

Intelligent
Systems

binary configuration tool

User Guide

June 2016



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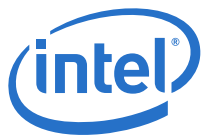
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Revision History

Date	Revision	Description
June 2016	1.4	Updated to support Intel(R) FSP EAS 2.0.
June 2015	1.3	Updated Linux OS from 14 to 22.
June 2013	1.2	Expanded section on the command line interface, updated screen shots, and removed redundancies.
March 2013	1.1	Updated Release package details.
January 2013	1.0	Initial release.

1.0 Introduction

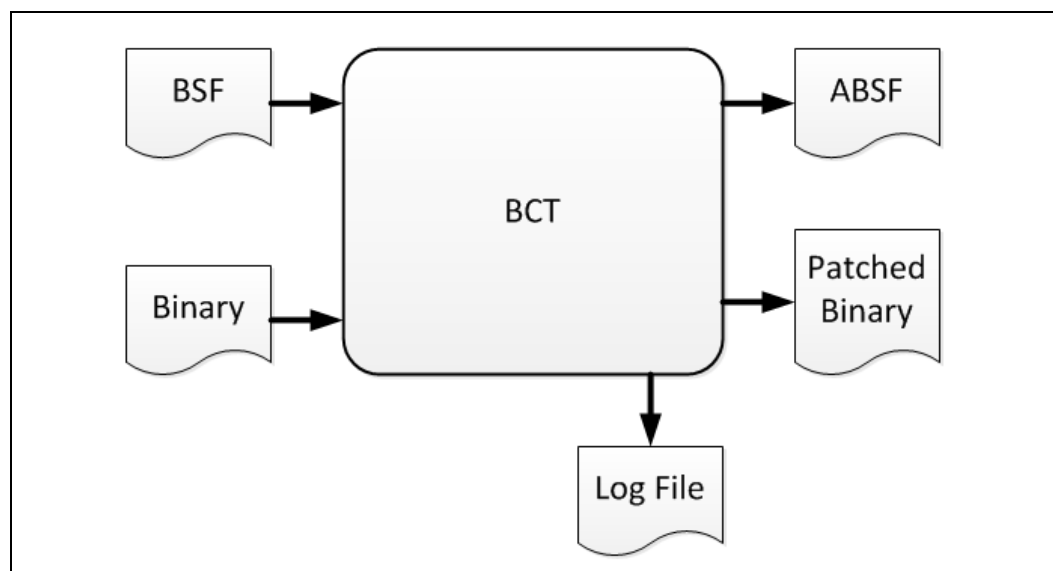
The binary configuration tool (BCT) is a utility used to change configuration settings embedded in a binary file. This enables the customer to use the BCT to customize the static FSP configuration parameters which are part of the Intel® FSP binary.

The figure below illustrates the basic input and outputs of the BCT.

The BCT reads a Boot Settings File (BSF) to provide a graphical interface for manipulating a binary's configuration settings. The BCT user can patch a binary with modified configuration settings.

In addition to the patched binary file, the BCT also produces an ABSF which is an augmented BSF that contains the configuration settings used to patch the binary file.

The BCT also produces a log file in the user's home directory named **bct.log**.



2.0 Download and Install Instructions

The tool can be downloaded as three separate packages, depending on the OS of the target system:

- Windows* installer with support for both 32- and 64-bit: bct-3.0.2-3-i686.win32.exe
- Linux* installer with support for 32-bit: bct-3.0.2-3-i686.fc22.tar.gz
- Linux installer with support for 64-bit: bct-3.0.2-3-x86_64.fc22.tar.gz where <x> is the current version

Follow installation instructions as detailed in the following sections. In each case the documentation is delivered with the package.

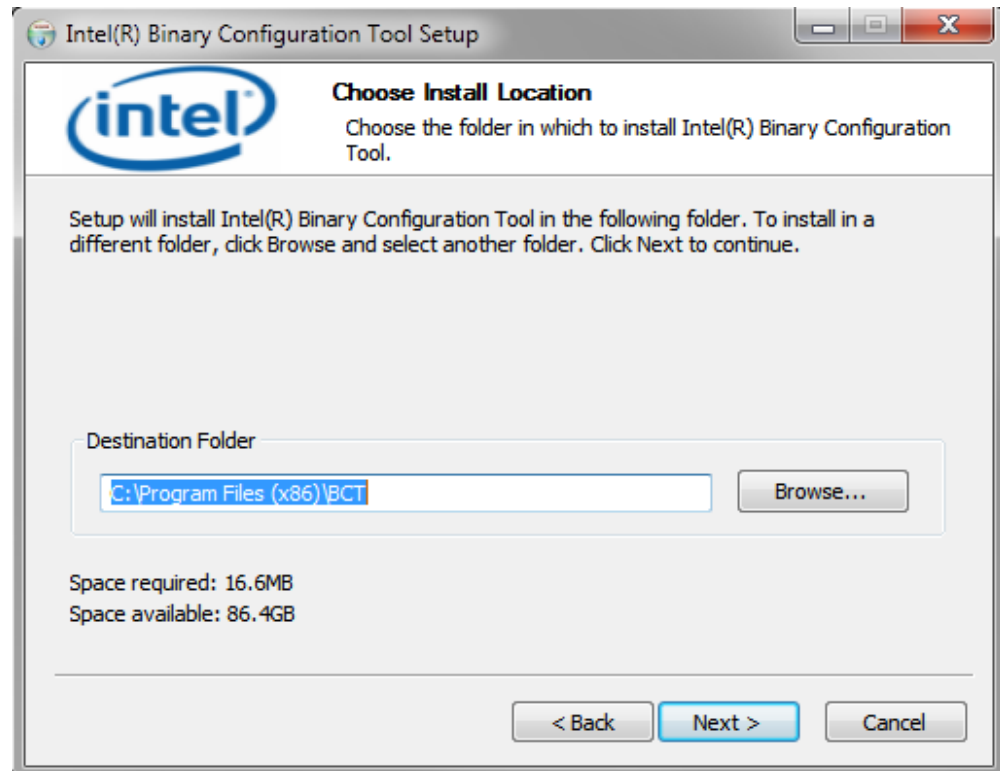
- Windows install: The supporting documents are in the installation directory.
- Linux install (both): The supporting documents are in the `documentation` directory.



Note: Please make sure you choose the right package to match your system to download and install. The screen shots in this document show examples for Crown Bay or Bay Trail. The platform name displayed during your installation will be based on the target platform you are using.

2.1 Windows Installation

The Windows Installer will copy files to `C:\Program Files(x86)\BCT` by default. The Windows UAC will prompt you to grant permission for the installer to start.

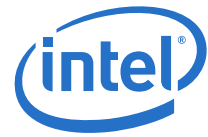


When BCT is run for the first time and the user accepts the End User License Agreement, the following files are created in the current user's home directory (`C:\Users\<user id>` in Windows and `/home/<user id>` in Linux):

- `.bctrc`
- `.bctstyle`
- `bct.log`

2.2 Linux Install

1. Copy the BCT `tar.gz` file to a local directory.
 - a. For 32-bit versions, choose `bct-<current version>.i686.fc22.tar.gz`
 - b. For 64-bit versions, choose `bct-<current version>.x86_64.fc22.tar.gz`



2. From the console terminal, navigate to the folder that contains the BCT tar.gz file and issue the following command:
 - a. For 32-bit versions, >tar -xvf bct-3.0.2-1-i686.fc22.tar.gz
 - b. For 64-bit versions, >tar -xvf bct-3.0.2-1-x86_64.fc22.tar.gz
3. The installation extracts a binary executable, `bct`, and three folders: `help`, `src`, and `documentation` inside a folder named `bct`.
4. Run the BCT program by issuing:


```
>cd bct
>./bct
```

3.0 Command Line Interface

The following command line is supported by the BCT:

```
bct [-v] [-h] [-d LEVEL] [-b BSF] [-i BIN] [-a [ABSF]] [-r [ADDR]] [-o BOUT] [-g] [-n]
```

where all arguments are optional and have the following meaning:

<code>-v, --version</code>	Emits version number and exits.
<code>-h, --help</code>	Show this help message and exits.
<code>-d LEVEL, --debug LEVEL</code>	Turn on LOGFILE messages at a specific log LEVEL which can be one of the following DEBUG, INFO, WARNING, ERROR, or CRITICAL. The default LEVEL is INFO.
<code>-b BSF, --bsf BSF</code>	Specifies the Boot Settings File, BSF. If BSF is used on the command line without specifying BIN or ABSF, then BCT opens BSF in the GUI.
<code>-i BIN, --bin BIN</code>	Specifies the Binary input file, BIN, to be configured.
<code>-a [ABSF], --absf [ABSF]</code>	Specifies the 'As Built' Boot Settings File, ABSF, to create. If ABSF is omitted, an ABSF will be generated in CLI Mode and named after the BSF except with a .absf file name extension. See CLI Mode below.
<code>-r [ADDR], --reloc [ADDR]</code>	Specifies the relocation load address, ADDR, of BIN which must also be specified via --bin or -i. The ADDR value must be hexadecimal, with or without the 0x prefix. If ADDR is omitted, then the binary's current load address will be emitted.



-o BOUT, --bout BOUT Specifies the binary output file name, BOUT.
-g, --gui Forces the graphical user interface to run.
-n, --info Displays the description table in the binary, if it has one.

The argument values [ABSF] and [ADDR] are optional.

CLI Mode

The following argument signatures will cause BCT to execute in command line mode without a GUI, unless the --gui option is also specified:

(--bin|-i) BIN (--bsf|-b) BSF [--reloc|-r] ADDR [--bout|-o) BOUT]
Patch binary BIN using setting in BSF, optionally rebase with load address ADDR and specify output file BOUT. An ABSF will be created with the same filename as BSF except with a .absf extension. If BOUT is omitted then BCT creates a new binary with the same filename as BIN except with a .rom extension.
Please note that if you want to rebase the load address, a valid address must be specified. It is not optional in this case.

(--bin|-i) BIN (--absf|-a) [ABSF] [--reloc|-r] ADDR [--bout|-o) BOUT]
Patch binary BIN using the settings in ABSF, optionally rebase with load address ADDR and specify output file BOUT. If ABSF is omitted, BCT will attempt to use an ABSF file with a path generated from BIN's filename with a .absf extension. If BOUT is omitted then BCT creates a new binary with the same filename as BIN except with a .rom extension. Please note that if you want to rebase the load address, a valid address must be specified. It is not optional in this case.

(--bin|-i) BIN (--reloc|-r) [ADDR] [--bout|-o) BOUT]
Relocate the base address of the binary specified by BIN and save it as BOUT.
If ADDR is omitted, then the current base address of BIN is printed. If BOUT is omitted then BIN will be over-written with the new base address.

(--bsf|-b) BSF (--absf|-a) [ABSF]
Create an ABSF file from a BSF file, using the defaults specified in BSF.
If ABSF is omitted, then an ABSF file is created with the name of the BSF with a .absf extension, otherwise BCT saves to ABSF.

(--bin|-i) BIN (--info|-n)
Print the description table that's in BIN, if it has any.

(--bin|-i) BIN (--relocm|-m) ADDR_M (--relocs|-s) ADDR_S (--reloct|-t) ADDR_T [--bout|-o) BOUT]
Relocate the base address of the binary specified by BIN and save



it as BOUT.

This command is used for rebasing a full FSP 2.0 Binary with FSP-M, FSP-S, FSP-T components. If BOUT is omitted then BIN will be overwritten with the new base address.

4.0 Quick Start Guide

The following sections document the basic work flow usage model of the BCT and are intended to educate the user as quickly as possible in the basic usage of the BCT.

For a comprehensive walk through of the BCT's Graphical User Interface components see "[GUI Overview](#)".

4.1 Changing Binary Configuration Settings

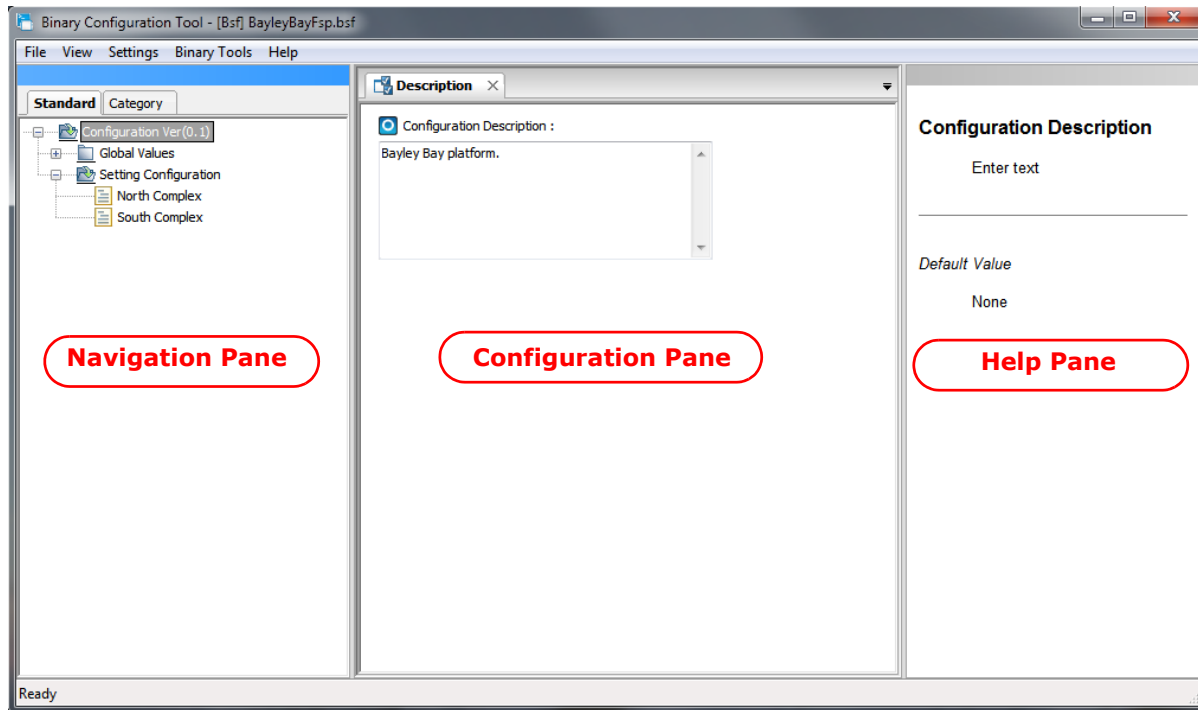
To modify one or more configuration settings in a binary file, the following BCT usage model should be followed after starting the BCT:

1. Open the BSF associated with the binary file.

This can be accomplished by doing **one** of four actions below:

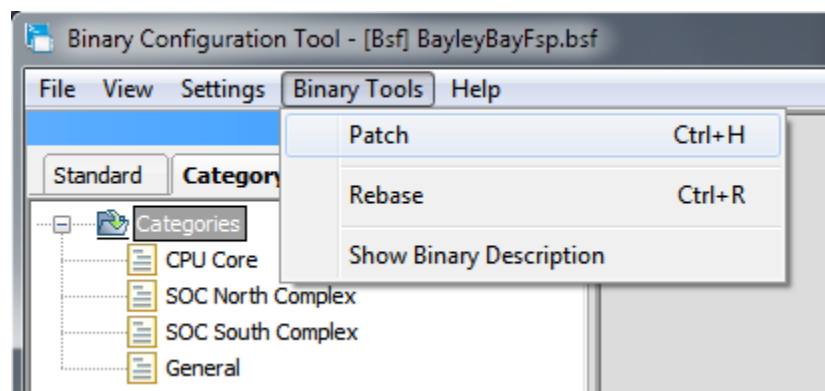
- Selecting the File --> Open menu item
- Selecting the Open BSF button
- Selecting the Settings --> Load menu item
- Select a file from the Recently Used Files list. File --> <File>

Configuration settings displayed in the center pane (the **Configuration Pane**) can be modified. The right pane (the **Help Pane**) will change as configuration settings are floated over by the mouse cursor. The left pane (the **Navigation Pane**) can be used to traverse the configuration settings tree under the **Standard** or **Category** tabs.



The **Category** tab offers an alternative way of navigating the configuration settings tree.

2. After you have modified the configuration settings as necessary, patch the binary associated with the BSF by selecting the Binary menu's **Patch** menu item.

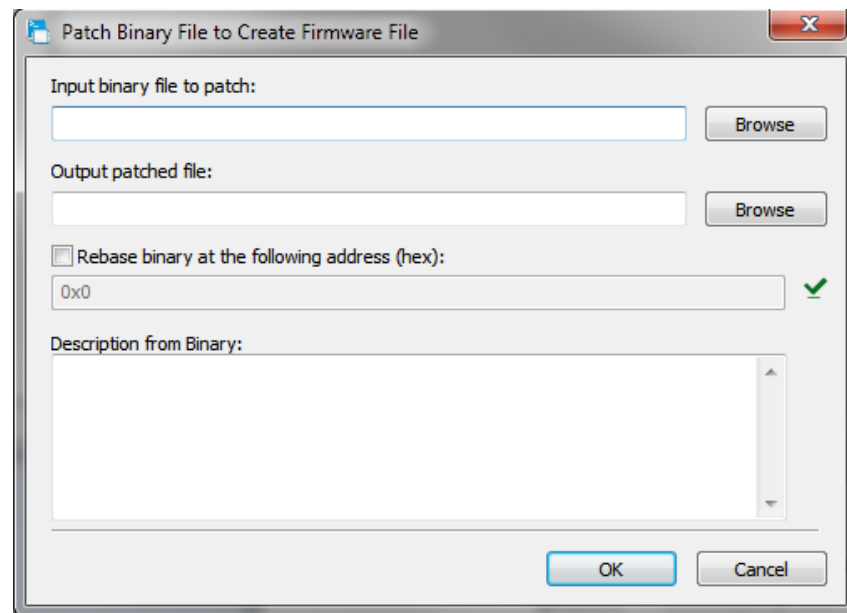


The configuration settings are saved to an ABSF.

Note: The ABSF file name used has the same base name as the BSF file but with a .absf file name extension rather than a .bsf file name extension.

The ABSF file can be used at a later date to update a binary with its saved configuration. See ["Creating a Final Firmware Image from an ABSF"](#).

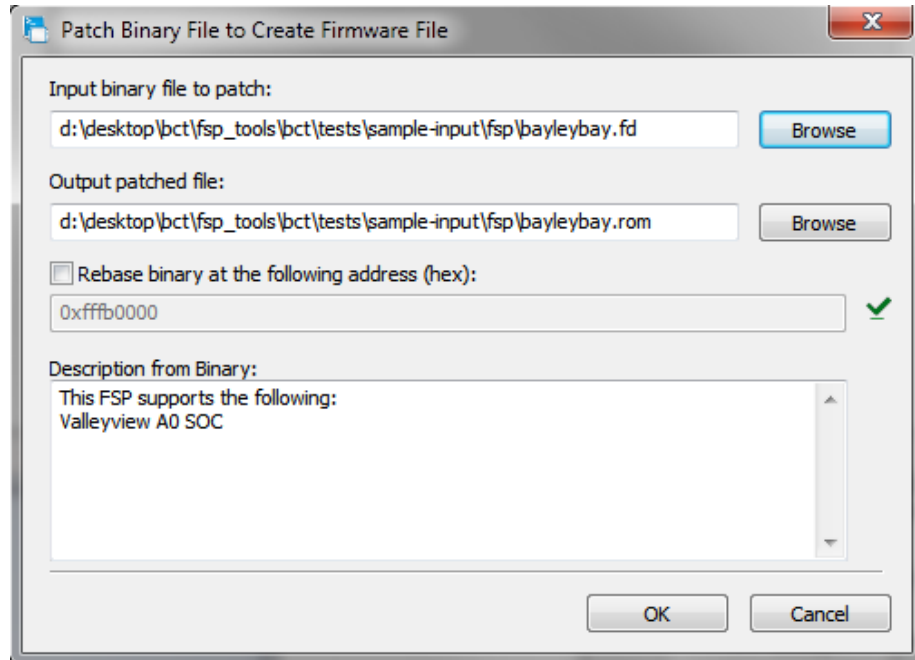
After the configuration settings have been saved to the ABSF, another dialog is displayed asking the user to browse to the binary file associated with the BSF and to provide a new firmware image file name that will contain the patched configuration settings.



If the binary contains a description table, it will be displayed in the "Description from Binary" area.

3. After both the binary file and the firmware file names have been supplied, select the **OK** button to patch the binary file and create the firmware file specified.

Note: By default the firmware file name is constructed by taking the binary file's base name (its name without a file extension) and adding the file extension `.rom` as shown below.



Optionally, the load address of the firmware file can be rebased. See the next section.

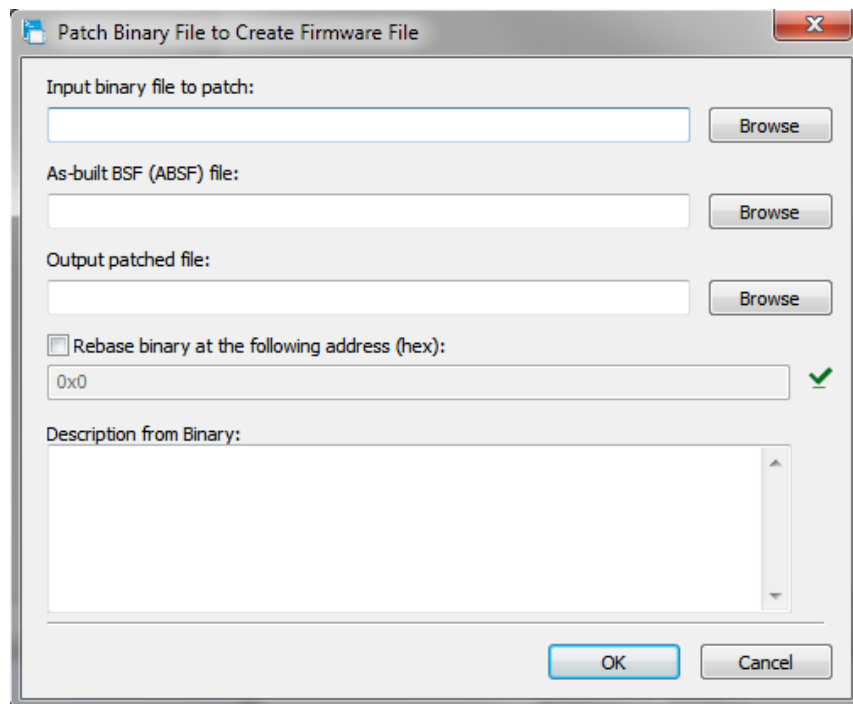
Successful creation of a Firmware image will display "Firmware file has been created successfully." in the status bar.

4.2 Creating a Final Firmware Image from an ABSF

When a binary file has its configuration settings changed, an ABSF is generated. This **ABSF** file can be used to modify binary files without the user having to load a BSF and manually change the configuration settings as described in the previous section.

To update a binary file with settings saved in an **ABSF**, select the **Binary --> Patch** menu *without* previously loading a **BSF**. Or, click "Patch Binary with ABSF" before loading a BSF.

This action will display the following dialog:



4. Use the **Browse** buttons to select the Binary, As built (**ABSF**) file, and the Firmware file to be created.

Optionally, the Firmware file can be rebased. See the next section for details.

5.0 Rebasing

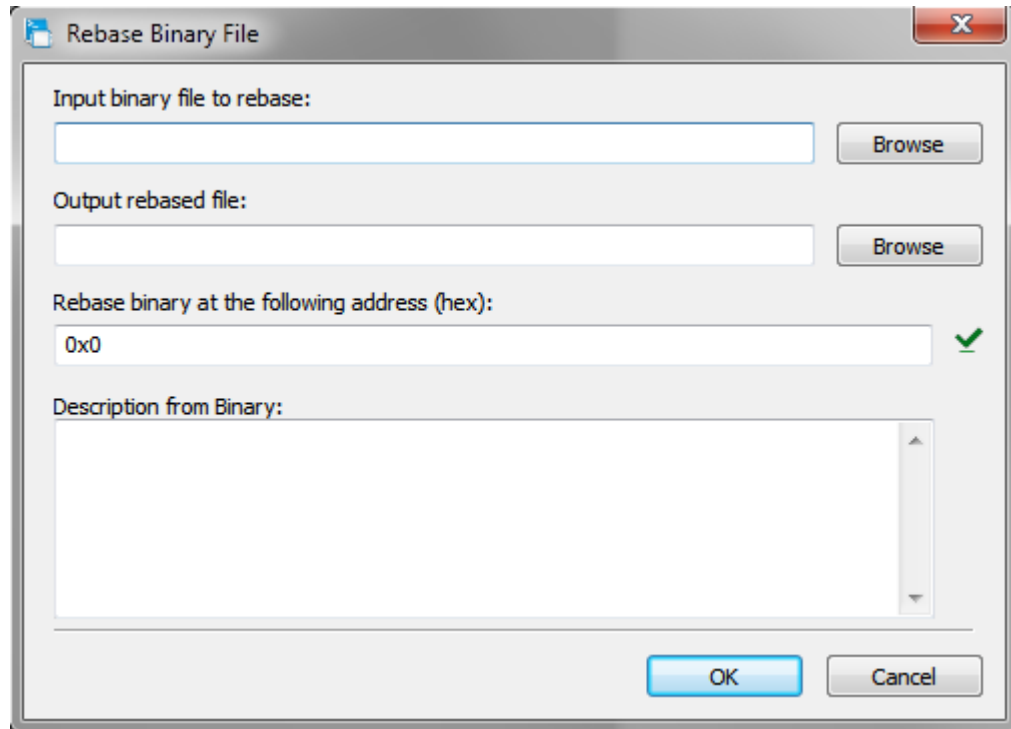
During integration of the Intel® FSP and the host boot loader, you will need to place the Intel® FSP binary at a default physical location based on the instructions provided by the FSP Integration Guide for that platform. If the default address needs to be relocated, you need to use the following Rebase tool to relocate the binary to another location in ROM.

The following section explains the process.

5.1 Rebasing the Load Address of a Binary

A binary file can be rebased without using a BSF by selecting the **Binary --> Rebase** menu item or “Rebase a Binary” before a BSF is loaded.

The following dialog is used to input the binary file name to rebase and the rebase address:



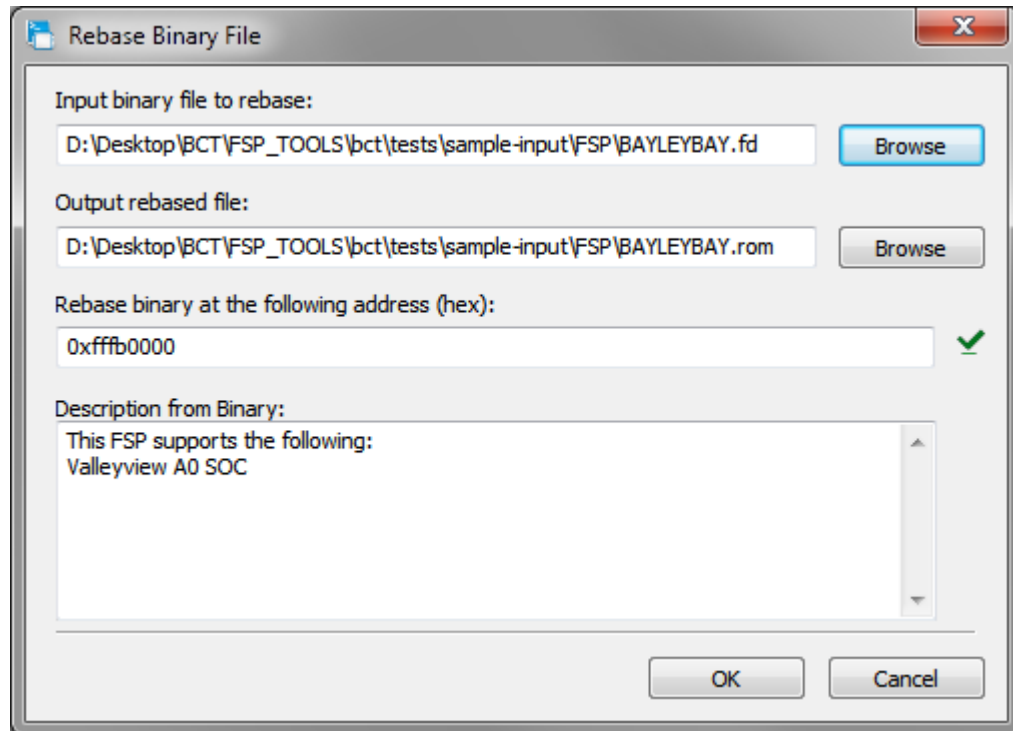
The dialog box is titled "Rebase Binary File". It contains the following fields and controls:

- Input binary file to rebase:** A text input field with a "Browse" button to its right.
- Output rebased file:** A text input field with a "Browse" button to its right.
- Rebase binary at the following address (hex):** A text input field containing "0x0" with a green checkmark icon to its right.
- Description from Binary:** A large text area for input.
- Buttons:** "OK" and "Cancel" buttons at the bottom right.

The **Browse** button is used to navigate and select the binary file to be rebased.

If the selected binary is a FSP, its current load address will appear in the **Firmware File Rebase HEX Address** input string widget.

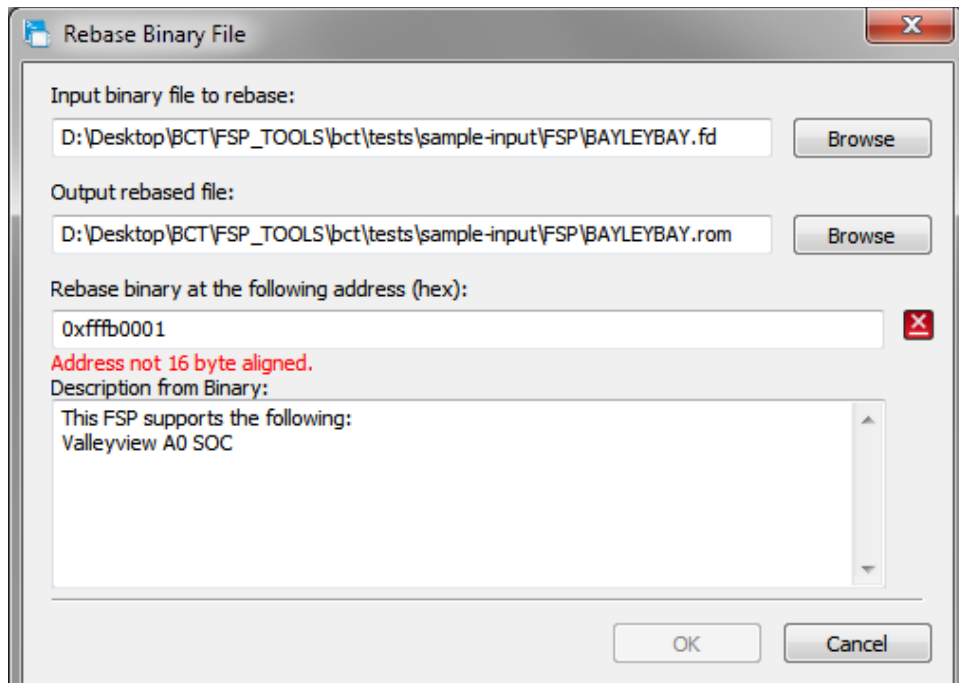
To change the load address of the binary, check the **Enable Rebase** check box.



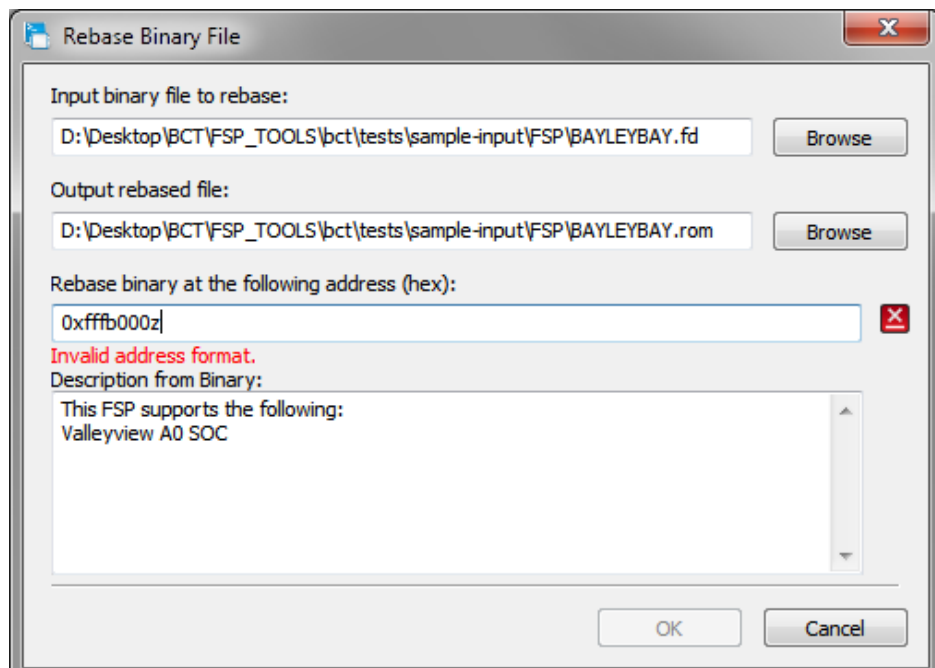
A valid hexadecimal can be entered in the **Firmware File Rebase HEX Address** field. A valid range is 0x00000000 thru 0xFFFFFFFF. The format of the entry can include uppercase or lowercase hex characters and *any* combination of the following prefixes and suffixes:

- a **0x** prefix, as in 0xFFFFA000
- a **H** suffix, as in FFFFA000H
- a **h** suffix, as in FFFFA000h
- a **L** suffix, as in FFFFA000L

If the user enters an invalid hexadecimal entry, the green check mark turns to a red X and a descriptive error message is displayed. Validation tests include a range check, as shown in the following example.



Validation tests include a hexadecimal character check, as shown below:



A successfully validated hexadecimal address will not generate an error dialog.

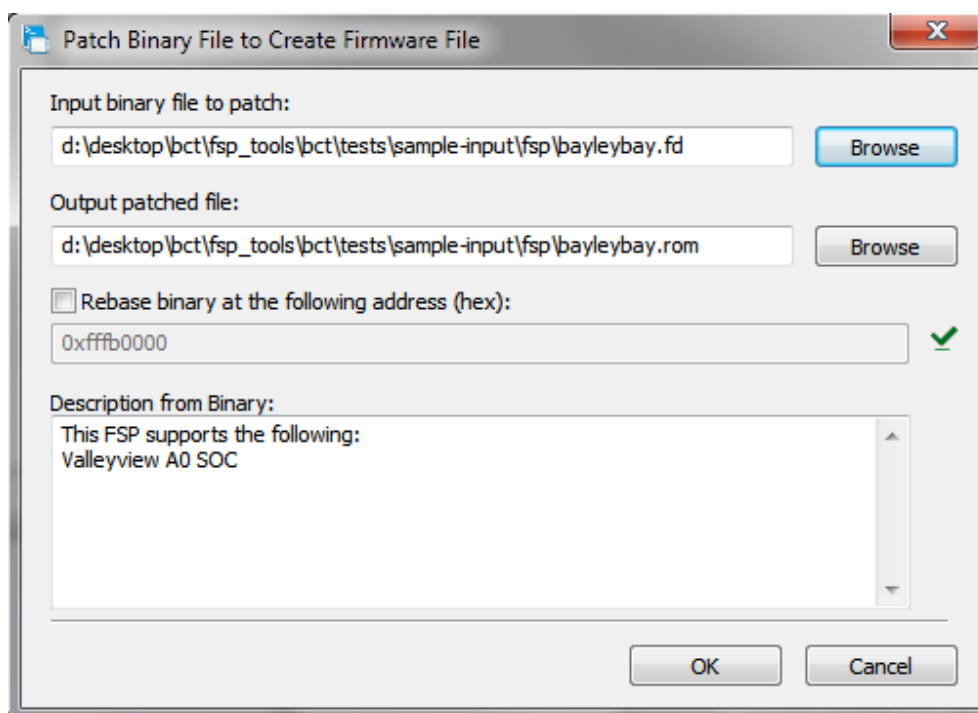
Selecting **OK** will patch the binary file creating the firmware file specified and then rebase the firmware file.

Note: The rebase process generates its own log file **rebase.log**.

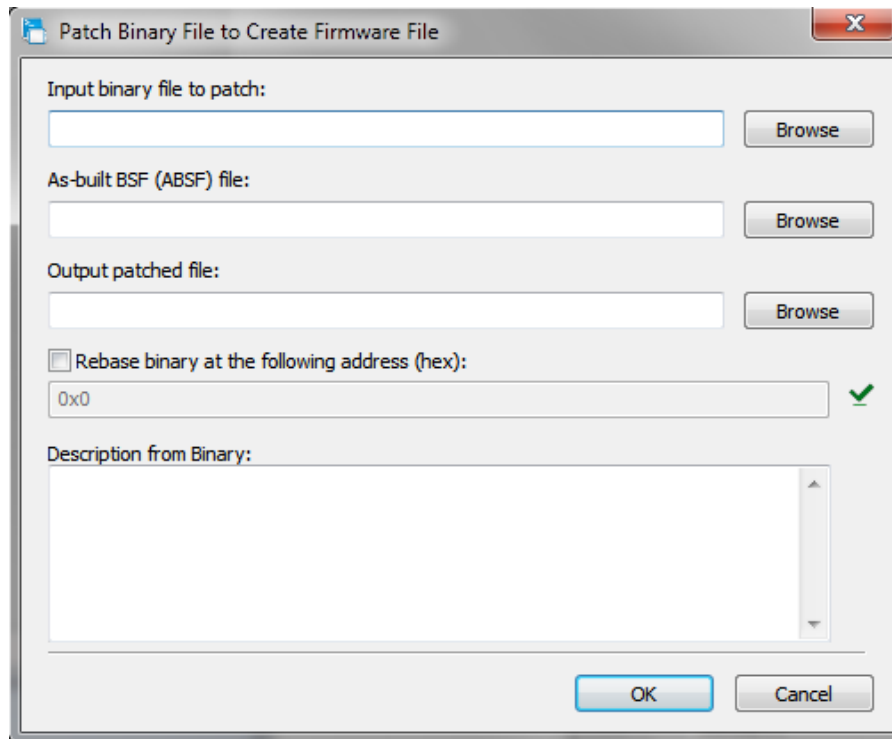
5.2 Optional Rebasing the Load Address of the Created Firmware

Both forms of the dialog titled **Patch Binary File to Create Firmware File** can optionally rebase (change the load address) the created firmware file (*.rom).

In this form:



Or this form:



6.0 GUI Overview

This section provides a brief description of each graphical interface component.

6.1 BCT Major Graphical Components

- The **Menu Bar** is the primary interface through which the user interacts with the BCT to open a BSF and patch the binary file.
- The **Navigation Pane** provides an interface for the user to traverse the configuration settings tree (once a BSF is opened) and change the view provided in the **Configuration Pane**.
- The **Configuration Pane** provides an interface for the user to manipulate specific configuration settings.
- The **Help Pane** by default is enabled to display additional help information about a specific item selected in the **Configuration Pane**.
- The **Status Bar** typically displays help messages when a menu or toolbar item is under the mouse cursor.

6.2 Menu Overview

This section provides a quick overview of the various BCT Menus.

6.2.1 File Menu

The File Menu options are:

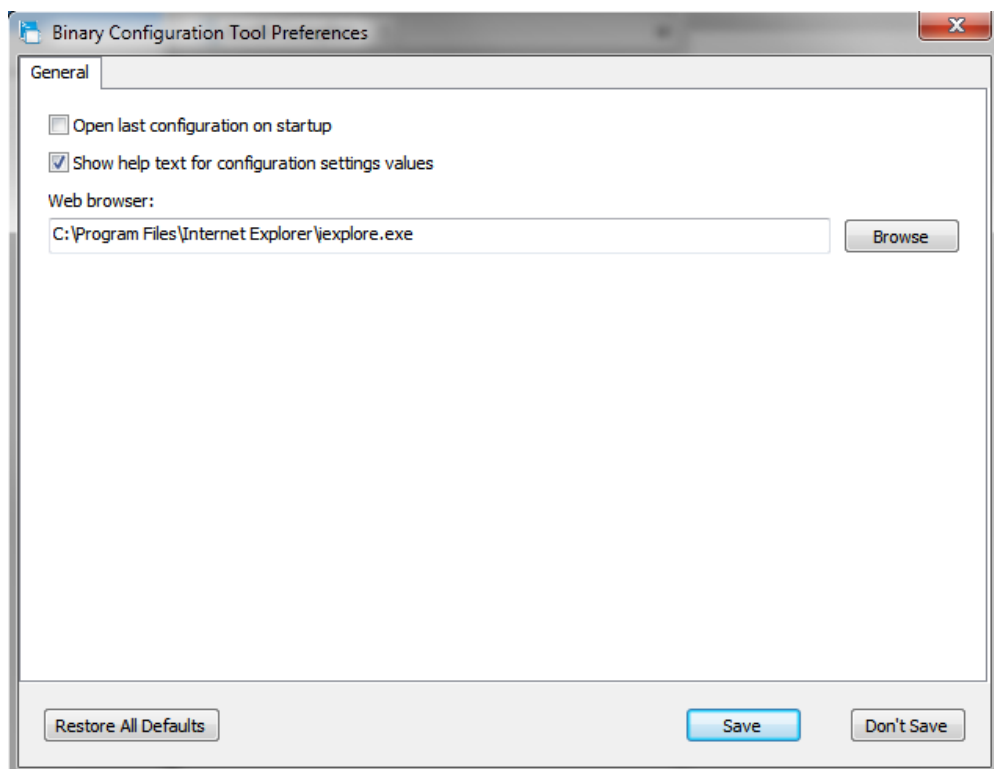
- Open - Open a BSF
- Preferences - Manipulate BCT preferences
- Exit - Exit BCT
- List of the five most recently opened BSFs

Note: The BSF may be opened using the Settings Menu (see "[Settings Menu](#)").

6.2.2 Preferences

The **File --> Preferences** menu selection opens a Preferences Dialog:

Figure 1. Preferences Dialog



The Preferences dialog allows the user to:

- Choose whether the last configuration should be opened on the next startup
- Choose to suppress configuration setting help messages that appear in the **Help Pane**
- Define a specific web browser to use to display the help documentation

6.2.3 View Menu

The View Menu provides an interface for the user to manipulate various graphical components.

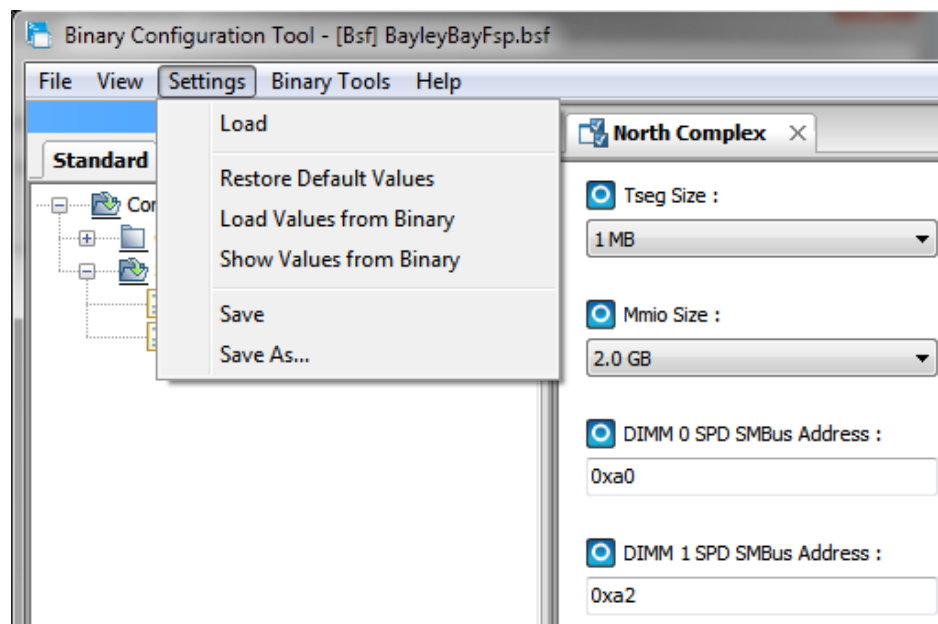
The View Menu selections have the following meanings.

View Menu Selection	Description
View --> Status Bar	Toggle the display of the Status Bar
View --> Side Windows	Toggle the display of the Navigation , Help , and Output Panes .

6.2.4 Settings Menu

The Settings Menu is shown in the figure below.

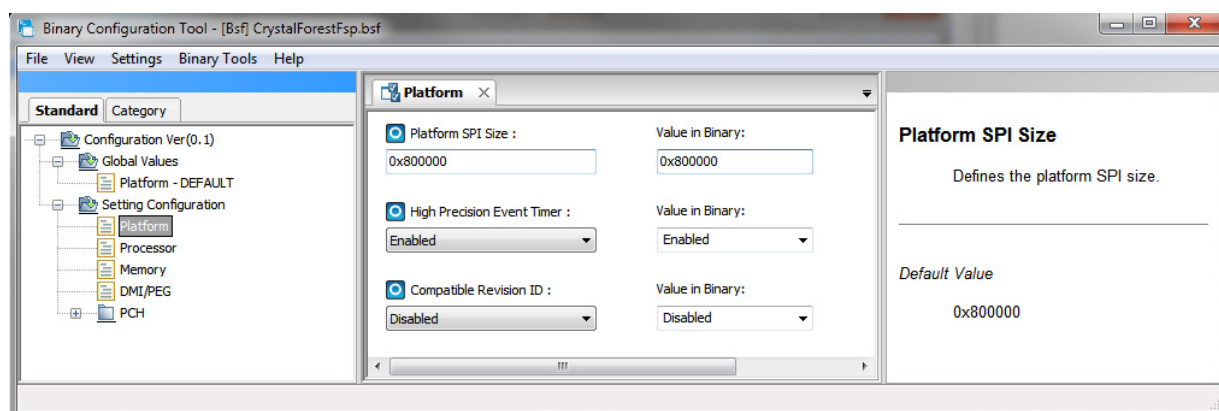
Figure 2. Settings Menu



The Settings Menu provides an interface to manipulate configuration settings as defined in the table below.

Settings Menu Selection	Description
Load	Load a BSF. See also "File Menu".
Restore Default Values	Re-load default values defined in the BSF. Any configuration setting changes will be restored to default values.
Load Values from Binary	Load configuration setting values from a binary file. Configuration setting changes will be reset to their values in the binary.
Show Values from Binary	Load configuration setting values from a binary file and display them beside the current configuration settings. See Figure 3 .
Save	Save the current configuration settings to an ABSF that uses the same base name as the BSF, but has a .absf file extension.
Save As...	Save the current configuration settings to an ABSF that the user names.

Figure 3. Binary Configuration Setting Values



6.2.5 Binary Tools Menu

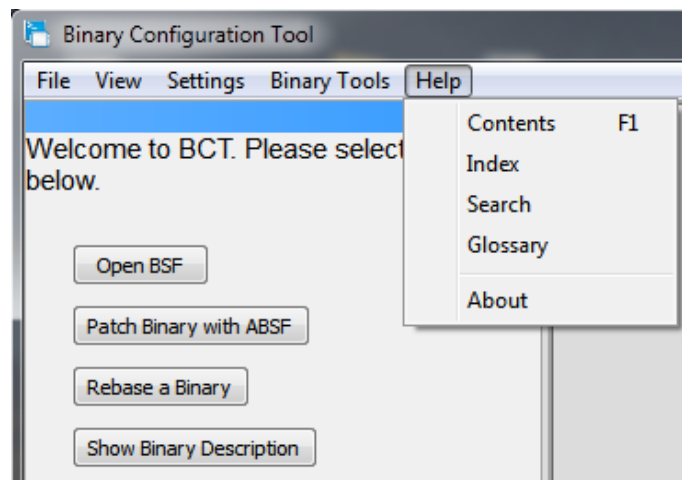
The Binary Tools Menu provides an interface to patch a binary file with the current configuration settings.

Binary Menu Selection	Description
Binary --> Patch	<p>Opens one of two dialogs depending on if a BSF has previously been loaded. If a BSF has previously been loaded, then the dialog will accept:</p> <ul style="list-style-type: none"> a binary file name to patch the resulting patched binary (firmware) file name to create <p>See "Changing Binary Configuration Settings".</p> <p>If no BSF was previously loaded, then the dialog will accept:</p> <ul style="list-style-type: none"> a binary file name to patch an As-built BSF (.absf) file the resulting patched binary (firmware) file name to create <p>See "Creating a Final Firmware Image from an ABSF".</p> <p>Both the above dialogs also contain a rebase check box that will enable rebase address entry and will rebase the firmware file after it has been created.</p>
Binary --> Rebase	Opens a dialog that accepts a binary file name and a rebase hexadecimal address.

6.2.6 Help Menu

The Help Menu provides access to this built-in help documentation and provides access to the About dialog.

Figure 4. Help Menu





The following table defines what each help menu selection does.

Help Menu Selection	Description
Help --> Contents	Invokes a web browser to display the Help Table of Contents
Help --> Index	Invokes a web browser to display the Help Index
Help --> Search	Invokes a web browser to display the Help Search page
Help --> Glossary	Invokes a web browser to display the Help Glossary page
Help --> About	Displays the About dialog that identifies the BCT version and provides access to licensing information

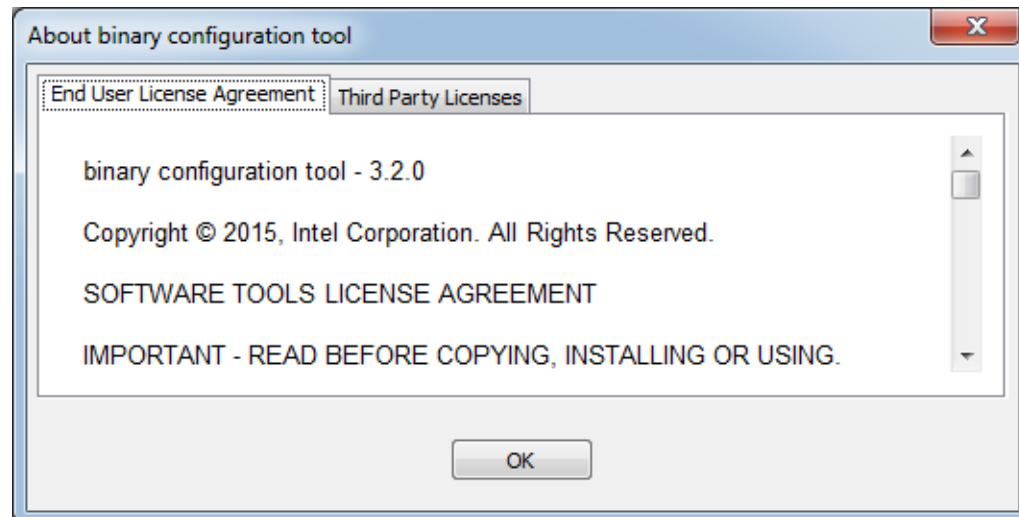
6.2.6.1 About Dialog

The About dialog displays BCT version information and a License Agreement selection that provides a tabbed interface to the BCT License Agreement and/or a reference list of third-party licenses associated with the external packages used by BCT.

Figure 5. About Dialog











Figure 6. About Dialog - Licensing Agreements



6.3 Configuration Setting Value Indicators

The following table identifies the various icons that are used to indicate the change or error states of a configuration data value and any help message that might be associated with the state indicated by the icon.

Icon	Displayed when	Message
	Normal, unchanged state	None
	Value has been changed, no error detected	None
	An invalid value has been entered	The message will provide information on what type of value is permitted
	Value entered is outside the acceptable range	Entered value is outside acceptable range
	As built value does not match the binary value	None
	A Profile has been selected and the value entered does not match the binary value	None
	Unknown value	The initial value was not set or cannot be determined
	Two or more values are in conflict	The message will provide information on resolving the conflict



6.4 Controlling View of the Main Panes

The main panes are the **Navigation Pane**, the **Configuration Pane**, and the **Help Pane** (see ["GUI Overview"](#)).

If you are unable to view the entire width of the screen, you can hide either the right side **Help Pane** or the left side **Navigation Pane**.

Scroll bars will allow you to move vertically and horizontally in the **Configuration Pane**. The **Configuration Pane** cannot be hidden.

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8.0 Glossary

Table 1. Glossary

ABSF	As-built Boot Settings File Similar to the BSF but also contains the configuration values used to patch the binary file. See the Basics section for contextual information regarding the ABSF.
BCT	binary configuration tool
BSF	Boot Settings File Contains a description of the configurable settings embedded in a binary file. This description includes: <ul style="list-style-type: none">• default value• help message describing the data• constructs used to represent a graphical interface to manipulate the data• location and size of the data in the binary file See the Basics section for contextual information regarding the BSF.
FSP	Firmware Support Package Provides an interface that initializes silicon components (CPU, chipset, and memory).
GUI	Graphical User Interface
Rebase	To change the binary file's load address

