SigmaTel STMP 35xx/36xx Manufacturing Application

StMfgTool User's Manual

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1. SCOPE

This document explains how to use SigmaTel's STMP 35xx/36xx Manufacturing Application (StMfgTool). It is intended for SigmaTel customers, or their OEMs, who plan to mass manufacture STMP 35xx/36xx based solutions.

2. INTRODUCTION

The STMP 35xx/36xx Manufacturing Application is designed to expedite flashing of firmware and copying of files into STMP 35xx/36xx based hardware. Manufacturing enhancements over the end-user application, StUpdaterApp.exe, include:

- Parallelism – up to 8 devices can be updated concurrently.
- Continuous operation – operations automatically begin with the arrival of a new device, and multiple operations such as Update and Copy can be linked together seamlessly.
- Enumeration – static-id firmware loaded into RAM in recovery-mode prevents Windows® from enumerating every device.
- AutoPlay - various Windows® 'pop-up' application and status messages, such as Explorer in Windows® XP, and "Unsafe hardware removal" in Windows® 2000, are suppressed.
- Registry – in addition to minimizing Windows® registry entries, an integrated utility is provided to keep the registry in good operating order.

The STMP Manufacturing Application is designed to flash firmware onto NAND devices and pre-load the data area with media files in an efficient and convenient manner. The application is NOT designed to test the devices or to diagnose manufacturing problems. Devices initialized with this application still need to be functionally verified.

In order to maximize manufacturing efficiency, please READ THIS ENTIRE DOCUMENT and follow the procedures as outlined. The setup and configuration for this application is extensive and must be followed in order to provide the speed enhancements and operator ease outlined above.

3. SYSTEM REQUIREMENTS

PC Requirements – 2.0 GHz CPU, 512 MB RAM

Windows® 2000 w/Service Pack 4, or Windows® XP w/Service Pack 1 or Service Pack 2

Two internal USB 2.0 ports and two external USB 2.0 powered(2.5 A) hubs.

4. INSTALLATION AND SETUP

4.1. Other SigmaTel Hosts

Before beginning, *uninstall all other SigmaTel-based host software*. The Manufacturing Application may not work properly if any other hosts are installed. During the installation, the Installer will give a warning highlighting that the Manufacturing Application may not work properly on the same PC with other SigmaTel-based host software. If there are other Hosts installed, uninstall the other hosts first.

4.2. Installing the Manufacturing Application

Open up the ZIP file. Click on *setup.exe*. Click *Next*, and then click *Yes* if in agreement with the license. Select the destination directory where the application is to be installed, or just continue with the recommended default. Click *Next* on the following screen to accept the default program name. The application will then begin installing. When installation is complete, click *Finish*.

4.3. Static-ID Firmware

Static-ID Firmware reduces manufacturing time *significantly* by eliminating the unique enumeration of every device. Therefore, it is *strongly* recommended that this option be used. The static-ID firmware option is enabled by default for UPDATE operations and must be unchecked in the operations editor to disable it.

If Static-ID Firmware will be used, the firmware image file must be created and pre-loaded. SDK versions 2.600 and later do not require a patch to the firmware, however the document *StMfgTool Static-ID Firmware Application Note* included with the SDK 2.251 firmware patch explains in detail how to build and where to place the static-ID firmware.

4.4. Physical Setup

Connect the devices according to one of the diagrams below (depending on device type). The minimal hardware requirements for the application are independent on which type of device is being used, 35xx or 36xx. Figure 1 represents the physical setup configuration.

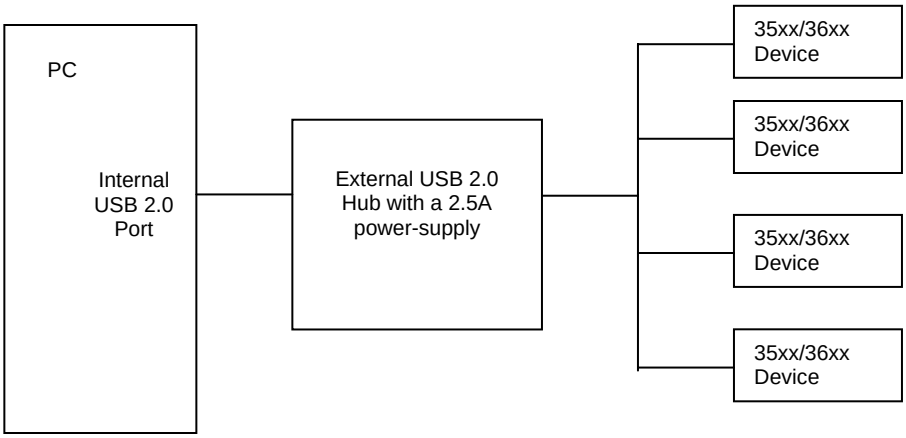

Figure 1

Connect an external USB 2.0 powered(2.5 A) hub to the PC's USB connection. The PC should recognize the external USB hub. The USB ports(up to 4) on the external hub will be configured for use by the Manufacturing Application (see Section 6.2). Please note that the hub is needs to be USB 2.0 compliant and also needs to be externally powered with a 2.5 A power supply, and not bus powered.

4.5. Launching the Application

To launch the application, go the Start menu, and select *SigmaTel Tools/STMP Manufacturing Tool.*

5. APPLICATION OVERVIEW

This section introduces the application's main window, describes the function of the various elements, and defines terms necessary to describe the overall program operation. The main application window's un-initialized state is shown here in Figure 1, and the main window's running state is shown at the end of this section in Figure 2.

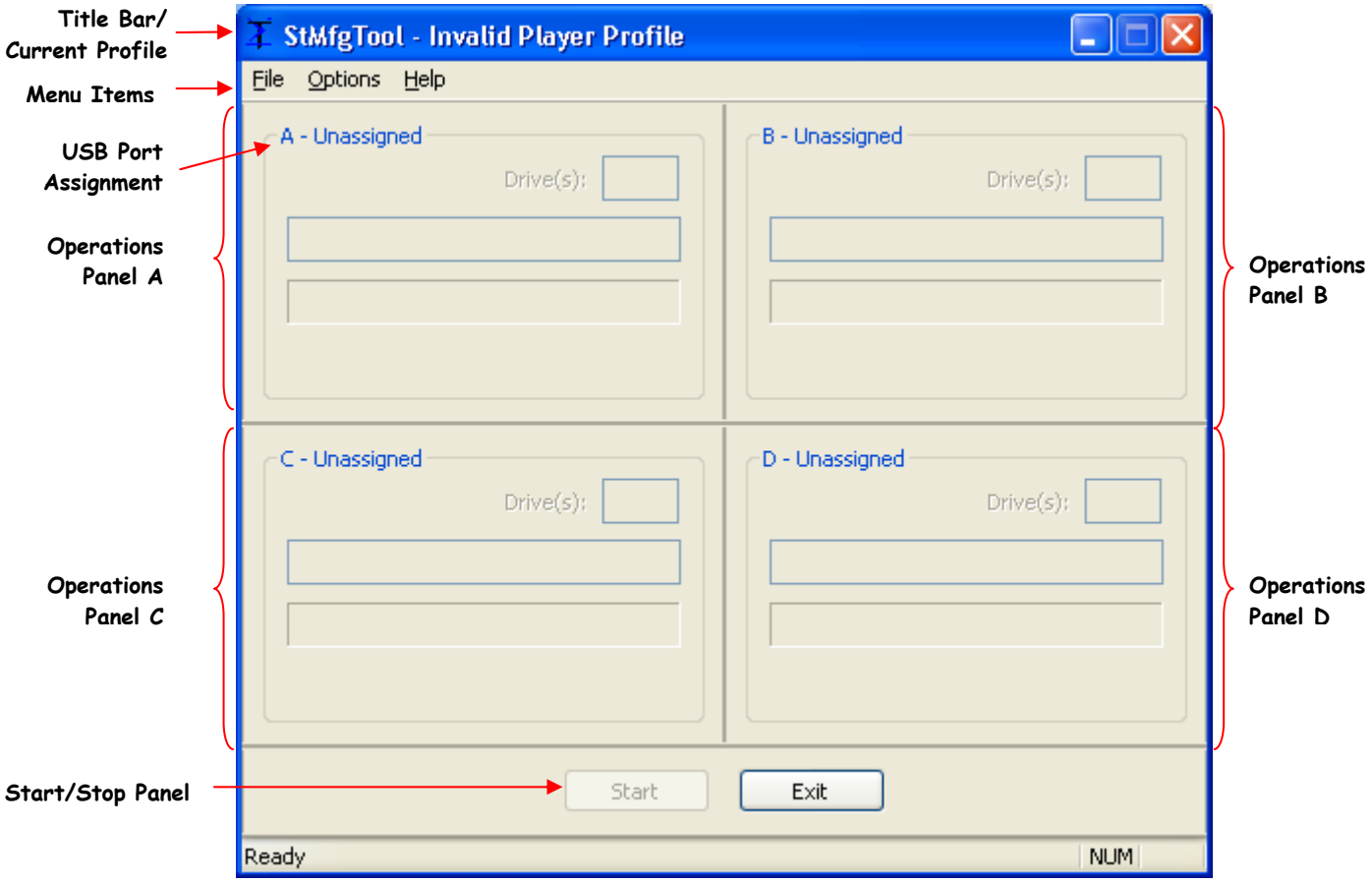

Figure 1

There are five basic concepts represented in the main application window: the Player Profile, Player Operations, Operations Panels, USB Ports, and the Start/Stop Panel.

5.1. The Player Profile

StMfgTool centers around Player Profiles. A Player Profile (profile) is a directory and file structure containing all the information about a particular product, the name of the product, USB IDs, SCSI IDs, device firmware files, and media files. The profile also contains a list of one or more Player Operations (operations) to be performed on devices matching the profile.

The title bar of the main application window reflects the currently selected profile (see Figure 2). If an invalid profile is selected, or if no profile exists, *Invalid Profile* will appear in the title bar (see Figure 1).

Creating and editing profiles is explained in Section 6.1, under the main heading, *Configuring the Application*. The directory and file structure for profiles is explained in Section 10.1 of the Appendix.

The **Start** *button in the main application window will not be enabled unless a valid profile is selected.*

5.2. Player Operations

Each Player Profile has a list of one or more Player Operations (operations) that are to be performed on the device matching the profile. Currently there are two types of operations supported by StMfgTool, UPDATE and COPY (see Section 10.2). Instructions regarding the creation, editing and enabling of operations begins in Section 6.1.12 under the main heading, *Configuring the Application*.

Enabled operations begin executing after the *Start* button in the main application window has been pressed. If a profile lists multiple operations, the enabled operations will be run consecutively, one after the other. The status of the operations is displayed in its Operations Panel.

Once all of the operations for a particular device are complete, the user simply needs to remove the device from the USB port, and replace it with the next device. The operations will automatically begin on the new device.

Operations are executed on a port-by-port basis. The operations on one USB port are independent of the operations on another USB port.

The **Start** *button in the main application window will not be enabled unless at least one operation is enabled in the profile.*

5.3. The Operations Panels

The main application window contains four (4) Operations Panels (panels), labeled A, B, C, and D. Each panel is assigned a physical USB port through the Configuration dialog (see Section 6.2, USB Ports (tab)). The assigned USB hub and port are shown for each panel (see Figure 2), and unassigned panels display *Unassigned* (see Figure 1).

Monitoring - Once a USB port is assigned to a panel, USB device activity on the assigned port is monitored in the corresponding Operations Panel. An Operations Panel is in *monitoring mode* when a port has been assigned to the panel, and the *Start* button has not been pressed. The *Operation* field in the panel (see Figure 2) will display *Monitoring…* when in this mode.

In monitoring mode, the panel will display the name of the device connected to its assigned port in the *Status Box* (see Figure 2). If a device is not connected to the assigned port, *No device connected* is displayed. Any drive letters associated with the connected USB device will be displayed in the panel's *Drive Letter Box*.

Running – After the *Start* button has been pressed, the Operations Panels reflect the operating or running state of the application (see Figure 2). The *Operation* field in the panel will display the type of the current operation, *Updating…* or *Copying…* when in *running mode*.

As in monitoring mode, the Operations Panel's display is directly tied to its assigned *USB Port*. Any drive letters associated with the connected USB device will be displayed in the panel's *Drive Letter Box*. The *Status Box* shows status information about the current operation and the profile's list of operations as a whole. *Operations Complete!* is displayed when all of the operations in the profile's list have been completed for a device.

The *Progress Bar* indicates progress through the list of operations (see Figure 2). The *Progress Bar* grows to the right and is BLUE while processing operations. When all operations for a device have been completed, the *Progress Bar* is completely filled and turns GREEN. A RED *Progress Bar* indicates an operation failure.

The *Firmware Version* field (see Figure 2) displays the firmware version that is being flashed onto the media during an UPDATE operation. This field is only used during UPDATE operations.

Device Completion – A device is complete when all operations have finished

successfully. Device completion is shown in the Operations Panel with *Operations Complete!* in the status box, and a completely filled GREEN progress bar.

Error Condition – An error condition exists when the Operations Panel displays a RED progress bar. The status box will contain an error message describing the problem, or an error code found in Appendix 8.

Operations Panels that are not assigned a USB port, will be grayed out and will not function in either mode; monitoring or running.

5.4. USB Ports

A physical USB port is assigned to an Operations Panel during the application configuration process detailed in Section 6.2, USB Ports (tab). The assigned USB hub and port are shown for each Operations Panel (see Figure 2), and unassigned panels display *Unassigned* (see Figure 1).

The **Start** *button in the main application window will not be enabled unless at least one USB Port is assigned an Operations Panel.*

5.5. The Start/Stop Panel

The Start/Stop Panel is located near the bottom of the main application window. Pressing *Start* causes the Operations Panels to switch from monitoring mode to running mode, and the text on the *Start* button changes to *Stop* and the *Exit* button is disabled.

In running mode, the application iterates through the profile's list of operations on a port-by-port basis. The progress of the operations is reflected in the Operations Panel associated with its specific USB port.

As finished devices are replaced with new devices, the operation loop begins again automatically.

To stop the operation loop, click on *Stop*. The Operations Panels return to monitoring mode, the text on the *Stop* button changes to *Start* and the *Exit* button is enabled. If all of the Operations Panels are have not reached the *Operations Complete!* state, the *Stop* button may briefly show *stopping…* before switching to *Start*. This allows the processing operations to reach a stable stopping state.

There are three conditions that must be satisfied before the *Start* button is enabled:

- A valid Player Profile must be selected (Section 6.1).
- The Player Profile must contain at least 1 enabled operation (Section 6.1.12).
- At least 1 USB port must be assigned to an Operations Panel (Section 6.2).

Additionally, the application must be in monitoring mode before any of the following actions can be initiated:

- Changing the configuration.
- Running the Registry Cleaning utility.
- Closing the application.

5. APPLICATION OVERVIEW (continued)

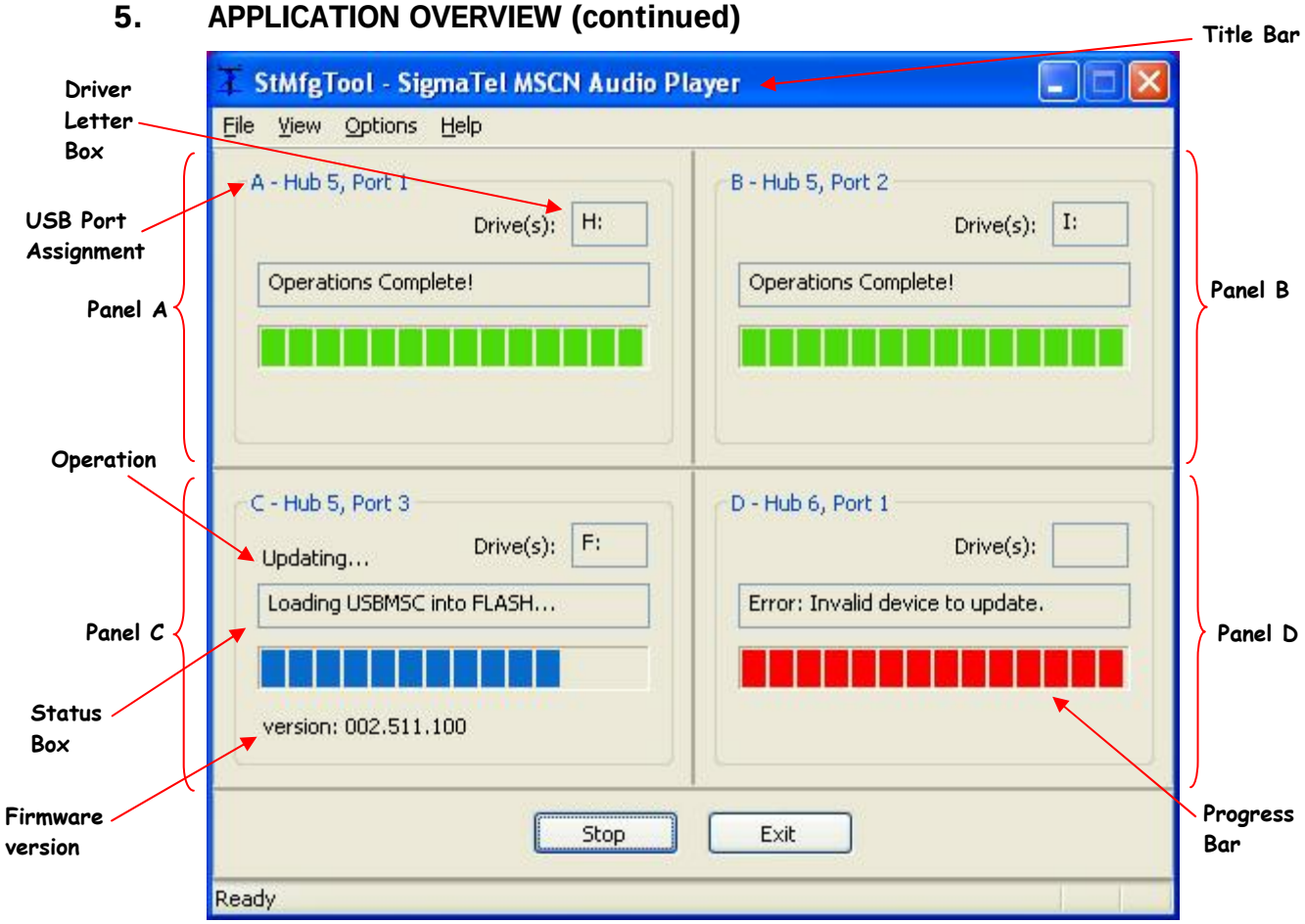

Figure 2

6. CONFIGURING THE APPLICATION

The Manufacturing Application's settings must be configured before the application can be used. The sections below explain how to configure these settings. To configure the settings, on the main application window, select menu item *Options→Configuration*. In the Configuration window, there are three tabs: the Profiles (tab), the USB Ports (tab), and the General (tab) .

After the settings are configured correctly, select *Close* at the bottom of the Configuration window to save the settings. Configured settings are saved and will be used upon subsequent executions of the manufacturing application.

6.1. Profiles (tab)

The Profiles tab (See Figure 3.) allows the user to set up and select an individual manufacturing profile. A manufacturing profile contains all the information about the intended hardware target including various identifiers, a list of operations to be performed, and any support files an operation may require. Appendix 10.1 describes the file infrastructure supporting profiles and operations.

Note: Multiple xample profiles are provided containing firmware supporting the 35xx and 36XX device families. The application will only support one device family at a time. Please ensure that only one update operation is selected at a time and that the selected operation is appropriate for the target device.

Profile Edit-Mode is entered by clicking the *New* or *Edit* buttons in the Profile group box found in the top, right-hand corner of the Profiles tab in the Configuration dialog. In edit-mode, all profile fields are editable and the *New* and *Delete* buttons change to *Save* and *Cancel* respectively. You can not activate other configuration tabs while in profile edit-mode. To exit edit-mode, you must click *Save* or *Cancel*.

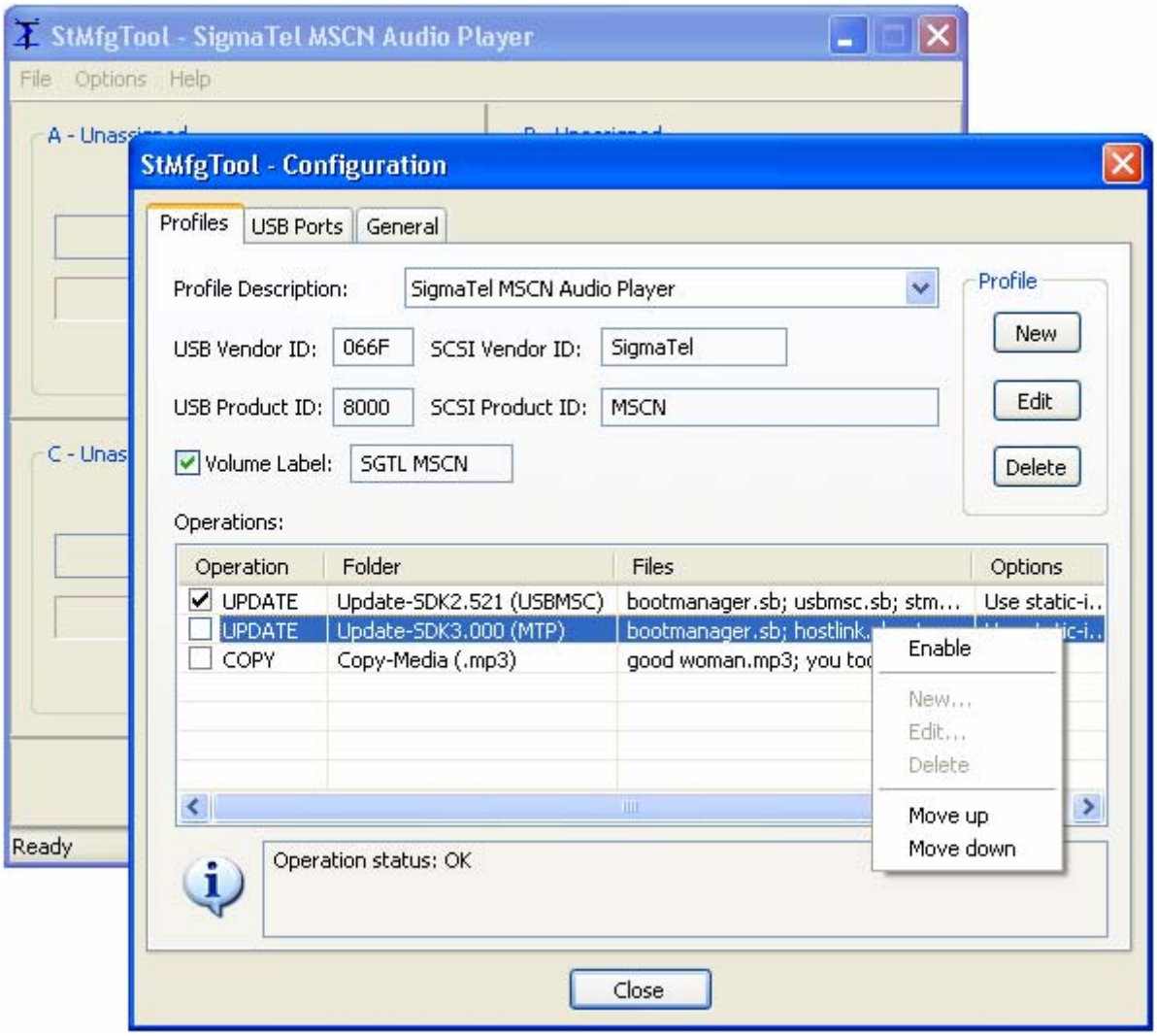

Figure 3

6.1.1. *New (button)*

Creates a new blank profile and puts the profile editor in edit-mode. To exit edit-mode, you must click *Save* or *Cancel*.

6.1.2. *Edit (button)*

Puts the profile editor in edit-mode so the current profile fields and operations can be modified. To exit edit-mode, you must click *Save* or *Cancel*.

6.1.3. *Save (button) (edit-mode only)*

Saves changes to the profile and exits edit-mode. The profile directory structure and files are updated, and any temporary files used during the editing process are deleted.

6.1.4. *Cancel (button) (edit-mode only)*

Restores the profile to its previous state if applicable, and exits edit-mode. Any temporary files used during the editing process are deleted.

6.1.5. *Delete (button)*

Deletes the currently selected profile. This operation will delete all directories and files associated with the selected profile and its operations.

6.1.6. *Profile Description (drop-down list)*

Name describing the product to be operated on. The application supports multiple profiles, but only the current profile will be used for operations. The current profile can be changed by clicking on the Profile Description pull down menu, and select the desired profile from the available list. Field must be a valid Windows® folder name, and can only be modified in edit-mode.

6.1.7. *USB Vendor ID*

The 4-digit hexadecimal value representing the USBMSC VID of the device. This value **must** match the corresponding ID reported by the usbmsc firmware. This field can only be modified in edit-mode.

6.1.8. *USB Product ID*

The 4-digit hexadecimal value representing the USBMSC PID of the device. This value **must** match the corresponding ID reported by the usbmsc firmware. This field can only be modified in edit-mode.

6.1.9. *SCSI Vendor ID*

The 8-character (max.) string representing the SCSI VID of the device. This value **must** match the corresponding ID reported by the usbmsc firmware. This field can only be modified in edit-mode.

6.1.10. *SCSI Product ID*

The 16-character (max.) string representing the SCSI PID of the device. This value **must** match the corresponding ID reported by the usbmsc firmware. This field can only be modified in edit-mode.

6.1.11. *Volume Label*

This field contains the text that will be used by update and format operations to label the volume. The field is limited to 11 characters and must conform to Windows® file-naming conventions. The Volume Label field will not be used unless it is checked. Enabling or disabling Volume Label usage can be done at any time, but the Volume Label string can only be modified in edit-mode.

6.1.12. *Operations (list)*

Lists the operations set up for the given profile. Operations are executed in order from top to bottom. Only operations that are enabled (checked) will be executed.

6.1.12.1. Operation

The operation type and a checkbox to enable or disable the operation. An operation can be enabled or disabled at any time by clicking the checkbox associated with the operation. The operation type can only be modified in the Operation Editor dialog.

6.1.12.2. Folder

The name of the operation. This field is used as a folder name under the profile folder and contains any files required by the operation. The operation folder must conform to Windows® file-naming conventions, and can only be modified in the Operation Editor dialog.

6.1.12.3. Files

A list of the files required by the operation. The operation files can only be modified in the Operation Editor dialog.

6.1.12.4. Options

A list of the enabled options for the operation. The operation options can only be modified in the Operation Editor dialog.

6.1.13. *Operations (menu)*

Actions available for the operations list through the right-click context menu (see Figure 3).

6.1.13.1. Enable

Enables or disables the operation. Only enabled operations will be executed. Disabling an operation does not delete the folder and files associated with the operation. This action can also be performed by clicking on the checkbox associated with the operation, or by pressing the keyboard space bar with the operation highlighted.

6.1.13.2. New

Adds a blank operation to the end of the operations list and brings up the Operation Editor dialog box. This action is only available in edit-mode.

6.1.13.3. Edit

Brings up the Operation Editor dialog box and initializes it with the values from the selected operation. This action is only available in edit-mode.

6.1.13.4. Delete

Removes the operation from the operations list and deletes all folders and files associated with the operation. This action may also be performed by pressing the delete-key while an operation is highlighted. This action is only available in edit-mode.

6.1.13.5. Move up

Moves the selected operation up in the operations list. Since operations are executed from top to bottom, moving the operation up in the list will cause it to run before the operation that it previously followed. This action is not available in edit-mode.

6.1.13.6. Move down

Moves the selected operation down in the operations list. Since operations are executed from top to bottom, moving the operation down in the list will cause it to run after the operation that it previously preceded. This action is not available in edit-mode.

6.1.14. *Operation Editor (dialog)*

The Operation Editor dialog (see Figure 4) allows the user to select the operation type, edit the operation name/folder, copy files and directories to the operation folder, and select any options appropriate for the given operation type.

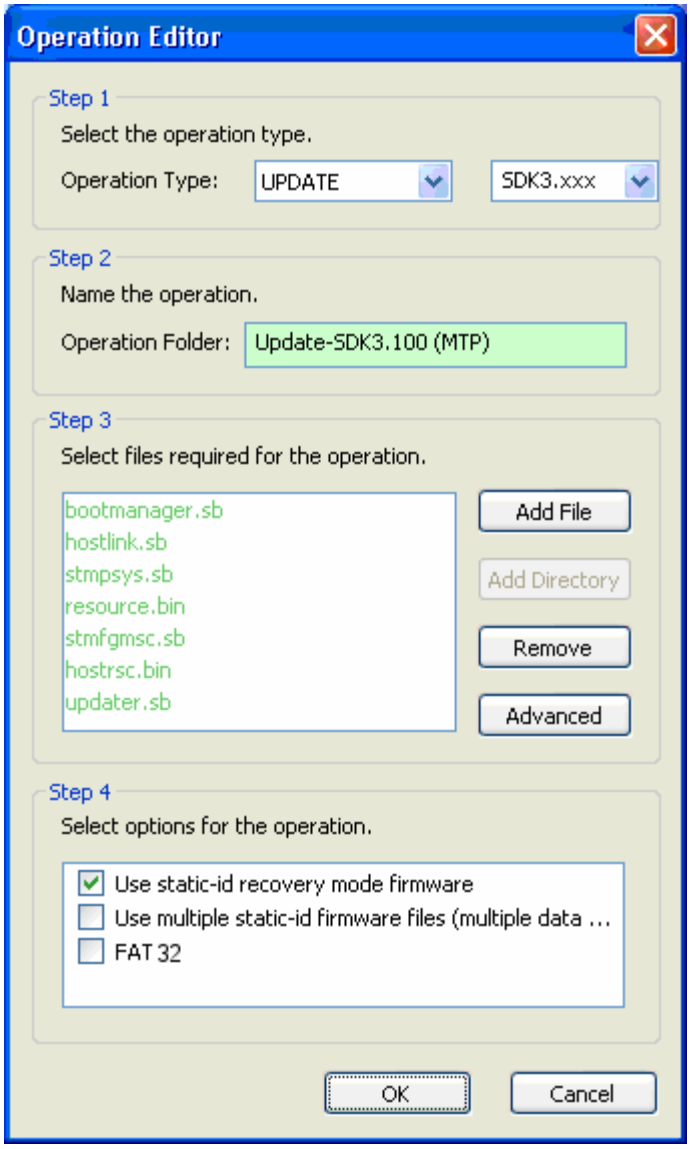

Figure 4

6.1.14.1. Operation Type (drop-down list)

Select from the list of currently supported operation types. If an UPDATE operation is selected you must select the SDK base version for the UPDATE type. If a COPY operation is selected a "Drive Number:" edit box will appear. The default value is 0 and it should not change unless the device has more than one data drive.

6.1.14.2. COPY Operation Drive Number (edit box)

Selects the drive for the copy operation. The default value is 0 and it should not change unless the device has more than one data drive.

6.1.14.3. UPDATE Operation SDK base (drop-down list)

The SDK version used as the base for the UPDATE operation. Selecting from this list will populate the operation files list with the required file names for the SDK base version.

6.1.14.4. Operation Folder

The name of the operation. This field is used as a folder name under the profile folder and contains any files required by the operation. The operation folder must conform to Windows® file-naming conventions. The application does not support multiple operations of the same name in a given profile.

6.1.14.5. Operation Files (list)

A list of the files and directories currently associated with the operation. If an UPDATE operation is selected the file list will be populated with the names of the required files for the selected SDK base of the UPDATE operation. File names will be colored gray until the file is added to the operation directory at which point it will turn green. Files that are not required will be colored red. For COPY operations all file names will be colored black.

6.1.14.6. Operation Files (Add File button)

Launches the Window® File Open dialog to allow the user to browse for the files needed for the operation. Locate the files necessary for the operation and click Add File. The selected file(s) will be copied to the operation folder and the files list box will be updated.

6.1.14.7. Operation Files (Add Directory button)

Launches the Window® Directory Select dialog to allow the user to browse for the directories needed for the operation. Locate the directory desired for the operation and click Add Directory. The selected directory will be copied to the operation folder and will appear in the operation files list box. The added directory name will be bracketed, "[*directory name*]".

6.1.14.8. Operation Files (Remove button)

Deletes files and directories highlighted in the operation files list from the operation folder and updates the operation files list.

6.1.14.9. Operation Files (Advanced button)

Launches the Advanced UPDATE Configuration dialog that allows the user to customize the operation.

6.1.14.10. Operation Options (list)

Select (check) the desired options for this operation. Options may or may not exist for a given operation type. Specific operation options are described in the Manufacturing Operations section of this document.

6.1.14.11. OK (button)

Saves changes to the operation and closes the Operation Editor dialog. The operation directory structure and files are updated, and any temporary files used during the editing process are deleted. The OK button will be disable if an UPDATE operation is selected and any of the necessary files for the UPDATE are missing (one or more file names are colored gray).

6.1.14.12. Cancel (button)

Restores the operation to its previous state if applicable, and closes the Operation Editor dialog. Any temporary files used during the editing process are deleted.

6.1.15. *Advanced Update Configuration (Dialog)*

The Advanced Update Configuration dialog allows the user to modify a default UPDATE operation (See Figure 5). The user starts with a default UPDATE SDK base selected either in the Operation Editor dialog or from the SDK base drop down in the Advanced Update Configuration dialog.

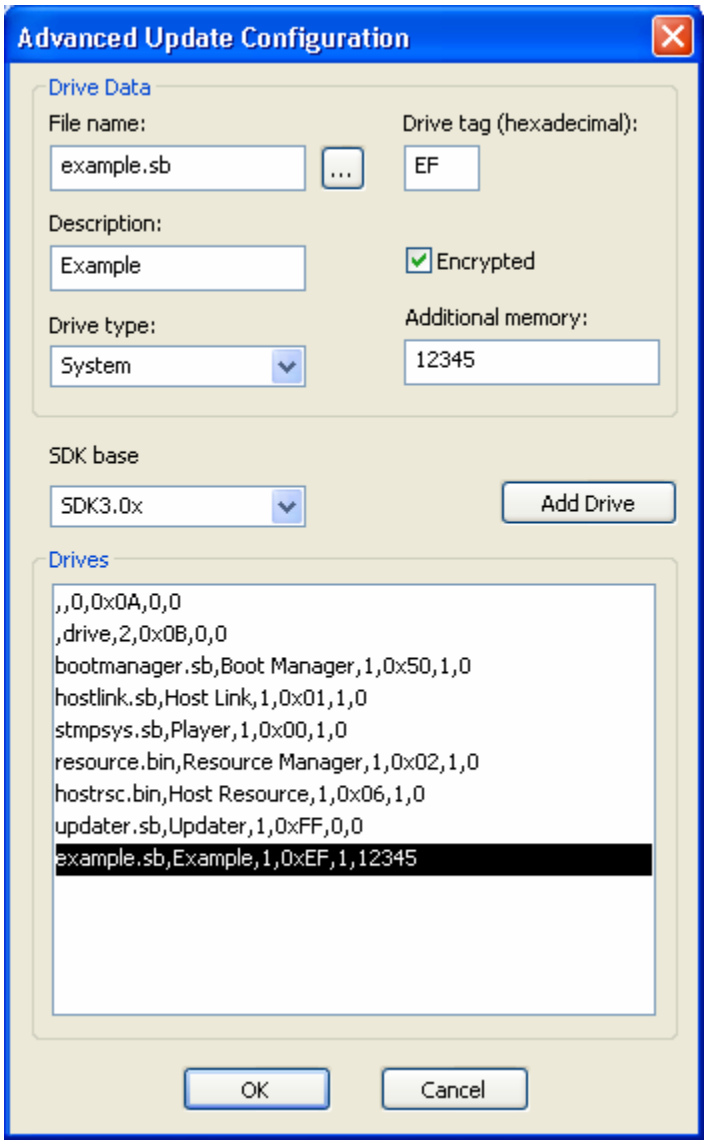

Figure 5

The drives can be selected by mouse click or by pressing the up or down arrows when the Drives list has the input focus. When a drive is selected the field values are displayed in the dialog controls. For data drives of a default configuration only the additional memory field can be changed. For system drives of a default configuration the file name, description, and additional memory fields can be edited. None of the drives of the default configuration can be deleted. Additional drives can be added by clicking the 'Add Drive' button. All fields of additional drives can be edited and deleted. To delete an additional drive, select the drive and press the delete key.

After the dialog is closed with the OK button the new configuration will be saved and the Operation Editor will reflect the changes. Required files will be listed in the file list and colored gray if the files are not in the directory or green if they are (See Figure 4). If any changes were made to the default configuration (as determined by the SDK base selection) the SDK base drop down in the Operation Editor will be disabled.

Note: Custom configurations supported by this dialog will require custom end-user software.

6.1.15.1. File Name (edit box)

Editing this control value changes the firmware file name field of the entry selected in the Drives list. It displays the firmware file name when a drive is selected.

6.1.15.2. Description (edit box)

Editing this control value changes the description field of the entry selected in the Drives list. It displays the description when a drive is selected.

6.1.15.3. Drive Type (drop down)

Selecting the drive type with this control changes the drive type field of the entry selected in the Drives list. It displays the drive type value when a drive is selected. The drive types supported are Data, System, Hidden Data, and Non-Volatile. This field cannot be changed for the default drives of the selected SDK base.

6.1.15.4. Drive Tag (edit box)

Editing this control value changes the drive tag field of the entry selected in the Drives list. It displays the drive tag value when a drive is selected. This field cannot be changed for the default drives of the selected SDK base.

6.1.15.5. Encrypted (check box)

Clicking this check box changes the Boolean value of the encryption field of the entry selected in the Drives list. It displays the encryption Boolean value when a drive is selected by setting the checked state of the control. This field cannot be changed for the default drives of the selected SDK base.

6.1.15.6. Additional Memory (edit box)

Editing this control value changes the additional memory field of the entry selected in the Drives list. It displays the additional memory value when a drive is selected. This value represents the amount of extra space reserved in the drive allocation table and allows for the future increase in firmware size without reallocation. This prevents having to erase the data drive during a firmware update which can result in the possible loss of media.

6.1.15.7. SDK Base (drop down)

Selecting the SDK base with this control populates the Drives list with the default set of drives. Note: All changes made to the current configuration will be lost if the SDK base is changed.

6.1.15.8. Add Drive (button)

Clicking the Add Drive button adds a new drive to the drives list.

6.1.15.9. Drives (list)

Displays all drives in the current configuration.

6.1.15.10. OK (button)

Saves changes made in the Advanced Update Configuration and closes the dialog.

6.1.15.11. Cancel (button)

Discards changes made in the Advanced Update Configuration dialog.

6.1.16. *Profile/Operation Configuration Status*

The status pane at the bottom of the Profile configuration window (see Figure 3) is used to display information about the profile configuration.

Profile status: is the configuration status of the profile as a whole and is displayed any time an operation is not highlighted in the Operations list.

Operation status: is the configuration status of a selected operation.

Profile status: OK - All the profile parameters and operations are set correctly.

Profile warning: - All the profile parameters are correct, there is at least 1 valid operation, and there are invalid operation(s) in the Operations list. The invalid operation will be denoted by a '!' in the operation checkbox. Highlighting the operation will provide information about the operation's error. Invalid operations will not be executed.

Profile error: - Profile parameters are incorrect, or there are no valid operations.

This state will prevent the Start button in the main application window from being enabled.

Operation status: OK – All the operation parameters are set correctly. Operation may be enabled or disabled.

Operation error: - There is a problem with the operation. The operation will have a '!' in the operation checkbox. The operation can not be enabled, and will not be executed.

6.2. USB Ports (tab)

Within the USB Ports tab, a visual representation of all the USB ports on the system is displayed. When any USB device is attached to the computer, the device description will appear next to the port node, and it will indicate *Connected*.

Up to four (4) physical ports can be assigned for use during the manufacturing process. After four ports are selected, the rest of the checkboxes will gray out indicating that no more ports are available. The Panels are assigned in alphabetical order. Given that all Panels are unassigned, the first USB port checked will be assigned to Panel A, the second port checked will be assigned to Panel B, etc. If some Panels are already assigned, the next checked port will be assigned to the first available Panel alphabetically.

Select the physical ports that are to be used during the manufacturing process. When a port is selected, the name of the associated (assigned) Panel will appear next to the port node. The four Panels (A, B, C, and D) in the main application window correspond to the four physically assigned ports (see Figure 6).

Do not add or remove USB hubs from the system once the Operations Panels are assigned to USB ports.

It is recommended that the user label each of the physical hub ports with the corresponding Panel letter to facilitate the cycling of devices though the process.

The **Start** *button in the main application window will not be enabled unless at least one USB port is assigned to a panel.*

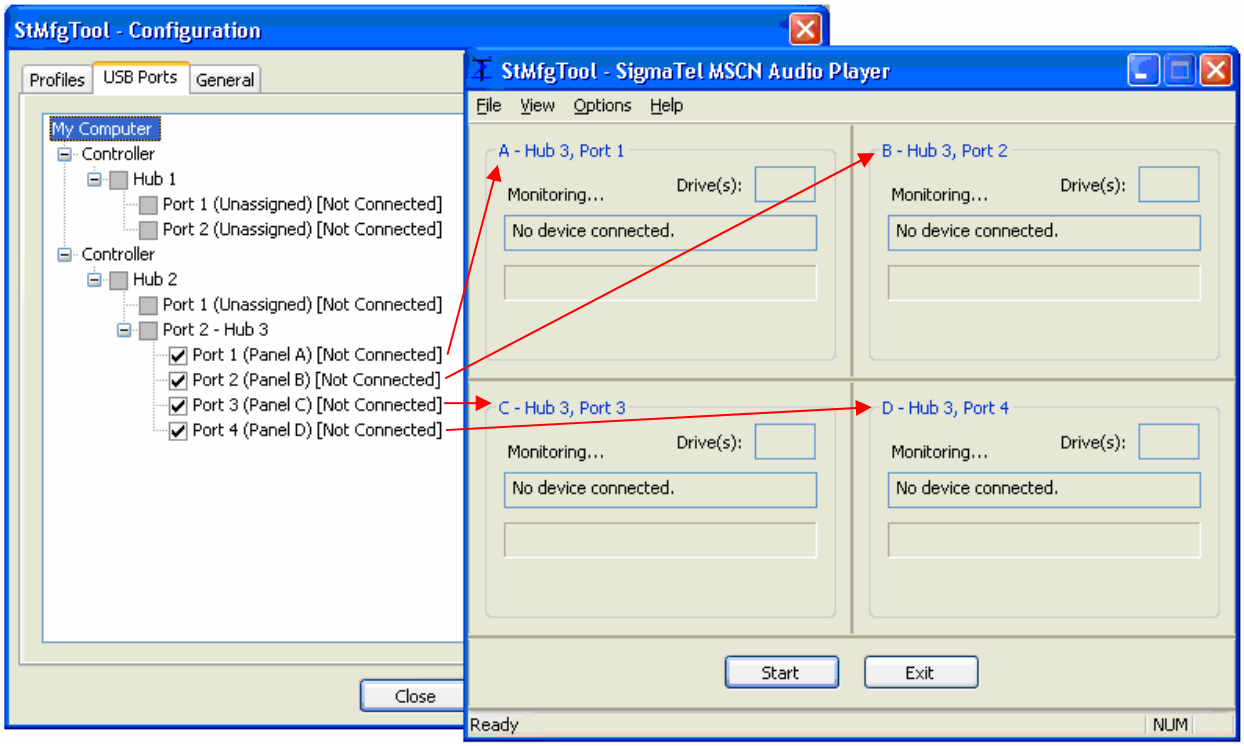

Figure 6

6.3. General (tab)

General preferences are set in the General tab (see Figure 7).

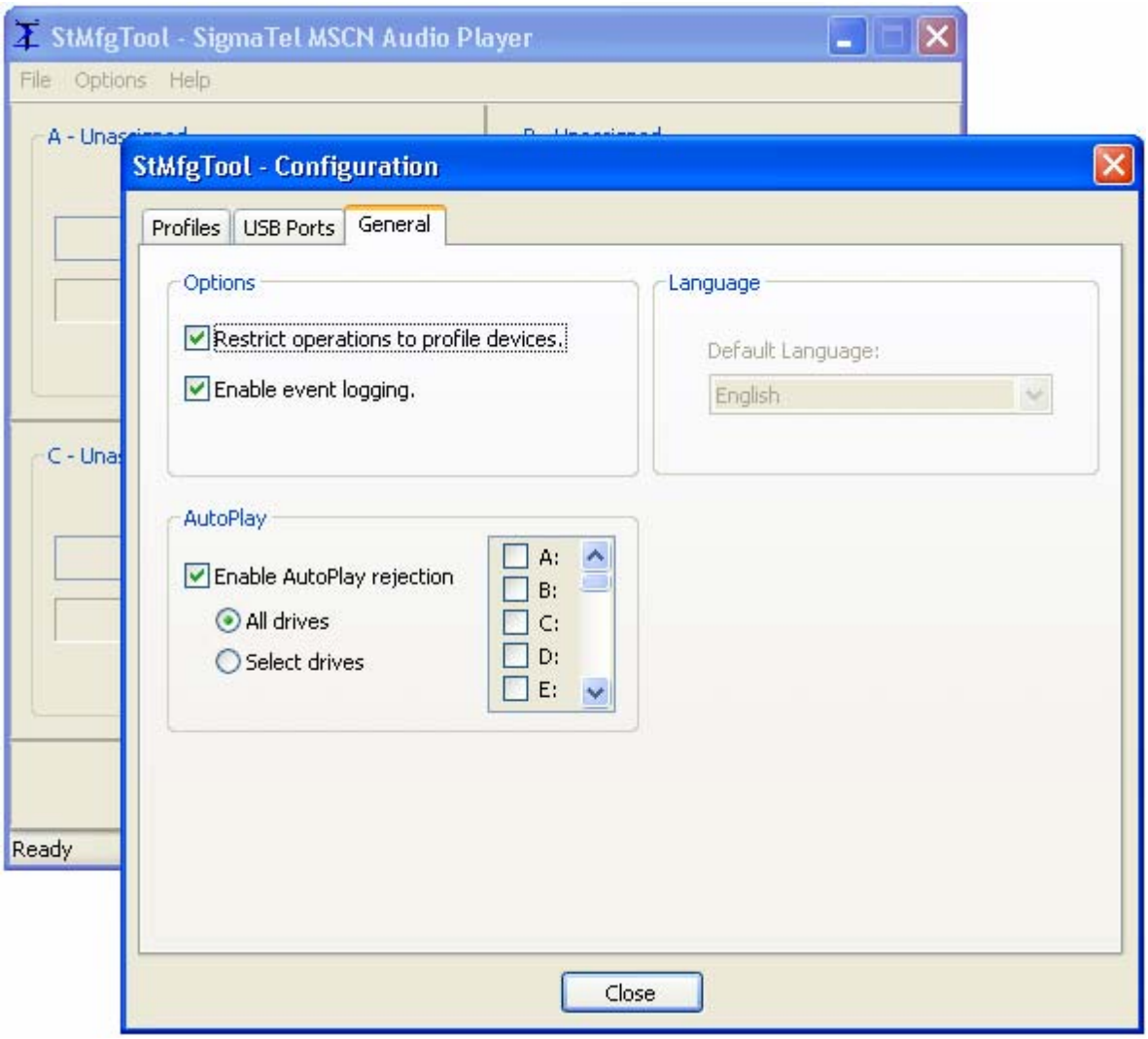

Figure 7

6.3.1. *Language*

Localization is planned for future versions.

6.3.2. *AutoPlay*

Select the Enable AutoPlay rejection checkbox to prevent Windows® OS from automatically opening an Explorer window every time a new device is installed (enumerated) on the computer, which may cause manufacturing delays. To select all drives, choose the *All drives* option. If only specific drives are to be prevented from opening Explorer windows, choose *Select drives*, and select the desired drive letter(s). AutoPlay rejection for all drives is enabled by default. To disable AutoPlay rejection, uncheck the *Enable AutoPlay rejection* checkbox. AutoPlay rejection is enabled for all drives by default.

6.3.3. *Options*

Restrict operations to profile devices – This option is used by all operations. When checked, operations will only run on devices that have USB VID/PID matching the IDs in the profile. Thus, the SigmaTel MSCN device can not be updated if the SigmaTel MSCNMMC Audio Player profile is selected; unless the MSCN device is placed into recovery mode, at which point it becomes a Player Recovery Device and not a SigmaTel MSCN device. When this option is unchecked, any STMP 35xx/36xx based device can be operated on independent of the profile selected. The *Restrict operations* option is checked by default.

Enable event logging – When checked the application will generate a file named *stmfgtool.log* in the application install directory. A timestamp will be entered into the file each time the Start button in the main application is pressed. After the timestamp the event logger will record information about the device at the end of each operation. This file does not get deleted between instances of the application, and new data is always appended to the end of the file. This option is enabled by default.

7. INITIALIZING THE SYSTEM

There are three final configuration procedures that must be performed before the application is ready for continuous operation. Section 7.1 describes how to pre-load the Recovery-Mode drivers onto each of the USB ports used by the Manufacturing Application. Section 7.2 describes how to pre-load the Static-ID USB Mass Storage drivers onto each of the same USB ports. The final initialization step is described in Section 7.3.

To prepare for these steps, launch the Manufacturing Application. Ensure that it is fully configured and in monitoring mode.

7.1. Step 1 - Pre-Loading the Recovery Mode Driver

Each physical USB port that will be used with the manufacturing application must be loaded with the Recovery Mode Driver. The Recovery Mode Driver allows the PC to communicate with the device while in Recovery Mode. *This procedure only has to be done once for each port.*

To load the Recovery Mode Driver for each port:

1. Plug the device into the external USB hub port that is to be configured.
2. Place the device in Recovery Mode.
3. The PC will recognize a new device is attached an attempt to load the Recovery Mode Driver . The New Hardware Wizard will appear. (See Figure 8.)

Figure 8

4. Choose *Install the Software Automatically*, and click *Next*.
5. The Hardware Wizard should find the Recovery Mode Driver that was installed when the Manufacturing Application was installed in Section 4.2.
6. After the Wizard has finished installing the driver, click *Finish* (see Figure 9).

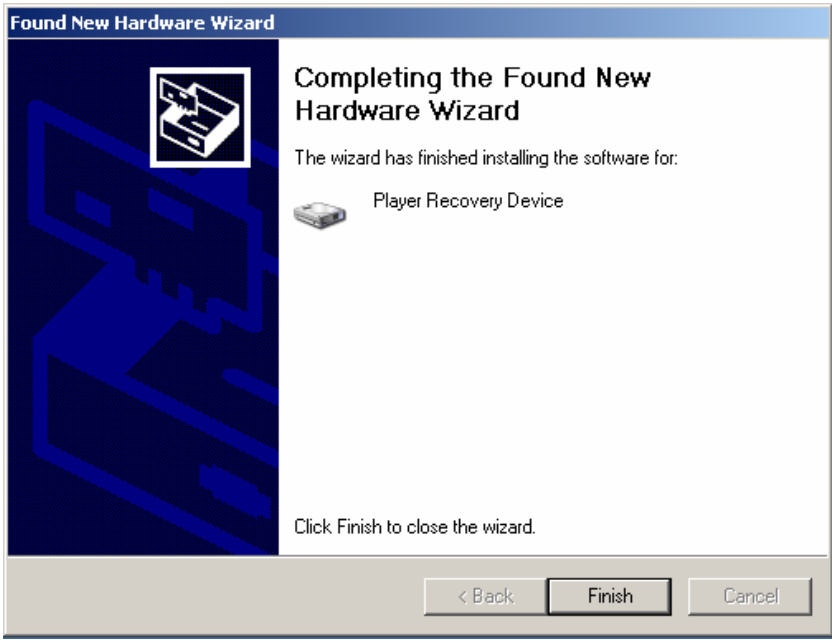

Figure 9

7. Repeat Steps 1-6 for each physical port that is to be used with the manufacturing application (up to 4).

Once this process is complete and all of the Hardware Wizard dialogs are closed, the Manufacturing Application should appear as it does in Figure 10. If the system is asking for a reboot, answer *No* at this time. The system will be rebooted after completing the procedure in the next section.

Figure 10

7.2. Step 2 - Pre-Loading the Static-ID USB Mass Storage Driver

[If the Static-ID Firmware is not being used, skip this section.]

Each physical USB port that will be used with the Manufacturing Application must be loaded with the Static-ID USB Mass Storage Driver. The USB Mass Storage Driver allows the PC to communicate with the device while in USBMSC Mode. *This procedure only has to be done once.* The steps outlined in Section 7.1 must be completed before starting this procedure.

To load the Static-ID USB Mass Storage Driver for each port:

1. Ensure that an UPDATE operation is enabled in the Player Profile, and that the *Use static-id recovery-mode firmware* option (see Figure 4) is enabled for the operation.
2. Disconnect and reconnect the four devices (in recovery-mode) to ensure the devices are ready (see Figure 10).
3. Click *Start* in the main application window.
4. The Static-ID firmware will be loaded into the four devices, and the system will enumerate them as USB Mass Storage devices and assign each of the devices a drive letter.
5. Allow all Operation Panels to run to completion (see Figure 11). If the system displays a reboot dialog (see Figure 12), answer *No* if the Manufacturing Application does not look like Figure 11. Alternatively, leave the reboot dialog open, complete the steps in this procedure, and click *Yes* to initiate Step 3.

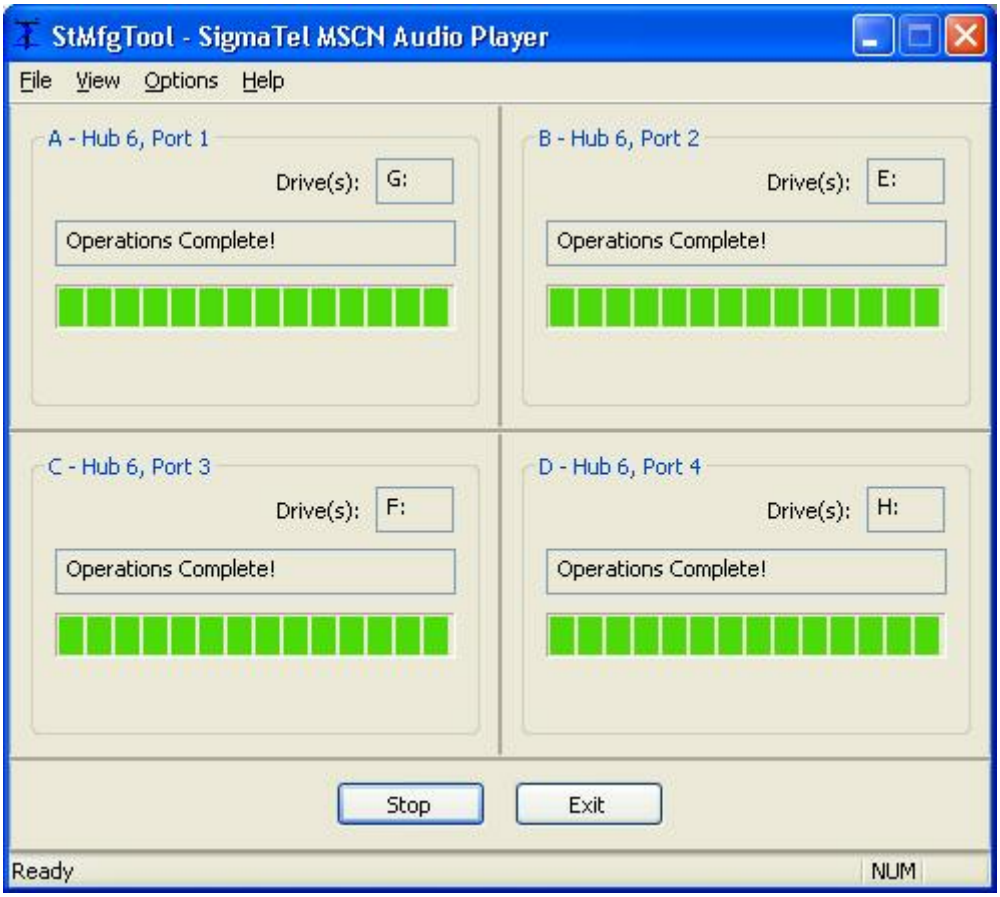

Figure 11

6. Click *Stop* and *disconnect* the STMP devices.

7. Click *Exit* to close the application.

Figure 12

7.3. Step 3 - Reboot the System

This step is critical and *must* be done to ensure system stability during continuous operation of the Manufacturing Application.

8. RUNNING THE APPLICATION

Having completed all of the preceding installation, setup, configuration, and initialization procedures, the application is now ready for mass production of STMP 35xx/36xx based devices.

- Launch the application.
- Select the Player Profile appropriate for the hardware.
- Ensure the USB ports are assigned to the Operation Panels and that each port has been initialized.
- Click the Start button.
- Attach STMP 35xx/36xx based devices to the assigned USB ports.
- Operations for the attached device will begin automatically.
- When the device is complete, replace it with the next device.
- If an error occurs, remove the device and replace it with a new device.
- Continue in this manner until all the devices have been processed.

9. REGISTRY SCRUB

To launch the registry scrub utility, on the main application window, select menu item *Options→Clean Registry*. If the current profile is invalid, an error message will be displayed instructing the user to select a valid profile before allowing access to the Registry Scrub dialog. If the current profile is valid, pertinent profile information will be reflected in the Registry Scrub dialog. (See Figure 13.)

Registry Scrub is a functional utility designed to assist in the removal of STMP 35xx/36xx based USB Mass Storage device information from the Windows® registry. Each time a USB Mass Storage device is initially connected to the PC, the OS enumerates the device and create three to five unique registry device node entries. The number of device node entries depends on the number of drives allocated to the USB Mass Storage device. These unique registry entries allow the system to 'remember' what type of device is being connected to the system and which drivers to load the next time the device is connected to the system (expedites the connectivity process).

Every USB device generates a unique set of device node entries in the system registry. If the same USB device is connected to a different USB port, another unique set of device node entries are created. If a new USB device(B), different from the USB device(A) by only the device serial number, is connected to the same USB port where device(A) was connected, another set of

device node entries are created. This type of operation is normal and useful in an end-user environment, but can drastically affect system performance in a manufacturing environment.

The *Use static-id recovery-mode firmware* for UPDATE operations (see Figure 4) was designed to reduce registry build-up and device enumeration time by not reporting the device serial number to the OS. By using the static-id firmware, all of the manufacturing devices will appear identical to the OS. After the initial enumeration (during the setup/configuration phase of this application) the OS will *not* need to enumerate future devices.

Down-stream PCs used to test the device after it has booted from the internal media *will be* affected by unique serial number reporting, and will eventually have many device node entries in the system registry. Run the Registry Scrub operation periodically on manufacturing test PCs that incur unique serial number registry build-up to maintain optimal system performance.

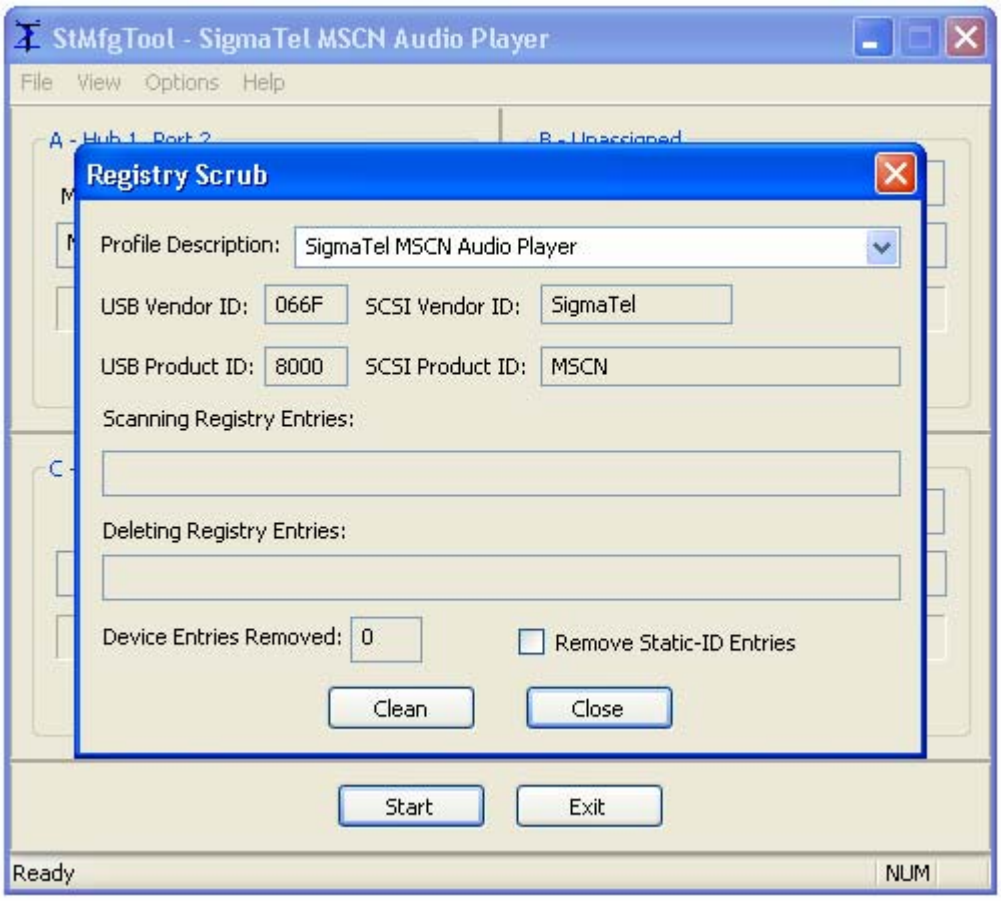

Figure 13

9.1. Profile Description (drop-down list)

The active profile is selected by default. The user can change the profile selection by clicking on the Profile Description pull down menu and selecting the desired profile from the available list. Once selected the USB and SCSI fields will display the Vender and Product IDs.

9.2. Clean (button)

Initiates the Windows® registry cleaning process. The currently selected profile must be valid to begin cleaning the registry. Once the *Clean* button is pressed, the application examines three device enumeration categories: Enum\USB, Enum\USBSTOR, and Enum\Storage and removes device entries matching the selected profile's criteria. Progress is indicated in the status fields: Scanning Registry Entries and Deleting Registry Entries. These status fields display *Finished* when the registry cleaning process is complete. The number of device nodes removed is displayed at the bottom of the dialog.

It is recommended that all devices matching the current profile be disconnected from the PC before starting the registry clean process.

9.3. Close (button)

Closes the Registry Scrub dialog.

9.4. Remove Static-ID Entries (checkbox)

This check box allows the user to remove the non-serialized device node entries in addition to device entries matching the selected profile's criteria.

This option is for advanced troubleshooting and should not be checked during normal registry maintenance. Removal of non-serialized device node entries will require the user to completely go through the application's setup/configuration reboot process.

Only check this box if experiencing problems with the static-id firmware files.

10. APPENDIX

10.1. Player Profile Directory Structure

It is recommended that Player Profiles are created and edited using Configuration dialog. This section is only for reference.

The *Profiles* sub-directory is located in the applications installation directory, *Program Files\SigmaTel\STMP Manufacturing Tool* (default). The *Profiles* directory contains *Player Profile* subdirectories that serve as containers for the configuration data and support files for the player. An example profile is located in the *<Application Directory>\Profiles\SigmaTel MSCN Audio Player* directory.

At the root of the *Player Profile* directory is the *player.ini* file that lists the *Player Operations* and configuration data for the player. The supported operations are: Update Firmware and Copy Files. Each operation has its own subdirectory under the *Player Profile* directory that contains files necessary for the operation. Multiple operations of the same type are permitted with the restriction that all operations for a given *Player Profile* must be uniquely named. For the example profile, one UPDATE operation is located in the *<Application Directory>\Profiles\SigmaTel MSCN Audio Player\Update-SDK3.000 (MTP)*. It has the *Use static-id recovery-mode firmware* option enabled (see Figure 4) and the static-id recovery mode firmware has been copied to the directory.

```
[PROFILE]
PLAYER=sigmatel mscn audio player
USB_VID=0x066F
USB_PID=0x8000
SCSI_MFG=SigmaTel
SCSI_PRODUCT=MSCN
VOLUME_LABEL=SGTL MSCN,1

[OPERATIONS]
UPDATE=Update-SDK2.521 (USBMSC),1
UPDATE=Update-SDK3.000 (MTP),0
COPY=Copy-Media (.mp3),0

[Copy-Media (.mp3)]
good woman.mp3
you took my heart.mp3

[Update-SDK2.521 (USBMSC)]
STATIC_ID_FW=TRUE
,,0,0x0A,0,0
bootmanager.sb,Boot Manager,1,0x50,1,0
usbmsc.sb,USB Mass Storage,1,0x01,1,0
stmpsys.sb,Player,1,0x00,1,0
resource.bin,Resource Manager,1,0x02,1,0

[Update-SDK3.000 (MTP)]
STATIC_ID_FW=TRUE
,,0,0x0A,0,0
,drive,2,0x0B,0,0
bootmanager.sb,Boot Manager,1,0x50,1,0
hostlink.sb,Host Link,1,0x01,1,0
stmpsys.sb,Player,1,0x00,1,0
resource.bin,Resource Manager,1,0x02,1,0
hostrsc.bin,Host Resource,1,0x06,1,0
updater.sb,Updater,1,0xFF,0,0
```

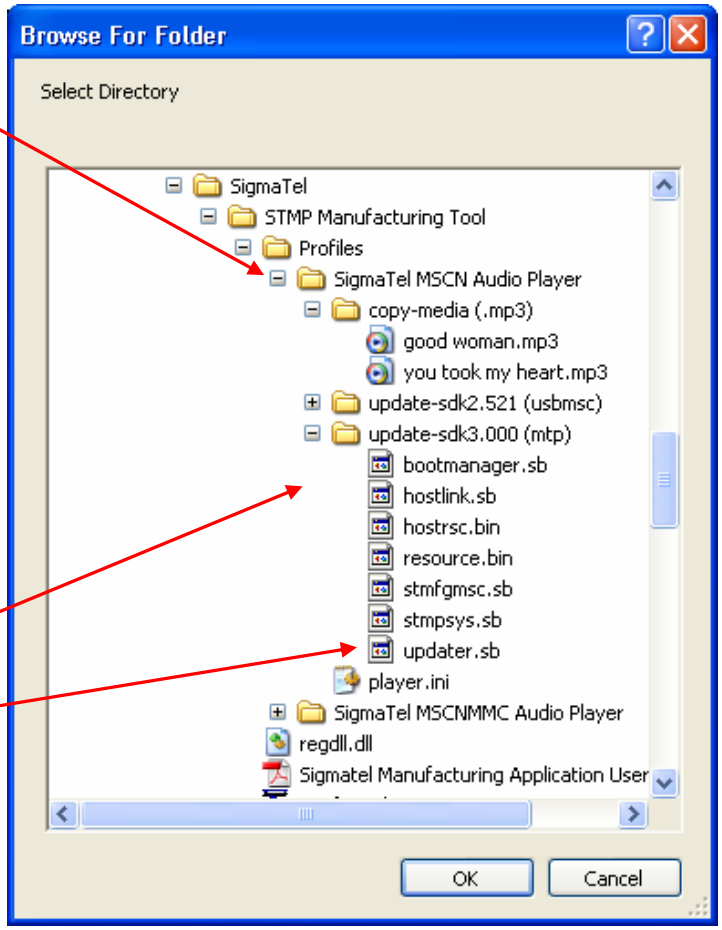

Figure 14

The *player.ini* file must contain at least the three sections listed below, [PROFILE], [OPERATIONS], and [<Operation Folder>].

10.1.1. *[PROFILE]*

The *[PROFILE]* section describes the device to be operated on. From the example:

```
[PROFILE]
PLAYER=SigmaTel MSCN Audio Player
USB_VID=0x066F
USB_PID=0x8000
SCSI_MFG=SigmaTel
SCSI_PRODUCT=MSCN
VOLUME_LABEL=SGTL MSCN,1
```

10.1.2. *[OPERATIONS]*

The *[OPERTIONS]* section of the *player.ini* file describes the operations that are to be performed on the device. Currently, there are two different types operations that can be performed: UPDATE and COPY (see Section 10.2). The syntax of an operations is:

<Operation Type> = <Operation Folder> , <Enable Operation>

<Operation Type> : currently UPDATE or COPY.

<Operation Folder> : a name describing the operation that can also be used as a folder name to hold the files needed by the operation.

<Enable Operation> : 1 (enabled) or 0 (disabled).

10.1.3. *[<Operation Folder>]*

An *[<Operation Folder>]* section exists for each <Operation Folder> in the *[OPERATIONS]* section of the *player.ini* file (see Figure 14). This section lists all of the support files for the operation. The name of this section is also the directory name that contains the listed files. From example, the *[OPERATIONS]* section contains an operation defined:

```
UPDATE= Update-SDK3.000 (MTP),1
```

The corresponding *[<Operation Folder>]* section is:

```
[Update-SDK3.000 (MTP)]
STATIC_ID_FW=TRUE
,,0,0x0A,0,0
,drive,2,0x0B,0,0
bootmanager.sb,Boot Manager,1,0x50,1,0
hostlink.sb,Host Link,1,0x01,1,0
stmpsys.sb,Player,1,0x00,1,0
resource.bin,Resource Manager,1,0x02,1,0
hostrsc.bin,Host Resource,1,0x06,1,0
updater.sb,Updater,1,0xFF,0,0
```

10.2. Manufacturing Operations

The supported operation types are listed below.

10.2.1. *UPDATE*

The Update operation flashes firmware onto the device.

10.2.1.1. Options

Static-id recovery mode firmware – Enabling this option will allow the update operation use the Static-ID firmware to eliminate unique enumeration of each device.

It is strongly recommended that static-ID firmware be created and this option enabled.

Use multiple Static-id firmware files – A device with more than one data drive must report a serial number. Enabling this option will cause the application to look for static-id firmware files named stmfgmsc1.sb, stmfgmsc2.sb, stmfgmsc3.sb, and stmfgmsc4.sb. Each file should report a unique serial number. This will prevent windows from enumerating the drives more than once per panel.

FAT32 – Enabling this option will force the update operation to format the media using FAT32. If this option is not enabled, the update operation will decide on the type of FAT to use based on the size of the media. If the media size is less than 2GB, FAT16 will be used. For media sizes greater than 2GB, FAT32 will be used.

10.2.2. *COPY*

The Copy operation copies files to the player media.

10.2.2.1. Options

There are no options available for this operation.

10.3. Troubleshooting

The STMP Manufacturing Application is a complex, system-dependent program. Assumptions regarding logical operation-linking and device states were made to create the continuous-operation environment. Every effort has been made to ensure the stability of this application.

Explicitly following all of the procedures outlined in this document is the best way to avoid most problems.

The following sections may provide some insight if a problem does arise.

1. Why do I get 'Invalid Device' and a RED progress bar?

Cause:	Solution:
The attached device is not a STMP 35xx or STMP 36xx device.	Disconnect the non-STMP device, or assign a different USB port to the operation panel.
The attached device is in USBMSC mode, the devices IDs do not match the current profile, and *Restrict operations to profile devices* is checked.	Place the STMP device in recovery mode, or uncheck *Restrict operations to profile devices*.

2. Why does the status hang at 'Waiting for device' even though the device is connected to the USB port?

Cause:	Solution:
The attached device is not connected to the panel's assigned USB port.	Ensure that the USB port the device is connect to is assigned to the 'hung' panel.
The attached device is a STMP 35xx/36xx device that 'timed-out' in recovery-mode.	Disconnect the device and re-connect it in recovery-mode.
Device may be defective.	Re-connect the device in recovery-mode for a second pass. If there is still a problem, analyze the device for hardware defects.

3. Why does the status hang at 'Waiting for device to return' even though the device is connected to the USB port?

Cause:	Solution:
The attached device is not connected to an external USB 2.0 hub.	Some PCs have multiple controllers for a single USB port. The device will enumerate on one controller or the other depending on the type of device (USB 1.1 or USB 2.0). The STMP 35xx/36xx is a USB 1.1 device in recovery-mode and a USB 2.0 device in USBMSC-mode. Connecting the device to an external USB 2.0 hub allows the device to enumerate on the same controller/port in both modes.
Device may be defective.	Re-connect the device in recovery-mode for a second pass. If there is still a problem, analyze the device for hardware defects.

4. Why does the same drive letter appear in 2 panels at the same time?

Cause:	Solution:
The system is in an unstable state.	Use the registry scrub utility to clean the mass-storage device entries. Ensure the *Remove static-id entries* box is checked. Re-initialize the manufacturing ports (see Step 2 - Pre-Loading the Static-ID USB Mass Storage Driver).
Device may be defective.	Re-connect the device in recovery-mode for a second pass. If there is still a problem, analyze the device for hardware defects.

5. Why does the application not stop when I click the *Stop* button?

Cause:	Solution:
An operation is still in progress.	Wait for the operation to complete. If all operations are not complete after 2 minutes, disconnect all 'incomplete' devices.
Device may be defective.	Re-connect the device in recovery-mode for a second pass. If there is still a problem, analyze the device for hardware defects.

6. How did my Panel become *Unassigned*?

Cause:	Solution:
The USB device-tree changed. The assigned port was on a hub that was disconnected from the system.	Reassign a USB port to the panel and repeat the initialization processes.

7. What do I do with a device that does not get to *Operations Complete!* status?

Cause:	Solution:
Device may be defective.	Re-connect the device in recovery-mode for a second pass. If there is still a problem, analyze the device for hardware defects.

8. Why do I get update error -11?

Cause:	Solution:
May be due to stmfgmsc.sb file not being present in update operation folder	Follow the instructions in the Application Note in the SDK firmware patch to generate manufacturing firmware. SDK 3.0 does not require the firmware patch to build the manufacturing firmware. Alternatively, uncheck the 'use static-id' option..

9. Why do I get update error -13 when downloading USBMSC in recovery mode?

Cause:	Solution:
May be due to bottlenecks in the hub. In recovery mode, the device enumerates as a USB 1.1 device. Many USB 2.0 hubs provide a single transaction translator to manage USB 1.1 traffic. This creates a bottleneck reducing the bandwidth of connected devices in recovery mode.	Use a USB 2.0 hub that provides a transaction translator for each port to provide maximum bandwidth in both USB versions.

Error Codes

These are the possible errors that can occur during operations. They can assist in debug or in error reporting back to SigmaTel.

Code	Meaning
-1	STERR_NO_MEMORY
-2	STERR_INVALID_POS_IN_ARRAY
-3	STERR_INVALID_REQUEST
-4	STERR_INVALID_DRIVE_TYPE
-5	STERR_FUNCTION_NOT_SUPPORTED
-6	STERR_DATA_INCOMPLETE
-7	STERR_RES_ARRAY_UNINITIALIZED
-8	STERR_INVALID_MEDIA_INFO_REQUEST
-9	STERR_INVALID_DRIVE_INFO_REQUEST
-10	STERR_PUT_DATA_SIZE_EXCEEDS_ARRAY_SIZE
-11	STERR_FAILED_TO_OPEN_FILE
-12	STERR_FAILED_TO_READ_FILE_DATA
-13	STERR_FAILED_TO_WRITE_FILE_DATA
-14	STERR_FAILED_TO_FIND_DEVICE_IN_RECOVERY_MODE
-15	STERR_FAILED_TO_CREATE_EVENT_OBJECT
-16	STERR_DEVICE_TIMEOUT
-17	STERR_FAILED_TO_OPEN_REGISTRY_KEY
-18	STERR_FAILED_TO_FIND_DRIVE_LETTER_IN_REGISTRY
-19	STERR_FAILED_TO_LOAD_WNASPI32
-20	STERR_FAILED_TO_GET_FUNCTION_PTR_IN_WNASPI32_DLL
-21	STERR_STATE_OF_WNASPI32_NOT_INITIALIZED
-22	STERR_FAILED_TO_LOCATE_SCSI_DEVICE
-23	STERR_FAILED_TO_SEND_SCSI_COMMAND
-24	STERR_INVALID_DEVICE_HANDLE
-25	STERR_FAILED_DEVICE_IO_CONTROL
-26	STERR_DEVICE_STATE_UNINITALIZED
-27	STERR_UNSUPPORTED_OPERATING_SYSTEM
-28	STERR_FAILED_TO_LOAD_STRING
-29	STERR_NULL_DRIVE_OBJECT
-30	STERR_FAILED_TO_FIND_DRIVE_NUMBER
-31	STERR_FAILED_TO_LOCK_THE_DRIVE

-32	STERR_FAILED_TO_UNLOCK_THE_DRIVE
-33	STERR_BAD_CHS_SOLUTION
-34	STERR_UNABLE_TO_CALCULATE_CHS
-35	STERR_UNABLE_TO_PACK_CHS
-36	STERR_FAILED_TO_READ_SECTOR
-37	STERR_FAILED_TO_WRITE_SECTOR
-38	STERR_UNKNOWN_ERROR
-39	STERR_INVALID_FILE_SYSTEM_REQUEST
-40	STERR_FAILED_TO_DISMOUNT_THE_DRIVE
-41	STERR_FAILED_TO_LOAD_ICON
-42	STERR_MISSING_CMDLINE_PARAMETER_FILENAME
-43	STERR_MEDIA_STATE_UNINITIALIZED
-44	STERR_FAILED_TO_LOAD_SETUPAPI_LIB
-45	STERR_MISSING_API_IN_SETUPAPI_LIB
-46	STERR_FAILED_TO_LOAD_CFGMGR32_LIB
-47	STERR_MISSING_API_IN_CFGMGR32_LIB
-48	STERR_FAILED_TO_GET_DEVICE_INFO_SET
-49	STERR_FAILED_GET_DEVICE_REGISTRY_PROPERTY
-50	STERR_ERROR_IN_CFGMGR32_API
-51	STERR_FAILED_TO_CREATE_MUTEX_OBJECT
-52	STERR_FAILED_TO_BRING_THE_RUNNING_APPLICATION_TO_FOREGROUND
-53	STERR_FAILED_TO_LOCATE_SCSI_DEVICE_ON_START
-54	STERR_FAILED_TO_LOCATE_SCSI_DEVICE_ON_SHOW_VERSIONS
-55	STERR_FAILED_TO_GET_DRIVE_MAP
-56	STERR_INVALID_DISK_INFO
-57	STERR_FAILED_READ_BACK_VERIFY_TEST
-58	STERR_NO_ADMINISTRATOR
-59	STERR_FAILED_TO_DELETE_SETTINGS_DOT_DAT_FILE
-60	STERR_ERROR_OUT_OF_RANGE
-61	STERR_FAILED_TO_LOAD_RESOURCE_DLL
-62	STERR_ANOTHER_INSTANCE_RUNNING
-63	STERR_UNKNOWN_VENDOR_SPECIFIC_SENSE_CODE
-64	STERR_ERROR_IN_SETUPAPI_API