Silicon Expert

User's Guide

Beta

Actel

Windows® and UNIX® Environments

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Introduction

The *Silicon Expert User's Guide* contains detailed information about using the Silicon Expert tool of the Designer Series software.

Silicon Expert reads in a netlist (.edn) file, and allows you to optimize designs for Actel devices, translate designs into various EDIF flavors, print out a timing report of your optimized design, and write an optimized structural netlist for place and route with Actel's Designer.

Also included in this guide is a tour that describes usage examples of Silicon Expert. Refer to the *Designing with Actel* manual for additional information about using the Designer software.

Document Organization

The *Silicon Expert User's Guide* is divided into the following chapters:

Chapter 1 - Design Flow contains information describing how Silicon Expert integrates into a schematic-based or a synthesis-based design flow.

Chapter 2- Macro Manager gives detailed information about the Macro Manager feature of Silicon Expert.

Chapter 3- Translate gives detailed information about the Translate feature of Silicon Expert.

Chapter 4- Design Report gives detailed information about the Design Report feature of Silicon Expert.

Chapter 5- Touring Silicon Expert gives examples of using Silicon Expert.

Appendix A - Menus, Commands, and Shortcut Toolbar gives detailed information about the menus, commands, and the shortcut toolbar used in Silicon Expert

Appendix B - Read Netlist Dialog Box gives detailed information about the Read Netlist dialog box of Silicon Expert

Appendix C - Write Netlist Dialog Box - gives detailed information about the Write Netlist dialog box of Silicon Expert

Appendix D - Product Support - Provides information about contacing Actel for customer and technical support

Document Assumptions

The information in this manual is based on the following assumptions:

1. You have installed the Designer Series software and the Silicon Expert tool. If you need to install Designer Series software and Silicon Expert, refer to the installation instructions in the *Designing with Actel* manual.
2. You are familiar with UNIX workstations and UNIX operating systems, or with PCs and Windows operating environments.
3. You are familiar with FPGA architecture and FPGA design software.

This manual uses screens from the PC version of Silicon Expert. UNIX screens appear slightly different, but the functionality is the same.

On-Line Help

The Designer Series software comes with on-line help. On-line help specific to each software tool is available in Designer, ACTgen, ACTmap, Silicon Expert, and APS.

Context Sensitive On-Line Help

Silicon Expert features context sensitive on-line help. Context-sensitive on-line help lets you point to any item on the screen and get specific information on that item.

To use context sensitive on-line help, do one of the following:

- (PC only) Choose the Help button on the toolbar, place the cursor over the item on the screen you need help with, and then click the left mouse button. An informational pop-up topic will appear.
- (PC only) Place the cursor over the item on the screen you need help with, and press the F1 function key. An informational pop-up topic will appear.

- Place the cursor over the item on the screen you need help with, and click the right mouse button. This displays the “What’s This” pop up. Click the left mouse button. An informational pop-up topic will appear.

1

Design Flow

This chapter contains information about how Silicon Expert fits into a typical Actel schematic- or synthesis-based design flow. Also contained in this chapter is an overview of Silicon Expert.

Schematic- or Synthesis-Based Design Flow

The Actel schematic- or synthesis-based design flow has four main steps; Design Creation/Verification, Design Implementation, Programming, and System Verification. A typical design flow using Silicon Expert is shown in Figure 1-1.[1]

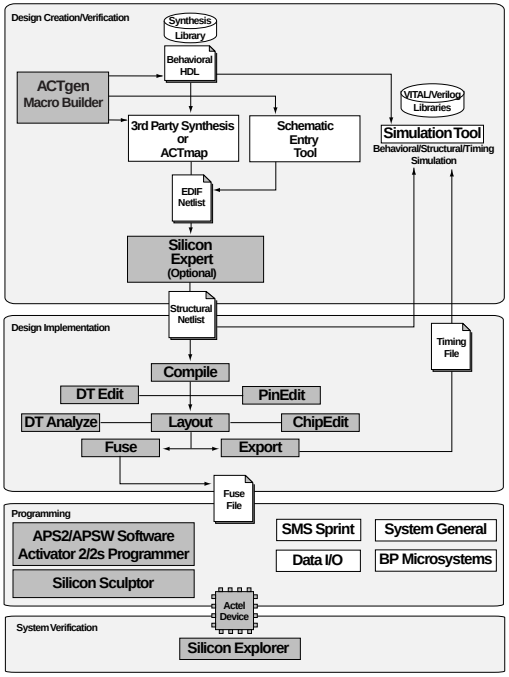

Figure 1-1. Silicon Expert Design Flow

1. Actel-specific utilities/tools are denoted by the grey boxes in Figure 1-1.

Silicon Expert can be used during design creation to add I/Os to a design or balance buffer trees. Silicon Expert can also be used after design creation to translate a structural netlist from one format to another. For more detailed information about typical Actel synthesis- and schematic-based design flows, refer to the *Designing With Actel* manual.

Overview of Silicon Expert

This section provides an overview of the Silicon Expert tool. More detailed information can be found in the chapters "Macro Manager" on page 7, "Translate" on page 13, "Design Report" on page 15, "Touring Silicon Expert" on page 21, and "Menus, Commands, and Shortcut Toolbar" on page 39.

Silicon Expert reads in a netlist (.edn) file, and allows you to optimize designs for Actel devices, translate designs into various EDIF flavors, print out a timing report of your optimized design, and write an optimized structural netlist for place and route with Actel's Designer.

Invoking Silicon Expert

Perform the following steps to invoke Silicon Expert on a PC or UNIX workstation.

PC

From the Windows Start bar, click Programs, click Designer R2-1998, and click the Silicon Expert icon in the Designer R2-1998 program group.

UNIX

From the command line, type the following:

```
expert
```

This will invoke the Silicon Expert window. The Silicon Expert window displays log and timing report information about the netlist. The Silicon Expert window is shown in Figure 1-2.

Refer to “Viewing a Report” on page 18 for information on Timing Reports displayed in the Silicon Expert window.

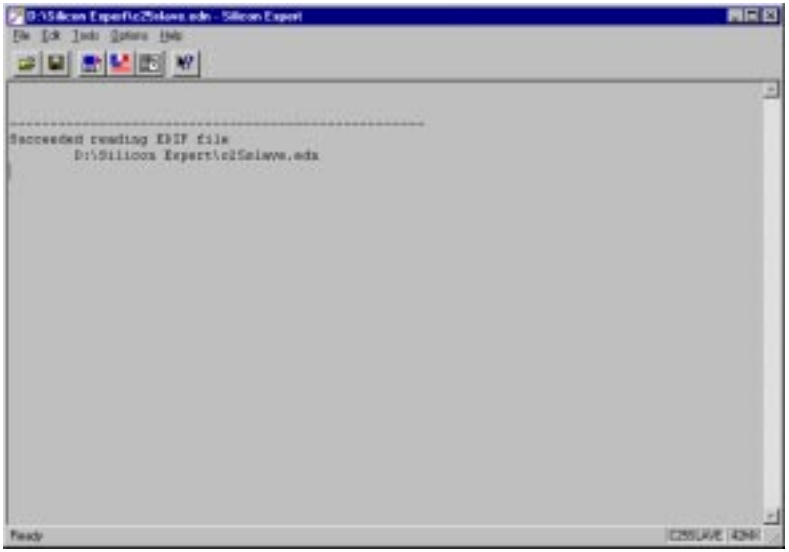

Figure 1-2. Silicon Expert Window

From the Silicon Expert window, you can observe the progress of design optimization, and read reports.

You can clear the information displayed on Silicon Expert window by clicking the clear command in the Edit menu.

When you invoke the Silicon Expert program, the Getting Started dialog box is displayed, as shown in Figure 1-3.

There are three choices in the Available Tools portion of the Getting Started dialog box:

- Macro Manager
- Translate
- Design Report

Check the appropriate button and click OK. This will invoke the Read A Netlist Dialog Box. Refer to "Read Netlist Dialog Box" on page 45 for information about reading a netlist.

You can also check the Read the last Netlist box and click OK to open the netlist on which you last worked.

Figure 1-3. Getting Started Dialog Box

The following are descriptions of I/O Macro Manager, Translate, and Design Report features of Silicon Expert.

Macro Manager

Macro Manager allows you to perform the following tasks to optimize your Actel designs:

- Insert, replace, or correct pads
- Insert global clock on selected networks
- Buffer high fanout nets and rebuffer networks

For more detailed information about Macro Manager, refer to "Macro Manager" on page 19.

Translate

Translate allows you to translate a structural netlist from a given format into a different format.

The Translate function can read EDIF, Verilog, and ADL netlists, and translate them into EDIF, Verilog, VHDL, or ADL netlist formats. For more detailed information about Translate, refer to "Translate" on page 25.

Design Report

Design Report generates a report with the following information:

- Utilization of chip resources, such as number of sequential and logic modules
- Worst/longest timing paths in the design

For more detailed information about Design Report, refer to "Design Report" on page 27.

Read the Last Netlist Box

The Read the last Netlist check box allows you to open the last netlist you worked on in Silicon Expert. Check this box, and click OK, and the last netlist you worked on will be read into Silicon Expert.

Show Getting Started Dialog Check Box

The Show Getting Started check box allows you to display the Getting Started box the next time you invoke Silicon Expert. If the box is checked, the Getting Started dialog box will display the next time you invoke Silicon Expert. If the box is not checked, the Getting Started dialog box will be disabled the next time you invoke Silicon Expert.

2 Macro Manager

This chapter describes in detail the features of the Silicon Expert Macro Manager.

Macro Manager enables you to take full advantage of architecture-specific features of Actel devices. With Macro Manager, you can:

- Perform pad/registered pad insertion for designs with no pads or pads inserted on only a portion of the design.
- Balance, replace or correct buffer trees.
- Insert buffer trees for high fanout nets.
- Utilize global resources such as CLKINT, QCLKINT, for reset/preset networks or high fanout nets.
- Perform complex netlist enhancement tasks.
- Incorporate expertise within the system to carry out all operations autonomously.

Using Macro Manager

You can invoke Macro Manager three ways:

1. Select Macro Manager from the Getting Started Dialog Box. Refer to “Show Getting Started Dialog Check Box” on page 5 for information on how to use the Getting Started Dialog Box.
2. Select Macro Manager from the Tools menu. Refer to “Menus, Commands, and Shortcut Toolbar” on page 39 for information on how to use the Tools menu.
3. Invoke the Macro Manager Wizard. Refer to “Macro Manager Wizard” on page 43 for information on how to use the Macro Manager Wizard.

Read a Netlist

When Macro Manager is invoked, the Read Netlist dialog box is displayed if a netlist has not yet been read in. Select the netlist you wish optimize, and open it. Refer to “Read Netlist Dialog Box” on page 45 for information on the Read Netlist dialog box.

Description of Macro Manager Features

When a netlist is read into Macro Manager, the I/O Macro Manager dialog box is displayed, as shown in Figure 2-1.

The I/O Macro Manager dialog box can also be displayed by selecting the I/O Macro Manager command in the Tools menu. Refer to "Tools Menu" on page 40 for more information on the Tools menu.

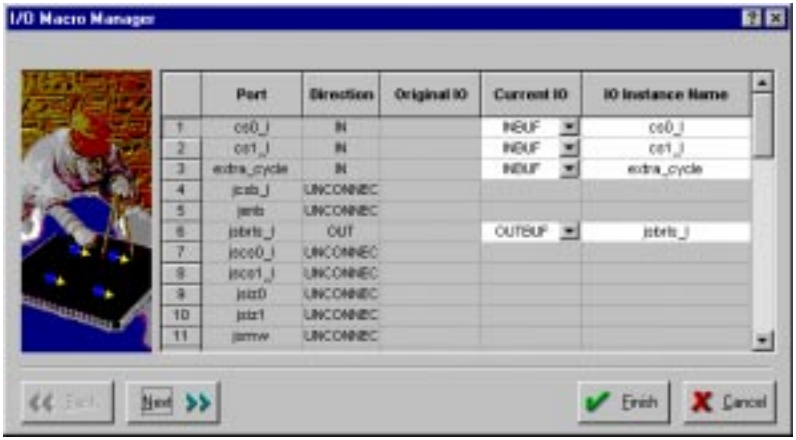

Figure 2-1. I/O Macro Manager Dialog Box

I/O Macro Manager Dialog Box

This section describes in detail the features of the I/O Macro Manager dialog box (Figure 2-1).

The I/O Macro Manager dialog box consists of the following spreadsheet columns and buttons:

Port Column

The Port column lists by name all of the ports found in the design.

Direction Column

The Direction column lists the port direction. If the port does not drive any cells, the word "UNCONNECTED" is displayed.

Original I/O Column

The Original I/O column displays the I/O Macro if it has already been inserted on the port. A blank indicates that an I/O Macro does not exist on the port.

Current I/O Column

The Current I/O column displays the best I/O macro for the given port, as suggested by Silicon Expert.

Use Seq I/O

The Use Seq I/O column appears if the design has latches directly connected to the I/O ports and if they can be combined for a latch I/O cell. Use this column to de-select the latches if you do not wish to use the latch I/O cells.

I/O Instance Name Column

The I/O Instance Name column displays the name of the I/O Macro.

Next Button

Click the Next button when you are finished with the I/O Macro Manager spreadsheet.

Finish Button

Click the Finish button to finish the design with all actions performed up to this point.

Cancel Button

Click the Cancel button to cancel changes to your design.

Buffer Manager Dialog Box

When you are finished with the I/O Macro Manager dialog box and click the Next button, the Buffer Manager dialog box is displayed, as shown in Figure 2-2.

The Buffer Manager dialog box can also be displayed by selecting the Buffer Manager command in the Tools menu. Refer to "Tools Menu" on page 40 for more information on the Tools menu.

This section describes in detail the features of the Buffer Manager dialog box.

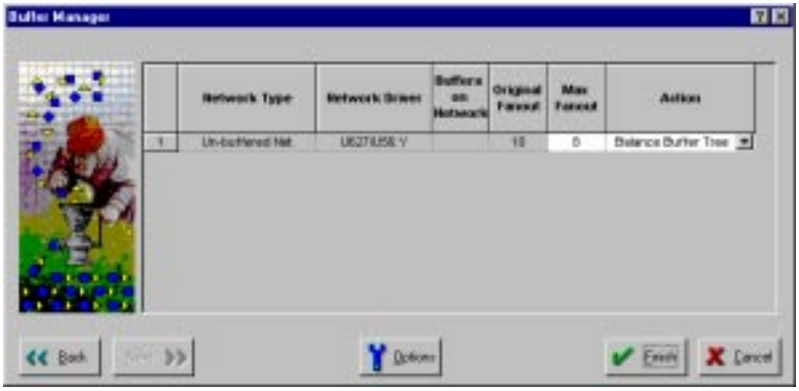

Figure 2-2. Buffer Manager Spreadsheet

The Buffer Manager dialog box consists of the following spreadsheet columns and buttons:

Network Type Column

The Network Type column lists the type of the network.

Network Driver Column

The Network Driver column lists the hierarchical pin name of the driver of the network.

Buffers on Network Column

The Buffers on Network column lists the total number of buffers on the network.

Original Fanout Column

The Original Fanout column lists the total number of pins driven by the network. The buffers on the network are ignored.

Max Fanout Column

The Max Fanout column lists the maximum fanout for buffer tree creation.

Action Column

The Action column lists the action command to the Silicon Expert. The user can select the type of action that can be applied for the network.

Finish Button

Click the Finish button to finish the design with all actions performed up to this point.

Cancel Button

Click the Cancel button to cancel all actions performed on the design.

Buffer Manager Options

You can assign various optional constraints to your design in the Buffer Manager by using the The Buffer Manager Options. The Buffer Manager Options dialog box, shown in Figure 2-3, is displayed when you click the Options button on the Buffer Manager spreadsheet.

This section describes in detail the features of the Buffer Manager Options dialog box.

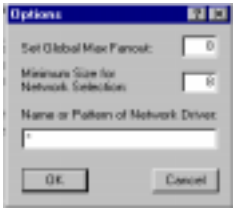

Figure 2-3. Buffer Manager Options Dialog box

Set Global Max Fanout Box

In the Global Max Fanout box, you can globally set the maximum fanout for all networks on the Max Fanout column of the Macro Manager spreadsheet.

Minimize Size for Network Selection Box

The Minimum Size for Network Selection box displays all the networks with a size above or equal to the given value.

Name or Pattern of Network Driver Box

The Name or Pattern of Network Driver box displays all the networks with a name matching the name you enter.

Write Netlist

When you have finished with the I/O Macro Manager spreadsheet, the Buffer Manager spreadsheet, and have clicked the Finish button, the Write Netlist dialog box is displayed.

Name your netlist, select an output format, and save it. Refer to “Write Netlist Dialog Box” on page 49 for information on the Write Netlist dialog box.

3

Translate

The Translate function of Silicon Explorer performs the following functions:

- Reads netlist in EDIF, ADL, Verilog formats and writes it out as a netlist in EDIF, Verilog, ADL, or VHDL format.
- Provides the user the ability to convert netlist in one format to another.
- Enables you to select the different netlist input and output flavors.

Using Translate

You can invoke Translate three ways:

1. Select Translate from the Getting Started Dialog Box. Refer to "Show Getting Started Dialog Check Box" on page 5 for information on how to use the Getting Started Dialog Box.
2. Select Translate from the Tools menu. Refer to "Menus, Commands, and Shortcut Toolbar" on page 39 for information on how to use the Tools menu.
3. Invoke the Translate Wizard. Refer to "Macro Manager Wizard" on page 43 for information on how to use the Translate Wizard.

Read Netlist

When Translate is invoked, the Read Netlist dialog box is displayed. Select the netlist you wish to translate, and open it. Refer to "Read Netlist Dialog Box" on page 45 for information on the Read Netlist dialog box.

Write a Netlist

After your design is read in, the Write a Netlist dialog box is displayed. Name your netlist, select the output format, and save it. Refer to "Write Netlist Dialog Box" on page 49 for information on the Write a Netlist dialog box.

4

Design Report

Design Report performs the following:

- Reports area and timing numbers for a compiled Actel design or an Actel sub-design block.
- Provides user control to most of the compile options.

Using Design Report

You can invoke Design Report three ways:

1. Select Design Report from the Getting Started Dialog Box. Refer to "Overview of Silicon Expert" on page 2 for information on how to use the Getting Started Dialog Box.
2. Select Design Report from the Tools menu. Refer to "Menus, Commands, and Shortcut Toolbar" on page 39 for information on how to use the Tools menu.
3. Invoke the Design Report Wizard. Refer to "Design Report Wizard" on page 44 for information on how to use the Design Report Wizard.

Read a Netlist

When Design Report is invoked, and a netlist has not already been read, the Read Netlist dialog box is displayed. Select the netlist you wish to optimize, and open it. Refer to "Read Netlist Dialog Box" on page 45 for information on the Read Netlist dialog box.

Design Report Variables Dialog Box

When a netlist is read, the Design Report Variables dialog box is displayed, as shown in Figure 4-1.

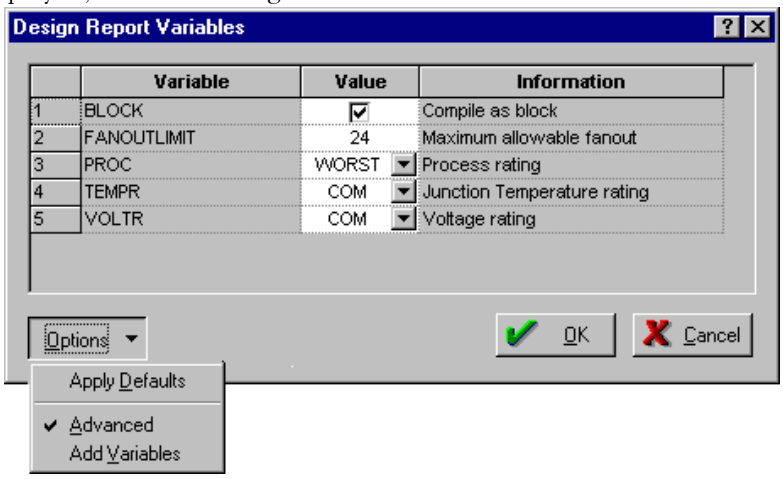

Figure 4-1. Design Report Variables Spreadsheet

The Design Report dialog box consists of the following spreadsheet columns and buttons:

Variable Column

The Variable column displays the variable that controls the Report Generator.

Value Column

The Value column displays the value that can be applied to the variable. You can click check boxes, select commands from drop down menus, or fill in blanks, as needed, to modify displayed value.

Information Column

The Information column displays a brief description of the variable and its function.

Design Report Options

The Design Report Options Dialog Box is displayed when you click the Options button, located at the lower left of the Read a Netlist dialog box (Figure 4-1.)

The following are descriptions of the Design Report options.

Apply Defaults

When you click the Apply Default option, the values in the Netlist Options spreadsheet are reset to the default values.

Advanced

When you click the Advanced option, additional netlister variables are displayed that allow advanced users more control over the netlister read operation.

Add Variables

When you click the Add Variables option, you can add undocumented netlister variables.

Viewing a Report

After setting all variables in the Design Report Variables dialog box, click OK to generate a report. A sample report is shown in Figure 4-2.

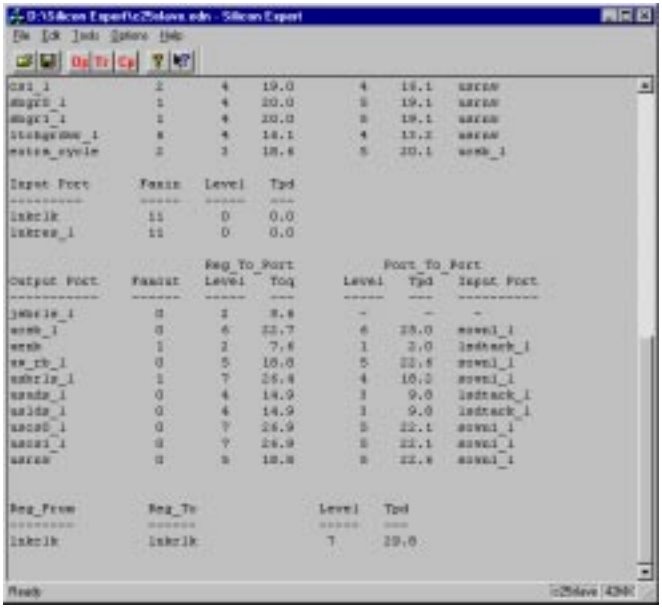

Figure 4-2. Sample Report

A report generated by Silicon Expert Design Report consists of an Area report section and Timing Report section.

Area Report

The Area report gives the count of sequential and combinatorial modules used by the design. The Area report also lists the number of I/O resources, clock resources, or special resources used in the design.

Timing Report

The pre-layout estimated timing is displayed for the following path groups:

- Port to Port
- Port to Register
- Register to Port
- Register to Register

5

Touring Silicon Expert

This chapter gives usage examples for using Silicon Expert to modify a design. Included are steps to read a sample netlist into Silicon Expert, compile the netlist as a block, set I/O buffers with the I/O Macro Manager, save the new netlist, run a design report, use the Buffer Manager options, observe the changes made by Buffer Manager, flatten a netlist, use Buffer Manager to change fanout of a design, and save a log file of your session.

Reading a Netlist to Generate a Report

This section describes how to read a netlist into Silicon Expert, and how to use the options available in the Read Netlist dialog box.

To read your design into Silicon Expert:

1. Invoke Silicon Expert as follows:

PC

From the Windows Start bar, click Programs, click Designer R2-1998, and click the Silicon Expert icon in the Designer R2-1998 program group.

UNIX

From the command line, type the following:

```
expert
```

The Silicon Expert widnow, along with the Getting Started dialog box is displayed, as shown in Figure 5-1.

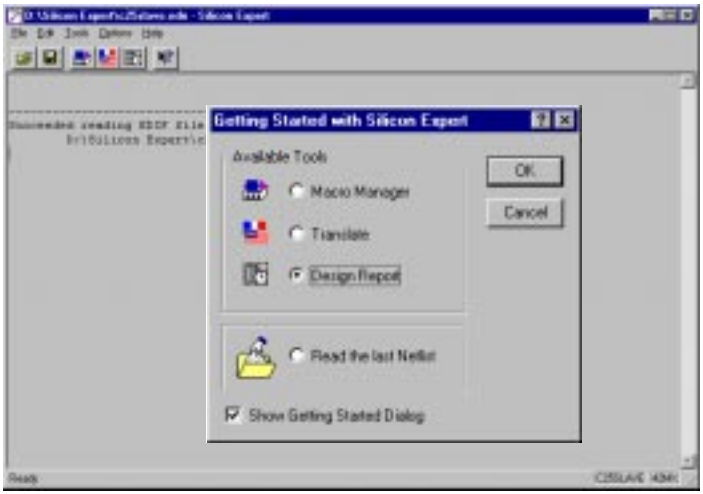

Figure 5-1. Getting Started Dialog Box

2. **Select Design Report.** Click OK. This invokes the Read Netlist dialog box, as shown in Figure 5-2.

Figure 5-2. Read Netlist Dialog Box

3. **Select Edif Netlist (*.ed*) in the Files of Type pull down menu, as shown in Figure 5-2.**

4. **Select ACT 3 in the Family pull-down.**

5. **In the Look In box, navigate to the $ALSDIR/Tutorial directory, and select the file c25busmaster.edn.** This file is a EDIF file created specifically for this tour.

6. **Click on the Options button at the lower right corner of the Read Netlist Dialog Box.** This displays the Read Netlist Options dialog box, as shown in Figure 5-3.

Figure 5-3. Read Netlist Dialog Box

7. **Select VHDL from the NETLIST_NAMING_STYLE pull-down menu, as shown in Figure 5-3.** Click OK.

8. **In the Read Netlist Dialog Box, click Open.** Confirmation that your netlist is opened is displayed in the Silicon Expert Window, and the Design Report Variables dialog box is displayed, as shown

in Figure 5-4. In the Design Report dialog box, five variables with default settings are displayed.

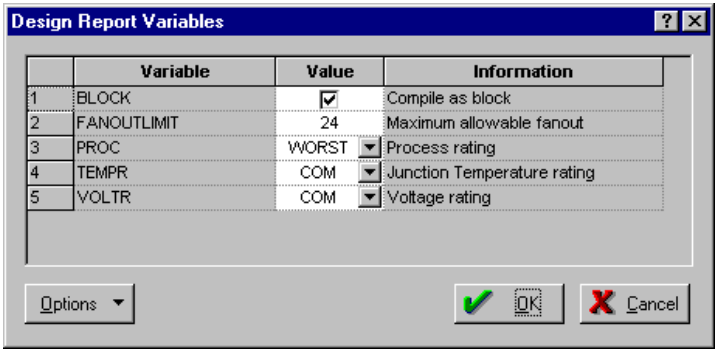

Figure 5-4. Design Reports Variables Dialog Box

Generating Netlist Report for a Block

You can run the Design Report in block mode for a brief display of the timing estimates without the tool checking for I/O pads on the top level ports.

To turn on the Block Compiler and compile your netlist:

1. **Click the Design Report Wizard button in the toolbar, as shown in Figure 5-5.**

Figure 5-5. Design Report Wizard

This displays the Design Report Variables dialog box, as shown in Figure 5-6.

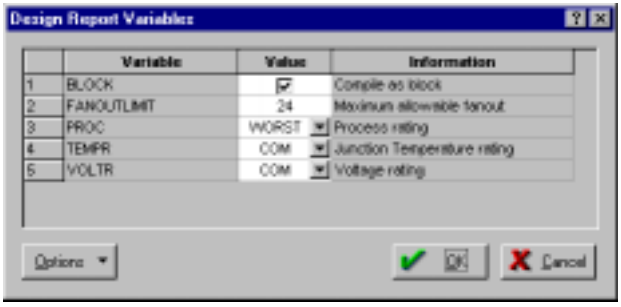

Figure 5-6. Design Report Variables Dialog Box with BLOCK Selected

2. **Select the Block (Block Compile) check box, as shown in Figure 5-6.** Click OK. A complete report of the netlist is displayed, including sequential and total logic utilization, operating conditions, inpad to register, register to register, register to outpad, inpad to outpad, and global signal propagation delays and logic levels. The software automatically recognizes the global signals from the netlist

Setting I/O Buffers With I/O Macro Manager

This section describes how to use the I/O Macro Manager tool to set I/O buffer assignments and specify global networks in the design.

To Use I/O Macro Manager:

1. **Select the I/O Macro Manager command from the Tools menu.** This displays the I/O Macro Manager dialog box, as shown in Figure 5-7.

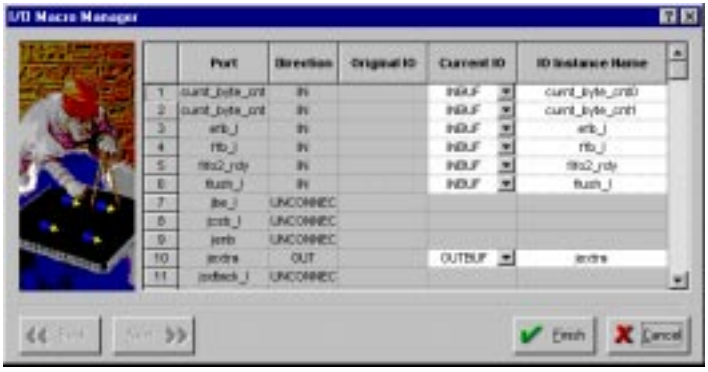

Figure 5-7. I/O Macro Manager Dialog Box

Examine the Current I/O column to see what type of buffers the software suggests. You will notice that the signals lnkclk and lnkres_l are automatically recognized as global signals, by suggesting the use of clkbuf macros.

You are not allowed to assign macros that are illegal for a particular network. For example, both of the global signals in this design drive non-sequential macros so the HCLK is not an I/O option.

2. **Click Finish, and observe the changes to the design in the Silicon Expert window.**

Saving a Modified Netlist

This section shows you how to save a modified netlist.

To save your netlist:

1. **Click on the Write Netlist Wizard button in the toolbar, as shown in Figure 5-8.** This invokes the Write Netlist dialog box, as shown in Figure 2.

Figure 5-8. Write Netlist button

2. **In the File Name text box, change the name to c25bus_io.edn, as shown in Figure 5-9.** Click Save.

Figure 5-9. Write Netlist Dialog Box

You will use this saved file in the next section of the tour.

Generating a Design Report

This section describes how to run a report on the design you completed and saved as c25bus_io.edn in the previous section.

To invoke Design Report:

1. **Click on the Design Report Wizard button in the toolbar, as shown in Figure 5-10.**

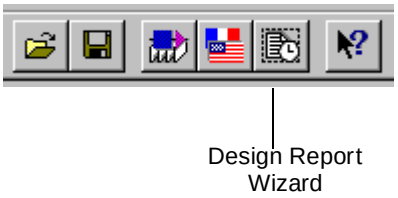

Figure 5-10. Design Report Wizard

This displays the Design Report Variables dialog box, as shown in Figure 5-11.

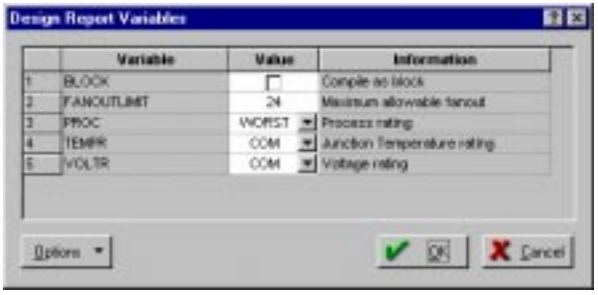

Figure 5-11. Design Report Variables dialog box

2. **Deselect Block (for Block Compile) in the Design Reports Variable dialog box, so that there is no check in the value box.** Click OK, and observe the contents of the Silicon Expert window. Observe I/O and clock utilization for this design, and timing estimates in the Silicon Expert window for inpad to gated, inpad to clock, inpad to async, inpad to outpad, clkbuf to outpad, clock to outpad, and register to register.

Using The Buffer Manager Options

This section describes how to use the Buffer Manager options on the netlist C25bus_io.edn to balance buffer trees or correct fanout violations.

To invoke Buffer Manager:

1. **Select Buffer Manager from the Tools menu.** This displays the Buffer Manager dialog box, as shown in Figure 5-12.

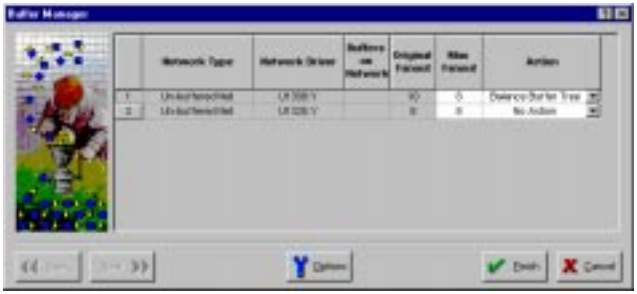

Figure 5-12. Buffer Manager Dialog Box

2. **Click on the options button in the Buffer Manager dialog box.** This displays the Buffer Manager Options dialog box, as shown in Figure 5-13.

Figure 5-13. Buffer Manager Options Dialog Box

3. **Set Global Max fanout to 4, and Minimum Size for Network selection to 4.** Click OK.

   The Buffer Manager Dialog Box is displayed, as shown in Figure 5-14, showing a list of all the macros that drive a network with a fanout greater or equal to 4.

   In the Action column, actions that are recommended by the software are displayed. For example, the network driver from U1308:Y has a fanout of 10, which is greater than the Global Max Fanout of 4, so the recommended action is to balance the buffer tree.

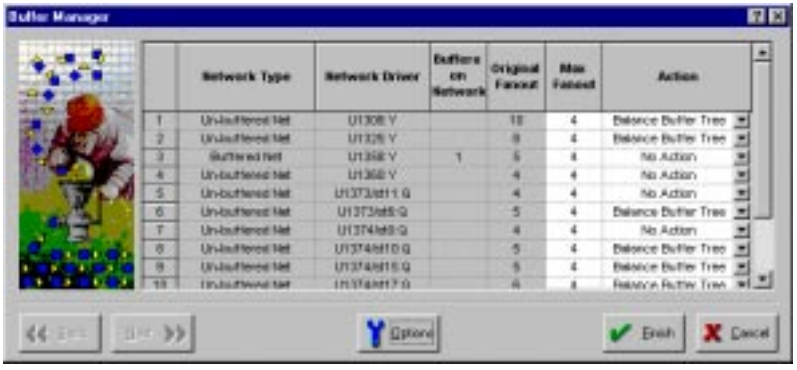

Figure 5-14. Buffer Manager Dialog Box

Click Finish to accept the defaults. In the Silicon Expert window, the networks that were edited are displayed.

Observing Changes Implemented by Buffer Manager

This section describes how to observe the fanout and buffer changes implemented by Buffer Manager to the design c25bus_io.edn.

To see changes made by Buffer Manager:

1. **Select Buffer Manager from the Tools menu.** This displays the Buffer Manager dialog box, as shown in Figure 5-15.

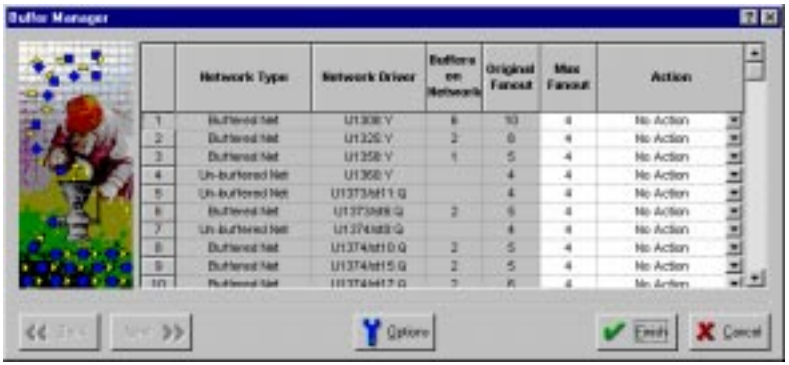

Figure 5-15. Buffer Manager Dialog Box

Observe the changes that have been implemented. The buffers on Network column now read 6 for the network driven by U1308:Y. Since this is a hierarchical design, the buffering is done by considering a pin of a hierarchical block to be a load of one. Buffers are therefore inserted at each hierarchical port in addition to what is needed to balance the tree.

Saving The Netlist

If you wish to preserve the changes made in Buffer Manager, you can save the netlist.

To re-name and save the netlist:

1. **Click on the Write Netlist Wizard button in the toolbar, as shown in Figure 5-16.**

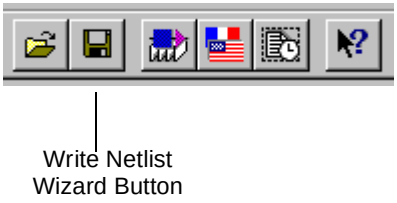

Figure 5-16. Write Netlist button

This invokes the Write Netlist dialog box, as shown in Figure 5-17.

Figure 5-17. Write Netlist Dialog Box

2. **In the File Name text box, change the name to c25bus_io_buf.edn.** Click Save.

Flattening a Netlist

For some applications, you may wish to remove the hierarchy in a design, and save it as a flat netlist. You can perform the following steps to flatten a netlist.

Opening the Previous Netlist

For this example, the netlist previously saved as c25bus_io.edn will be opened, and then flattened, using the Write Netlist Options.

To Open the netlist c25bus_io.edn:

1. **Click on the Read Netlist Wizard button in the toolbar, as shown in Figure 5-18.**

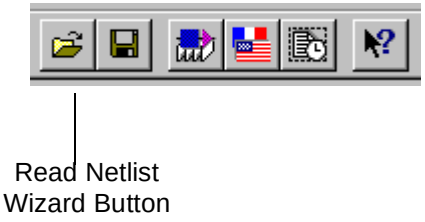

Figure 5-18. Read Netlist button

This invokes the Read Netlist dialog box, as shown in Figure 5-19 Select the file c25bus_io.edn. Click Open.

Figure 5-19. Read Netlist Dialog Box

Flattening the Netlist using Write Netlist Options

The netlist c25bus_io.edn will be flattened and saved using the Write Netlist option.

To invoke the Write Netlist dialog box:

1. **Click on the Write Netlist Wizard button in the toolbar, as shown in Figure 5-20.**

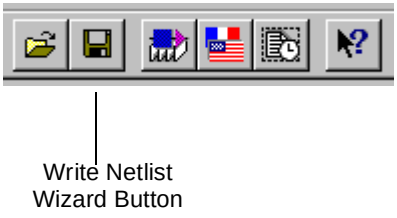

Figure 5-20. Write Netlist button

This invokes the Write Netlist dialog box, as shown in Figure 5-21.

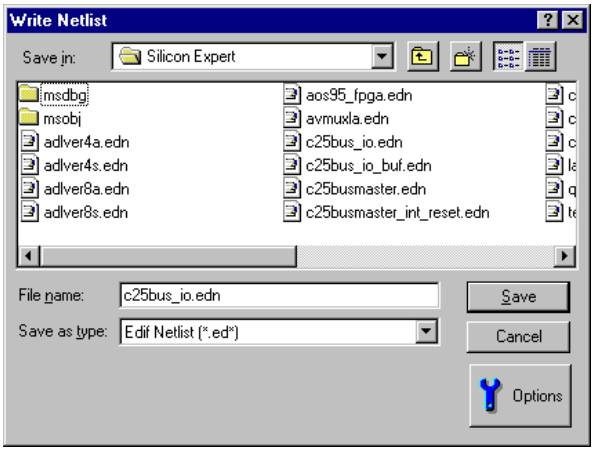

Figure 5-21. Write Netlist Dialog Box

2. **In the Write Netlist dialog box, select Options.** This displays the Write Netlist Options dialog box, as shown in Figure 5-22.

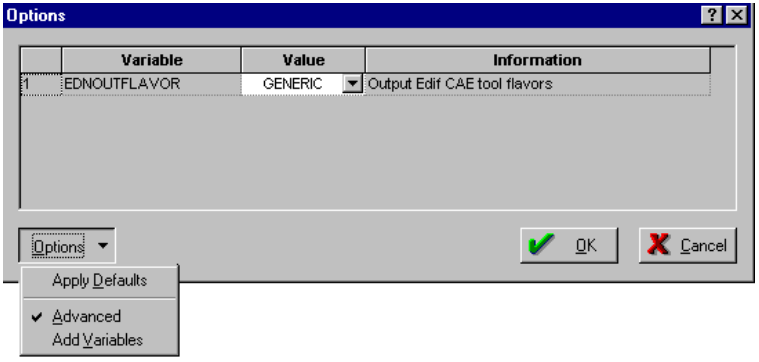

Figure 5-22. Write Netlist Options Dialog Box

3. **In the Write Netlist dialog box, click on the options pull-down and select advanced, as shown in Figure 5-22.** This displays advanced features of the Write Netlist Options dialog box, as shown in Figure 5-23.

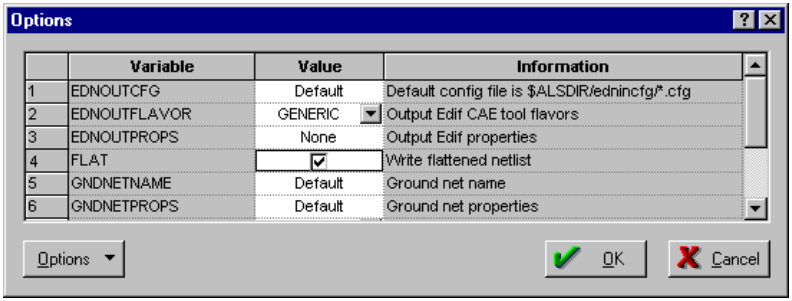

Figure 5-23. Write Netlist Options with Advanced Features Enabled

4. **Turn on the flatten netlist feature by clicking the value for FLAT, so that a check appears in the box, as shown in Figure 5-23.** Click OK.

5. **In the File Name text box, change the name to c25bus_io_flat.edn, as shown in Figure 5-24. Click OK. This creates a flat EDIF netlist. .**

Figure 5-24. Write Netlist Dialog Box

Using Buffer Manager to Change Fanout of the Design

You can use the Buffer Manager to change the global fanout of the non-hierarchical design in memory from the previous steps, as follows:

To invoke the Buffer Manager tool:

1. **Select Buffer Manager from the Tools menu.** This displays the Buffer Manager dialog box, as shown in Figure 5-25.

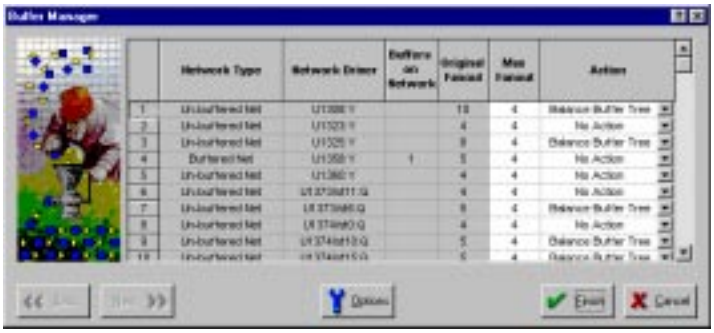

Figure 5-25. Buffer Manager Dialog Box

2. **Click the options button in the Buffer Manager dialog box.** This displays the Buffer Manager Options dialog box, as shown in Figure 5-13.

Figure 5-26. Buffer Manager Options Dialog Box

3. **Ensure that Global Max fanout is set to 4, and Minimum size for Network Selection is set to 4, as shown in Figure 5-26.** Click OK.

4. **Accept the defaults in the Buffer Manager dialog box.** Click Finish.

Saving a Log File of Your Session

This section describes how save a text log file of your session.

To save a log file:

1. **Select the Save Report As command from the File Menu.** This invokes the Export Report dialog box, as shown in Figure 5-27. Navigate to a directory, specify a file name, and click Save.

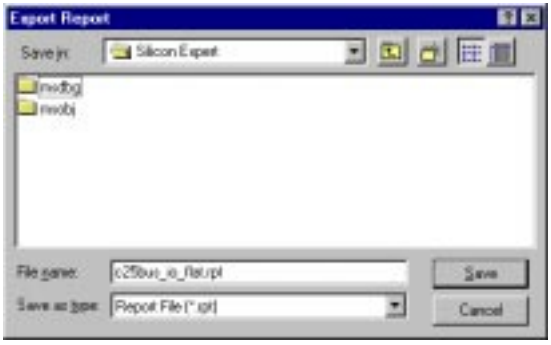

Figure 5-27. Export Report Dialog Box

You can refer to this text file and view the actions that you have performed to see the current state of your netlist.

A

Menus, Commands, and Shortcut Toolbar

Features of Silicon Expert can be invoked using Silicon Expert menus. This appendix describes Silicon Expert menus, commands, and the shortcut toolbar.

File Menu

The File menu is shown in Figure A-1.

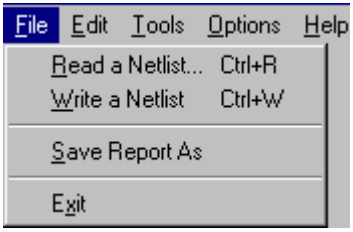

Figure A-1. File Menu

Read Netlist

The Read a Netlist command invokes the Read Netlist dialog box. Refer to “Read Netlist Dialog Box” on page 45 for more information on the Read Netlist dialog box.

Write Netlist

The Write a Netlist command invokes the Write a Netlist dialog box. Refer to “Write Netlist Dialog Box” on page 49 for more information on the Write Netlist dialog box.

Save Report As

The Save Report As command allows you to save a report as a .rpt file, using your netlist name or a name other than your netlist. Refer to “Design Report” on page 15 for more information on reports generated by Silicon Expert.

Exit

The Exit command allows you to exit Silicon Expert.

Edit Menu

The Edit menu is shown in Figure A-2.

Figure A-2. Edit Menu

Clear

The Clear command clears the information displayed on the Silicon Expert window. Refer to “Overview of Silicon Expert” on page 2 for more information on the Silicon Expert window.

Tools Menu

The Tools menu is shown in Figure A-3.

Figure A-3. Tools menu

Macro Manager

The Macro Manager command invokes the Macro Manager function of Silicon Expert. Refer to “Macro Manager” on page 7 for more information on Macro Manager.

Translate

The Translate command invokes the Translate Function of Silicon Expert. Refer to “Translate” on page 13 for more information on Translate.

Design Report

The Design Report command invokes the Design Report function of Silicon Expert. Refer to “Design Report” on page 15 for more information on Design Report.

I/O Macro Manager

The I/O Macro Manager command invokes the I/O Macro Manager dialog box. Refer to “I/O Macro Manager Dialog Box” on page 8 for more information on the I/O Macro Manager dialog box.

Buffer Manager

The Buffer Manager command invokes the Buffer Manager dialog box. Refer to “Buffer Manager Dialog Box” on page 10 for more information on the Buffer Manager dialog box.

Options Menu

The Options menu is shown in Figure A-4.

Figure A-4. Options Menu

Show Getting Started Dialog

The Show Getting Started Dialog command allows you to disable the Getting Started box the next time you invoke Silicon Expert. Refer to “Overview of Silicon Expert” on page 2for more information on the Show Getting Started dialog box.

Help Menu

The Help menu is shown in Figure A-5.

Figure A-5. Help Menu

Help Topics

The Help Topics command invokes the Silicon Expert On-Line Help. Refer to "On-Line Help" on page viii in the Introduction chapter for more information on On-Line Help.

About Silicon Expert

The About Silicon Expert command lists information about this release of Silicon Expert.

Silicon Expert Shortcut Toolbar

A shortcut toolbar is located on the Silicon Expert window. By clicking in the buttons on the shortcut toolbar, you can invoke functions of Silicon Expert. The Silicon Expert shortcut toolbar is shown in Figure A-6.

Figure A-6. Silicon Expert Shortcut Toolbar

Read a Netlist Button

The Read Netlist button invokes the Read Netlist dialog box. Refer to for more information on the Read Netlist dialog box.

Write a Netlist Button

The Write a Netlist button invokes the Write a Netlist dialog box. Refer to "Write Netlist Dialog Box" on page 49 for more information on the Write a Netlist dialog box.

Silicon Expert Wizard Buttons

Silicon Expert offers wizards to guide you through all of the steps associated with using of the I/O Macro Manager, Translate, and Design Report functions. Silicon Expert Wizard buttons are shown in Figure A-7.

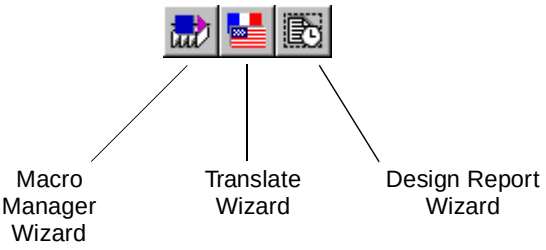

Figure A-7. Silicon Expert Wizard Buttons

Macro Manager Wizard

The Macro Manager Wizard button invokes the Macro Manager Wizard. The Macro Manager Wizard steps you through the Macro Manager process, including reading a netlist, displaying the I/O Macro Manager spreadsheet, displaying the Buffer Manager spreadsheet, and writing a netlist. The Macro Manager Wizard flow is shown in Figure A-8.

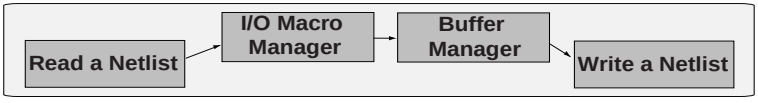

Figure A-8. Macro Manager Wizard Flow

Translate Wizard

The Translate Wizard button invokes the Translate Wizard. The Translate Wizard steps you through the Translate process, including reading a netlist and writing a netlist in a different netlist format. The Translate Wizard flow is shown in Figure A-9.

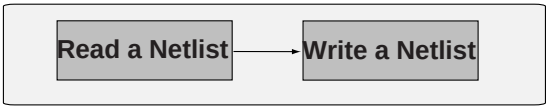

Figure A-9. Translate Wizard flow

Design Report Wizard

The Design Report Wizard button invokes the Design Report Wizard. The Design Report Wizard steps you through the Design Report process, including reading a netlist and displaying the design report. The Design Report flow is shown in Figure A-10.

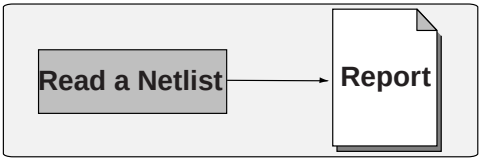

Figure A-10. Design Report Flow

Help Button

The Help button invokes Silicon Expert context-sensitive on-line help. After clicking this button, place the cursor over any item of a screen in Silicon Expert, and click again. A help topic will appear to give information about the item. Refer to “On-Line Help” on page viii for more information about Silicon Expert on-line help.

B

Read Netlist Dialog Box

This appendix describes the Read Netlist dialog box and its options.

When you select Macro Manager, Translate, or Design Report, the Read Netlist dialog box is displayed. The Read Netlist dialog box is shown in Figure B-1.

In the File Name box, enter the name of the netlist you wish to open, or use the Files of Type box to select the type of netlist file you wish to open (EDIF, Verilog, or ADL), and use the Look In box to navigate to the desired .edn file.

In the Family box, select the Actel device family from the pull-down menu. Click Open to open the netlist.

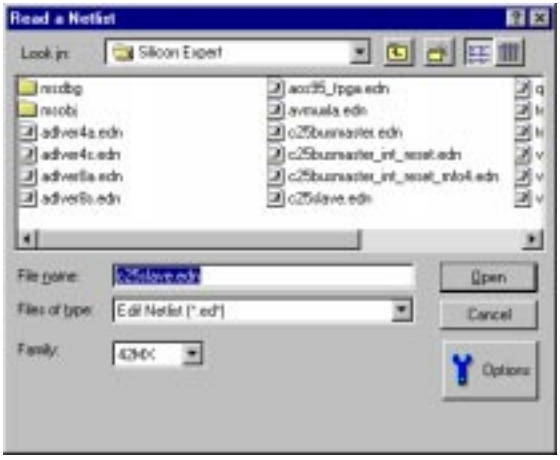

Figure B-1. Read a Netlist Dialog Box

Read Netlist Options Dialog Box

The Read Netlist Options dialog box is displayed when you click the Options button, located at the lower right of the Read Netlist dialog box. The options are available when EDIF or ADL is selected in the File of Type box. The Read Netlist Options dialog box is shown in Figure B-2.

Figure B-2. Read Netlist Options Spreadsheet

The following are descriptions of the Read Netlist Options spreadsheet columns.

Variable Column

The Variable column lists the variables that control the netlist reader.

Value Column

The Value column displays values that can be changed and applied for a netlister variable. You can double-click check boxes, select commands from drop down menus, or fill in blanks to modify displayed values.

Information Column

The Information column displays a brief description of the variable and its function.

Additional Read Netlist Options

Additional options are displayed in the pull down menu in the lower left portion of the Read Netlist Spreadsheet (Figure B-2).

The following are descriptions of the additional option selections.

Apply Defaults

When you click the Apply Default option, the values in the Netlist Options spreadsheet are reset to the default values.

Advanced

When you click the Advanced option, additional netlister variables are displayed that allow advanced users more control over the netlister read operation.

Add Variables

When you click the Add Variables option, you can add undocumented netlister variables.

C

Write Netlist Dialog Box

This appendix describes the Write Netlist dialog box and its options.

After a design is optimized with Macro Manager or Translate, you can write an optimized netlist file, which can be read into Designer software for design implementation. The Write Netlist dialog box is shown in Figure C-1.

In the File Name box, enter the name of the netlist you wish to save, or use the Save as Type box to select the type of netlist file you wish to save (EDIF, Verilog, VHDL, or ADL), and use the Save In box to navigate to the desired directory in which to save your netlist file. Click Save to save the netlist.

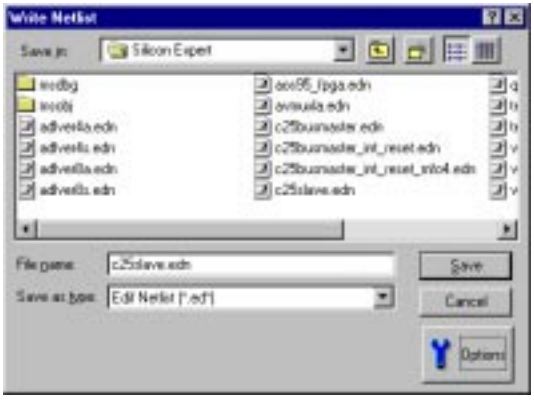

Figure C-1. Write Netlist Dialog Box

Write Netlist Options Dialog Box

The Write a Netlist Options dialog box is displayed when the Options button, located at the lower right of the Write a Netlist dialog box, is clicked. The options are available when EDIF or ADL is selected in the

File of Type box. The Write Netlist Options dialog box is shown in Figure C-2.

Figure C-2. Write Netlist Options Dialog Box

The following are descriptions of the Write Netlist Options spreadsheet columns.

Variable Column

The Variable column lists the variables that control the netlist reader.

Value Column

The Value column displays values that can be changed and applied for a netlister variable. You can click check boxes, select commands from drop down menus, or fill in blanks, as needed, to modify displayed value.

Information Column

The Information column displays a brief description of the variable and its function.

Additional Write Netlist Options

Additional options are displayed in the pull down menu in the lower left portion of the Write a Netlist Options dialog box.

The following are descriptions of the additional option selections.

Apply Defaults

When you click the Apply Default option, the values in the Netlist Options spreadsheet are reset to the default values.

Advanced

When you click the Advanced option, additional netlister variables are displayed which allow advanced users more control over the netlister read operation.

Add Variables

When you click the Add Variables option, you can add undocumented netlister variables.

D

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