

# **BCT User's Guide**

**version 3.2.0**

**Intel Corporation**

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# binary configuration tool User Manual

The binary configuration tool is a utility used to change configuration settings embedded in a binary file.

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### *Basics*

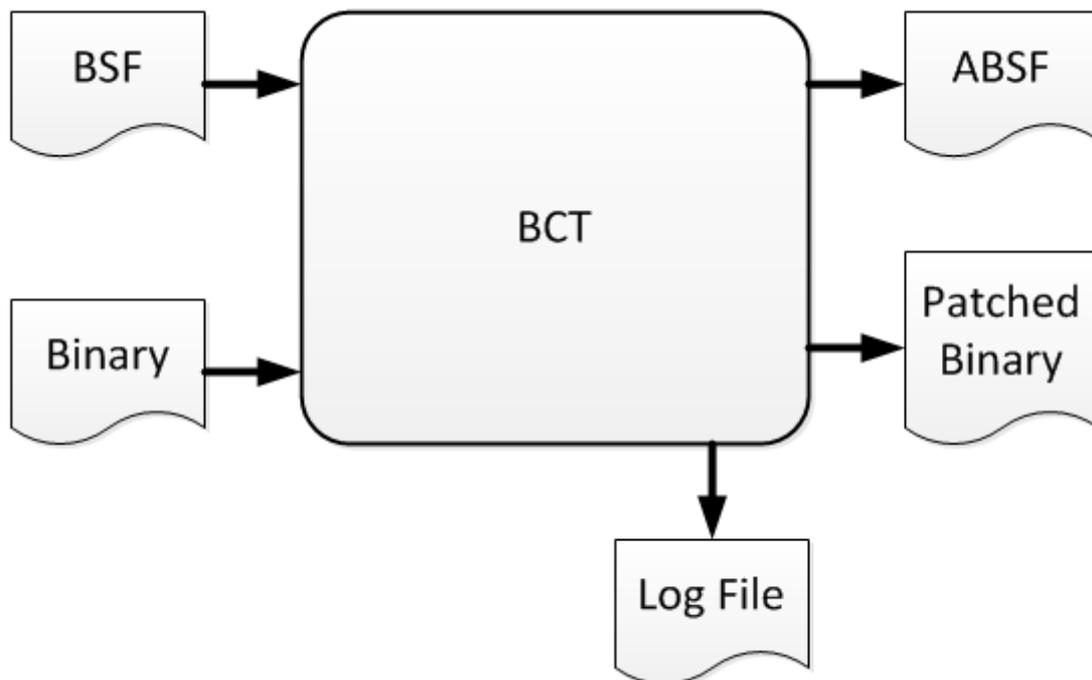
The binary configuration tool is a utility used to change configuration settings embedded in a binary file. This enables the customer to use the BCT to customize the static FSP configuration parameters which are part of the Intel® FSP binary.

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 current directory named **bct.log**.



### *Download and Install Instructions*

BCT comes as a stand-alone .exe installer for Windows and as a tarball for Linux. BCT was tested and validated on Fedora 14, which will be the only supported Linux distribution.

The Release package when unzipped will contain the following:

- `bct-release<X>-i686.fc14.tar.gz` (32-bit Linux)
- `bct-release<X>-x86-64.fc14.tar.gz` (64-bit Linux)
- `bct-release<X>-i686.win32.exe` (Windows)

## Note

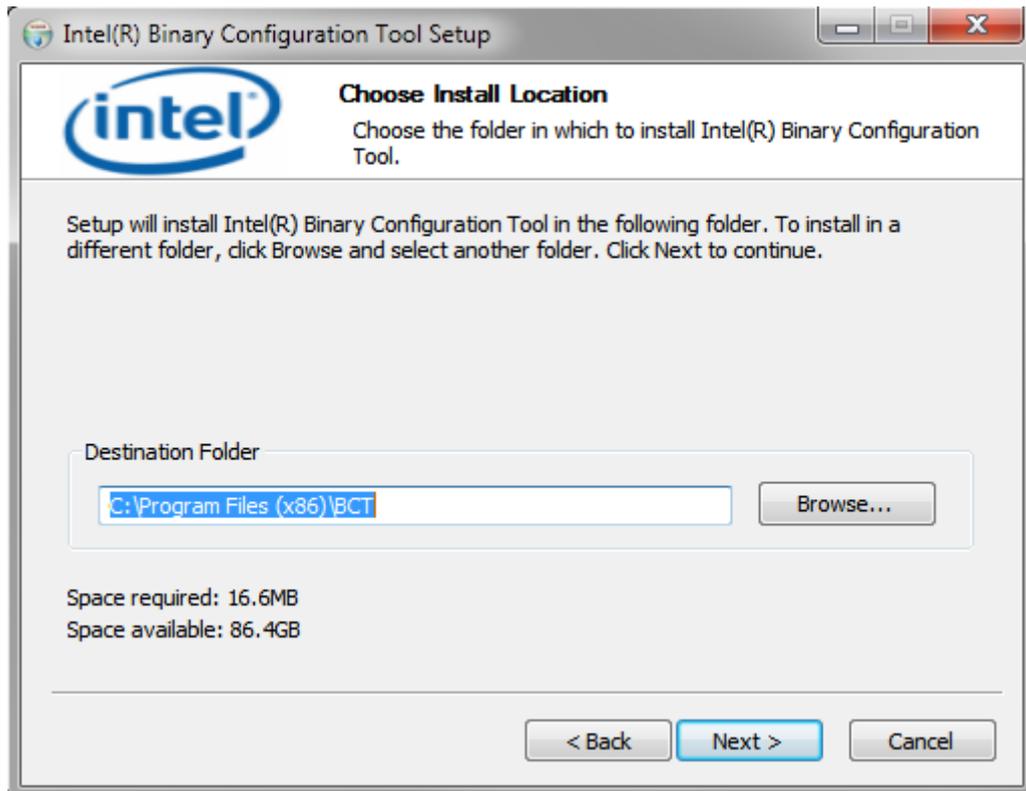
Please make sure you chose the right package to match your system to download and install. Also, the value of <X> will change with each release.

## 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 current user's home directory (C:\Users\

- .bctrc
- .bctstyle
- bct.log

## Linux Install

1. Copy the BCT tar.gz file to a local directory.
  - a. For 32-bit versions, choose bct-<X>-i686.fc14.tar.gz
  - b. For 64-bit versions, choose bct-<X>-x86\_64.fc14.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-<X>-i686.fc14.tar.gz
  - b. For 64-bit versions, >tar -xvf bct-<X>-x86\_64.fc14.tar.gz

**Note**

The name of the file will change with each release.

- The installation extracts a binary executable `bct` and two folders: `help` and `xrc`. Both are necessary for BCT to work.
- Run the BCT program by issuing:

```
> ./bct
```

**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:

```
-v, --version           Emits version number and exits.

-h, --help              Show this help message and exits.

-d LEVEL, --debug LEVEL
                        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.

-b BSF, --bsf BSF      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.

-i BIN, --bin BIN       Specifies the Binary input file, BIN, to be configured.

-a [ABSF], --absf [ABSF]
                        Specifies the 'As Built' Boot Settings File, ABSF, to
                        create. If ABSF is omitted, then an ABSF will be
                        generated in CLI Mode and named after the BSF except with
                        a .absf file name extension. See CLI Mode below.

-r [ADDR], --reloc [ADDR]
                        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.
```

## Quick Start Guide

The following sections document the basic work flow usage model of the BCT and are indented 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](#).

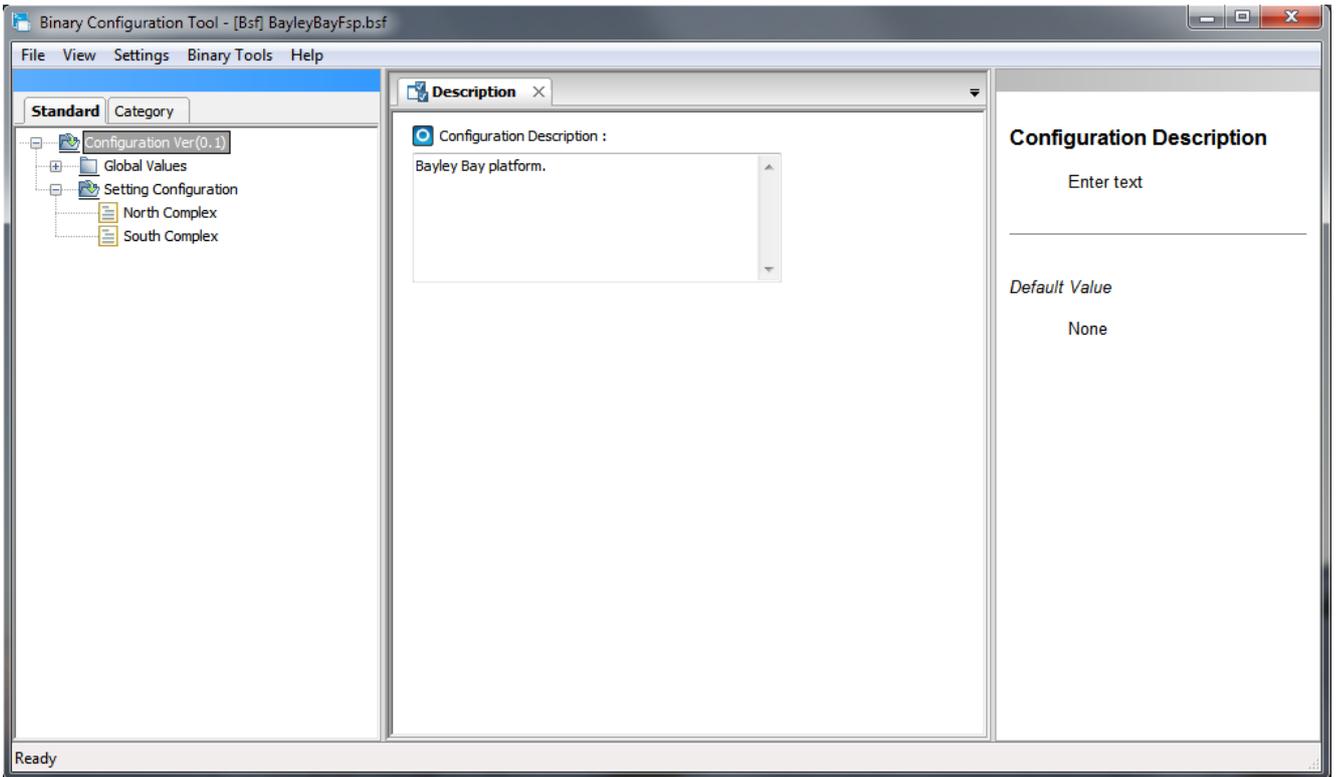
## Changing Binary Configuration Settings

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

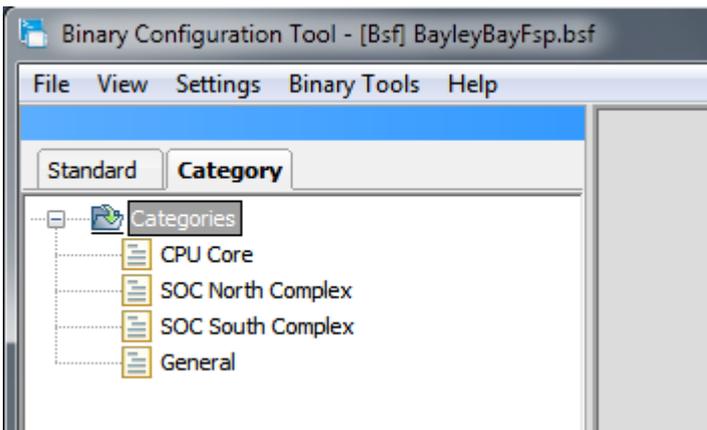
Open the *BSF* associated with the binary file. This can be accomplished by doing one of four actions below:

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

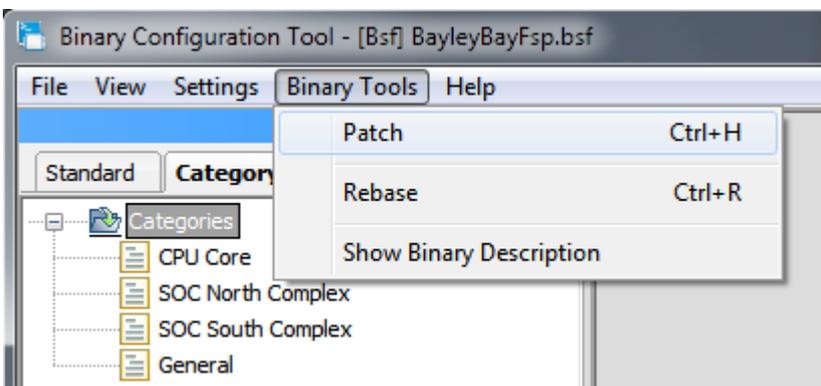
Configuration settings displayed in the center pane (the **Configuration Pane**) can be modified. The right pane (the **Help Pane**) will change as configuration settings are floated over by the mouse cursor. The left pane (the **Navigation Pane**) can be used to traverse the configuration settings tree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



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



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.



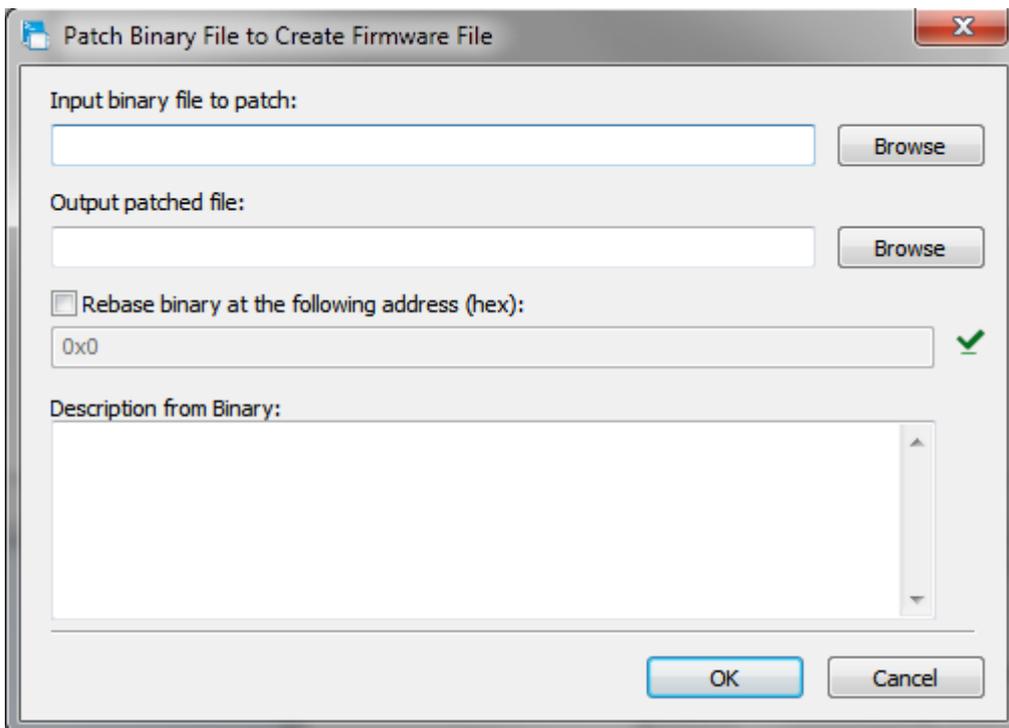
The configuration settings are saved to a *ABSF*.

### 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*, then another dialog will be 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 contained the patched configuration settings.

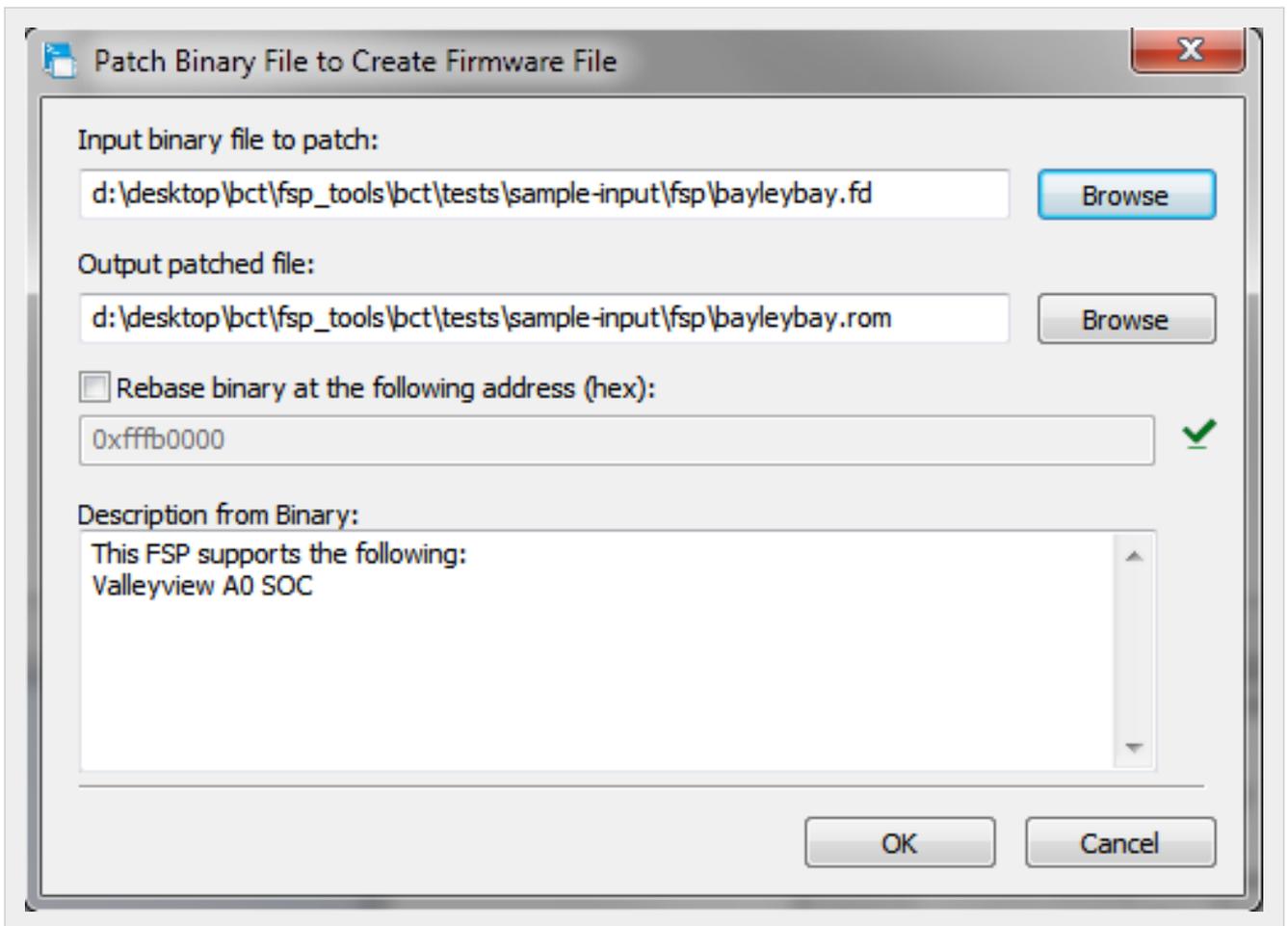


If the binary contains a description table, it will be displayed in the "Description from Binary" area.

After both the binary file and the firmware file names have been supplied, selecting the **OK** button will patch the binary file creating 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 [Optional Rebasing the Load Address of the Created Firmware](#).

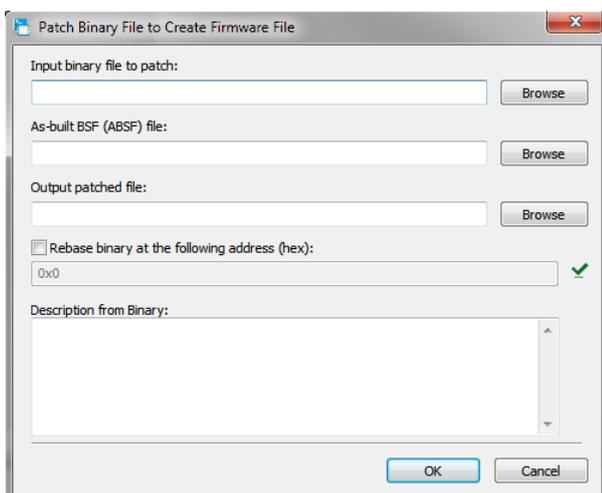
Successful creation of a firmware image will display "Firmware file has been created successfully." in the status bar.

### 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 Tools--> Patch** menu *without* previously loading a **BSF**. Or, click on the "Patch Binary with ABSF" button before loading a **BSF**.

This will display the following dialog:



The **Browse** buttons can be used to select the Binary, As built (**ABSF**) file, and the Firmware file to be created.

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

Optionally, the load address of the firmware file can be rebased. See *Optional Rebasing the Load Address of the Created Firmware*.

## 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.

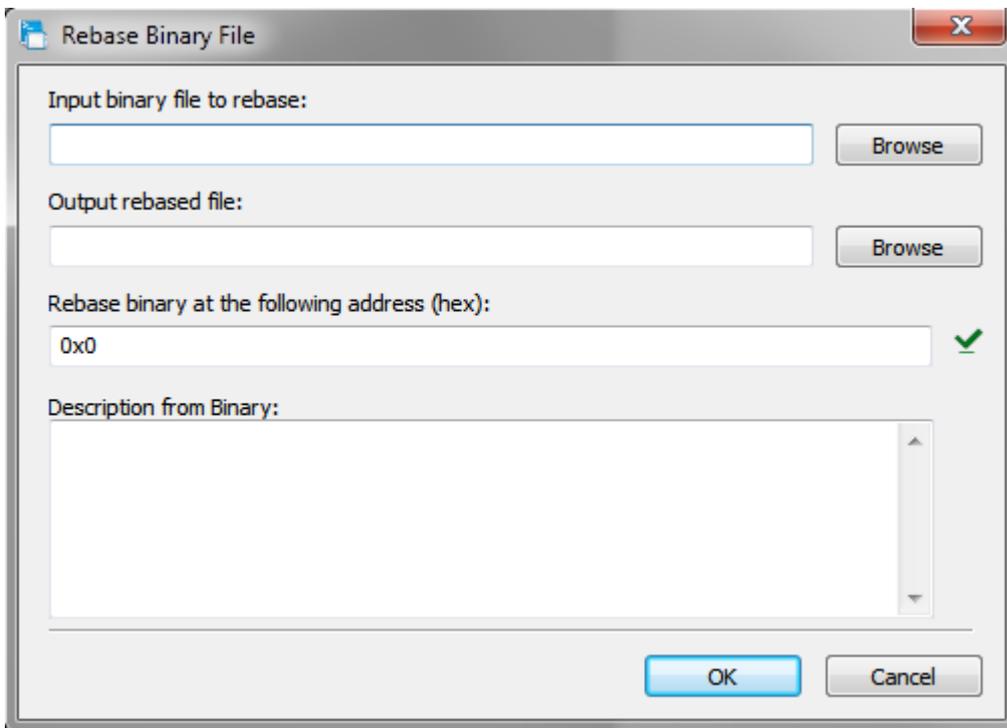
Rebasing is only available for FSP binaries.

The following section explains this process.

### Rebasing the Load Address of a Binary

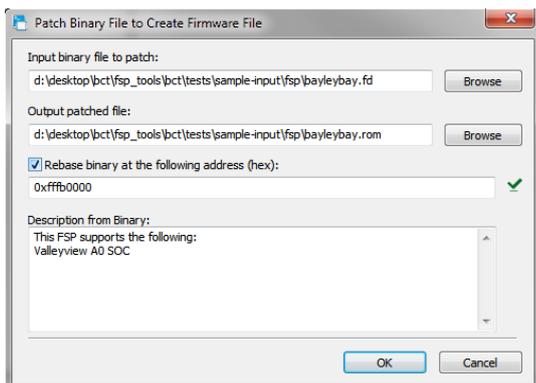
A binary file can be rebased without using a BSF by selecting the **Binary Tools--> Rebase** menu item or the "Rebase a Binary" button before a BSF is loaded.

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



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

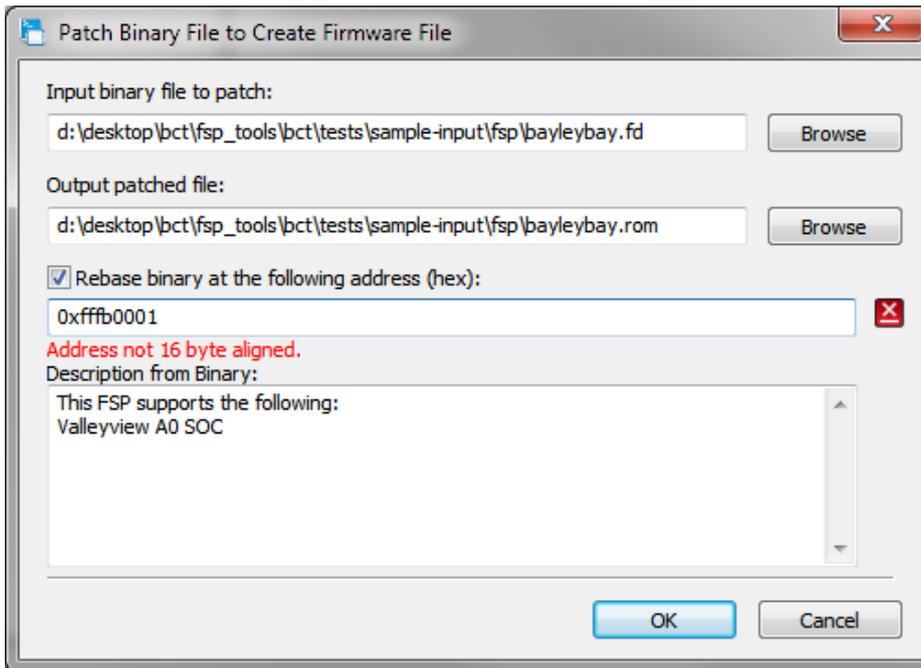
If the selected binary is a FSP, its current load address will appear in the **Firmware File Rebase HEX Address** input string widget. To change the load address of the binary check the **Enable Rebase** check box.



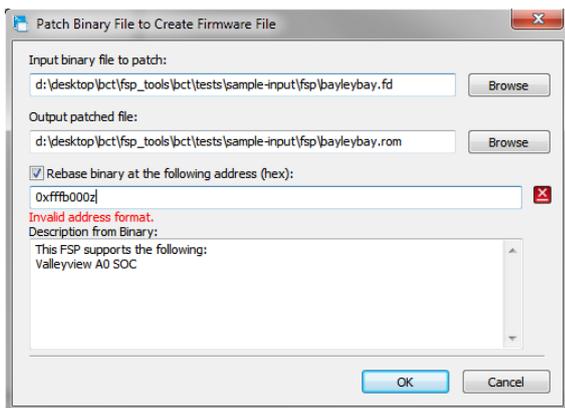
A valid hexadecimal can be entered in the **Firmware File Rebase HEX Address** field. A valid range is 0x00000000 thru 0xFFFFFFFF. The format of the entry can include upper or lower case hex characters and *any* combination of the following prefixes and suffixes:

- 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 will be displayed:



and a hexadecimal character check:



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

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

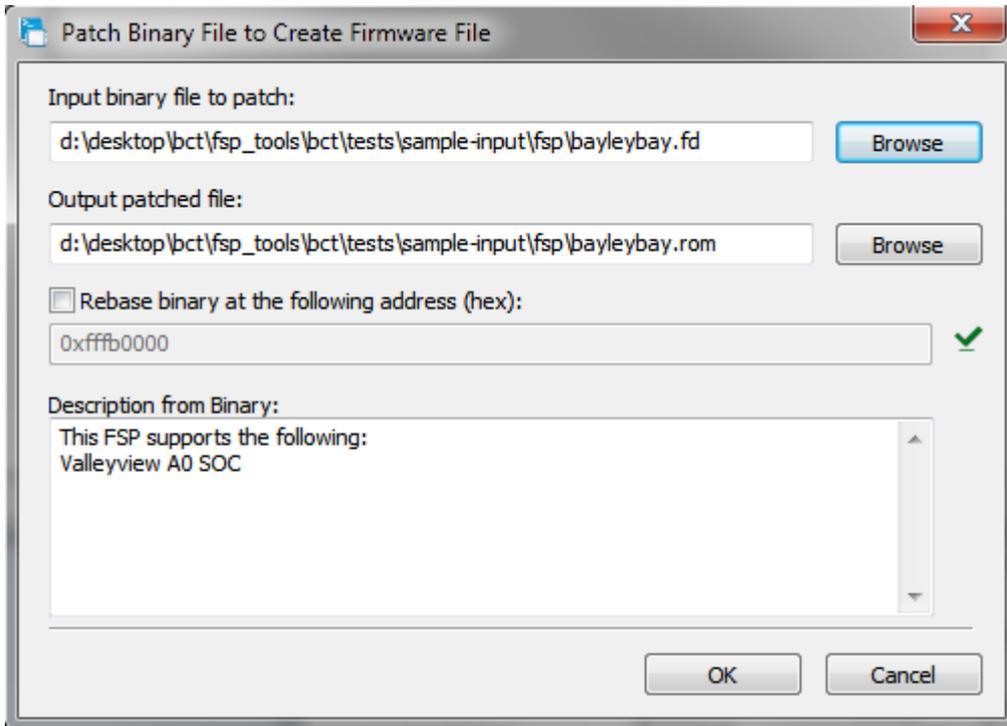
### **Note**

The rebase process will generate its own log file **rebase.log**.

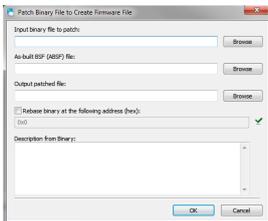
### *Optional Rebasing the Load Address of the Created Firmware*

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:



## *GUI Overview*

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

### *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 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.

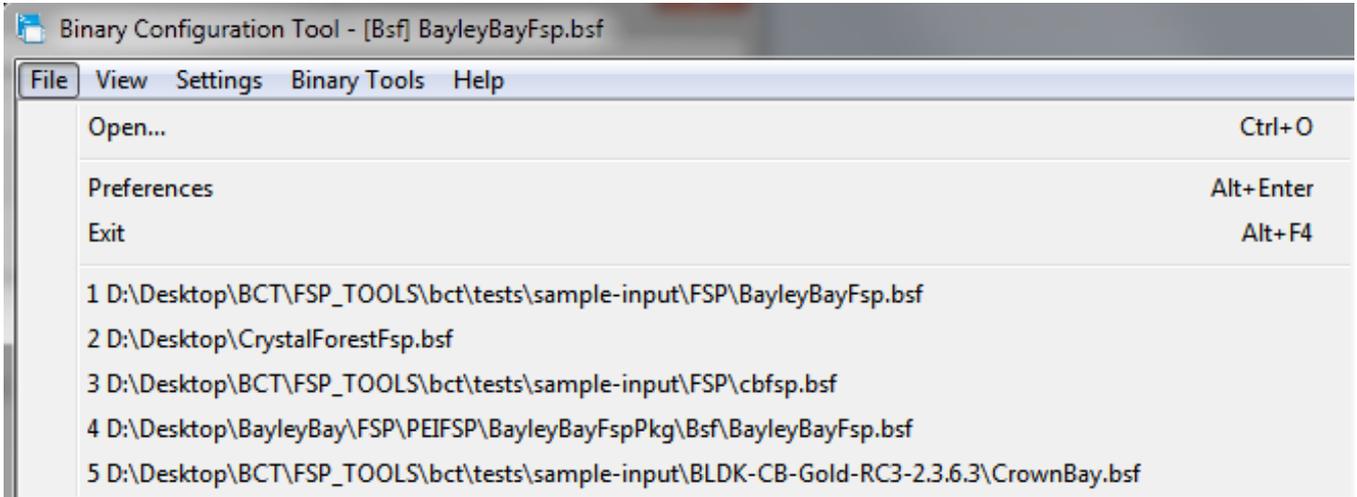
### *Menu Overview*

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

## File Menu

The File Menu consists:

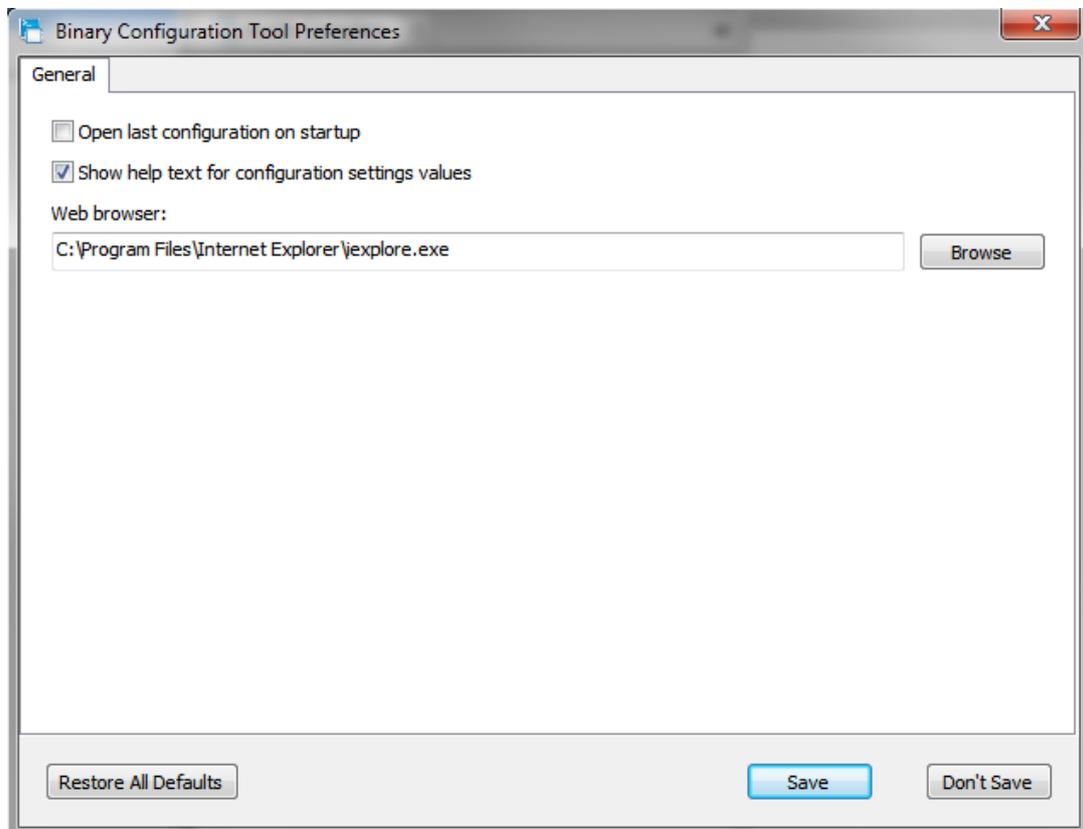
- Open - Open a BSF
- Preferences - Manipulate BCT preferences
- Exit - Exit BCT
- List of the 5 most recently opened BSFs



File Menu

## Preferences

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



Preferences Dialog

This Preferences dialog allows the user to:

- Choose if 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

### View Menu

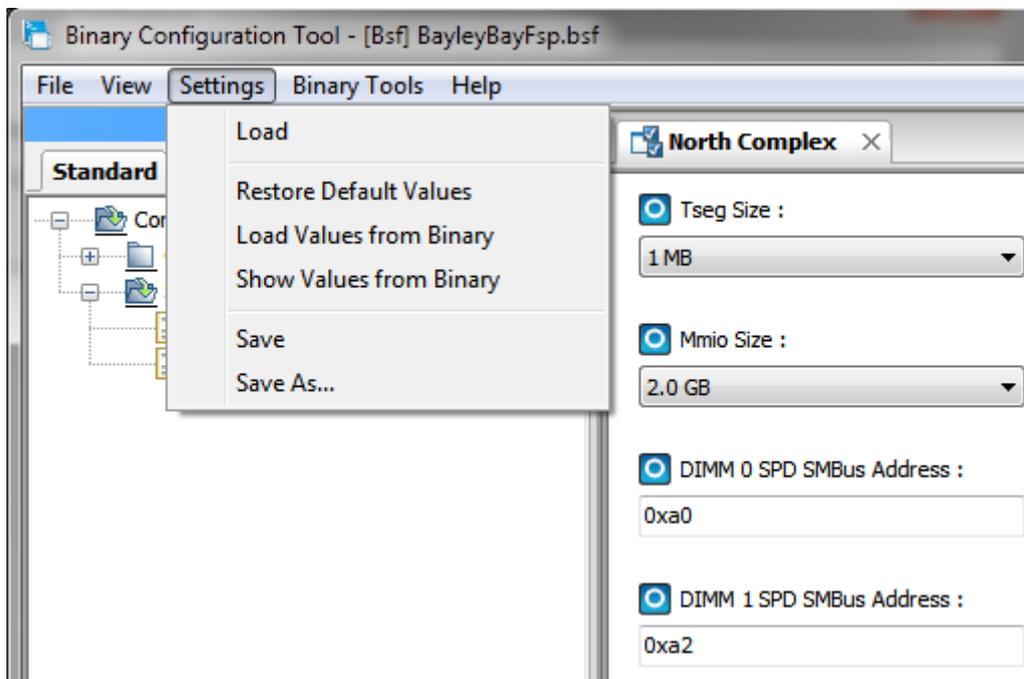
The View Menu provides an interface for the user to manipulate various graphical components.

The View Menu selections have the following meanings.

View Menu Selection	Description
View --> Status Bar	Toggle the display of the <b>Status Bar</b>
View --> Side Windows	Toggle the display of the <b>Navigation</b> and <b>Help</b> Panes

### Settings Menu

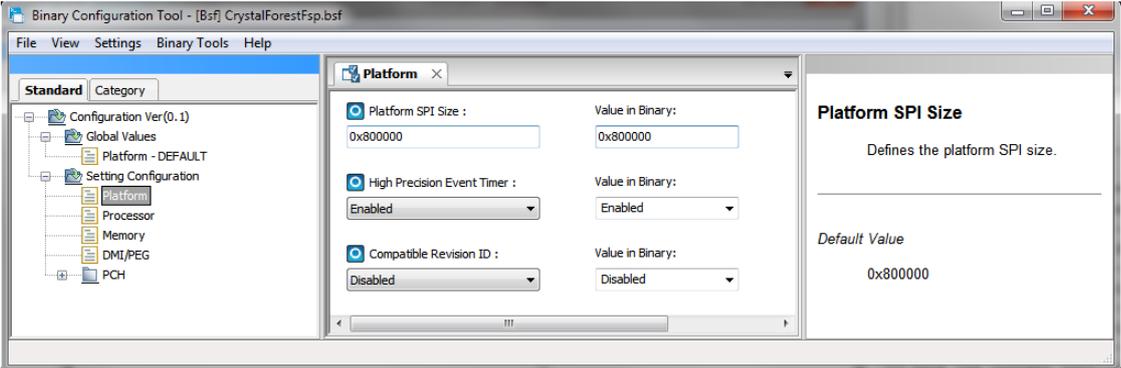
The Settings Menu is show in the figure below.



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 <i>File Menu</i> .
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.

<p>Show Values from Binary</p>	<p>Load configuration setting values from a binary file and display them beside the current configuration settings. As seen below.</p> 
<p>Save</p>	<p>Save the current configuration settings to an ABSF that uses the same base name as the BSF, but has a ".absf" file extension.</p>
<p>Save As...</p>	<p>Save the current configuration settings to an ABSF that the user names.</p>

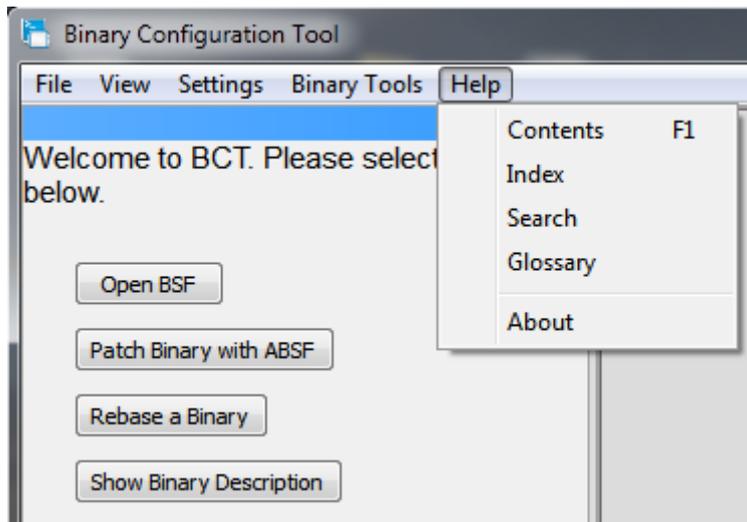
### Binary Tools Menu

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

Binary Menu Selection	Description
<p>Binary --&gt; Patch</p>	<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"> <li>• a binary file name to patch</li> <li>• the resulting patched binary (firmware) file name to create</li> </ul> <p>See <a href="#">Changing Binary Configuration Settings</a></p> <p>If no BSF was previously loaded, then the dialog will accept:</p> <ul style="list-style-type: none"> <li>• a binary file name to patch</li> <li>• an As-built BSF (.absf) file</li> <li>• the resulting patched binary (firmware) file name to create</li> </ul> <p>See <a href="#">Creating a Final Firmware Image from an ABSF</a>.</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>
<p>Binary --&gt; Rebase</p>	<p>Opens a dialog that accepts a binary file name and a rebase hexadecimal address.</p>
<p>Binary --&gt; Show Binary Description</p>	<p>Opens a dialog that accepts a binary file name and displays the description contained in the binary.</p>

### Help Menu

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



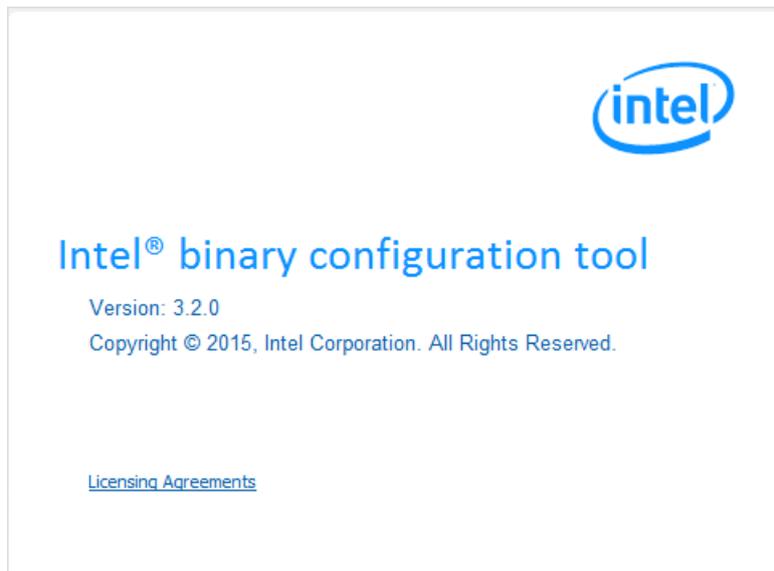
*Help Menu*

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

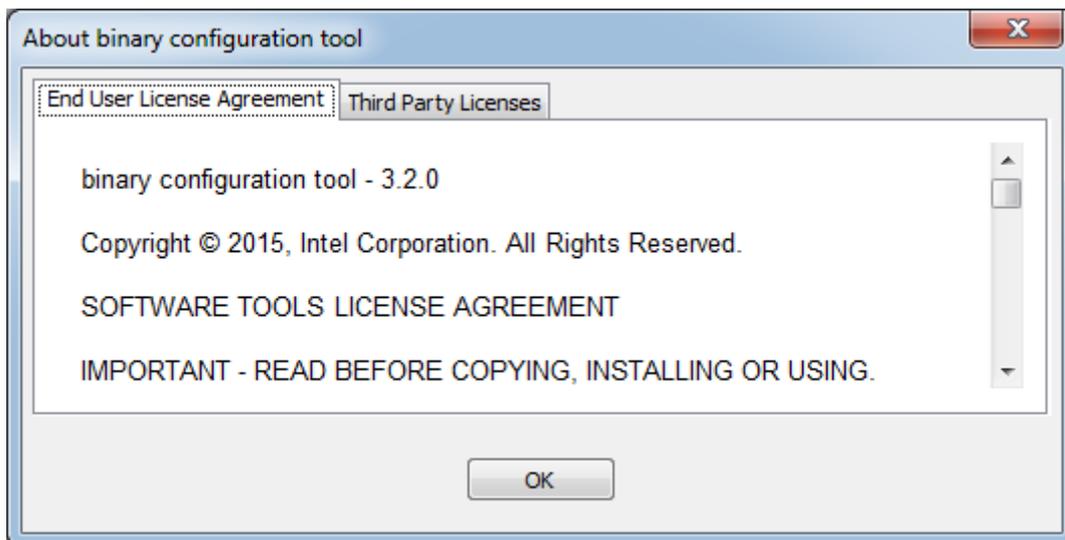
### *About Dialog*

The About dialog displays BCT version information and a License Agreement selection



*About Dialog*

that provides an tabbed interface to read the BCT License Agreement and or a reference list of third party licenses associated with the external packages used by BCT.



*About Dialog - Licensing Agreements*

### **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

### **Controlling View of the Main Panes**

The three main panes are the **Navigation Pane**, the **Configuration Pane**, and the 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.

The **Navigation Pane**, and **Help Pane** views are all controllable from:

- the **View -> Side Windows** menu selection

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## *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:

- 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

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