Release Notes for Lattice Diamond 3.11

Welcome to Lattice Diamond®, the complete design environment for Lattice Semiconductor FPGAs. Lattice Diamond design software offers leading-edge design and implementation tools optimized for cost-sensitive, low-power Lattice FPGA architectures.

Diamond is available for both the Windows and Linux operating systems. For details, see “System Requirements” on page 7.

This version of Diamond adds a variety of enhancements to make designing for Lattice Semiconductor programmable devices easier than ever. The design tools also include support for the latest Lattice Semiconductor devices.

Lattice Semiconductor offers a rich variety of information sources, including the Help system, PDF manuals, tutorials, and online discussions. The easiest way to reach them all is through the online Help. The first topic in the Help provides links to all the other sources of information.

You can also find extensive information about Diamond and its capabilities, tools, and workflow on the Lattice Semiconductor website under:

www.latticesemi.com/latticediamond

What's New in Diamond 3.11

MachXO3D Device Support

- 9400 COM/IND Generally available
- 4300 COM/IND/AUTO Generally available

RedHat Linux version 6.9/7.4 support

Synplify Pro timing driven synthesis

Note

The hardware timing data for I/O logic for CrossLink devices has been characterized to more precise and final values in Diamond 3.11 as compared to Diamond 3.10. This change results in a slight degradation to fMAX in Diamond 3.11 when I/O registers are being used.

Supported Devices

Lattice Diamond can be used with either a free license or a subscription license. The two licenses provide access to different device families.

Device Family	Free License	Subscription License
ASC	◀	◀
ECP5U™	◀	◀
ECP5UM™		◀
ECP5UM5G™		◀
LatticeEC™	◀	◀
LatticeECP™	◀	◀
LatticeECP2™	◀	◀
LatticeECP2M™		◀
LatticeECP2S™		◀
LatticeECP2MS™		◀
LatticeECP3™		◀
LatticeSC™		◀
LatticeSCM™		◀
LatticeXP™	◀	◀
LatticeXP2™	◀	◀
LIFMD (CrossLink)™	◀	◀

Device Family	Free License	Subscription License
MachXO™	◀	◀
MachXO2™	◀	◀
MachXO3D™	◀	◀
MachXO3L™	◀	◀
MachXO3LF™	◀	◀
Platform Manager™	◀	◀
Platform Manager 2™	◀	◀

Updating Projects from an Earlier Version

If you want to work on a design project created with an earlier version of Diamond, start with the following procedures. These procedures adapt the project for the changes in Diamond.

Find out which version of Diamond your project was created with. Then work through the changes for that and every later version, starting with the earliest and going to the most recent. For example, if your project was created with Diamond 1.1, you would start with the changes for 1.1. After completing those changes, you would work on the changes for 1.2, then 1.4, and so on.

When you open a project from Diamond 1.2 or earlier, Diamond opens a dialog box warning that Diamond will automatically move all SDC files to the Synthesis Constraint Files folder in File List view and remove the “Input SDC Constraint File” options from the strategies. If the project is using LSE, the file names will be changed to use an .ldc extension.

Once saved, the project will not be compatible with earlier Diamond versions.

2.2 Projects

ECP5 does not use the CIN port of the CCU2C Carry Chain primitive. This port should not be connected to anything. If the port is connected, the Design Map stage will fail with an error message. If you see such a failure, correct the design in one of the following ways:

- Rerun synthesis. This should correct the problem if the CCU2C primitive is part of an IPexpress module.
- If the CCU2C primitive was added to your HDL manually, edit the code to remove the connection. See the following examples:

  In Verilog:

```
CCU2C addsub_0 (.A0(scuba_vlo), .A1(DataA[0]),
  .B0(scuba_vlo), .B1(DataB[0]), .C0(scuba_vhi),
  .C1(scuba_vhi), .D0(scuba_vhi), .D1(scuba_vhi),
```

```
  .CIN(), .S0(), .S1(Result[0]), .COUT(co0));
```

In VHDL:

```
signal tmp: std_logic := 'X';
cnt_cia: CCU2C
  generic map (INJECT1_1=> "NO", INJECT1_0=> "NO",
  INIT1=> X"0000", INIT0=> X"0000")
  port map (A0=>scuba_vhi, A1=>scuba_vhi, B0=>scuba_vhi,
  B1=>scuba_vhi, C0=>scuba_vhi, C1=>scuba_vhi,
  D0=>scuba_vhi, D1=>scuba_vhi,
  CIN=>tmp, S0=>open,S1=>open, COUT=>cnt_ci);
```

2.0.1 Projects

Several strategy options have new default values. If you are using Synplify Pro in integrated mode (running synthesis automatically in Diamond), check that the following settings are still as you want them. Also, check the setting of the Auto Hold-Time Correction option under Place & Route Design. Its default changed to On for all devices. This is still current in Synplify Pro versions.

Table 1: New Default Values for Synplify Pro for Lattice

Option	Before	Now
Fanout Limit is now Fanout Guide	100	1000
Export Diamond Settings to Synplify Pro GUI (new in 2.2)	Not available	No
Fix Gated Clocks and Fix Generated Clocks combined into new Clock Conversion	3 (converts and reports all sequential elements)	True (converts with no report)
Frequency	200 (CrossLink, LatticeECP3, LatticeECP5, LatticeXP2) 100 (Mach series)	auto (blank means “auto”)
Number of Critical Paths	3	blank (unspecified)
Number of Start/End Points	0	blank (unspecified)
Output Preference File	False	True
Pipelining and Retiming	False	Pipelining Only
Resolved Mixed Drivers	True	False
Use Clock Period for Unconstrained I/O	True	False

1.4 Projects

For Diamond 1.4 and earlier, there might be some constraints that are not honored because of the Synplify Pro cross-probing feature. This EDIF renaming is usually related to bus names.

If such a problem occurs, you can turn off the renaming feature by placing the following line in the “Command line Options” text box of the Synplify Pro section of the active strategy:

set_option -syn_edif_array_rename 0

1.2 Projects

There were several enhancements for IP and MachXO2.

IP Incompatibilities

SPI4.2 2.7 is not compatible with Diamond 1.3 or later. If you are using this IP, check the Lattice Semiconductor Web site for a more recent version.

MachXO2 Changes

See if your design involves any of the following features:

- For EFB modules with user flash memory (UFM), regenerate the module.
- For IO_TYPE=PCI33 on a MachXO2-1200 or larger device, check if the CLAMP is using the default setting. With Diamond 1.3 the CLAMP default changes from ON to PCI and the I/O will be placed in bank 2. If you were using the default and still want the setting to be ON, you need to set it explicitly.
- For PCI33 MT 6.5 and PCI33 T 6.4 IP, either set the CLAMP to ON explicitly or choose a bigger package (256 or more).

1.1 or 1.0 Projects

There were several enhancements for IP and MachXO2.

IP Incompatibilities

The following IP versions are not compatible with Diamond 1.2 or later. If you are using any of these IP, check the Lattice Semiconductor Web site for a more recent version.

- Convolution Block Encoder 3.6
- DDR1 6.9
- DDR2 7.1
- DDR3 1.2.1
- DDR1_CP 1.1 with MachXO2
- DDR2_CP 1.1 with MachXO2
- Interleaver Deinterleaver 3.5
- PCI_MT_33 6.4
- PCIe RC Lite 1.2
- Tri-Speed MAC 3.4
- Viterbi Block Decoder 4.6

MachXO2 Support

Some aspects of the software support for MachXO2 designs have been improved. See if your design involves any of the following features:

- The 4K/7K design with PLL has a CIB-to-PLL jump change. If you are using this design, recompile it.
- The EFB simulation model has changed. If you are using the EFB module, rerun your simulation tests to see more accurate results.
- In the DDR_GENERIC module of IPexpress, the GDDRX1_RX.Aligned with PLL interface is no longer supported. If you are using such a module, use IPexpress to regenerate it without the PLL option.

Also, MachXO2 has IP evaluation capability and TransFR mode for all I/Os.

Other Information Resources

Other available information resources for the Diamond software include the following.

- General Information: General information on Lattice Diamond can be found on the Lattice Web site at:

  www.latticesemi.com/latticediamond

- Online Help: Start Lattice Diamond and choose **Help > Lattice Diamond Help**.
- *Lattice Diamond User Guide*: This document can be found from a link on the Start Page view.
- Training Videos: Several short videos are available on different aspects of the Lattice Diamond software. These can be viewed online at:

www.latticesemi.com/latticediamond

Click the **Videos** tab.

System Requirements

The basic system requirements for Lattice Diamond are:

- Intel Pentium or Pentium-compatible PC, or AMD Opteron system support (Linux only)
- CPU with the SSE3 instruction set to run the Aldec Active-HDL Lattice Edition simulator
- One of the following operating systems:
  - Windows 7 (64-bit), Windows 8/8.1 (64-bit, including Windows 8.1), or Windows 10 (64-bit).
  - Red Hat Enterprise Linux 6.9/7.4. The host operating system is supported in 64-bit only.
- Approximately 5.75 GB free disk space
- RAM adequate for your FPGA design. For guidelines see “Memory Requirements” on page 7.
- Network adapter and, for a floating license, network connectivity

  A node-locked license is based on the physical (hard-coded) address provided by the network adapter. Network connectivity is not required for a node-locked license. In the absence of a network connection, you can install the NWLink IPX/SPX protocol to force recognition of your NIC card ID (see the Installation Notice).

  A floating license requires access to the license server, so both a network adapter and connectivity are required.
- JavaScript-capable Web browser
- Microsoft Internet Explorer 8 or higher if using the included Aldec Active-HDL Lattice Edition simulator
- Acrobat Reader 5.0 or later

Memory Requirements

Table 2 lists the minimum memory requirements and the recommended memory for the Lattice Semiconductor devices supported by Diamond.

Designing for LatticeECP3 with more than 95K LUT on a Windows system requires a 64-bit operating system.

Table 2: Recommended Memory

Device	Size	64-Bit Operating Systems	
		Minimum	Recommended
ECP5U/UM/UM5G	All	4 GB	6 GB
LatticeEC, LatticeECP	Up to 20K LUT	1 GB	1.5 GB
	Up to 50K LUT	1.5 GB	2 GB
LatticeECP2/M	Up to 20K LUT	1.5 GB	2 GB
	Up to 50K LUT	2 GB	3 GB
	Up to 100K LUT	2 GB	4 GB
LatticeECP3	Up to 95K LUT	4 GB	6 GB
	Up to 150K LUT	6 GB	8 GB
LatticeSC/M	Up to 40K LUT	1.5 GB	2 GB
	Up to 115K LUT	2 GB	5 GB
LatticeXP, LatticeXP2	Up to 20K LUT	1 GB	1.5 GB
	Up to 50K LUT	1.5 GB	2 GB
MachXO, MachXO2, MachXO3D, MachXO3L	All	512 MB	1 GB
LIFMD (CrossLink)	All	512 MB	1 GB
Platform Manager, Platform Manager 2	All	512 MB	1 GB

Extending Memory on Windows

Note that increasing the amount of memory available to applications decreases the amount available for the file cache, paged pool, and nonpaged pool, which can affect applications with heavy networking or I/O.

Use the `BCDEdit /set increaseuserva 3072` command to set the boot entry option to 3 GB. For details, see Microsoft article “BCDEdit /set”: msdn.microsoft.com/en-us/library/ff542202.aspx

- When installing the Red Hat Enterprise Linux version, be sure to install the PERL modules XML::Parser, XML::DOM, and XML::RegExp. These PERL modules are available at www.cpan.org.

Issues Fixed

The following known issues are fixed with this release. Their workarounds are no longer needed. For the complete list of known issues, see www.latticesemi.com/view_document?document_id=50676

fMAX for Synplify Pro degradation if no frequency constraint provided

Recent release of Synplify Pro has a new engine in which fMAXshows worst result if the frequency is left at the default 1 Mhz. A user can set to a design's desired frequency in Strategies or by providing a synthesis frequency.

Versions affected: Diamond 3.11
Devices affected: All
Fixed_3.11
CR129409

Known Issues

Following are known issues with this release and workarounds for them. For the complete list, see:
www.latticesemi.com/view_document?document_id=50676

UFM Simulation doesn't match hardware behavior

The read behavior of the UFM simulation model does not match MachXO3D hardware behavior for certain commands. In simulation, three dummy bytes (0xFF FF 00) precede the expected read data. Affected commands include 0x73 (Read Flash) and 0xC9 (Read UFM). All sysConfig ports, including WISHBONE, primary I2C, Slave SPI, and JTAG are impacted.

There is no current work-around. Users may wish to validate portions of their UFM interface design in simulation using MachXO2, MachXO3L or MachXO3LF device simulation environments. The simulation model is expected to be corrected in the next Diamond release.

Contact Lattice technical support for more information.

Versions affected: Diamond 3.11
Devices affected: MachXO3D
CR129774

RedHat version 7.4 can't open Programmer

This issue requires the user to update to a Linux driver from RedHat in order to support version 7.4. This fix ensures that it is backward compatible with previous versions of RedHat. Refer to the *Lattice Diamond 3.11 Installation Notice for Linux* for RedHat instructions.

Versions affected: Diamond 3.11
Devices affected: All
CR129730

Online Help may not work using Chrome Browser

The newest version of Google Chrome browser has a defect that prevents Diamond software online help, which is generated using WebWorks software, from working properly. The issue has been reported to Google Chrome developers.

Until the problem is resolved, workarounds include:

- Open a different kind of browser (such as Internet Explorer or Firefox) and browse to the index.htm file of the software's help.
- Set a different kind of browser as your default browser.

Versions affected: All versions of Lattice Diamond and Radiant software
Devices affected: All
CR129729

Contacting Technical Support

FAQs The first place to look. The Answer Database on the Lattice Semiconductor Web site provides solutions to questions that many of our customers have already asked. Lattice Applications Engineers are continuously adding to the Database.

Technical Support Assistance Submit a technical support case via www.latticesemi.com/techsupport.

For Local Support Contact your nearest Lattice Sales Office

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