

# SDSoC Development Environment

Release Notes, Installation, and Licensing Guide

UG1294 (v2018.2) July 2, 2018





# Revision History

The following table shows the revision history for this document.

Section	Revision Summary
<b>07/02/2018 Version 2018.2</b>	
Initial Xilinx release	This document contains SDSoC™ release information. It was branched from the <i>SDAccel Environments Release Notes, Installation, and Licensing Guide (UG1238)</i> , which now provides release information specific to SDAccel™.

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# Release Notes

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## SDSoC Development Environment What's New for 2018.2

The following updates to the SDSoC™ Development Environment are included in the 2018.2 release:

- New **Platforms** and faster clocks deliver performance improvements.
- **SDx™ IDE** enhancements that include an Assistant, actionable Guidance, and simplified import/export.
- Ease-of-Use improvements for **C-Callable IP** that simplify and protect IP libraries.
- Introduction of transaction-level hardware **Debug**.

**Note:** New updates to the **HLS Compiler** for 2018.2 are also provided below.

### Supported Platforms

For a list of all supported platforms and devices, see the [SDSoC Product Page](#).

- Support for two new platforms, ZCU104 and ZCU106, giving more choice in base hardware.
- To ease custom platform creation, there is now a Platform Interfaces Tab in Vivado® IP Integrator that can be used for setting SDSoC™ platform properties.
- Faster clock for data movers. The system compiler now puts the HW accelerator and the data mover on the same clock for faster data transfers and system performance.

### SDx IDE

- Assistant.
  - New view to manage SDx software projects. This view is used to manage hardware functions, build projects, and view reports. The common actions are in the pop-up menu for ease of use.
- Project Export/ Import.

- Gives ability export and import a project to move between workspaces. This includes custom build/debug configurations.
- Guidance on Linux (only for the HLS portion of the flow).
  - Provides feedback on the coding styles in the accelerator from the HLS tools.

### C-Callable IP

- Changes to the flow to make it easier to create and use a library of C-Callable IP.
- Third party IP providers are allowed to encrypt IP, enabling an IP market.
- `SDx_pack` replaces the harder to use `sdslib`.

### Debug

- `sds++` has a new switch, `--dk`, for users familiar with the FPGA design flow. This switch allows them to compile their application to get transaction level visibility when running on hardware.
- Prior releases had one project for Vivado synthesis and a second for Vivado implementation. Now there is a single project with both synthesis and implementation and improved debug flow.

### HLS Compiler

- A new Schedule Viewer accessible from the Analysis Perspective graphically displays dependencies of operations and control steps.
- Overall faster processing of source code embedded directives (pragmas).
- Redesigned "dataflow" with strict-flow checks to help guide toward optimal solution.
- Performance enhancements with both higher clock rates (4% higher on average) and reduced design latency with 10% fewer clock cycles for design completion.
- Five additional `math.h` optimized functions for fixed-point data types (`pow`, `abs`, `sincos`, `acos`, `asin`).
- XFast xfOpenCV libraries are now fully supported in Vivado HLS.
- Co-simulation waveforms are enhanced to clearly display DATAFLOW transaction views.
- New DRCs added to the Vivado HLS GUI DRC tab to expedite timing closure and strengthen pragma checks.

## Changes to Existing Behavior

- HLS Compiler
  - When using the `hls::FFT`, constant inputs must now be assigned using a method.

- C arbitrary precision types are no longer supported in C++.
- Changes to dependence directive WAR and RAW modes: Option "WAR false" previously also implied a "RAW false." This is no longer the case.

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## Known Issues

Known Issues for the SDx™ Environment are available in [AR#71223](#).

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## Release Notes from Previous Versions

Release notes for previous versions of the SDSoC™ Environment are available at the following links:

- [What's New in SDSoC for 2017.4](#)
- [What's New in SDSoC for 2018.1](#)

# Introduction to the SDSoC Development Environment

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## About the SDx Environments

The 2018.2 SDx™ Environment software release consists of the SDSoC™ Development Environment for Zynq® UltraScale+™ MPSoC and Zynq®-7000 SoC families, and the SDAccel™ Development Environment for Data Center and PCIe®-based accelerator systems. These environments share a common installer, but are licensed individually. All SDx Environments include the Vivado® Design Suite for programming the target devices and for developing custom hardware platforms.

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## SDSoC Hardware Requirements

The 2018.2 SDSoC™ environment release includes support for the following development boards:

- ZC702, ZC706, and ZedBoard development boards featuring the Zynq®-7000 SoC
- ZCU102, ZCU104, and ZCU106 development board featuring the Zynq® UltraScale+™ MPSoC.

Additional platforms are available from partners. Also, the SDSoC Platform Utility enables you to target any custom Zynq and Zynq UltraScale+ MPSoC board. For more information, visit the SDSoC Developer Zone: <https://www.xilinx.com/products/design-tools/software-zone/sdsoc.html>.

Depending on the board, you will need one or more USB cables and possibly an ethernet cable to observe the UART output, program, and debug the board.

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## Software Requirements

The SDSoC™ Development Environment runs on both Linux and Windows operating systems. The supported operating systems are listed below.

- Windows 7 and 7 SP1 Professional (64-bit)
- Windows 10 Professional versions 1709 and 1803 (64-bit)
- Linux Support
  - Red Hat Enterprise Workstation/Server 7.3-7.4 (64-bit)
  - Red Hat Enterprise Workstation 6.7 and 6.8
  - CentOS 7.2
  - Ubuntu Linux 16.04.3 LTS (64-bit)
    - Linux kernel 4.4.0 is supported
    - Ubuntu LTS enablement (also called HWE or Hardware Enablement) is *not* supported

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## About the SDSoC Installation

The installation of the SDSoC™ tool suite includes the following:

- SDSoC environment, including an Eclipse/CDT-based GUI, high-level system compiler, and ARM GNU toolchain
- Vivado® Design Suite System Edition, with Vivado® High-Level Synthesis (HLS) and the Xilinx® Software Development Kit (SDK)

The SDSoC environment includes the same GNU ARM toolchain included with the Xilinx Software Development Kit (SDK), which also provides additional tools used by the SDSoC environment. The SDSoC environment setup script sets PATH variables to use this toolchain.

More information about the SDSoC installation:

- The provided toolchains contain 32-bit executables, requiring your Linux host OS installation to include 32-bit compatibility libraries.
- RHEL 6 and 7 64-bit x86 Linux installations might not include the 32-bit compatibility libraries, and might need to be added separately; see <https://access.redhat.com/site/solutions/36238>.
- On RHEL, 32-bit compatibility libraries can be installed by becoming a superuser with root access privileges and running the `yum install glibc.i686` command.



- On Ubuntu, 32-bit compatibility libraries can be installed by becoming a superuser with root access privileges and running the following commands.

```
sudo dpkg --add-architecture i386
sudo apt-get update
sudo apt-get install libc6:i386 libncurses5:i386 libstdc++6:i386
sudo apt-get install g++-multilib
sudo apt-get install libgtk2.0-0:i386 dpkg-dev:i386
sudo ln -s /usr/bin/make /usr/bin/gmake
```

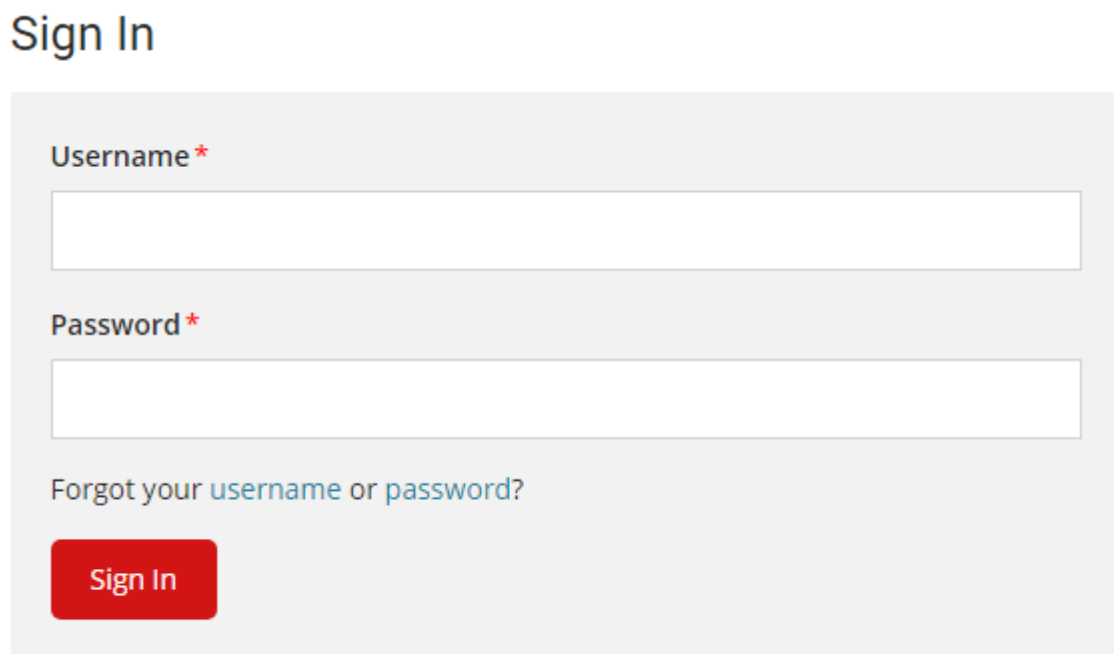
- The version of the toolchain can be displayed by running the `arm-linux-gnueabi-g++ -v` command. The last line of the output printed in the shell window should be GCC version 4.9.2 20140904 (pre-release)(crosstool-NG linaro-1.13.1-4.9-2014.09 - Linaro GCC 4.9-2014.09).

# Obtaining a License on the Xilinx Licensing Site

This section describes the steps to obtain a license for the SDx™ development environment.

1. Sign in to the Xilinx® licensing website: <https://www.xilinx.com/getproduct>. See the following figure.

Figure 1: Xilinx Licensing Site Sign-in Screen



The screenshot shows a sign-in form with the following elements:

- Sign In** (Section Header)
- Username \*** (Label) with an empty text input field below it.
- Password \*** (Label) with an empty password input field below it.
- Forgot your username or password?** (Text link)
- Sign In** (Red button)

[New to Xilinx? Create your account](#)

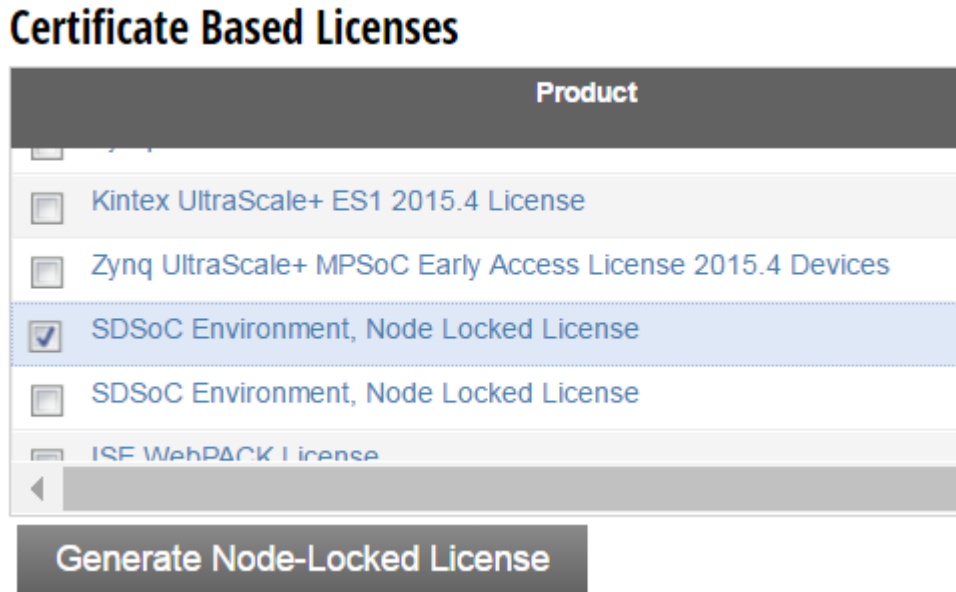
SDSoC comes with a 60-day evaluation license, so you should be able to see it in your available license list.

2. In the account drop-down menu, select **XILINX - SDSoC Environment**.

**Note:** This only shows up if you have purchased or redeemed an SDSoC license.

- From the Certificate Based Licenses menu, select **SDSoC Environment, Node-Locked License**.

Figure 2: **Certificate Based Licenses Menu**



- Click **Generate node-locked license**.
- Enter a Host ID in the **License Generation** screen and click **Next**.
- Verify that the Host ID for the license is correct and click **Next**.
- Accept the licensing agreement by clicking **Accept**.

You will receive an email from `xilinx.notification@entitlenow.com` with the license file.

- Set the `XILINXD_LICENSE_FILE` environment variable to point to the location of the license file on your system.

# Installing the SDSoC Environment

This chapter explains the installation process for the SDSoC™ environment.

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## Preparing to Install the Tools

**Note:** Before starting installation, you must complete the following steps.

1. Make sure your system meets the requirements described in the following topics:
  - [Software Requirements](#)
  - [SDSoC Hardware Requirements](#)
2. Disable anti-virus software to reduce installation time.
3. Close all open programs before you begin installation.

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## Installing the SDSoC Environment

The SDSoC Development Environment installation is available on the [Xilinx® Downloads Website](#).

**Note:** There is no separate Vivado® version of the installation, only "stand alone" and SDx™ installations. Any difference in the installation happens if you use a different xsetup installer than the one from SDx or the one from the Vivado® Design Suite. Running the SDx xsetup installer would get you the same Vivado Design Suite as the 2018.2 Vivado xsetup installer, and offers the same options as the Vivado System Edition installation. The SDx xsetup installer is a super-set of the Vivado System Edition version.

## Using the Web Installer

Xilinx recommends that you use the web installer.

Using the web installer you can pick and choose what you would like to install up front and that is the only data that you need download for installation. Also, in the case of a network failure, you can resume from where you last stopped, instead of starting again from the beginning.

**Note:** The following devices are pre-selected in the individual installers:

- For the SDSoC™-specific web installer, Zynq®-7000 and Zynq®-7000 SoC are pre-selected.
- For the combined SDx™ SFD (single file download) image, no devices are pre-selected.

## Downloading and Installing the Full Installation File

If you downloaded the full product installation, decompress the file and run `xsetup` (for Linux) or `xsetup.exe` (for Windows) to launch the installation.

If you downloaded the web installer client, launch the downloaded file. You are prompted to log in and use your regular Xilinx login credentials to continue with the installation process.

Xilinx recommends the use of 7-zip or WinZip (v.15.0 or newer) to decompress the downloaded `tar.gz` file.

- The **Download and Install Now** choice allows you to select specific tools and device families on following screens, downloads only the files required to install those selections, and then installs them for you. After entering your login credentials, you can select between a traditional web-based installation or a full image download.
- The **Download Full Image** requires you to select a download destination and to choose whether you want a Windows only, Linux only, or an install that supports both operating systems. There are no further options to choose with the **Download Full Image** selection, and installation needs to be done separately by running the `xsetup` application from the download directory.

## Batch Mode Installation Flow

The installer can run in an unattended batch process. To run unattended, a standard edition and install location must be specified or a configuration file must be present which tells the installer the install location and which of the tools, devices and options you wish to install. The installer has a mode in which it can generate a reference option file for you based on common configurations, which you can further edit to customize your installation.

Xilinx recommends that you generate this reference for each new quarterly release, so that new devices, tools, options or other changes will be accounted for in your options file.

To begin using batch mode, open a command shell and change to the directory where you have stored your extracted installer.

For Windows, open the command window with administrator privileges and run the `xsetup.bat` file, found in the `\bin` directory, and not `xsetup.exe` with the options below.

## Generating a Configuration File

1. Run:

```
xsetup -b ConfigGen
```

This will put you in an interactive mode where you will see the following menu. Choose the SDx™ IDE for SDSoC development environment edition.

2. After you make a selection, you will be prompted with the location/filename for your configuration file and the interactive mode exits. Below is a sample configuration file:

```
Edition=SDx Development Environments

# Path where Xilinx software will be installed.
Destination=/opt/Xilinx

# Choose the Products/Devices the you would like to install.
Modules=Built-in Platforms and associated devices for SDSoC:1,Zynq
UltraScale+ MPSoC:1,Virtex UltraScale+ HBM ES:0,Zynq-7000:1,Kintex
UltraScale+ ES:0,Kintex UltraScale+:1,ARM Cortex-A53:1,Spartan-7:1,ARM
Cortex-A9:1,ARM Cortex R5:1,Virtex UltraScale+ ES:0,System Generator
for DSP:0,Artix-7:1,Built-in Platforms and associated devices for
SDAccel:1,DocNav:1,Kintex-7:1,Virtex UltraScale+:1,Model
Composer:0,Zynq UltraScale+ RFSoc ES:0,Kintex UltraScale:1,Engineering
Sample Devices for Custom Platforms:0,Virtex UltraScale:1,Zynq
UltraScale+ MPSoC ES:0,MicroBlaze:1,Virtex-7:1

# Choose the post install scripts you'd like to run as part of the
finalization step. Please note that some of these scripts may require
user interaction during runtime.
InstallOptions=Acquire or Manage a License Key:0,Enable WebTalk for SDK
to send usage statistics to Xilinx:1,Enable WebTalk for Vivado to send
usage statistics to Xilinx (Always enabled for WebPACK license):1

## Shortcuts and File associations ##
# Choose whether Start menu/Application menu shortcuts will be created
or not.
CreateProgramGroupShortcuts=1

# Choose the name of the Start menu/Application menu shortcut. This
setting will be ignored if you choose NOT to create shortcuts.
ProgramGroupFolder=Xilinx Design Tools

# Choose whether shortcuts will be created for All users or just the
Current user. Shortcuts can be created for all users only if you run
the installer as administrator.
CreateShortcutsForAllUsers=0

# Choose whether shortcuts will be created on the desktop or not.
CreateDesktopShortcuts=1

# Choose whether file associations will be created or not.
CreateFileAssociation=1
```

Each option in the configuration file matches a corresponding option in the GUI. A value of 1 means that option is selected; a value of 0 means the option is unselected.

**Note:** In this configuration file, by default there are no devices selected for installation (all devices have a value of 0). You **MUST** update a device to a value of 1 in order to install that device.

## Running the Installer

Now that you have edited your configuration file to reflect your installation preferences, you are ready to run the installer. As part of the command line installer, you must indicate your acceptance of the Xilinx® End-User License Agreement [Xilinx End-User License Agreement](#) and Third Party End-User License Agreement [Third Party End-User License Agreement](#), and confirm you understand the WebTalk Terms and Conditions.

### WebTalk Terms and Conditions

The WebTalk Terms and Conditions, which you must agree to when running the installer, reads as follows:

By indicating I AGREE, I also confirm that I have read Section 13 of the terms and conditions above concerning WebTalk and have been afforded the opportunity to read the WebTalk FAQ posted at <https://www.xilinx.com/webtalk>. I understand that I am able to disable WebTalk later if certain criteria described in Section 13(c) apply. If they don't apply, I can disable WebTalk by uninstalling the Software or using the Software on a machine not connected to the internet. If I fail to satisfy the applicable criteria or if I fail to take the applicable steps to prevent such transmission of information, I agree to allow Xilinx to collect the information described in Section 13(a) for the purposes described in Section 13(b).

When using the command line, use the command-line switch, `-a` or `--agree`, to indicate your agreement to each of the above. If one of the above is left out of the list, or the agree switch is not specified, the installer exits with an error and does not install.

### Batch Mode Installation

This is an example of the command line for a typical new installation using a configuration file.

```
xsetup --agree XilinxEULA,3rdPartyEULA,WebTalkTerms
--batch Install --config install_config.txt
```

If you wish to use one of Xilinx's default Edition configurations, you do not have to specify the `--config` option, but since the destination directory is included in the configuration file, you will be required to specify this on the command line.

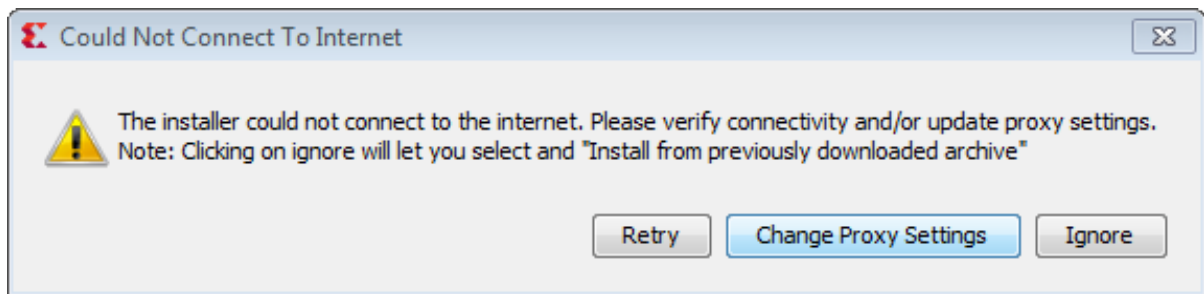
```
xsetup --agree 3rdPartyEULA,WebTalkTerms,XilinxEULA
--batch Install --edition "SDx Development Environments" --location
"C:\Xilinx"
```

The above command uses the default configuration options for the edition specified. To see the default configuration options, use the `-b ConfigGen` mode as described above. The batch mode of the SDx™ installer can also perform uninstallation and upgrades (adding additional tools and devices). For the full list of the options in the installer batch mode run `xsetup -h` or `xsetup --help`.

## Verifying Connectivity

The installer connects to the Internet through the system proxy settings in Windows. These settings can be found under **Control Panel** → **Network and Internet** → **Internet Options**. For Linux users, the installer uses Firefox browser proxy settings (when explicitly set) to determine connectivity.

Figure 3: **Internet Connectivity**



If there are connectivity issues, verify the following:

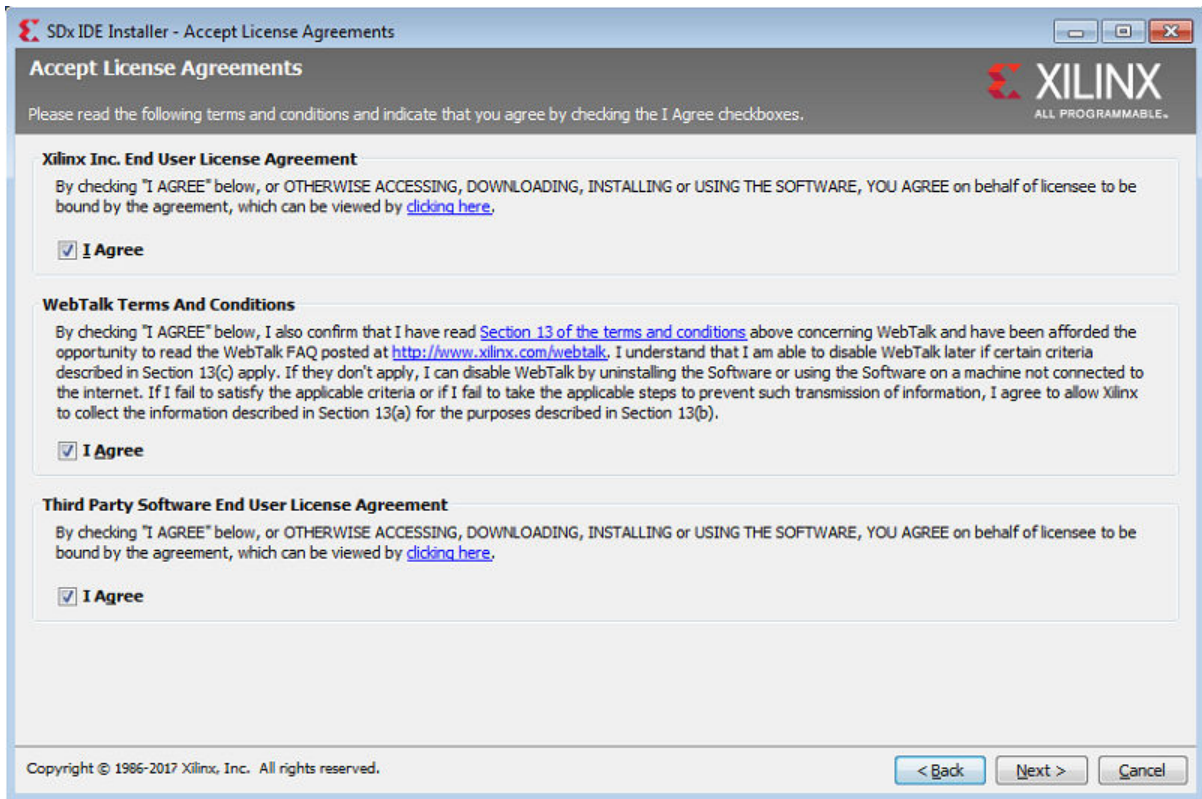
1. If you are using alternate proxy settings to the ones referred to, select the **Manual Proxy Configuration** option to specify the settings.
2. Check whether your company firewall requires a proxy authentication with a user name and password. If so, select the **Manual Proxy Configuration** option in the dialog box above.
3. For Linux users, if either the **Use System settings** or the **Auto detect settings** option is selected in the Firefox browser, you must manually set the proxy in installer.

## Accepting License Agreements

Carefully read the license agreements before continuing with the installation. If you do not agree to the terms and conditions, cancel the installation and contact Xilinx.



Figure 4: License Agreements

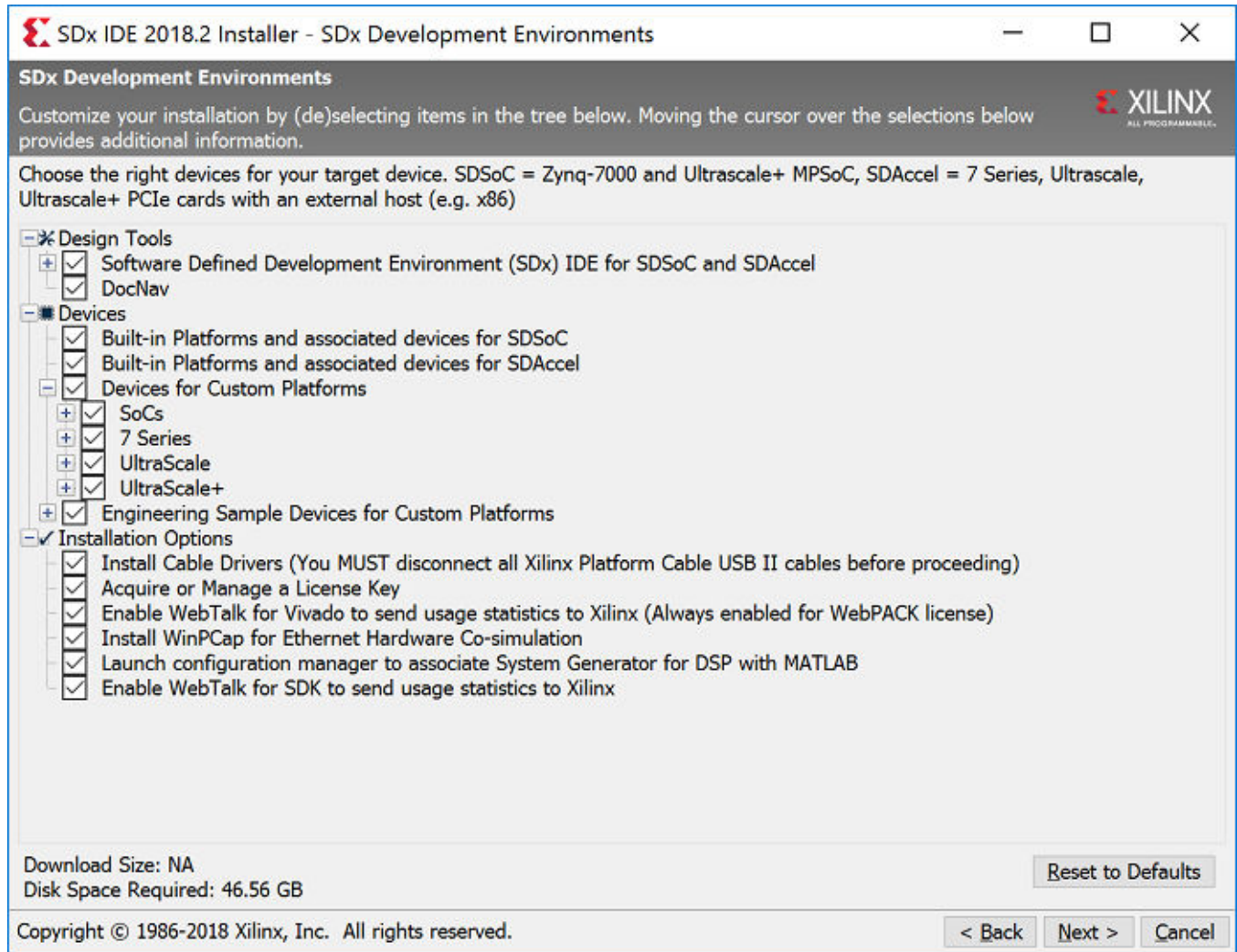


## Selecting Tool and Device Options

Customize the installation by choosing the design tools, device families and installation options. Selecting only what you need helps to minimize the time taken to download and install the product. You will be able to add to this installation later by clicking **Add Design Tools or Devices** from either the operating system Start Menu or the **Vivado** → **Help** menu.

When you launch the installer for the product you want to use, the devices are preselected for you.

Figure 5: Design Tools and Device Options



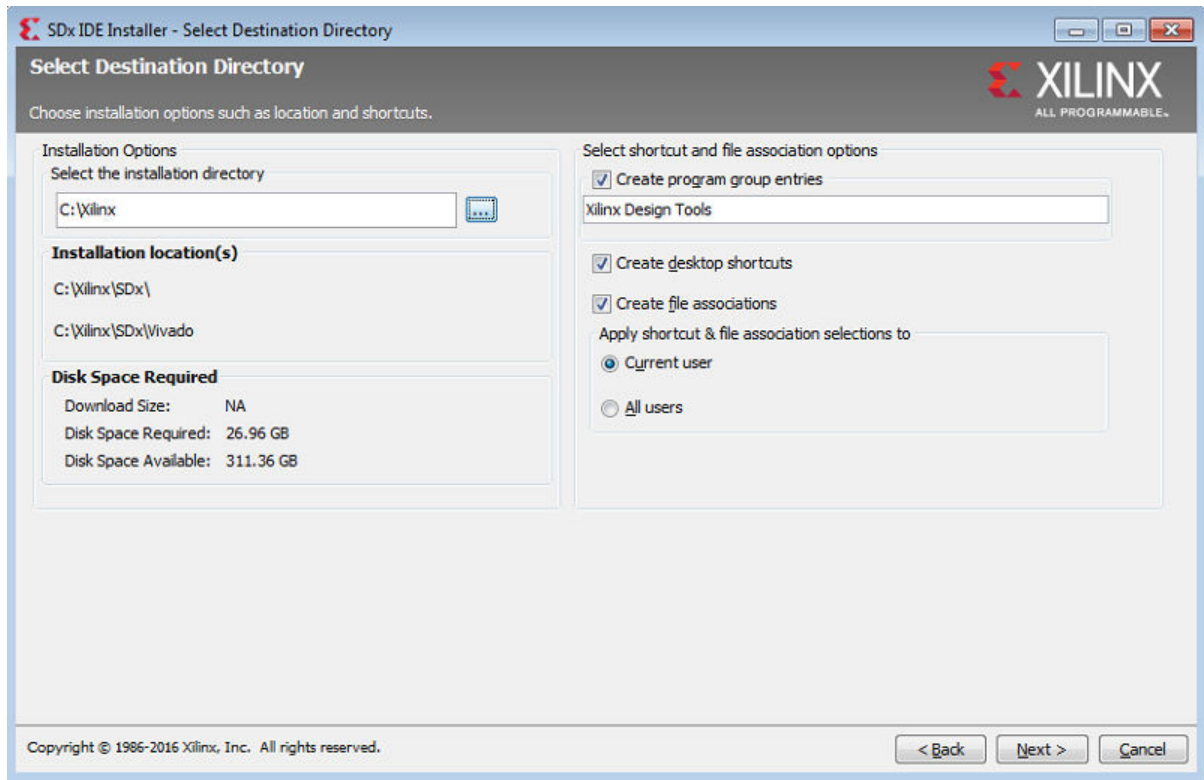
## Setting Destination Directory and Installation Options

Define the installation directory for the software, as shown in the following figure.

**Note:** The installation directory name must not contain any spaces in any part of the directory path.

You can customize the creation of the program group entries (Start Menu) and the creation of desktop shortcuts. The shortcut creation and file association options can be applied to the current user or all users.

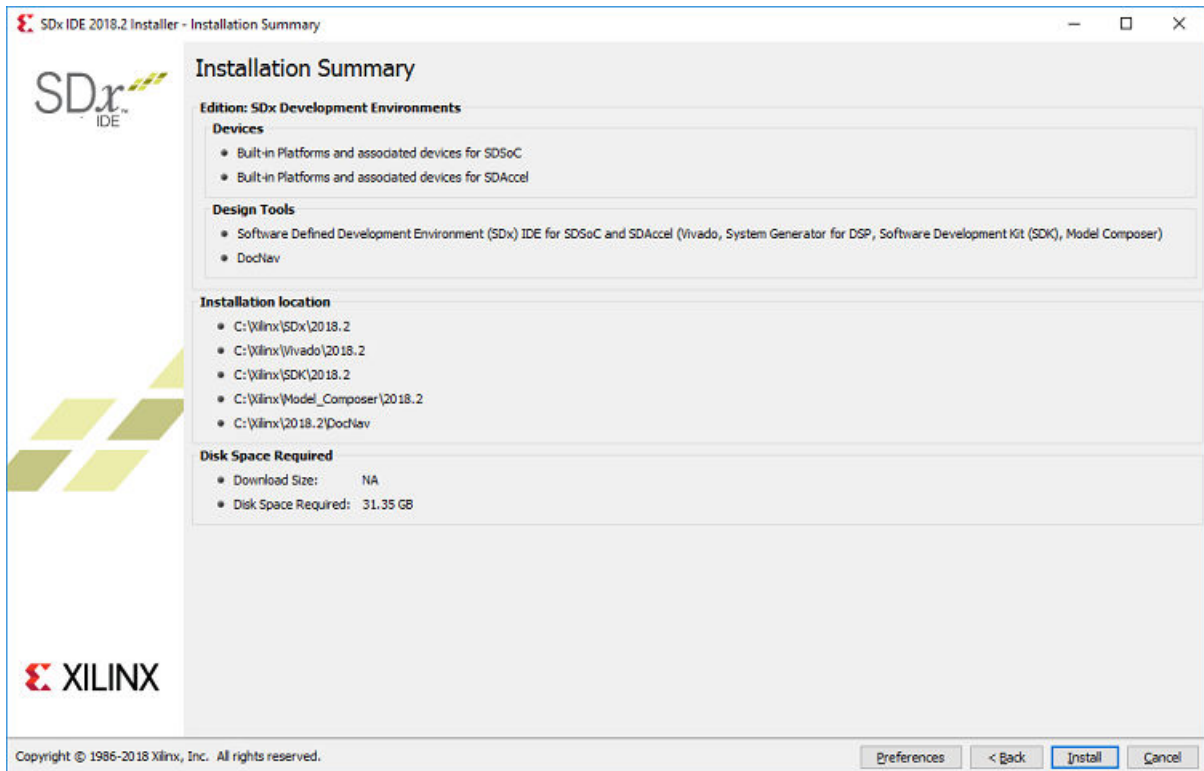
Figure 6: Destination Directory and Installation Options



## Reviewing the Installation Details

Review the installation details shown in the **Installation Summary** screen.

Figure 7: Installation Summary



When you click **Install**, the installation process takes several minutes to complete.

## Setting Up the Environment to Run SDx

1. To set up the environment to run SDx, source the file below so that the `sdx` command is in the PATH.

For Linux:

```
C Shell: source <SDX_INSTALL_DIR>/settings64.csh
Bash: source <SDX_INSTALL_DIR>/settings64.sh
```

For Windows:

```
C:> <SDX_INSTALL_DIR>\SDx\2018.2\settings64.bat
```

# Additional Resources and Legal Notices

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## Xilinx Resources

For support resources such as Answers, Documentation, Downloads, and Forums, see [Xilinx Support](#).

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## Documentation Navigator and Design Hubs

Xilinx® Documentation Navigator provides access to Xilinx documents, videos, and support resources, which you can filter and search to find information. The Xilinx Documentation Navigator (DocNav) is installed with SDSoc™ and SDAccel™. To open it:

- On Windows, select **Start** → **All Programs** → **Xilinx Design Tools** → **DocNav**.
- At the Linux command prompt, enter `docnav`.

Xilinx Design Hubs provide links to documentation organized by design tasks and other topics, which you can use to learn key concepts and address frequently asked questions. To access the Design Hubs:

- In the Xilinx Documentation Navigator, click the **Design Hubs View** tab.
- On the Xilinx website, see the [Design Hubs](#) page.

**Note:** For more information on Documentation Navigator, see the [Documentation Navigator](#) page on the Xilinx website.

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## References

These documents provide supplemental material useful with this guide:

1. *SDSoC Environments Release Notes, Installation, and Licensing Guide* ([UG1294](#))
2. *SDSoC Environment User Guide* ([UG1027](#))
3. *SDSoC Environment Getting Started Tutorial* ([UG1028](#))
4. *SDSoC Environment Platform Creation Tutorial* ([UG1236](#))
5. *SDSoC Environment Platform Development Guide* ([UG1146](#))
6. *SDSoC Environment Profiling and Optimization Guide* ([UG1235](#))
7. *SDx Command and Utility Reference Guide* ([UG1279](#))
8. *SDSoC Environment Programmers Guide* ([UG1278](#))
9. *SDSoC Environment Debugging Guide* ([UG1282](#))
10. *SDx Pragma Reference Guide* ([UG1253](#))
11. *UltraFast Embedded Design Methodology Guide* ([UG1046](#))
12. *Zynq-7000 SoC Software Developers Guide* ([UG821](#))
13. *Zynq UltraScale+ MPSoC: Software Developers Guide* ([UG1137](#))
14. *ZC702 Evaluation Board for the Zynq-7000 XC7Z020 SoC User Guide* ([UG850](#))
15. *ZCU102 Evaluation Board User Guide* ([UG1182](#))
16. *Vivado Design Suite User Guide: High-Level Synthesis* ([UG902](#))
17. *Vivado Design Suite: Creating and Packaging Custom IP* ([UG1118](#))
18. [SDSoC Development Environment web page](#)
19. [Vivado® Design Suite Documentation](#)

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## Training Resources

1. [SDSoC Development Environment and Methodology](#)
2. [Advanced SDSoC Development Environment and Methodology](#)

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