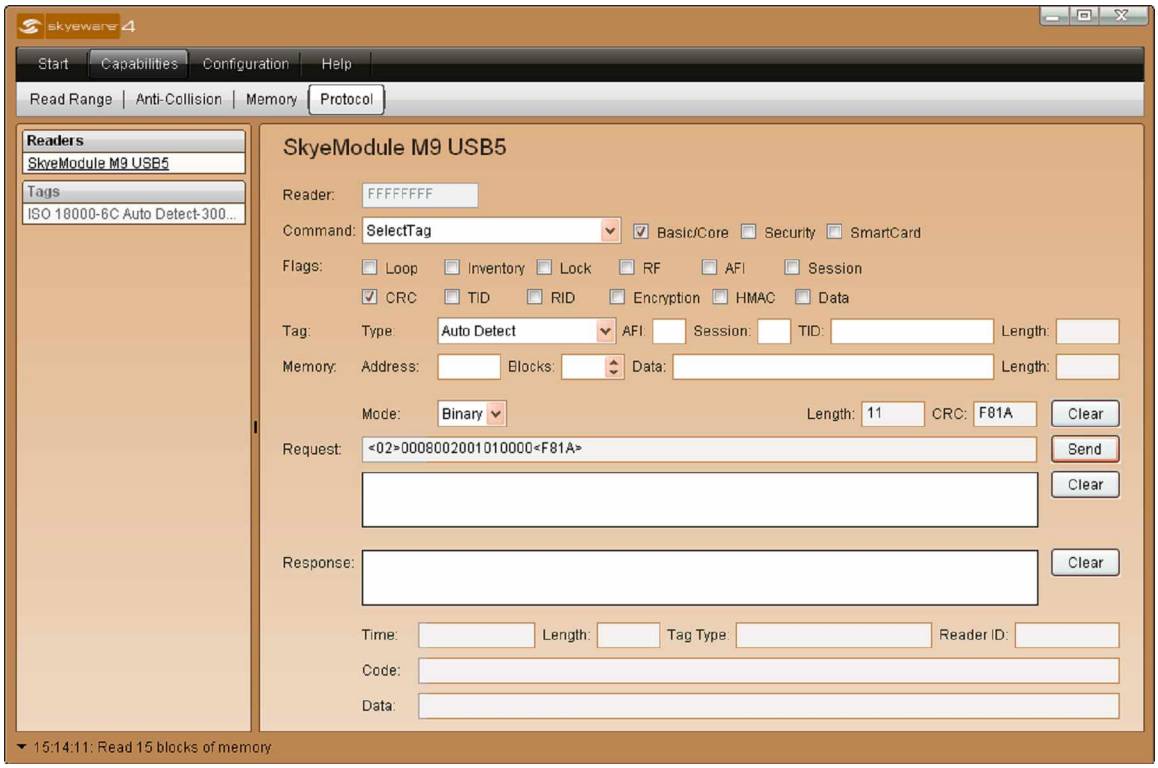
2. (Optional) If you are using multiple tags in the field, click on the tag you wish to work with in the tag list on the left side of the screen.
3. (Optional) To read or reread all of the tag memory, click on the Read button.
4. (Optional) To write to memory:
    a. Click on one of the editable fields in the memory display (User Bank, Bin, Hex or ASCII).
    b. Type a new data value into the selected field. As the edit field changes, the memory display updates with the memory for the selected mode.
    c. Click on the Write button write the new data values to the tag.

5. (Optional) To load the current tag memory with the contents of a previously saved binary (.bin) file:
    a. Click on the Load button. This opens a file selection window for the SkyeWare 4 firmware directory.
    b. Select a binary file (.bin) that contains the memory data from a compatible tag.
    c. Click Open. This loads the stored memory onto the current tag. If the file is incompatible with the tag (for example, if the file has more memory than the tag can hold), the read operation fails.
6. (Optional) To save the current tag memory contents to a binary (.bin) file:
    a. Click on the Save button. This opens a file selection window for the SkyeWare 4 firmware directory.
    b. Enter a filename with a .bin extension in the file name field.
    c. Click the Save button. You can now load the file onto other tags using the Load button on the memory screen.

Protocol

The Protocol tab lets you send specific SkyeTek Protocol v3.0 (STPv3) commands to the reader so that you can develop and test software to support your specific application.

- For detailed information on understanding and using STPv3 commands, flags, fields, and responses, refer to the SkyeTek Protocol v3 Reference Guide.
- Refer to the reference guide for your SkyeModule reader for reader-specific examples of using STPv3 commands.



Protocol Panel

How to Use:

To execute a command:

1. Click on the arrow next to the Command field. This displays a pull-down list of all reader and tag commands.
2. Click on a command on the list.
3. Enter additional values for the command parameters:
    - Reader—Lets you specify a reader ID if you click the RID flag checkbox.
    - Flags: SkyeWare automatically highlights the available flags for each command that you select from the command list.
        - Loop—enables loop mode for tag selection.
        - Inventory—enables Inventory mode for tag selection
        - Lock—the command will lock tags or blocks of tag memory

- RF—keep the RF detection field activated after the command executes
- AFI—the command will use the Application Field Identifier (AFI) field to select tags
- Session—use the Session Field to select tags
- CRC—CRC required for the request or response
- TID—Tag ID (TID) present in the request
- RID—Reader ID (RID) present in the Request (see Reader field above)
- Encryption—write or read data will be encrypted
- HMAC—verify the HMAC for read and write commands
- Data—data is present in the command

(Required flags for each command and flag combinations are described in the SkyeTek Protocol v3 Reference Guide.)

- Tag parameters:
  - Type—Specifies the type of tag with which the reader module communicates (select from pull-down list)
  - AFI value—specifies the Application Field Identifier (AFI) used to detect a tag in the RF field
  - Session—specifies the session number to be used with a series of commands
  - TID—specifies the tag ID to which the command is directed
  - TID Length—the length of the Tag ID
  - Memory parameters:
  - Address—specifies the address
  - Blocks—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.)
  - Data—the data being sent with the command
  - Data Length— the exact number of bytes required by the data field
  - Mode (binary or ASCII)
  - Length—the length of the command in bytes (automatically calculated)
  - CRC (automatically calculated; mandatory in binary mode, and optional in ASCII mode)

4. Click the Send button to send the command to the reader to be executed. The response is displayed in the Response area.

You can also:

- Click the Clear button to clear the screen and reset the screen to its default values.

- Read and write to all system parameters supported by the reader. (See the reference guide for your SkyeModule reader for more information on which parameter address and values are supported.)
- Perform all tag commands supported by the reader, including communications with specific tag types. (See the protocol document for supported commands and the reference guide for specific tag examples.)
- Use the memory field for writing to system parameters or when reading and writing to tag memory. (See the reference guide for your SkyeModule reader for the address, number of blocks and valid data values for different system parameters.)
- Select whether data is transmitted in ASCII or binary format – when using binary mode, the CRC flag is required.

The Response section displays all responses to commands in the text field with a time stamp of when the response was received. You can also:

- Click the Clear button to clear the screen and reset the defaults.
- View the response received from the reader in the Code field.
- View contents of the Tag Type field which is valid when sending tag commands only and provides the tag type being used.
- View the contents of the Data field, which contains the data stored in the specified address or the tag id when issuing a Select Tag command.

Chapter 4: SkyeWare Configuration

Overview

SkyeWare 4's Configuration tab lets you easily customize the full functionality of the SkyeReader 300 and the tags it supports. This chapter discusses each configuration function.

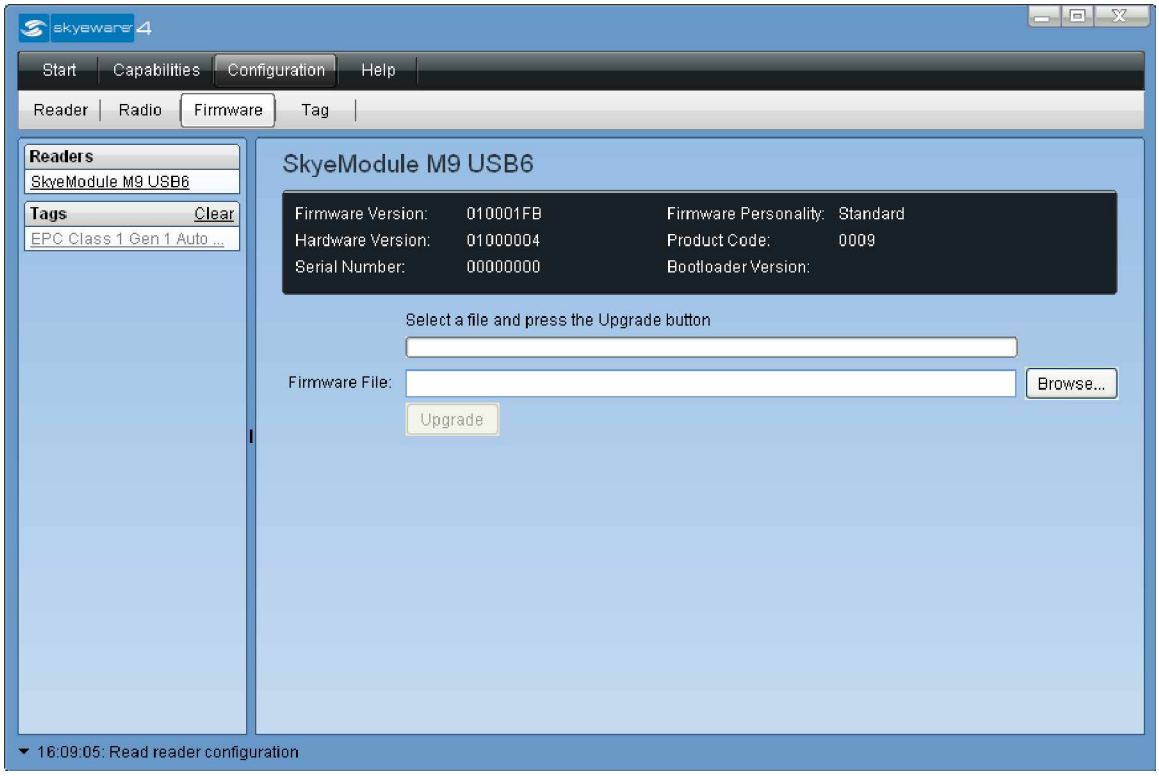
SkyeWare 4 Capabilities Tab

You can:

- Upgrade firmware
- Configure tag settings

Firmware

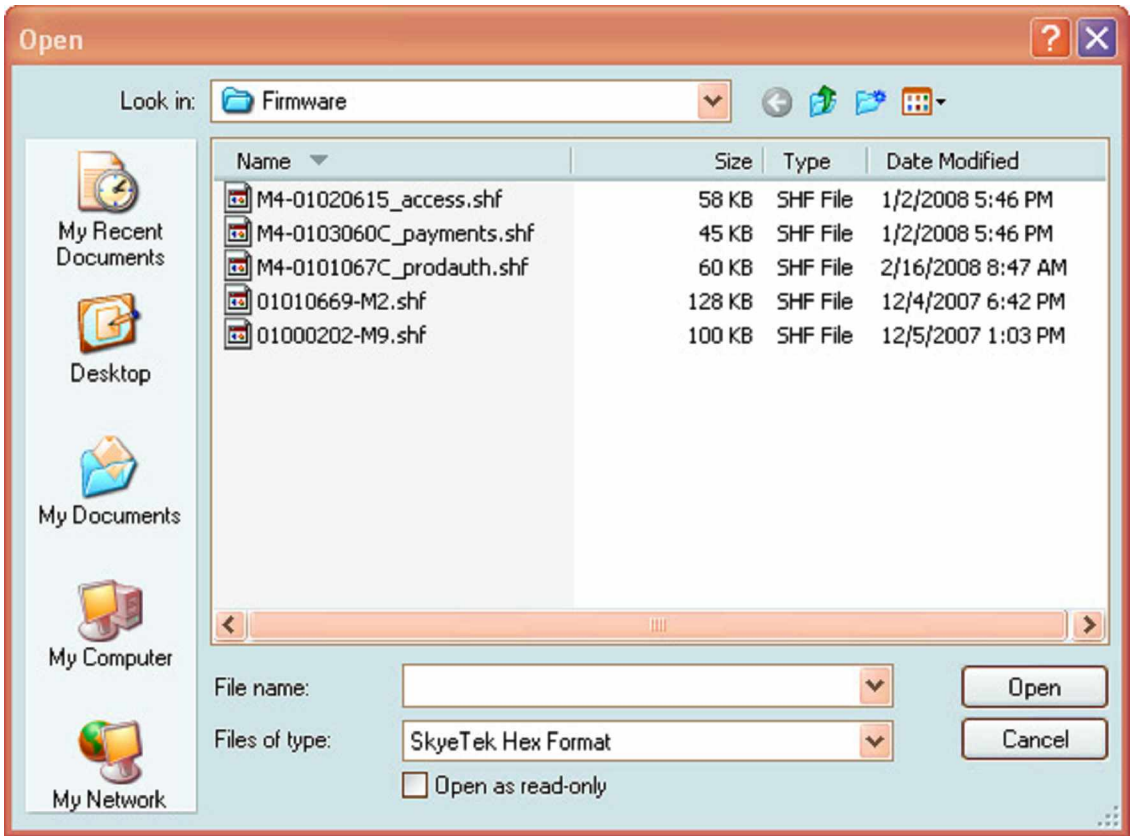
The Firmware tab lets you display firmware information and upgrade or reload firmware for your SkyeModule. To display the Firmware tab, click on the Configuration tab and then on the Firmware sub-tab.



Firmware Configuration Panel

How to Use:

1. Check the SkyeTek support portal at support.skyetek.com for announcements of updates to the SkyeModule M2, M4, M7, or M9 firmware. SkyeTek will provide an updated SkyeTek hex format (.shf) file.
2. Save the .shf file to the folder:C:\\Program Files\SkyeWare 4 \Firmware
3. Start SkyeWare 4.
4. Click on the Configuration tab and then the Firmware subtab.
5. Click on the Browse... button to open a file selection window.



Firmware File

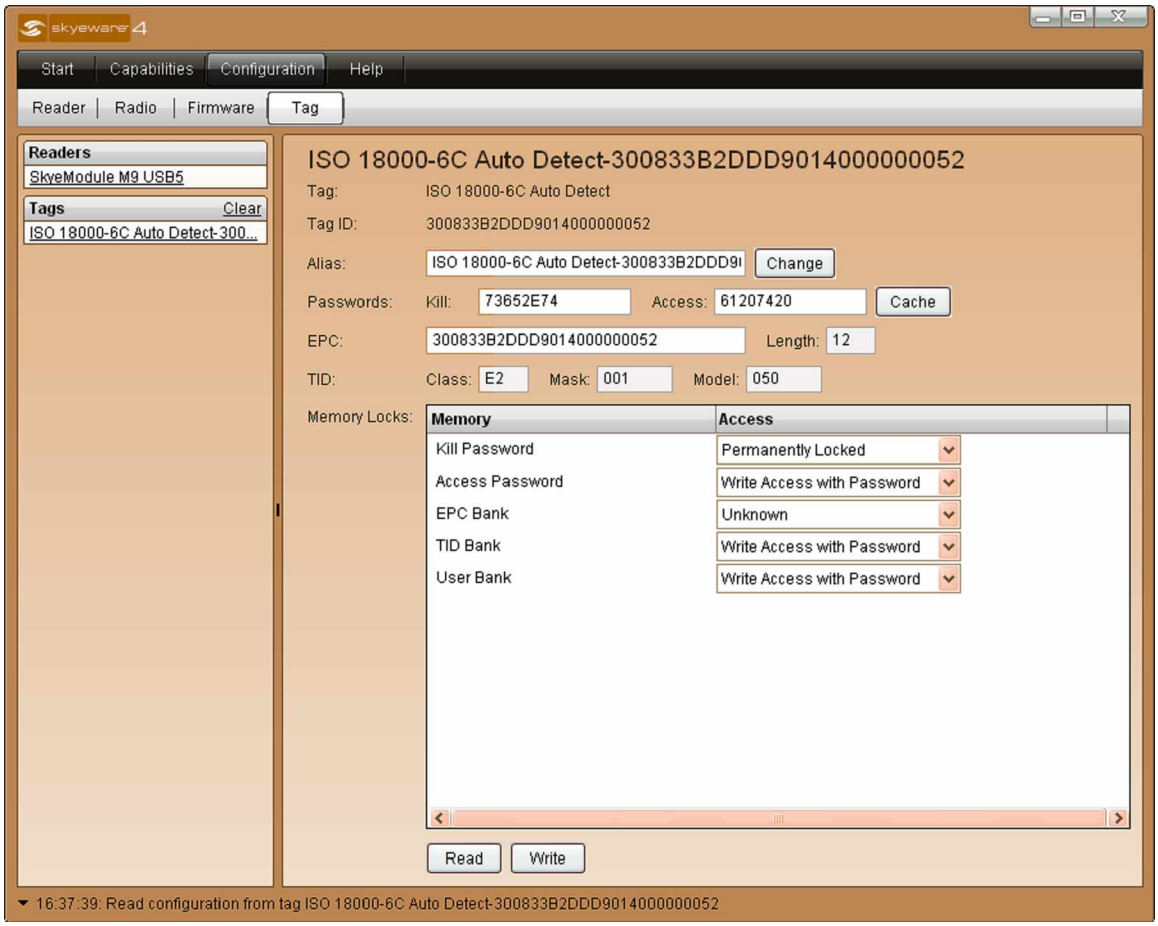
6. Click on the new firmware file in the file list.
7. Click Open. This closes the file selection window and displays the filename in SkyeWare 4.
8. Click Upgrade to start the upgrade process. The panel displays the update information and a progress meter. When the update is complete, the panel refreshes the reader information by querying the reader again. The personality is displayed on the Firmware Configuration panel title and information box.
9. Check the display area to verify that the new firmware information is correct.

You can also create your own firmware update utility. For more information:

1. Log on to the SkyeTek support portal at http://support.skyetek.com. (Contact SkyeTek to get an authorized login.)
2. Under the Firmware heading, click on Creating Custom Update Utilities for SkyeModule Readers. This PDF document contains the specifications you will need to create your own firmware update application.

Configuring Tags

The Tag panel lets you set the various settings for configurable tags. To display the Tag Configuration panel, click on the Configuration tab and then on the Tag subtab.



Typical UHF Tag Configuration Panel

Note – SkyeWare displays a different screen for each tag type, showing only the fields that are configurable for that tag type.

How to Use (UHF tags):

1. Place a configurable tag in the read field. SkyeWare. The screen displays the configurable fields for the tag.
2. Specify new values using the editable fields. Typical configurable fields for EPC Class 1 Gen 2 tags are as follows:
    - Alias—When you assign an alias to a tag, SkyeWare uses the alias instead of the TID in all tag lists and data lists. Type a name in the Alias field, and then click the Change button. (This is the only configurable parameter for many tags.)
    - Passwords—Lets you set the kill and access passwords (requires that you have access permission).

    - To enter a new password, type the password in the Kill or Access field., and then click the Write button. This writes the password to the tag. for future use.
    - SkyeWare 4 can memorize passwords so that you don't have to issue a password command each time you use a password-protected tag with SkyeWare. To store the access password for the tag, click the Cache button.
- EPC—Lets you edit Electronic Product Code information:
    - NSI—Number System Identifier, identifies the
    - UII—Unique Item Identifier
- Oscillator bias—(Read-only) displays the tag's current oscillator bias setting. The oscillator supplies a clock to the tag logic and defines the transmit data rate.
- TID—(Read only) Displays the tag Class, Mask, and Model.
- Memory Locks—lets you set access permissions for the access and kill passwords and for the EPC, TID, and User memory banks. For example, you can configure the tag so that it requires entry of the access password before any data is written to the EPC bank. The following permissions are available:
    - Unknown—Indicates that a permission setting has not been applied.
    - Read, Write, or Read/Write— Grants read, write, or read/write access permission.
    - Permanent Read/Write— Permanently grants read, write, or read/write access to the tag.
    - Write with Password— Requires entry of the access password before data can be written to the tag.
    - No Access— Password or memory block is not readable or writable.

3. (Optional) Click on the Write button to apply the changes to the tag.
4. (Optional) You can view actual memory contents block by block by clicking on the Capabilities Tab and Memory subtab. See ''Memory'' on page 28.