# NetSpeed Crux

## *Release Notes*

**Version: CRUX-17.10**

**Revision A.0**

January 22, 2018

# NetSpeed Crux 17.10 Release Notes

## About This Document

This document lists the release notes for NetSpeed Crux. Using NetSpeed NocStudio, users can define NoC architectures, describe specifications and requirements, optimize the NoC design and finally generate the NoC IP files such as RTL, testbench, synthesis scripts, NoC IP documentation etc.

## Audience

This document is intended for users of NocStudio:

- NoC Designers
- NoC Architects
- SoC Architects

## Prerequisite

Before proceeding, you should generally understand:

- Basics of NetSpeed Crux IP Technology

## Related Documents

The following documents can be used as a reference to this document.

- NetSpeed NocStudio User Manual

## Customer Support

For technical support about this product, please contact support@netspeedsystems.com

For general information about NetSpeed products refer to: www.netspeedsystems.com

# Revision History

| Revision | Date | Updates |
|---|---|---|
| 0.0 | Oct 24, 2017 | Initial |
| 0.1 | Nov 7, 2017 | Release candidate |
| A.0 | Jan 22, 2018 | 1. A new mesh property has been added to support performance counter register to be cleared upon software read<br>2. A new register TXDESTERR – Transmit Destination Error register, has been added to log first occurrence of a look-up error.<br>3. Added property support “axi4_input_register” for regbus master bridge |

# Contents

# 1 Deliverables

- NetSpeed NocStudio Package and one of the license options:
  - N7 version supporting 8 layers and 256 bridges
  - N6 version supporting 4 layers and 128 bridges
  - N5 version supporting 4 layers and 60 bridges
  - N4 version supporting 2 layers and 32 bridges
  - N3 version supporting 1 layers and 12 bridges
- NocStudio executable with interactive GUI.
- Verification checkers to be used in the DV environment.
- Sanity Test Bench.
- Documentation
  a. NocStudio User Manual: The User Guide describes how to set up a system using NocStudio and how to use it to generate NetSpeed IP.
  b. IP Integration Spec: The Integration Manual describes how to integrate a configured network into a larger subsystem.
  c. Technical Reference Manual: The Technical Reference Manual describes how the functionality of the various NoC elements, the features and functions available, and how to dynamically change the functions using the programmer's mode.

# 2 Installation

- NocStudio uses FlexLM based licensing.
  - Linux CentOS 5.5 or higher
  - For node-locked license file, copy over the license file under NocStudio installation directory and renamed it as “license.dat”. If the license file resides in a separated folder, please set environment variable LM_LICENSE_FILE with the proper path.
  - For floating licensing scheme, please download and extract netspeed.flexlmpkg.tar.gz for 32- or 64-bit license daemon and follow FlexLM documentation.

  NOTE: Please use a Linux machine to unpack release tarball set. Unpack Linux tarball set on Windows machines may cause problems with symbolic links.

- The release makes use of Qt libraries covered under LGPL:
  - http://qt-project.org/downloads

# 3 Feature Update: Design Methodology

## 3.1 New look of NocStudio GUI

Fresh new look of NocStudio GUI. Key features include (1) dock / float support of individual sub-windows (2) added support for new_soc with fine grained physical specification of Host IPs (3) Re-designed toolbar icons (4) Merging of selective GUI icons to minimize window real estate (5) new command "highlight" is supported with significantly increased color choices. (6) tune_sibs, tune_router_conn, tune_max_outstanding and build_low_area added for automatic area optimization.

Please note that "Selection", "Default", "Mesh" and "Sim" tabs are moved to lower right corner of the screen by default.

## 3.2 Creating design with unified domain mode

New release allows user to define a unified domain with a common clock, voltage and power domain. All modules within the domain will be part of a RTL group. GUI visualization has been enhanced with outline in the floorplan view.

## 3.3 GUI visualization enhancements during performance analysis

GUI tooltip window displays complete detailed information of all links of a router, including lists of flows and traffic activities. The pop-up window can be disabled by setting "prop_default tooltip_on no".

## 3.4 GUI support for individual font size control

Each of the Icon size, Console Font, Main Tabs font and Side panel font can now be controlled by the user by clicking "view → Resize Icon and Size".

## 3.5 New Heat Map support and power modeling with GUI visualization during simulation – preliminary

New default property "heatmap_enabled" can be set to yes for user to visualize the NOC heatmap / activities during simulation. Please refer to NocStudio help manual and search for keyword "heatmap".

## 3.6 New display_node_as_x_y property to switch between node ID and [x,y]

This added property allows user to switch GUI node ID display to [x, y] coordinate. The feature improves usability for user to extensively specify [x, y] in the design script file and eases host/bridge relocation and mesh resizing. Please refer to command "resize_mesh" for details.

## 3.7 New command "resize_mesh"

This newly added command allows user to increase / decrease rows and columns in the mesh. Setting "prop_default display_node_as_x_y yes" should be used to create highly scalable design flow.

## 3.8 Next Gen SOC Physical Floorplan View – preliminary

User specified fine grained definition of the Host IP dimension. Instead of grid/mesh based Host IP size specification with new_mesh, user can draw the actual size (with um granularity) using new_soc command. The "chip_view" in prior releases has been replaced with command "generate_chip_view".

## 3.9 Design Config Rule check (lint) support

New command "lint" is now supported to check the integrity of the design configuration. Similar to logic linting flow, user can define their own waiver rule file based on the design criteria on per project basis or a corporate wide defined rule.

# 4 Feature Updates: System Interconnect

## 4.1 Multi-cast Modeling Enhancement

Enhancements on host and router modeling in NocStudio has been made in this release for multicast capable designs to support single- and double-flits multicast packets. This is a license controlled feature, please contact NetSpeed support team for details.

## 4.2 Added support of axi4_input_register for RBM

When set, input register flops are added at its inputs. Please note that the property can be set globally using prop_default or individually using bridge_prop.

# 5 Feature Updates: Streaming Protocol

None

# 6 EDA Tool Compatibility

- Cadence EDA tools were used for verification and synthesis of this product.
  - Incisive RTL Simulator 15.22-s012
  - Genus RTL Synthesis 16.22-s033_1
  - HAL Linting tool 15.20-s027
  - Conformal 16.20-s240
- Compatibility testing has been done with VCS vcs-mx/L-2016.06 and Synopsys Design Compiler L-2016.03-SP5.
- Please contact NetSpeed support team (support@netspeedsystems.com) for additional platform and tool compatibility details.

# 7 Errata: System Interconnect

## 7.1 REGBUS MASTER MIS-CONFIGURATION WHEN IS_SINGLEBEAT SET TO YES

In 1710 release, the design with regbus enabled should set its prop_default is_singlebeat to NO. Apparently this property was applied onto the RBM (regbus master) configuration by mistake which triggers sanity testbench failure.

# 8 Errata: Streaming Protocol

None

# 9 Changes to Commands and Properties

Please refer to NocStudio Help → User Manual Supplement for details.

## 9.1 Command Changes

| Command Name | Comment |
|---|---|
| add_column / del_column | Add / delete a column to the logical mesh at the position specified in the physical floorplan view |
| add_domain / del_domain | Add / delete a single domain with a clock domain, power domains and an RTL group |
| add_row / del_row | Add / delete a row to the logical mesh at the position specified in the physical floorplan view |
| add_to_region / del_from_region | Add / delete a physical region and specify clock domains, power domains, RTL groups. |
| add_unwaiver / del_unwaiver / list_unwaivers | This command adds / delete / list one or more IDs and/or one or more categories and/or one or more strings to the unwaiver list used for lint |
| add_waiver / del_waiver / list_waivers | This command adds / delete / list one or more IDs and/or one or more categories and/or one or more strings to the waiver list used for lint |
| analyze_interface_perf_ratios | Report on interface performance ratios of last sim run |
| build_low_area | Build a NoC with lowest possible area |
| expand_var | Expand variable and print the result |
| generate_chip_view | Draws a physical chip view of the NoC |
| highlight | Highlights the filtered NoC components in the specified color (default color is automatically chosen by NocStudio). If no filter is given then all NoC components are chosen |
| lint | This command runs a design verification check (or lint check) on the current NoC, and presents a report with the errors and warnings that might hinder rtl generation |
| list_channel_tooltips | deprecated |
| list_regions | Lists all specified physical regions |
| list_rtl_groups | Lists most rtl elements in each group |
| list_tooltips | Prints the tooltip for the specified element |

| | |
|---|---|
| load_waiver_list | This command loads a list of waived/unwaived IDs and/or categories and/or strings for lint |
| move_region | Move a part of a region that was added using the add_to_region command to a new position |
| new_soc | This command creates a new blank SoC on which hosts can be drawn using physical coordinates |
| permute_router_conn | Changes the router connections of all provided bridges |
| reset_node_physical_positions | Resets the physical position of all nodes in the logical grid |
| reset_unwaivers | This command resets the list of waived IDs, categories, and strings for lint |
| reset_upgraded_warning | Reset the given upgraded warning ID(s) to be warning(s) again |
| reset_waivers | This command resets the list of waived IDs, categories, and strings for lint |
| resize_mesh | This command is used to change the number of rows and columns in the mesh |
| save_lint_report | Save the lint report as a .csv file |
| set_node_physical_position | Set the physical position of a node in the logical grid |
| transform_soc | This command transforms the physical floorplan view into the logical mesh view |
| tune_router_conn | Tunes the bridges router connections to minimize the number of distinct routers that the bridges are connected to |
| upgrade_warning | Upgrade the given warning ID to be an error |

## 9.2 MESH PROPERTY CHANGES

| **Property Name** | **Comment** |
|---|---|
| flop_density | Indicates the flop density (number of flops per um2) for chip view display mode. |
| interrupt_mode | Controls the type of interrupt signals that are exposed in ns_soc_ip.v |
| link_wire_density | Indicates the wire density (number of wires per um). |
| link_wire_width_nm | deprecated |
| logical_transform_tolerance_cap | The maximum tolerance that can be used to transform the physical positions of objects into the logical positions |
| register_area_nm2 | deprecated |
| soc_view_reference_line | Choose type of lines to show in the SoC view. |

| | |
|---|---|
| soc_view_wire_width_scale | Scaling factor for width of wires in the SoC view. |
| tooltip_on | deprecated |
| virtual_ok | Deprecated |
| register_clear_on_read_enabled | If set to yes, event counter registers are reset to zero upon software read. No behavior change with software write. |

## 9.3 HOST PROPERTY CHANGES

| Property Name | Comment |
|---|---|
| Color | Color choices are significantly enhanced<br>help → Available_colors |

## 9.4 BRIDGE PROPERTY CHANGES

| Property Name | Comment |
|---|---|
| allowed_positions | Sets the positions that this bridge is allowed to move to |
| color | Color choices are significantly enhanced<br>help → Available_colors |
| lock | Lock / unlock the position of a bridge |

## 9.5 INTERFACE PROPERTY CHANGES

None

## 9.6 LINK PROPERTY CHANGES

| Property Name | Comment |
|---|---|
| domain_crosser_phy_pos | The physical position of the crosser for this link |

## 9.7 ROUTER PROPERTY CHANGES

None

## 9.8 VC PROPERTY CHANGES

None

## 9.9 DEFAULT PROPERTY CHANGES

| Property Name | Comment |
|---|---|
| check_name_validity | Enable NocStudio to skip the check for any duplicated host, router, bridge names in order to speed up parsing. |
| display_node_as_x_y | This prop can be used to display Node ids as x,y values so the row and column of a node can be quickly identified. |
| domain_region_show | This property allows users to control how domain regions are shown in the SoC view |
| dynamic_power_equation | This property allows users to provide a formula for computing dynamic power of NoC logic |
| gen_passthroughs | Enabling this flag changes RTL generation to automatically create passthroughs for internal wires whose logical path would pass through a node with rtl group that is neither the source nor destination of that wire |
| heatmap_enabled | If yes, NocStudio will compute the power consumption during performance simulation runs, and in a separate tab display the heatmap of the NoC based on the power consumption at various routers and bridges and links |
| heatmap_include_static_power | If yes, the power computation for heatmap would include the static power consumption. |
| heatmap_pixels_mm | The pixel granularity of power sim heatmap. |
| heatmap_propag_dist_mm | The propagation radius of power sim heatmap. |
| list_region_corners | This property allows the user to control the format in which regions are printed |
| next_gen_bridge | This property is used to turn on certain area or performance optimizations in NocStudio that are not yet available in the bridge and router RTL. RTL generation capability is turned off when this property is set to yes |
| shared_doc_enable | Indicates generation of redistributable documents is enabled when running gen_ip for this NoC |
| show_flow_list_in_channel_tooltip | Whether to show the mapped/simulated flows list in VC/Ifce tooltip or not |
| static_power_equation | This property allows users to provide a formula for computing static power of NoC logic |
| tooltip_on | Indicates whether to display tool-tip in NoC display |

| | |
|---|---|
| wire_power_equation | This property allows users to provide a formula for computing dynamic power of NoC logic |

# 10 Hot fixes

None.

2870 Zanker Road,

Suite 210,

San Jose, CA 95134

(408) 617-5209

http://www.netspeedsystems.com