Virtuoso EDIF 200 Reader and Writer User Guide

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EDIF 200 In

EDIF 200 In translates design data files from the EDIF 200 format into the Cadence® Design Framework II (DFII) format.

For information about

- An overview of the EDIF 200 In translation process, see “Understanding EDIF” on page 6
- Procedures for starting and controlling an EDIF 200 In translation, see “Using EDIF 200 In” on page 9
- Explanations of how EDIF 200 In translates different kinds of views, see “How EDIF 200 In Translates Data” on page 13
- An overview of the EDIF 200 In output files, see “EDIF 200 In Output Files” on page 32
- A description of the EDIF 200 In form fields, see “EDIF 200 In Form Fields” on page 33

Licensing Requirements

For information on licensing in the Virtuoso Studio Design Environment, see *Virtuoso Software Licensing and Configuration Guide*.

Working in the Team Design Manager Environment

If you choose to run EDIF 200 In in a team design manager (TDM) workArea, note the following:

- For a new library, EDIF 200 In does not check anything in to the TDM environment.
- For an existing library that is already under TDM control, EDIF 200 In overwrites this library and checks everything in to the TDM environment.

  If adding a new cell to an existing library that is already under TDM control, EDIF 200 In automatically checks this cell in to the TDM environment.

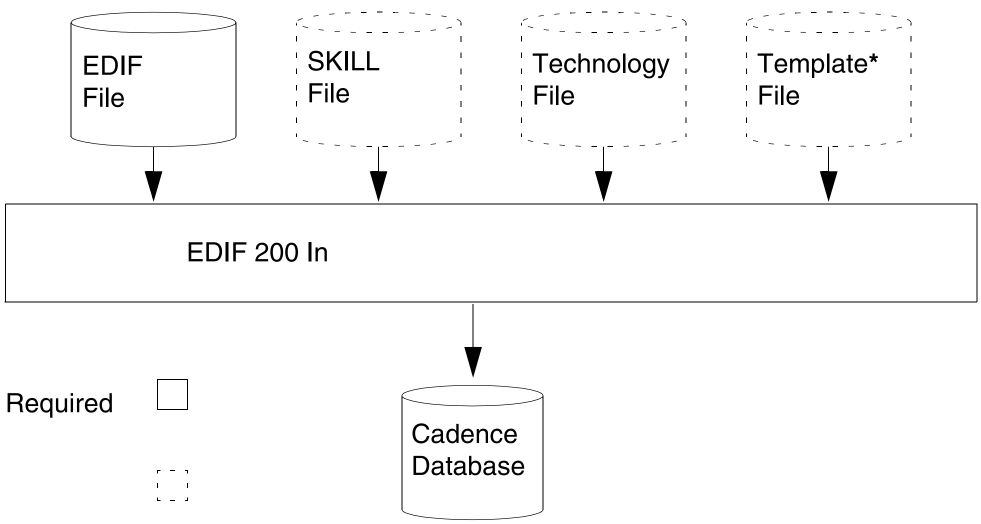
Understanding EDIF

The Electronic Design Interchange Format (EDIF) is a non-proprietary, standard interchange format that uses text to describe electronic design data. To express constructs that represent electronic design, EDIF 200 uses a syntax similar to LISP, a list-processing programming language.

For more information about the EDIF 200 syntax and the functional and semantic descriptions of each EDIF 200 construct, see the *Electronic Design Interchange Format Version 200, ANSI/EIA 548 Manual.*

Overview of Translation Process

The Cadence EDIF 200 In translator translates design data from an EDIF 200 format into the DFII format.



* A template file is required only for batch mode operation.

EDIF 200 In Support Features

The EDIF 200 In translator supports

- EDIF version 200
- Keyword Level 0

- EDIF constructs
- Legal EDIF files that pass the semantic checker written by University of Manchester, EDIF Technical Centre

  The semantic checker generates error and warning messages. Warning messages do not prevent processing.
- Other input files with Component Description Format (CDF) information for any EDIF file generated by Cadence EDIF 200 Out

  EDIF 200 In automatically looks for the CDF files in the run directory.

  Using this feature, you can bring a Cadence design with CDF information back into the Cadence environment (providing the CDF information was stored in the EDIF format using EDIF 200 Out). The CDF information is reapplied to the design when you run EDIF 200 In.

The EDIF 200 In translator does not support

- Version 110 or any other version of EDIF
- Aliases or keyword macros
- Variables, expressions, or control flow

EDIF 200 Limitations

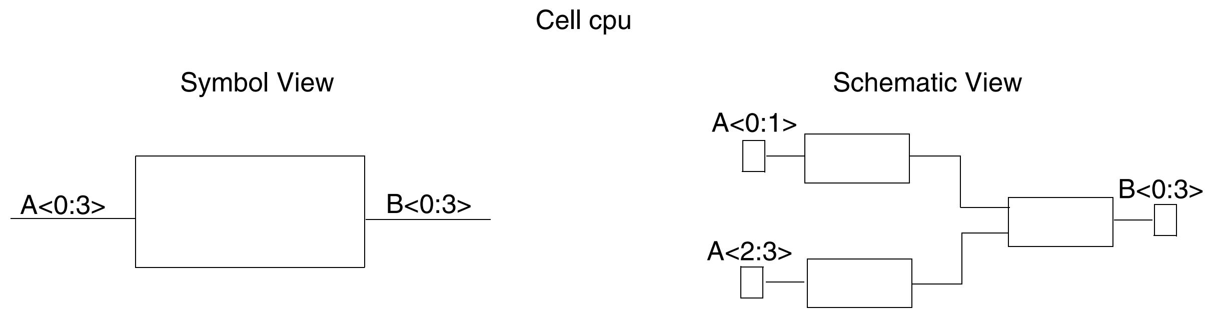
You need to be aware of the following EDIF 200 limitations:

- EDIF 200 does not include an equivalent to the DFII layer-purpose pair. See "Mapping EDIF Constructs to DFII Objects" on page 14 for more information.
- You cannot describe donuts in EDIF 200.

  Donuts are complex shapes that you construct as composite shapes.
- The EDIF 200 standard does not include the concept of a net that is global to an arbitrary hierarchical depth.
- EDIF 200 does not support the following design styles:
  - Inconsistent port grouping between the symbol view and the schematic view of a cell (see example 1 below)
  - Replication of a tapped bit from a bus or bundle (see example 2 below)

Example 1

This example shows inconsistent port grouping between the symbol view and the schematic view of a cell.

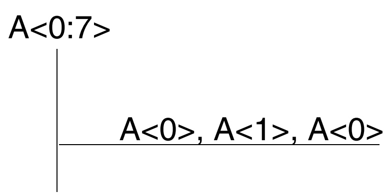


In the example, cell cpu has two interface ports: A<0:3> and B<0:3>. Port A<0:3> is grouped on the symbol of cell cpu. But on the schematic, port A<0:3> is divided into ports A<0:1> and A<2:3>.

In most CAE systems, you establish connectivity by connection and by name, such that ports A<0:1> and A<2:3> are members of port A<0:3>. However, in EDIF 200, ports A<0:1> and A<2:3> cannot be represented because the interface (which defines ports) contains only A<0:3> and B<0:3>.

Example 2

This example shows replication of a tapped bit from a bus or bundle.



In the example, the bus slice is three bits wide. The first bit is A<0>, the second bit is A<1>, and the third bit is A<0>. This slice cannot be represented in EDIF 200 because it requires A<0> to be represented twice in the port list of a joined statement.

Using EDIF 200 In

You can start and control EDIF 200 In from either a UNIX prompt or from the Command Interpreter Window (CIW).

Starting EDIF 200 In from a UNIX Prompt

From a UNIX prompt, you refer to a template file. The template file contains the name of the data file that you want to read in and the preset values for the EDIF 200 In options that you want to apply during the translation process. Template files are described later in this section.

➤ To refer to a template file from a UNIX prompt, type the following:

```
edifin templateFile
```

➤ To refer to a template file from a UNIX prompt and use a specific `cds.lib` file, type the following:

```
edifin templateFile -cdslib  cdslibFile
```

This command tells the software to use a particular `cds.lib` file instead of searching for the `cds.lib` file in the standard locations. See *Cadence Library Path Editor User Guide* for more information about `cds.lib` files.

Note: After you translate a schematic, you must use the *Design – Check and Save* command from the schematic window to ensure connectivity. See Virtuoso Schematic Editor User Guide for more information.

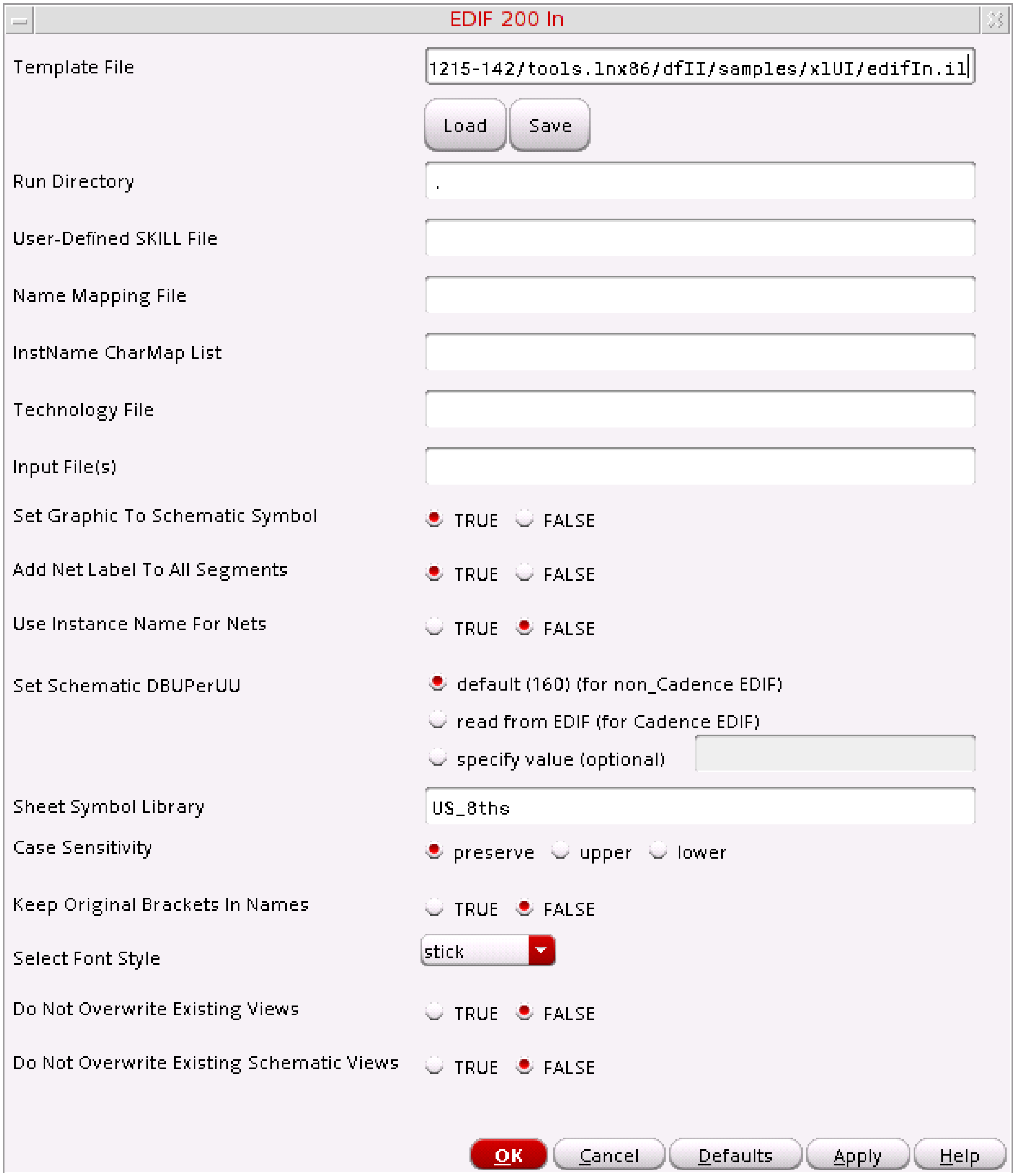
Starting EDIF 200 In from the CIW

From the CIW, you can access the EDIF 200 In form to specify the options you want to apply to the current design translation.

To access the EDIF 200 In form,

1. Choose *File – Import – EDIF 200*.

The EDIF 200 In form appears.



Note: The `cds.lib` file replaces the search path from earlier versions of EDIF 200 In. The `cds.lib` file identifies the locations of your reference libraries. For more information, see Cadence Library Path Editor User Guide.

2. Complete the *Input File(s)* field.

   The input files are the EDIF 200 files to be translated.

3. Specify any other options you want to apply during the translation.

   Information about the optional fields is provided in the “EDIF 200 In Form Fields” on page 33.

4. Do one of the following:

   ❑ Click *OK* to close the EDIF 200 In form and begin the translation process.

   ❑ Click *Apply* to keep the EDIF 200 In form open and begin the translation process.

   EDIF 200 In creates a log file called `edifin.log` in the run directory. The translated library is also created in the run directory. (By default, the *Run Directory* field is set to the current working directory.)

   Note: If you translated a schematic, you must use the *Design – Check and Save* command from the schematic window to ensure connectivity. See Virtuoso Schematic Editor User Guide for more information.

Creating a Template File

A template file is a text file that contains preset values for the options you want to apply during an EDIF 200 In translation.

There are three ways to create a template file:

- Click *Save* on the EDIF 200 In form to save the values you specified on the form. The information is saved to the filename you enter in the *Template File* field.
- Use your local text editor to copy the sample template file to a new file and modify the new file as needed. The sample template file (`edifIn.il`) is located in the *`your_install_dir`*`/tools/dfII/samples/xlUI` directory.
- Use your local text editor to create a new template file, like the one shown in the sample below. The sample shows all the EDIF 200 In variable names and the SKILL property list format.

Sample Template File

The following is a sample EDIF 200 In template file:

```
edifInKeys = list(nil
     'runDirectory "."
     'inFile ""
     'userSkillFile ""
     'mapFile ""
     'charMapForInstName ""
     'techFile ""
     'setSchematicType "TRUE"
     'addNetLabelToAllSegment "TRUE"
     'useInstNameForNet "TRUE"
     'setSchematicDBUPerUU "FALSE"
     'DBUPerUUValue ""
     'sheetSymbolLib "US_8ths"
     'caseSensitivity "preserve"
     'keepOrigBracketsInNames "FALSE"
     'fontStyle "stick"
     'noOverWrite "FALSE"
     'noOverwriteSch "FALSE"
)
```

Required lines

Note: You use the `inFile` field to specify the EDIF 200 files to be translated.

Mapping Form Fields to Template File Entries

The following table maps the EDIF 200 In form fields to their corresponding template file entries. For descriptions of the form fields, see "EDIF 200 In Form Fields" on page 33.

Mapping Form Fields to Template File Entries

EDIF 200 In form field	EDIF 200 In template file entry	Default value
Run Directory	`'runDirectory`	`"."`
User-Defined SKILL File	`'userSkillFile`	`""`
Name Mapping File	`'mapFile`	`""`
InstName CharMap List	`'charMapForInstName`	`""`
Technology File	`'techFile`	`""`
Input File(s)	`'inFile`	`""`
Set Graphic To Schematic Symbol	`'setSchematicType`	`"TRUE"`

Mapping Form Fields to Template File Entries, *continued*

EDIF 200 In form field	EDIF 200 In template file entry	Default value
Add Net Label To All Segments	`'addNetLabelToAllSegment`	`"TRUE"`
Use Instance Name For Nets	`'useInstNameForNet`	`"TRUE"`
Set Schematic DBUPerUU with the fields:		
■ *default(160)*	`'setSchematicDBUPerUU`	`"FALSE"`
■ *read from Cadence EDIF*	`'setSchematicDBUPerUU`	`"TRUE"`
■ *specify value*	`'DBUPerUUValue`	`""`
Sheet Symbol Library	`'sheetSymbolLib`	`""`
Case Sensitivity	`'caseSensitivity`	`"preserve"`
Keep Original Brackets In Names	`'keepOrigBracketsInNames`	`"FALSE"`
Select Font Style	`'fontStyle`	`"stick"`
Do Not Overwrite Existing Views	`'noOverWrite`	`"FALSE"`
Do Not Overwrite Existing Schematic Views	`'noOverwriteSch`	`"FALSE"`

Any value you enter for `'DBUPerUUValue` overrides the value in the `'setSchematicDBUPerUU` field. If you use `'DBUPerUUValue`, make sure the value you choose is the same value you used to create the EDIF file, and set the `'setSchematicDBUPerUU` field to `"FALSE"`. For more information, see "Set Schematic DBUPerUU."

How EDIF 200 In Translates Data

Each construct in EDIF 200 is associated with one or more view types. EDIF 200 In supports only constructs associated with *general*, *netlist*, *schematic*, *masklayout*, and *graphic* view types. EDIF 200 In does not support constructs associated with *behavior*, *document*, *logicmodel*, *pcblayout*, *symbolic*, or *stranger* view types.

Note: If you are not sure how EDIF 200 In handles a construct, create a sample file and submit it to EDIF 200 In. If EDIF 200 In does not support the construct, the program informs you. If EDIF 200 In does support it, examine the output library to determine how EDIF 200 In handles the construct.

Mapping EDIF Constructs to DFII Objects

The following table shows how EDIF 200 constructs are mapped to the DFII objects by EDIF 200 In.

Caution

There are important differences between the EDIF 200 constructs and the DFII objects. To prevent a loss of data, study the following table and the information that follows the table before you attempt a data conversion.

Mapping EDIF 200 Constructs to DFII Objects

EDIF 200 construct	DFII object
`annotate`	label
`arc`	arc
`boundingBox`	bounding box
`cell`	cell
`circle`	ellipse
`color`	layer-purpose pair color
`connectLocation`	pin
`criticality`	criticality
`curve`	arc
`designator`	property named *refDes*
`direction`	terminal direction
`display`	*theLabel*
`dot`	ellipse
`endType`	*pathStyle*
`external`	library
`figure`	layer-purpose pair

Mapping EDIF 200 Constructs to DFII Objects, *continued*

EDIF 200 construct	DFII object
`figureGroup`	layer-purpose pair definition
`includeFigureGroup`	layer-purpose pair definition
`instance`	any instance
`instanceMap`	property
`joined`	net-to-terminal definition
`library`	library
`net`	net
`netBundle`	bundle
`offPageConnector`	terminal
`openShape`	curve or line
`orientation`	orient
`origin`	origin
`page`	sheet cell view
`path`	path or line
`pathWidth`	path width
`permutable`	groups
`polygon`	polygon
`port`	terminal
`portBundle`	terminal
`portImplementation`	pin, figure
`portInstance`	*instanceTerminal* (not direct mapping)
`property`	property
`protectionFrame`	routing barrier
`rectangle`	rectangle
`stringDisplay`	text
`symbol`	view
`textHeight`	font height

Mapping EDIF 200 Constructs to DFII Objects, *continued*

EDIF 200 construct	DFII object
`transform`	transform
`view`	cellview
`visible`	layer visibility

How EDIF 200 In Translates Constructs

The following sections discuss EDIF 200 constructs. There are five types of constructs:

- General constructs
- Netlist view constructs
- Schematic view constructs
- Masklayout view constructs
- Graphic view constructs

General Constructs

The `general` constructs described in this section are often used or translated differently than as defined by the Electronic Industries Association (EIA) standards.

Cell Construct

EDIF 200 In converts EDIF 200 cells to DFII cells.

Contents Construct

The `contents` construct defines a detailed implementation of the cellview. Most objects that go into the database of the DFII view are defined in constructs within the EDIF 200 `contents` construct.

Direction Construct

The `direction` construct defines whether a port is input, output, or bidirectional. If no direction is defined, EDIF 200 In sets the direction to `unknown`.

Display Construct

The `display` construct is supported for displaying text. For example, EDIF 200 In uses the `display` construct, within the context of the `keywordDisplay` construct, to create a label for displaying the cell name as follows:

```
(keywordDisplay CELL
     (display textLayer
          (justify LOWERCENTER)
          (origin (pt 0 -20))
     )
)
```

External Construct

EDIF 200 uses the `external` construct to declare libraries that are referenced but not defined in the EDIF file. EDIF 200 In expects to find libraries declared as external to exist on the system and to be accessible through the paths specified in the `cds.lib` file.

EDIF 200 In uses the `cds.lib` file to locate the views, opens each view in the read-only mode, and verifies the existence of the ports declared in the interface section.

External library declarations must be `edifLevel 0`. Parameterization is not supported.

Figure and FigureGroup Constructs

EDIF 200 In reads the `figureGroup` construct in the EDIF file and the set of system layers in the technology file to define the layer name and layer-purpose. You must define the layer name and layer-purpose for each shape. If the shape is a pin, the default layer name is *pin* and the layer-purpose is *drawing*. If the shape is a net, the default layer name is *wire* and the layer-purpose is *drawing*. If the shape is a net label, the default layer name is *wire* and the layer-purpose is *label*.

Library Construct

EDIF 200 In uses the `library` construct to create the library that contains the cellviews. If a library defined in the EDIF file exists in the DFII environment, EDIF 200 In opens the library in append mode.

OpenShape Construct

The `openShape` construct describes a shape that is open.

Port Construct

Ports and port bundles defined in the EDIF 200 *interface* section are mapped to DFII terminals. When EDIF 200 In encounters a `port` construct, it generates a terminal. The DFII environment supports only one-dimensional arrayed ports.

PortBundle Construct

When EDIF 200 In reads a `portBundle` construct, it generates a terminal name by concatenating the name of each port listed in the `listOfPorts` construct. This list is separated by commas. Consider the following example:

```
(portBundle pbExample
     (listOfPorts
          (port a)
          (port b)
```

```
      (port (array c 3))
      )
)
```

In this example, EDIF 200 In creates a terminal named a,b,c<0:2>.

PortImplementation Construct

EDIF 200 In uses the `portImplementation` `connectlocation` construct to define a pin shape and to set the layer name to *pin* and the layer-purpose to *drawing*. You must set the layer name and layer-purpose if you want to use the schematic editor to edit the design.

Scale Construct

In the `numberDefinition` construct, the `scale` construct establishes the ratio of DFII units to user units. The formula is as follows:

ScaleRatio = (edifUnits / userUnits in meters) * conversion

The user units conversion is .0254 m/inch for schematics, and 1.0 $x10^{-6}$ m/micron for mask layouts. But because netlists are not graphic, distances are meaningless for netlist views. Therefore, the DFII point is equivalent to the EDIF point divided by the ScaleRatio.

For example, if the EDIF file contains

```
(numberDefinition
      (scale 1 (E 254^-6) (unit DISTANCE))
)
..
(viewtype schematic)
boundingBox (rectangle (pt 0 0) (pt 80 60))
```

the DFII mapping points are as follows:

ScaleRatio	=	((1 / 254e^{-6}) / 254e^{-4})
	=	100
DFII point	=	(edifpoint / ScaleRatio)
	=	80 / 100
	=	.8

Technology Construct

The technology file information in DFII 4.4 and beyond is not compatible with version 4.3.x.

View Construct

EDIF 200 In maps EDIF 200 `view` constructs to DFII `cellview` objects. Then EDIF 200 In attaches properties to the cellviews.

Netlist View Constructs

The netlist view describes the design connectivity for circuit simulators and layout tools. Because the schematic view contains network topology plus graphic information, `netlist view` constructs are a subset of `schematic view` constructs.

Note: You cannot edit a nongraphic netlist view. The schematic editor does not allow you to edit a view type other than *schematic*.

Contents Construct

For the netlist view type, the `contents` construct defines the connectivity of instances, nets and netBundles, and ports.

UserUnits Construct

For the netlist view type, EDIF 200 In sets the `userUnits` construct to `"inches"` and the conversion number to 2.54*10 m/UU.

Schematic View Constructs

The schematic view is a logical description of an electronic design. It is a superset of the netlist view because the schematic view specifies all the connectivity information of the design plus graphic information.

The EDIF 200 schematic view can contain symbol libraries and schematics at the block, gate, and transistor level.

Contents Construct

The `contents` construct of a `schematic` view consists of connectivity and graphics that include instances and nets of standard device symbols and descriptive labels. In addition, the `contents` is subdivided into pages. The existence of `page` constructs in the `contents` construct of a schematic view causes EDIF 200 In to create an indexed schematic.

Page Construct

EDIF 200 In supports the `page` construct for the schematic view and generates multisheet schematics. EDIF 200 In uses the `offPageConnector` construct in the `contents` construct outside the scope of a page to establish off-page connectors in the DFII database.

Symbol Construct

Use the `symbol` construct to generate symbols for schematics or symbolic layouts. In a schematic view type, the `symbol` construct defines graphics for a schematic symbol, such as a NAND gate.

A schematic symbol is a standalone entity that the DFII environment places as an instance in a schematic; EDIF 200 In defines a schematic symbol using the `symbol` construct embedded in an `interface` construct, not in the context of a sheet schematic.

Transform Construct

For schematic views that have geometrical constructs, EDIF 200 In supports the `transform` construct of an instance.

UserUnits Construct

For the schematic view type, set `userUnits` to `"inches"` and the conversion number to $2.54*10^{-2}$ m/UU.

Masklayout View Constructs

The `masklayout` view constructs are discussed below. `masklayout` constructs are often used or translated differently than as defined by the EIA standards.

Contents Construct

A `masklayout` view can contain connectivity, but the primary information transmitted to the database is the mask artwork defined by the `figure` constructs within the `contents` construct.

Transform Construct

For `masklayout` views that have `geometrical` constructs, EDIF 200 In supports the `transform` construct of an instance.

UserUnits Construct

Set masklayout `userUnits` to `"microns"` and use a conversion number of 10^{-6}m/UU; for example:

UserUnitsPerMicron	=	(1 edif unit/1*10-9 m) * (1*10-6)m/UU
	=	1000 UserUnitsPerMicron

Graphic View Constructs

The `graphic view` construct that EDIF 200 In supports is the graphic view type.

User Units

Set graphic `userUnits` to `"microns"` and use a conversion number of 10^{-6}m/UU, for example:

DBUPerUU	=	(1 edif unit/1*10-9 m) * (1*10-6)m/UU

= 1000 DBUPerUU

How EDIF 200 In Translates Connectivity

EDIF 200 In imposes certain constraints because of differences in connectivity rules and models between EDIF 200 and DFII. These constraints and differences are discussed in the following sections.

Differences in Connectivity Rule

DFII allows one master port for each port joined in a net at a given level of hierarchy. The joining of two or more master ports at the same level constitutes a short.

For example, the following connection is allowed because port `P1` at the current level of hierarchy is joined to port `P1` on instance `I1`.

```
(net N1
     (joined (portRef P1) (portRef P1 (instanceRef I1)))
)
```

But the following connection is *not* allowed because both ports (P1 and P2) are at the same level of hierarchy.

```
(net N2
     (joined (portRef P1) (portRef P2))
)
```

Differences in Connectivity Models

The EDIF 200 connectivity model differs from the DFII connectivity model. EDIF 200 uses *net-based* connectivity; that is, EDIF 200 defines a net and establishes connectivity by stating which ports are connected to the net. The DFII environment supports a *terminal-based* connectivity model.

Consider the following example:

```
(port (array P 2))
...
(instance i1 (viewRef v1 (cellRef c1 (libraryRef l1))))
..
(net a
     (joined
          (portRef (member p 0))
          (portRef p1 (instanceRef i1))
     )
)
(net b
     (joined
```

```
        (portRef (member p 1))
        (portRef p2 (instanceRef i1))
    )
)
```

For a schematic view, EDIF 200 In generates a net named `a,b` and connects the p<0:1> terminal to it. The `a` net connects to the `p1` port on instance `i1`. The `b` net connects to the `p2` port on instance `i1`.

For a netlist view, EDIF 200 In generates net `a` and net `b`. The `a` net connects to the p<0> terminal. The `b` net connects to the p<1> terminal.

Physical Implementation of Nets

EDIF 200 expresses the physical implementation of a net through a `figure` within the context of the `net` construct. EDIF 200 In also supports `commentGraphics` and `property` constructs.

Critical Nets

EDIF 200 In uses the `criticality` construct to define the relative importance of a net. Placement and routing uses the `criticality` construct to establish net criticality.

Rippers

When EDIF 200 In translates a cell whose cell type is `RIPPER`, the string property `schType` is attached to the cellview and its value is set to `"ripper"`.

EDIF 200 In processes the `interface` section of `RIPPER` cellviews differently from `GENERIC` cellviews. Rather than creating a terminal, EDIF 200 In creates a pin for each port defined in the interface and a terminal for each joined construct declared in the interface.

The pins are attached to the terminals based on the references in the joined constructs. The following EDIF fragment illustrates this concept:

```
(cell rip (cellType RIPPER)
    (view symbol (viewType SCHEMATIC)
    (interface
        (port  (array A 512)  (direction INOUT))
        (port  (array B 512)  (direction INOUT))
        (port  (array C 512)  (direction INOUT))
        (joined
            (portRef A)
            (portRef B)
            (portRef C)) ... )))
```

In this example, EDIF 200 In creates a pin for ports A, B, and C. EDIF 200 In creates a terminal named `ripTerm` when it processes the joined constructs. Because all three ports are referenced in the single joined construct, the pins corresponding to each of these ports are attached to the terminal.

When the terminal and its associated pins are created for a ripper, the width of the pins is not recorded. The widths of the connections between the ports of the ripper are determined when the ripper is instantiated. The connectivity is established when the ripper is used.

Caution

Although EDIF 200 In can accept ripper cell definitions, the connectivity of nets cannot be guaranteed if the nets use rippers that do not conform to the Electronic Industries Association (EIA) recommended structure.

Note: The EDIF 200 In structure for creating rippers is consistent with the recommendations by the EDIF Monograph Series publication, *EDIF Connectivity,* and by the EDIF Schematic Technical Subcommittee in the *Using EDIF 200 for Schematic Transfer* application guide.

When the ripper is used in a net, EDIF 200 In extracts the information from the joined constructs in the nets connected to the ripper. It builds a connection expression for each port of the ripper that is connected.

The connection expression, a string property attached to the instance, denotes the connectivity between the net and a particular ripper cell pin. The property name contains the ripper pin name. The following EDIF fragment contains an instance that refers to the ripper cell defined in the previous example:

```
instance I1 (viewRef symbol (cellRef rip)) ...)
      ...
      (net
      (joined
            (portRef D)
            (portRef (member A 0) (instanceRefI1))) ...)
```

When EDIF 200 In processes this net, it extracts the member information for the referenced port instance `A`. Because the instance is a ripper cell, EDIF 200 In uses the member information to construct a net expression property that attaches to instance I1 (`instanceRefI1`). The name of the net expression property is `edifNetExpr_A`. The value of the property is `"0=0"`.

Both vectors are equivalent and, therefore, a shorter notation can be applied and the value can be set to `"0"` (zero).

The syntax for the net expression properties is as follows:

`net_expression_name` `::= 'edifNetExpr_'`*`ripperPinName`*

`net_expression` `::=` *`vector_expression`*`'='`*`vector_expression`*

EDIF 200 In uses a subset of the available vector expressions. For more information about vector expressions, refer to Virtuoso Schematic Editor User Guide.

Note: Rippers are not allowed in netlists. Rippers are allowed in schematics, but only as a support mechanism for EDIF. Cadence recommends that you edit any schematics generated from EDIF 200 In that contain rippers. Replace the rippers with wires and labels that represent tap expressions. Refer to Virtuoso Schematic Editor User Guide for information about tap expressions.

EDIF 200 In supports one-dimensional, two-dimensional, and multidimensional rippers. One-dimensional rippers are connection points between wires and buses of different sizes. Two-dimensional rippers are those cells that have two ports that are not implemented in the same location. Multidimensional rippers are those that rip out several signals from a bus with a single ripper.

Note: Different nets cannot join the same port of a ripper cell.

How EDIF 200 In Translates Design Hierarchy

EDIF 200 In establishes design hierarchy through the `instance` construct. However, EDIF 200 In does not support either the `parameterAssign` construct, which assigns parameters to instances, or the `portInstance` construct, which applies and modifies properties on instance terminals.

How EDIF 200 In Translates Parameters

You can set the parameters for some Cadence applications by setting user properties in the DFII environment. For example, you can use the graphics editor to set properties on graphics data, which is equivalent to setting parameters for an application that runs in the graphics environment.

The following example shows how you can set properties for *schematic* views. In the example, EDIF 200 In uses the values in the `scale` construct together with the `viewType` to determine scaling.

```
(library L
      (edifLevel 0)
      (technology
            (numberDefinition
                  (scale 160 (e 254 -4) (unit DISTANCE))
            )
      )
      (cell C
            (cellType GENERIC)
            (view V
                  (viewType SCHEMATIC)
                  (interface ...)
```

```
                (property screenGridSpacing
                     (number (e 125 -3))
                )
                (property snapSpacing
                (number (e 625 -4))
                )
                (property screenGridMultiple
                     (integer 8)
                )
                ...
           )
      )
)
```

In the preceding example, the `scale` construct says that every 160 distance units in the EDIF file corresponds to $254*10^{-4}$ meters. The `viewType` is `schematic`. Therefore, EDIF 200 In sets the `userUnit` attribute to `"inches"` and uses a conversion of $2.54*10^{-2}$ m/UU. The scaling is calculated as follows:

DBUPerUU	=	(160 edif units / 254*10-4 m) * (2.54*10-2 m / UU)
	=	160 DBUPerUU

The other properties in the example set the screen grid spacing, snap spacing, and screen grid multiple of the graphics editor. For more information about setting user properties, see *Virtuoso Studio Design Environment User Guide*.

How EDIF 200 In Translates Mosaics

EDIF 200 In translates mosaics only for mask layout. EDIF 200 In supports two-dimensional instance arrays. For example, the following fragment produces a 3 by 5 simple mosaic in the DFII database.

```
(instance (array mosaic1 3 5)
(viewRef V1 (cellRef C1 (libraryRef L1)))
)
```

If you replace the `viewRef` construct in the example with a `viewList` construct (which places instances of different views in the array), EDIF 200 In generates a complex mosaic that does not permit connectivity.

The DFII environment does not support connectivity involving mosaic instances. However, the following one-dimensional arrayed instance generates an iterated instance (not a mosaic instance) in the DFII database. And EDIF 200 In supports connection to ports on iterated instances.

```
(instance (array I2 8)
(6viewRef V2 (cellRef C2 (libraryRef L1)))
)
```

How EDIF 200 In Translates Object Attributes

Most objects in the DFII environment have associated attributes that are used by one or more applications. Attributes are similar to user-defined properties because they are pieces of information attached to an object. However, properties exist only at your discretion, whereas attributes always exist as a permanent part of the database.

Cadence specifies the attribute type. When the DFII environment creates a database object, it assigns a value to each of the object's attributes. If you do not specify a value, the system chooses a default value. You can change the attribute value at any time.

You can set certain attributes in EDIF 200 In. Use the EDIF 200 `property` construct with an `owner "Cadence"` qualification to distinguish the attribute from the usual `property` construct.

For example, to set a ground net signal type, use the following construct:

```
(net (rename GND "gnd!")
(joined
     (portRef S (instanceRef &0))
     (portRef GND (instanceRef &2))
)
     (property sigType
     (string "ground")
     (owner "Cadence")
     )
)
```

To set object attributes using `owner "Cadence"` properties, use certain key words for both the *property* name and the *property* value. The next sections describe which property names and property values to set for figure groups, instances, and nets.

Figure Groups

A figure group must contain the following property information:

Attribute:	layer number
Property name:	`layer`
Legal values:	integers between `0` and `127`
Attribute:	layer priority
Property name:	`priority`

The following example shows how you can use EDIF 200 In to translate a figure group:

```
(library L1
      (edifLevel 0)
      (technology
            (figureGroup diffusion
                  (property layer
                        (integer 52)
                        (owner "Cadence")
                  )
                  (property priority
                        (integer 37)
                        (owner "Cadence")
                  )
            )
      )
)
```

Instances

An instance must contain the following property information:

Attribute:	instance placement status
Property name:	`placementStatus`
Legal values:	`"unplaced"` (default for `netlist` view)
	`"suggested"`
	`"placed"`
	`"locked"`
	`"firm"` (default for `masklayout`, `graphic`, and `schematic` views)

The following example shows how you can use EDIF 200 In to translate an instance:

```
(instance I1
      (viewRef ...)
      (transform ...)
      ...
      (property placementStatus
           (string "suggested")
           (owner "Cadence")
      )
      ...
)
```

Nets

The three net types are as follows:

- Connection status
- Signal type
- Global

The following three sections describe the property information of each net type.

Net Connection Status

A net connection status must contain the following property information:

Attribute:	net connection status
Property name:	`connStatus`
Legal values:	`"connected"`
	`"edgeConnected"`
	`"connectOutside"`
	`"needToConnect"` (default)

The following example shows how you can use EDIF 200 In to translate net connection status:

```
(net N1
     (joined ...)
     ...
     (property connStatus)
          (string "connectOutside")
          (owner "Cadence")
     )
     ...
)
```

Net Signal Type

A net signal type must contain the following property information:

Attribute:	signal type
Property name:	`sigType`
Legal values:	`"signal"` (default)
	`"ground"`
	`"supply"`
	`"clock"`
	`"testLatch"`

The following example shows how you can use EDIF 200 In to translate net signal type:

```
(net VDD
     (joined ...)
     ...
```

```
     (property sigType)
          (string "supply")
          (owner "Cadence")
     )
     ...
)
```

Net Global Status

A net global status must contain the following property information:

Attribute:	global signal
Property name:	`global`
Legal values:	`(true)`
	`(false)` (default)

The following example shows how you can use EDIF 200 In to translate net global status:

```
(net VDD
     (joined ...)
     ...
     (property global
          (boolean (true))
          (owner "Cadence")
     )
     ...
)
```

For a schematic view, EDIF 200 In automatically appends an exclamation point (!) to the end of the global signal name. For example, it changes VDD to VDD! to represent a global signal. For a netlist view, EDIF 200 In does not modify the global net name.

Net Names

EDIF 200 In converts curly braces ({ }) and brackets ([ ]) in net names to angle brackets (< >). EDIF 200 In also converts double periods (..) and hyphens (-) in the bit range of net names into colons (:). The table shows how EDIF 200 In expands net names and vector expressions

How EDIF 200 In Expands Net Names and Vector Expressions

Name	Number of Members	Expanded Form
clk	1	clk

How EDIF 200 In Expands Net Names and Vector Expressions, *continued*

Name	Number of Members	Expanded Form
data<2>	1	data<2>
<*1>base	1	base
<*2>term	2	term,term
<*2>(a,b),c	5	a,b,a,b,c
<*2>(a,<*2>b)	6	a,b,b,a,b,b
b<0:2>	3	b<0,1,2>
b<0:2:1>	3	b<0,1,2>
b<3:0:2>	2	b<3,1>
b<0:2*2>	6	b<0,0,1,1,2,2>
b<(0:2)*2>	6	b<0,1,2,0,1,2>
b<0,2*2>	3	b<0,2,2>
b<(0,2)*2>	4	b<0,2,0,2>
b<(0,1:3:4*1,2:2>	3	b<0,1,2>
b<0:1,2:2>	3	b<0,1,2>

As shown in the table, the expanded form of a name is semantically equivalent to the original specification. It is created by expanding the range specifications, applying repeat operators, and removing parentheses.

To determine the _n_th member name, use a zero-based counting scheme to find the _n_th element in the expanded form. For example, member zero of _<*2>(a,<*2>b)_ is _a_, member one is _b_, member two is _b_, and so on. If the name contains a vector expression, such as _b<0:1,2:2>_, then member zero is called _b<0>_, member one is _b<1>_, and member two is _b<2>_.

Note: Net names can have up to 8000 characters only.

EDIF 200 In Output Files

In addition to a translated design data file, EDIF 200 In produces log messages. The messages are written to either a file or the screen, depending on how you started EDIF 200 In.

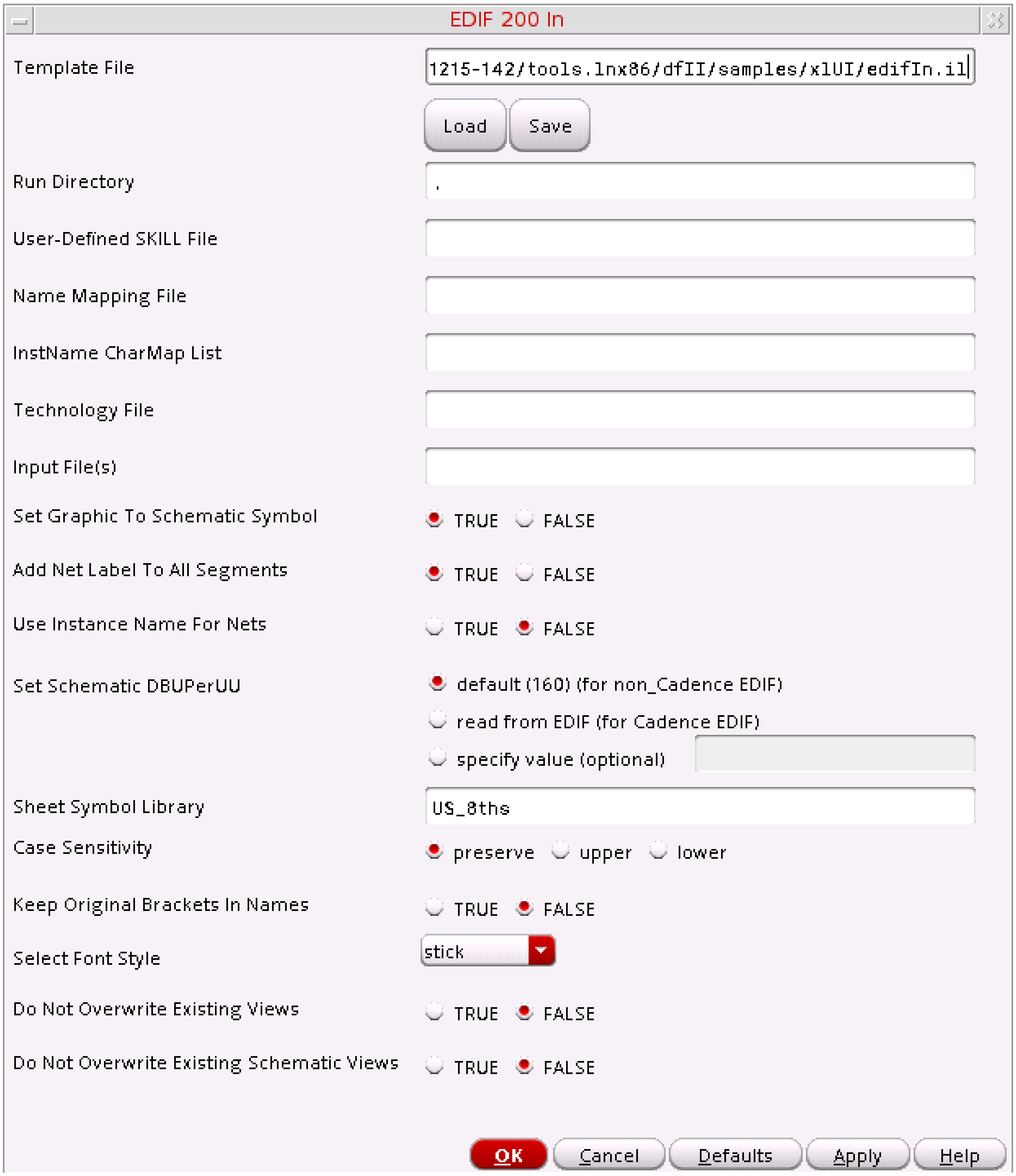
- When you use the EDIF 200 In form to start EDIF 200 In, the software writes the log messages to the `CDS.log` file in your home directory and to the `edifin.log` file in your run directory.
- When you start EDIF 200 In by typing the `edifin` command at the UNIX prompt, the software displays the log messages on your screen and writes error and warning messages to `edifin.log` file in your run directory.

You can redirect the messages by piping the messages to a file. To pipe the messages to a file, type the following at the UNIX prompt:

```
edifin templateFile >& file.log
```

where *`templateFile`* is the name of the template file and *`file`*`.log` is the name of the log file you want to create.

EDIF 200 In Form Fields



- *Template File*— specifies the name of a text file that contains filenames and values for the options you want to apply during an EDIF 200 In translation process.

- *Load*—button reads the template file and applies its contents (field names and values) to the EDIF 200 In form.
- *Save*—button creates a template file that contains the filenames and option values you specify in the form. The information is written to the filename you specify in the *Template File* field.
- *Run Directory*—is the directory where the output files and libraries are generated. You must have write permission to this directory. The default is the current working directory from which you started the software.
- *User-Defined SKILL File*—is a file that contains user-defined SKILL routines.
- *Name Mapping File*—lets you specify the file in which EDIF 200 In writes specific name mapping information such as the legal names that EDIF 200 In substitutes for illegal names. If you do not provide a filename in this field, EDIF 200 In does not generate the file.
- *InstName CharMap List*—is a file that contains the user-defined mapping information. The mapping information tells EDIF 200 In how to handle instance names that contain illegal characters.

  The format is a list containing mapping pairs enclosed in parentheses. For example, the string "(/ |) ($ -)" maps the character "/" in an instance name to the character "|" and maps the character "$" to the character "-". That is, the first character in the parentheses is the original character and the second character is the character to which the first one is mapped.
- *Technology File* —specifies the name of a technology file. A technology file sets the library configuration. If you do not specify a technology file, EDIF 200 In uses the current library configuration.
- *Input File(s)*—specifies the names of the EDIF 200 files to translate. Specify more than one input file by separating each file with a space. You must specify at least one input file.
- *Set Graphic To Schematic Symbol*—specifies whether EDIF 200 In converts graphic symbols to schematic symbols.
  - *TRUE*—converts graphic symbols to schematic symbols.
  - *FALSE*—does not convert graphic symbols to schematic symbols. This is useful for nonschematic transfer.
- *Add Net Label To All Segments*—specifies whether EDIF 200 In adds labels to all net segments without labels.
  - *TRUE*—adds labels to all net segments without labels.

- ❑ *FALSE*—does not add labels to any net segments without labels, except bus signals tapped from a bus.

- ■ *Use Instance Name For Nets*—specifies the net name for an unconnected terminal.
  - ❑ *TRUE*—specifies the net name that EDIF 200 In derives from the corresponding instance name and terminal name. The syntax for the derived net name is *`instanceName.portName`*
  - ❑ *FALSE*—specifies the default net name that EDIF 200 In generates.

- ■ *Set Schematic DBUPerUU*—specifies how EDIF 200 In sets the value for DBUPerUU (database units per user unit), which is the value for the grid spacing on the schematic.
  - ❑ *default (160) for non_Cadence EDIF*—specifies that the default value of 160 DBUPerUU is used. Use this setting for third-party EDIF files.
  - ❑ *read from EDIF for Cadence EDIF*—specifies that EDIF 200 In is to take this value from the EDIF file. Use this setting for EDIF files generated by EDIF 200 Out.
  - ❑ *specify value (optional)*—lets you enter a specific value. Any value you enter in this field overrides the two previous choices.

- ■ *Sheet Symbol Library*—specifies the library containing sheet symbols used to generate schematic sheets. The default is the `US_8ths` library.

- ■ *Case Sensitivity*—specifies whether EDIF 200 In changes the case of letters in all the EDIF identifiers; that is, all the names (including cell names, net names, and instance names), renames, and keywords in the EDIF file.
  - ❑ *preserve*—converts EDIF identifiers without changing case. For example, the name `Obj1` remains `Obj1`.
  - ❑ *upper*—converts EDIF identifiers to uppercase. For example, the name `Obj1` becomes `OBJ1`.
  - ❑ *lower*—converts EDIF identifiers to lowercase. For example, the name `Obj1` becomes `obj1`.

- ■ *Keep Original Brackets In Names*—specifies whether the bus notation stays in its original form or is mapped into Cadence bus notation.
  - ❑ *TRUE*—keeps the original bus notation in the EDIF 200 file.
  - ❑ *FALSE*—converts non-angle-bracketed bus notation into the Cadence bus notation, which uses angle brackets (< >).

  Note: If the EDIF file is *schematic view*, the bus notation must be mapped into the Virtuoso® Schematic Composer schematic capture bus notation. That is, if you are going to use the composer tool for design entry, use *FALSE* to convert bus notation into Cadence bracketed notation. Otherwise, the composer tool does not generate the correct connectivity for the design. Use *TRUE* if the design is going to be worked in another tool.

- *Select Font Style*—sets the font style you want to use in the DFII database. The font choices are `stick`, `euroStyle`, `fixed`, `gothic`, `math`, `roman`, `script`, and `swedish`. The default is `stick`.
- *Do Not Overwrite Existing Views*—specifies whether the existing cellview has to be recreated during EDIF 200 In translation or not.
    - *TRUE*—keeps the original cellview during EDIF 200 In translation..
    - *FALSE*—overwrites the original cellview.
- *Do Not Overwrite Existing Schematic Views*—specifies whether the existing schematic cellview has to be re-created while updating the symbol views during EDIF 200 In translation or not.
    - *TRUE*—keeps the original cellview in the schematic during EDIF 200 In translation.
    - *FALSE*—overwrites the original cellview in the schematic.