ARM® Cortex®-M

32-bit Microcontroller

NuMicro® Family
Nu-Link Command Tool
User Manual

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NU-LINK COMMAND TOOL USER MANUAL

Table of Contents

NU-LINK COMMAND TOOL USER MANUAL

List of Figures

1 OVERVIEW

Nu-Link Command Tool is a console based command tool to support ICP Programmer functions. User can use it to erase, program, and dump code from any NuMicro® Family devices.
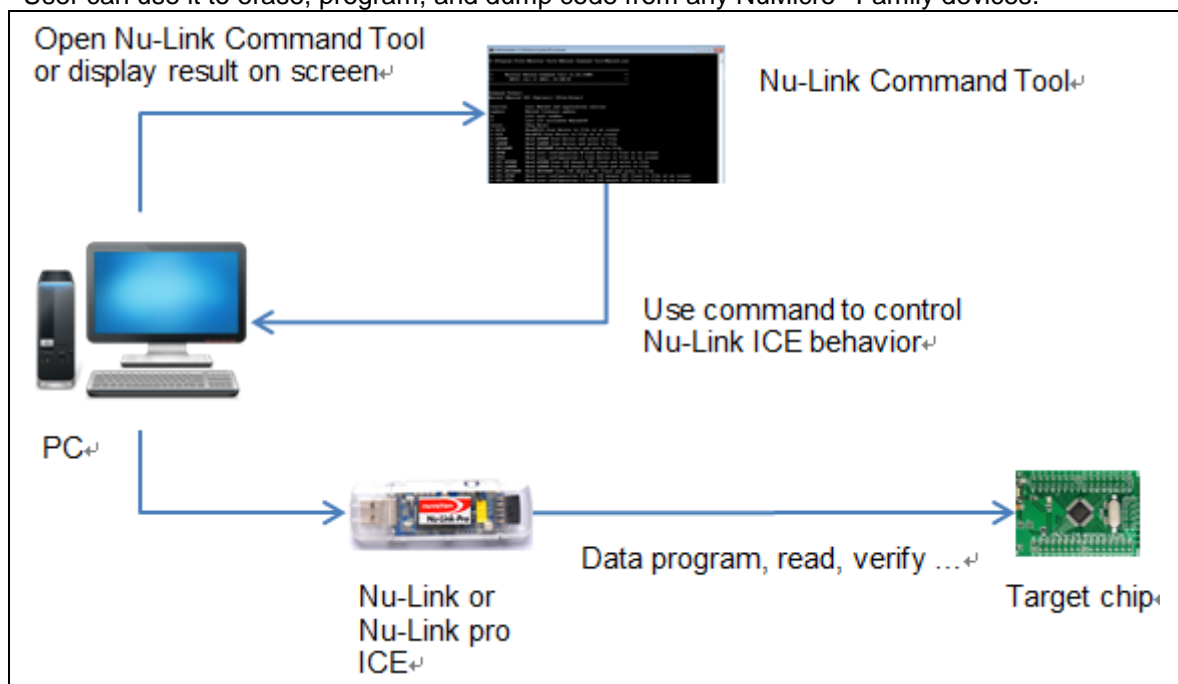
Figure 1.1-1 Nu-Link Command Tool System Block Diagram

1.1 Supported Chips Nu-Link Command Tool

M030G series

- M030GAE
- M031GAE

M031 series

- M031AE/M032AE

M051 series

- M052/M054/M058/M0516AN
- M052/M054/M058/M0516BN
- M052/M054/M058/M0516DN
- M052/M054/M058/M0516DE

M0518 series

- M0518AE

M0519 series

- M0519AE

M0564 series

- M0564AE

M058S series

- M058SAN

M071 series

- M071M
- M071R/M071S
- M071Q/M071V

M0A21 series

- M0A21AC/M0A23AC

Mini51 series

- Mini51/Mini52/Mini54AN
- Mini51/Mini52/Mini54DE
- Mini55DE

Mini57 series

- Mini57DE

Mini58 series

- Mini58DE

NM1120 series

- NM1120

NM1200 series

- NM1100
- NM1200

NM1230 series

- NM1230

NM1240 series

- NM1240

NM1500 series

- NM1510
- NM1530
- NM1520

NM1810 series

- NM1810

NM1820 series

- NM1820

NM1830 series

- NM1830

Nano100 series

- Nano100AN
- Nano100BN

Nano103 series

- Nano103AE

Nano112 series

- Nano102AN
- Nano112AN

NUC029 series

- NUC029AN
- NUC029AE
- NUC029DE
- NUC029EE
- NUC029GE

NUC100 series

- NUC100AN
- NUC100BN
- NUC100CN
- NUC100DN

NUC121 series

- NUC121AE
- NUC125AE

NUC122 series

- NUC122AN

NUC123 series

- NUC123AN
- NUC123AE

NUC126 series

- NUC126AE
- NUC1261AE
- NUC1262AE

NUC131 series

- NUC131AE
- NUC1311AE

NUC200 series

- NUC200AN
- NUC220AN
- NUC230AE
- NUC240AE
- NUC2201AE

NUC400 series

- NUC442AE
- NUC472AE

M451 series

- M451AE
- M452AE
- M453AE
- M451MAE
- M4521AE

M471 series

- M471M/M471R1/M471S

M479 series

- M479AE

M480 series

- M481AE
- M482AE
- M483AE
- M484AE
- M485AE
- M487AE

M251 series

- M251AE
- M252AE
- M253AE
- M254AE
- M256AE
- M258AE

M2351 series

- M2351AE

M2354 series

- M2354AE

M261 series

- M261AE
- M262AE
- M263AE

8051 1T series

- N76E885
- N76E616
- N76E003
- ML51
- ML56
- MS51

Furthermore, user can develop their own UI to support all functions supported by Nu-Link Command Tool.

In this reference guide, the descriptions of Nu-Link Command Tool are included and a VendorUI example is introduced to show how to customize a NuMicro® Family ICP tool by using Nu-Link Command Tool.

2 NU-LINK COMMAND TOOL

2.1 Install Nu-Link Command Tool

Execute Nu-Link Command Tool install package and following the dialog to choose a suitable item for your environment.

1. Select language of UI display during the installation.

Figure 2.1-1 Language Selection Dialog

2. The setup wizard dialog includes tool version number.
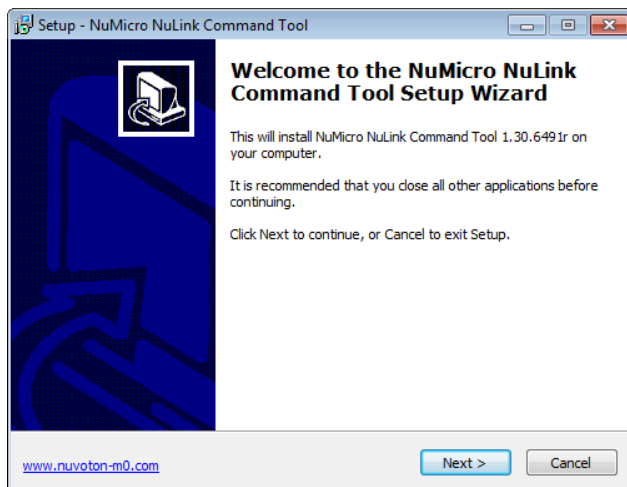
Figure 2.1-2 Setup Wizard Dialog

3. Browse the install path of Nu-Link Command Tool.
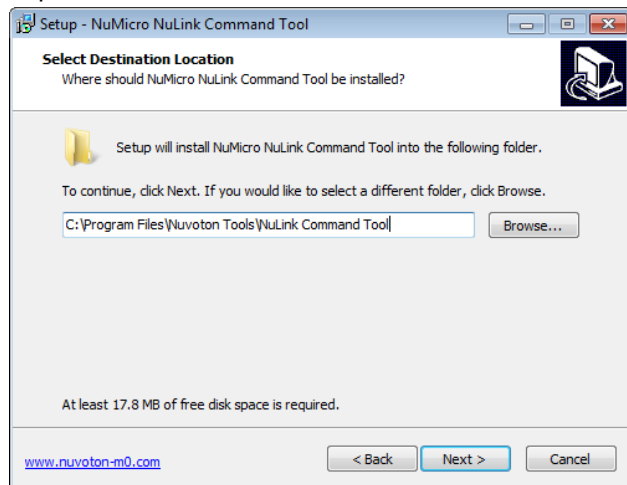
Figure 2.1-3 Install Path Selection Dialog

4. Select the path to place shortcut on "Start Menu".
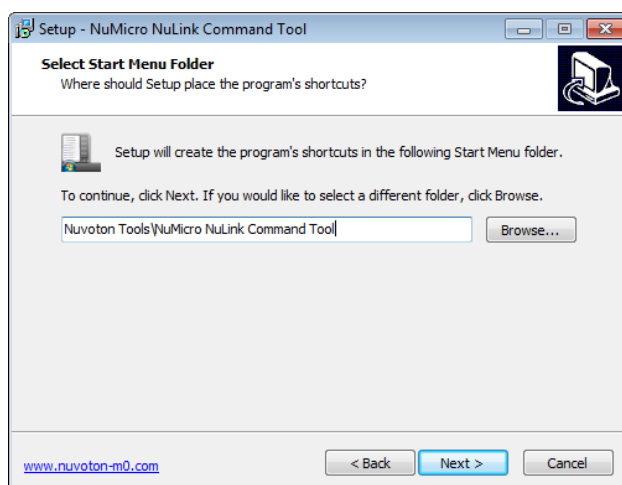
Figure 2.1-4 Shortcut Path Setting Dialog

5. Confirm all the information for these install steps.
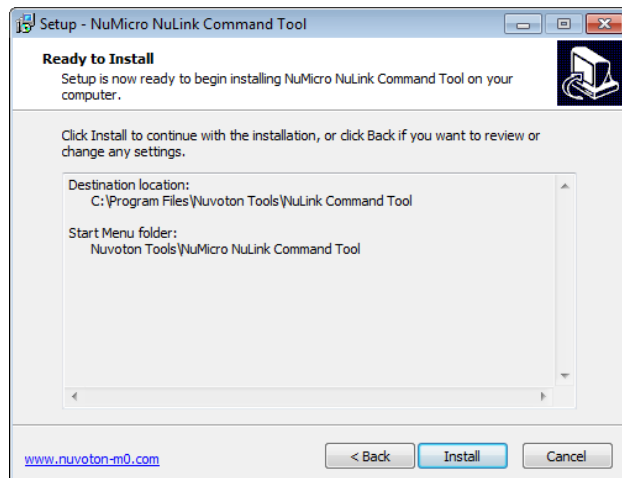
Figure 2.1-5 Installation Information Confirm Dialog

6. Finish Nu-Link Command Tool installation.
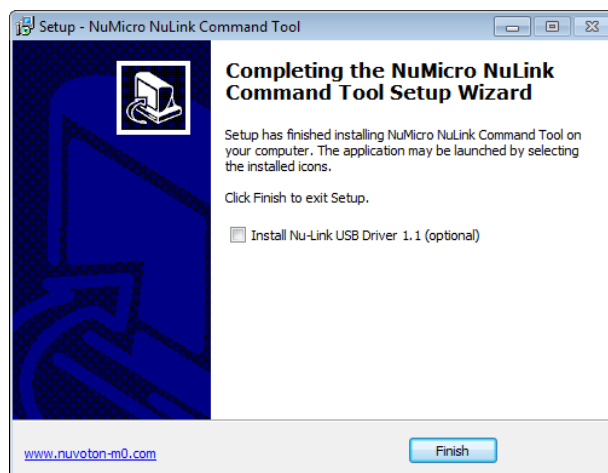
Figure 2.1-6 Setup Completely Dialog

2.2 Launching the Nu-Link Command Tool

To launch Nu-Link Command Tool, please open the Windows command prompt. Change the current directory to the install path of Nu-Link Command Tool. Type "NuLink.exe" and press "enter" button. The brief description of Nu-Link Command Tool will displayed in the Windows command prompt.
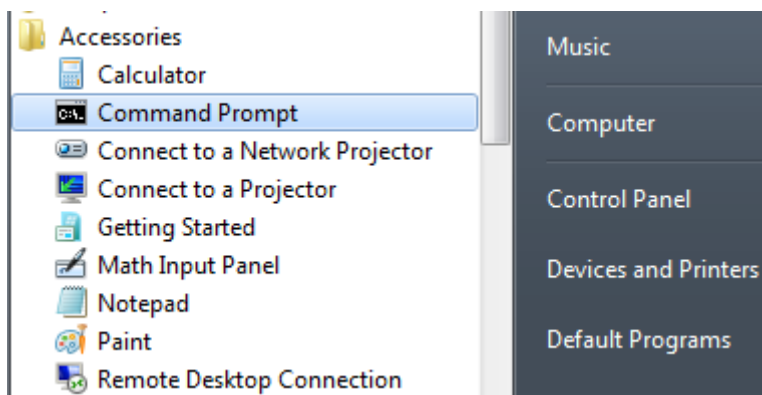
Figure 2.2-1 Open Windows Command Prompt
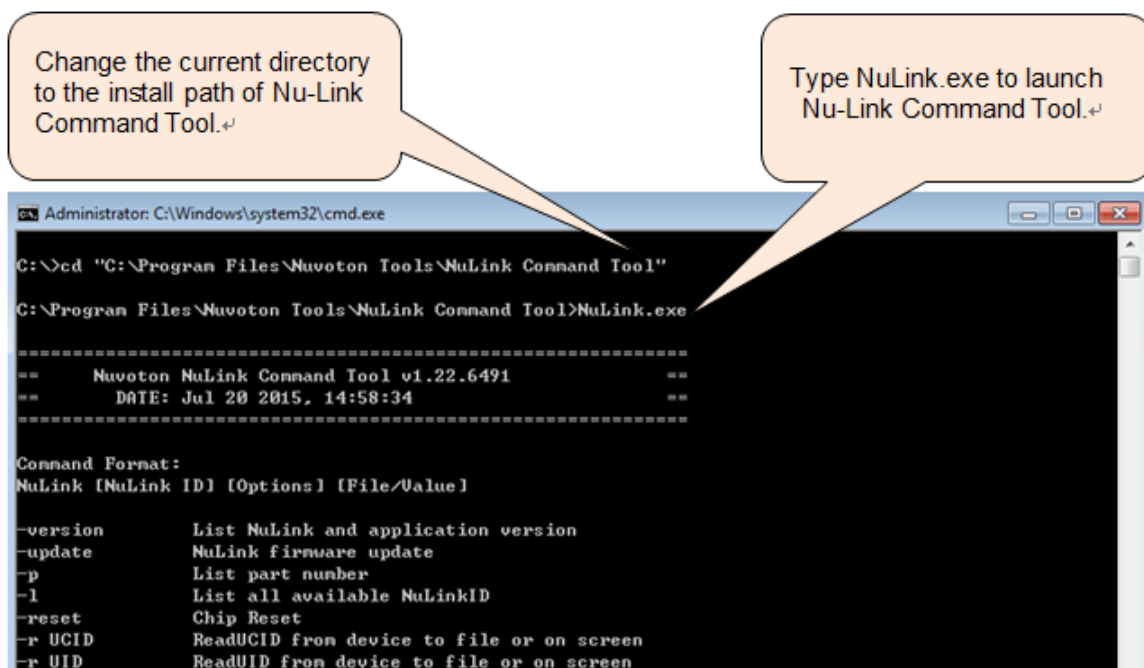
Figure 2.2-2 Launch Nu-Link.exe by Using Windows Command Prompt

2.3 Command Format

Nu-Link Command Tool is a console based command tool. User can open a console command window on Windows system and execute Nu-Link Command Tool by the DOS shell.

The usage of the Nu-Link Command Tool is:

>**NuLink** [Nu-Link ID] [Options] [sections] [File/Value]

Note: NuLink is the execution name of Nu-Link Command Tool and it is case sensitive.e

2.3.1 Nu-Link ID

Each Nu-Link has one ID. User can select a corresponding ID to control specified Nu-Link dongle.

By using keyword argument "all_nulink" instead of Nu-Link ID, Nu-Link command tool will do the same command to target chip for each connected Nu-Link and all of connected target chip must be the same part no.

Note: During execution, the process message will be displayed quickly, and only display the last executed command on the screen. User can use "> file.txt" to output the complete information in the file.

2.3.2 Options

Nu-Link command types are shown as following table.

| Options	Description
-cks	Display the file size and checksum
-d	Dump bin data to device with specific range
-disconnect	Disconnect from target chip and quit ICE mode
-e	Erase chip or flash ROM
-l	Display all available Nu-Link ID
-p	Display the part number of target device
-r	Read data from chip
-reset	Reset taget device
-update	Update firmware of Nu-Link ICE dongle
-v	Verify chip data with source file/value
-version	Display Nu-Link Command Tool and firmware of Nu-Link ICE dongle version
-w	Write data to chip with source file/value

2.3.2.1   Dump bin data

Command: Dump bin data from device with specific range.

>*NuLink* [Nu-Link ID] –d [start_address] [end_address] [file]

[Nu-Link ID] Optional.

[start_address] Required. Start address of dump range.

[end_address] Required. End address of dump range.as following and case insensitive.

[file] Required. A file path name for outputting result.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Example:

Dump bin data to device with specific range.
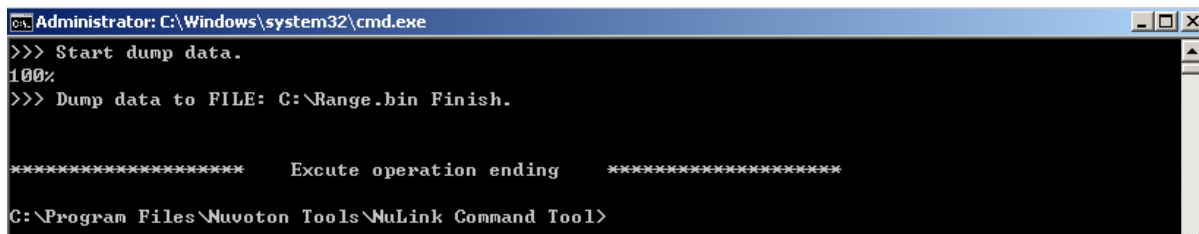
>*NuLink* –d 0x1000 0x2000 C:\Range.bin

Figure 2.3-1 Use -d Command to Dump Data from Device to File

2.3.2.2   Display All Available Nu-Link ID

Command: Display all availiable Nu-Link ICE ID.
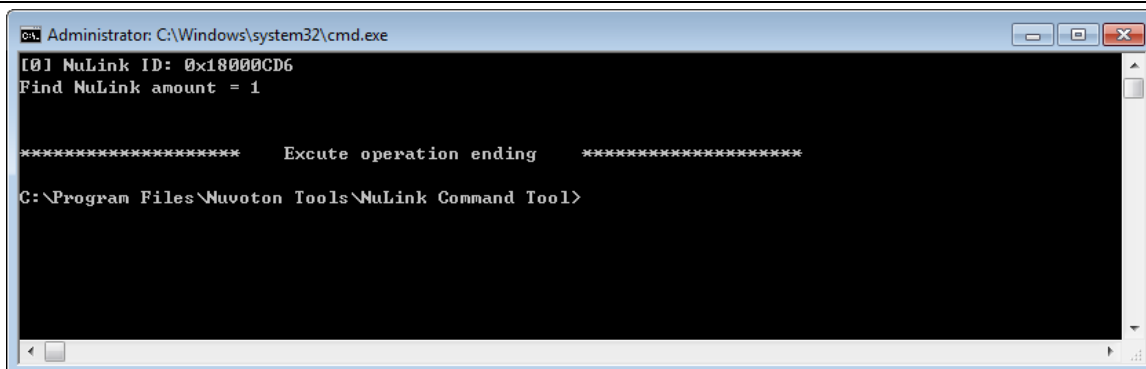
>*NuLink* –l

Example:

>*NuLink* –l

Figure 2.3-2 Use -l Command to Display Nu-Link ID

2.3.2.3   Read Data From Chip

Command: Read data of specific region from target chip.

>***NuLink*** [Nu-Link ID] -r [sections] [file]

[Nu-Link ID] Optional.

[sections] Required. Argument names are shown as following and case insensitive.

Read data from target chip : CFG0, CFG1, CFG2, CFG3, LDROM, APROM, DATAROM, SPROM, SPROM2, SPROM3, KPROM, UID, UCID.

[file] Required. But reading config0 and config1 can be optional.

A file path name for outputting result.

>***NuLink*** [Nu-Link ID] -r SPIFLASH [file] address [value1] size [value2] channel [value3]

[value1] The start address of reading SPI flash.

[value2] The size of reading SPI flash.

[value3] The SPIM channel. The option is optional.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Example:

Display UCID value from chip on screen.

>***NuLink*** –r UCID

Display config0 value from chip with Nu-Link ID 0x12345678 on screen.

>***NuLink*** 0x12345678 –r CFG0

Read APROM data of target chip and save data to file.

>***NuLink*** –r APROM C:\APROM.bin

Read APROM data of target chip with Nu-Link ID 0x12345678 and save data to file.

>***NuLink*** 0x12345678 –r APROM C:\APROM.bin

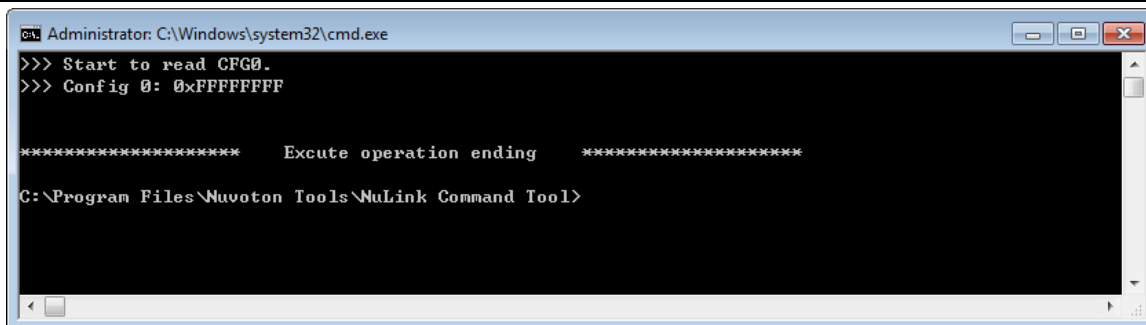Read SPI flash data of target chip with range (0x0~0x1000) and save data to file.

>***NuLink*** –r SPIFLASH C:\SPIFLASH.bin address 0x0 size 0x1000

Read APROM data of target chip for each connected target chip and save data to file.

>***NuLink*** all_nulink –r APROM C:\APROM.bin

Display config0 value on screen.

>**NuLink** –r CFG0

Figure 2.3-3 Use -r Command to Read Config 0 Value

2.3.2.4   Write Data to Chip

Command: Write data of specific region to target chip.

> >**NuLink** [Nu-Link ID] -w [sections] [file/value]

[Nu-Link ID] Optional.

[sections] Required. Argument names are shown as following and case insensitive.

Write data to target chip: CFG0, CFG1, CFG2, CFG3, LDROM, APROM, DATAROM, SPROM, SPROM2, SPROM3, SBKEY, IB.

[file/value] Required.

A file path name or value for data writing.

> >**NuLink** [Nu-Link ID] -w SPIFLASH [file/value] address [value1] channel [value2] key0 [value3] key1 [value4]

[value1] The start address of programming SPI flash.

[value2] The SPIM channel. The option is optional.

[value3] The option is optional.

The secure key0 of SPI flash encrypt file data. Value is 0 : file data does not to encrypt.

[value4] The option is optional.

The secure key1 of SPI flash encrypt file data. Value is 0 : file data does not to encrypt.

> >**NuLink** [Nu-Link ID] -w SN number [value1] address [value2]

[value1] The programming value of serial number.

[value2] The programming address of serial number.

> >**NuLink** [Nu-Link ID] -w KPROM [*value1*] [*value2*] [*value3*] [*value4*] [*value5*] [*value6*]

[value1] The porgramming key0 value of KPROM.

[value2] The porgramming key1 value of KPROM.

[value3] The porgramming key2 value of KPROM..

[value4] The power-on maximum number of error key retry counts.

[value5] The maximum number of error key retry counts for each power-on.

[value6] The data write protection.

Value: 0 = APROM and KPROM protection.

Value: 1 = APROM, KPROM and configuration protection.

Value: 2 = APROM, KPROM and SPROM protection.

Value: 3 = APROM, KPROM, SPROM and configuration protection.

Value: others = APROM and KPROM protection.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Example:

Program 0xFFFFFFFE value to config0 through Nu-Link ID 0x12345678.

Remark: The config value is 32bit data length. To program config value of 8bit data length for 8051 series, users need to combine four config value into one.

In 8051 series: Config0 = 0xDB, Config1 = 0xFB, Config2 = 0x67, Config3 = 0xFF, Config4 = 0x5F.

In command config value: CFG0 = 0xFF67FBDB, CFG1 = 0xFFFFFF5F.

> *>NuLink* 0x12345678 –w CFG0 0xFFFFFFFE

Program APROM data of target chip from file.

> *>NuLink* –w APROM C:\APROM.bin

Program APROM data of target chip with Nu-Link ID 0x12345678 from file.

> *>NuLink* 0x12345678 –w APROM C:\APROM.bin

Program APROM data of target chip for each connected target chip from file.

> *>NuLink* all_nulink –w APROM C:\APROM.bin

Program SPI flash data of target chip with base address 0x0 from file.

Remark: Secure key0 of SPI flash is 0x123 and Secure key1 of SPI flash is 0x456. Use non-zero value of secure key to encrypt file data and program encrypted data to SPI flash. Use zero value of secure key to program file data to SPI flash without encrypted.

> *>NuLink* –w SPIFLASH C:\SPIFLASH.bin address 0x0 key0 0x123 key1 0x456

Program serial number 0x18000000 to address 0x100010.

> *>NuLink* –w SN number 0x18000000 address 0x100010

Program 0xFFFFFFFE value to config0.
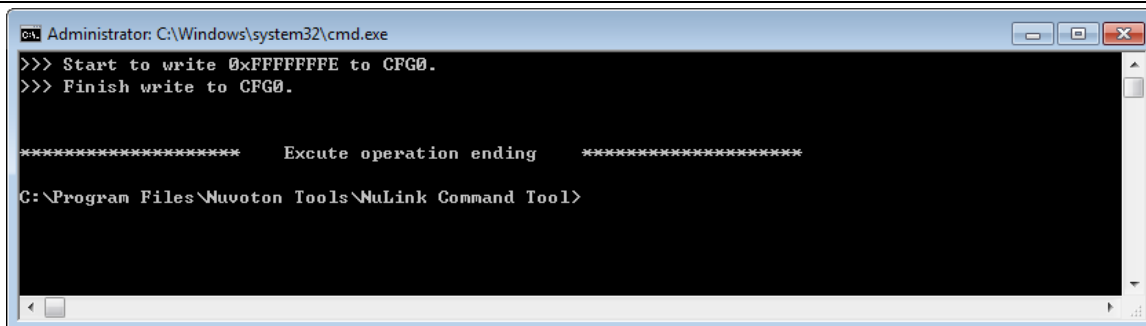
> *>NuLink* –w CFG0 0xFFFFFFFE

Figure 2.3-4 Use -w Command to Write Config 0 Value

2.3.2.5 Verify Chip Data with Source File/Value

Command: Verify data of specific region from target chip with source file or value.

>*NuLink* [Nu-Link ID] -v [sections] [file/value]

[Nu-Link ID] Optional.

[sections] Required. Argument names are shown as following and case insensitive.

Verify data from target chip : CFG0, CFG1, CFG2, CFG3, LDROM, APROM, DATAROM, SPROM, SPROM2, SPROM3.

[file/value] Required.

A file path name or value for data verifying.

>*NuLink* [Nu-Link ID] -v SPIFLASH [file/value] address [value1] channel [value2]

[*value1*] The start address of verifying SPI flash.

[value2] The SPIM channel. The option is optional.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Example:

Verify Config0 with data 0xFFFFFFFE through Nu-Link ID 0x12345678.

>*NuLink* 0x12345678 –v CFG0 0xFFFFFFFE

Verify LDROM data of target chip from file.

>*NuLink* –v LDROM C:\LDROM.bin

Verify LDROM data of target chip with Nu-Link ID 0x12345678 from file.

>*NuLink* 0x12345678 –v LDROM C:\LDROM.bin

Verify LDROM data of target chip for each connected target chip from file.

>*NuLink* all_nulink –v LDROM C:\LDROM.bin

Verify SPI flash data of target chip from file.
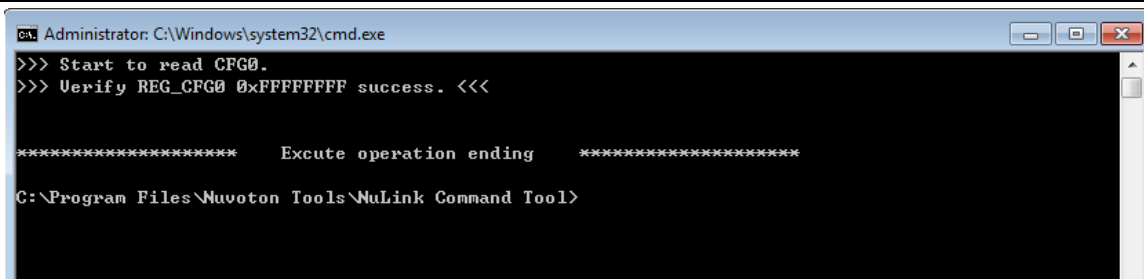
>*NuLink* –v LDROM C:\LDROM.bin

Verify SPI flash data of target chip with base address 0x0 from file.

>*NuLink* –v SPIFLASH C:\SPIFLASH.bin address 0x0

Verify config0 with 0xFFFFFFFE value.

>*NuLink* –v CFG0 0xFFFFFFFE

Figure 2.3-5 Use -v Command to Verify Config 0 Value

2.3.2.6 Erase Chip/Flash ROM

Command: Erase data of specific region from target chip.

> >***NuLink*** [Nu-Link ID] –e [sections]

[Nu-Link ID] Optional.

[sections] Required. Argument names are shown as following and case insensitive.

Erase data from target chip : all, LDROM, APROM, DATAROM, SPROM, SPROM2, SPROM3, KPROM.

> >***NuLink*** [Nu-Link ID] –e SPIFLASH address [value1] size [value2] channel [value3]

[*value1*] The start address of erasing SPI flash.

[value2] The size of erasing SPI flash.

[value3] The SPIM channel. The option is optional.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Example:

Erase LDROM data of target chip.

> >***NuLink*** –e LDROM

Erase APROM data of target chip.

> >***NuLink*** –e APROM

Erase DATAROM data of target chip.

> >***NuLink*** –e DATAROM

Erase LDROM data of target chip with Nu-Link ID 0x12345678.

> >***NuLink*** 0x12345678 –e LDROM

Erase APROM data of target chip with Nu-Link ID 0x12345678.

> >***NuLink*** 0x12345678 –e APROM

Erase APROM data of target chip for each connected target chip.

> >***NuLink*** all_nulink –e APROM

Erase DATAROM data of target chip with Nu-Link ID 0x12345678.

> >***NuLink*** 0x12345678 –e DATAROM

Erase SPI flash data of target chip with range (0x0~0x1000).

> >*NuLink* –e SPIFLASH address 0x0 size 0x1000

Erase whole chip data for each connected target chip.

> >*NuLink* all_nulink –e all

Erase whole chip data including config0, config1, config2, config3, LDROM, APROM, DATAROM, SPROM, SPROM2, SPROM3, KPROM.

> >*NuLink* –e all

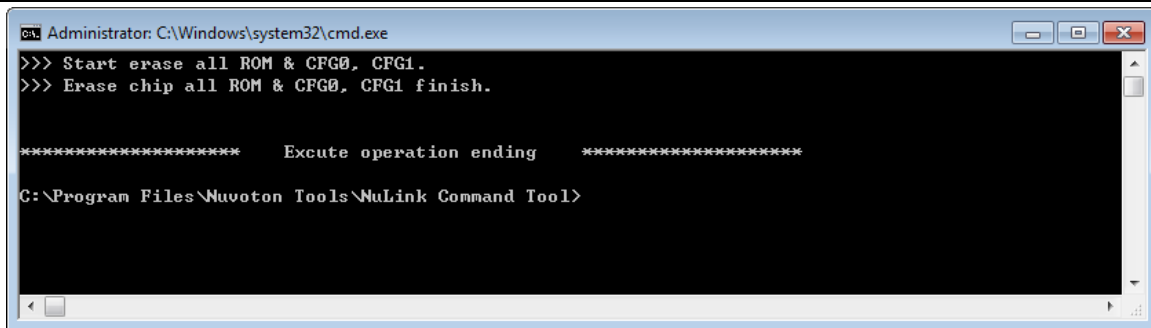Figure 2.3-6 Use -e Command to Erase Chip

2.3.2.7   Reset Target Chip

Command: Reset target chip.

> >***NuLink*** [Nu-Link ID] –reset

[Nu-Link ID] Optional.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Example:

Reset target chip with Nu-Link ID 0x12345678.

> >***NuLink*** 0x12345678 –reset

Reset for each connected target chip.

> >***NuLink*** all_nulink –reset

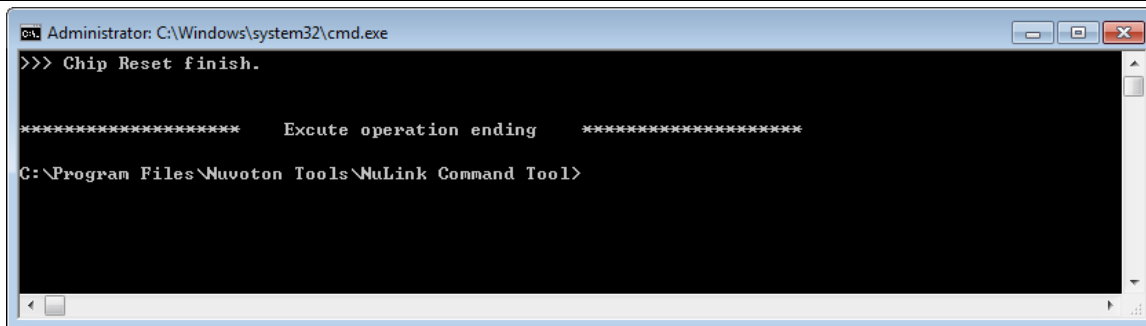Reset target chip.

> >***NuLink*** –reset

Figure 2.3-7 Use -reset Command to Reset Target Chip

2.3.2.8   Display the Part Number of Target Chip

Command: Display the part number of target chip.

>*NuLink* –p

Remark:

The command only support one Nu-Link ICE dongle plug into one PC.

Example:
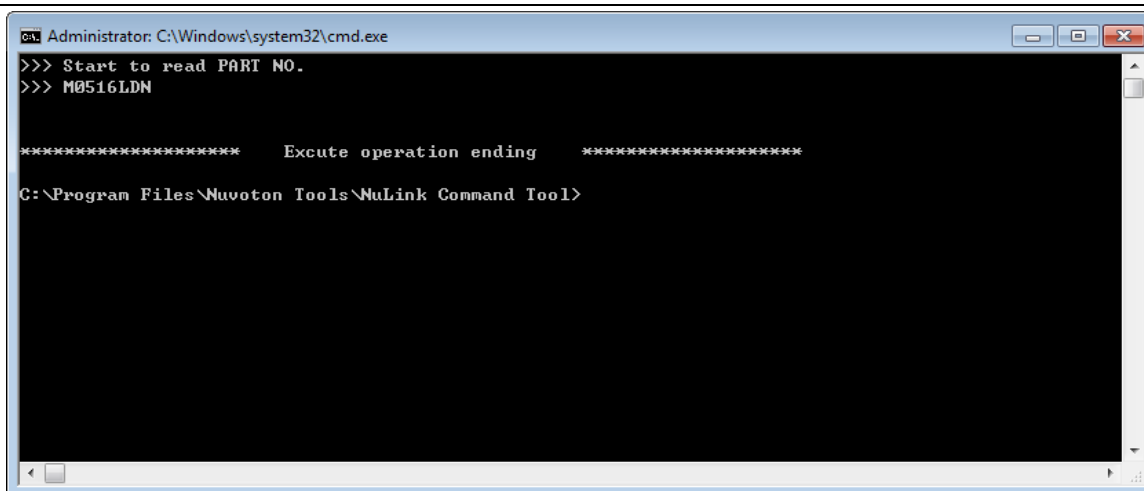
Display the part number of target chip.

>*NuLink* –p

Figure 2.3-8 Use -p Command to Display the Part Number of Target Chip

2.3.2.9 *Display Nu-Link Command Tool and Firmware of Nu-Link ICE Dongle Version*

Command: Display Nu-Link Command Tool and firmware of Nu-Link ICE version.

>*NuLink* –version

Remark:

The command only support one Nu-Link ICE dongle plug into one PC.

Nu-Link firmware's version is the firmware version of Nu-Link ICE dongle plugged into current PC.

Current application version is the version of Nu-Link Command Tool.

Example:

Display Nu-Link Command Tool and Firmware of Nu-Link ICE Dongle Version.
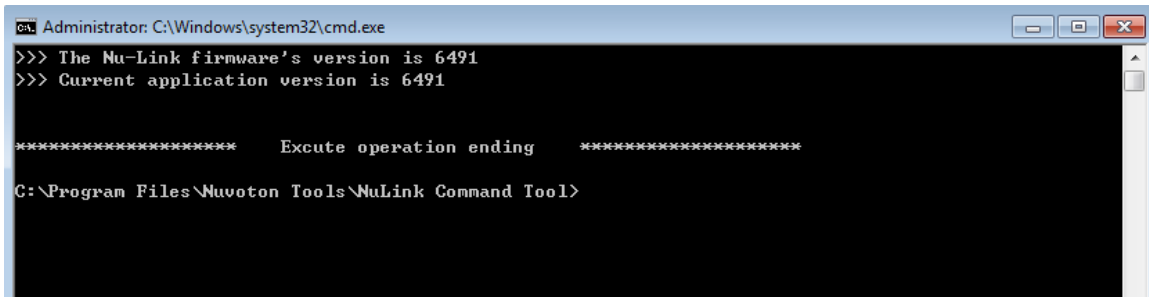
>*NuLink* –version

Figure 2.3-9 Use -version Command to Display Application and Nu-Link Firmware Version

2.3.2.10 Update Firmware of Nu-Link ICE Dongle

Command: Update firmware of Nu-Link ICE dongle.

> >*NuLink* –update

Remark:

The command only support one Nu-Link ICE dongle plug into one PC.

If Nu-Link firmware's version and current application version are different, the firmware version will be updated to current application version by executing the command.

Example:

Update firmware of Nu-Link ICE dongle.

> >*NuLink* –update

Figure 2.3-10 Use -update Command to Update Nu-Link Firmware

2.3.2.11 Disconnect from Target Chip

Command: Disconnect from target chip and quit ice mode.

>*NuLink* [Nu-Link ID] –disconnect

[Nu-Link ID] Optional.

Remark:

If more than one Nu-Link ICE dongles plug into one PC and no Nu-Link ID is specified, the command might not work.

Must to use the command after programming flash.

Example:

Disconnect from target chip with Nu-Link ID 0x12345678.

>*NuLink* 0x12345678 –disconnect

Disconnect for each connected target chip.

>*NuLink* all_nulink –disconnect

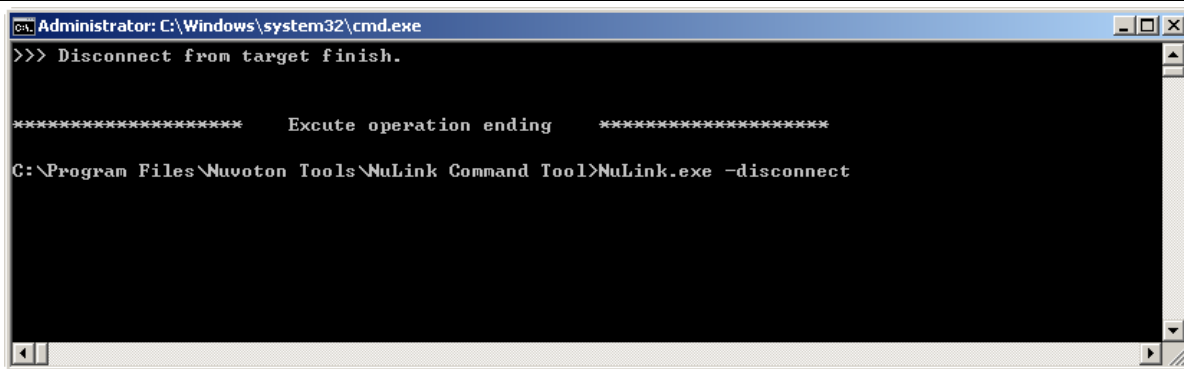Disconnect from target chip.

>*NuLink* –disconnect

Figure 2.3-11 Use -disconnect Command to Disconnect from Target Chip

2.3.2.12 Display the File Size and Checksum
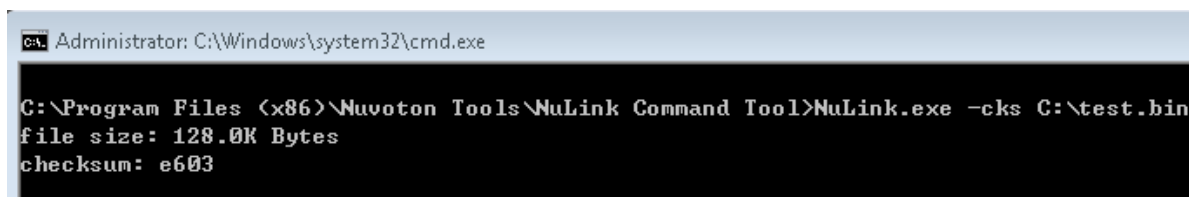
Command: Display the file size and checksum.

>***NuLink*** –cks [file]

Example:

Display the file size and checksum.

>***NuLink*** –cks C:\test.bin

Figure 2.3-12 Use -cks Command to Display the File Size and Checksum

2.3.3 Example for Programming APROM

The following steps is an example that write "APROM.bin" file data to APROM of target chip and verify and read data after writing APROM data. Finally, reset the target chip.

>*NuLink* –e APROM
>*NuLink* –w APROM C:\APROM.bin
>*NuLink* –v APROM C:\APROM.bin
>*NuLink* –r APROM C:\R_APROM.bin
>*Nulink* –reset

Note: User needs to erase flash before programming data.

The following steps is that write "APROM.bin" file data to APROM of target chip and verify and read data for all connected target chip. Finally, all of reset the target chip.

>*NuLink* all_nulink –e APROM
>*NuLink* all_nulink –w APROM C:\APROM.bin
>*NuLink* all_nulink –v APROM C:\APROM.bin
>*NuLink* all_nulink –r APROM C:\R_APROM.bin
>*Nulink* all_nulink –reset

3 CUSTOMIZED FLASH PROGRAMMING TOOL

This chapter introduces an example Windows application program which is based on Nu-Link Command Tool. This program invokes Nu-Link Command Tool to access Fash memory embedded in a NuMicro® MCU. It supports to update multiple NuMicro® MCUs concurrently and supports dynamic scan all connected NuMicro® MCUs.

The source codes of example are stored in the installation folder. Users can reference the source code to create their costumized Flash programming tool.

3.1 Environment

The Vendor UI Tool is based on Nu-Link Command Tool. Therefore, user needs to install Nu-Link Command Tool before executing Vendor UI.

The default path of execution file of Nu-Link Command Tool is at *"C:\Program Files\Nuvoton Tools\NuLink Command Tool"*.

A prebuilt execution version is located at "C:\Program Files\Nuvoton Tools\NuLink Command Tool\NuLinkVendorUI.exe".

3.2 Nu-Link Vendor UI Usage

The following descriptions show the steps for executing NuLinkVendorUI.

Step1:

Connect Nu-Link ICE dongles to PC.

Step2:

Execute NuLinkVendorUI.exe.

Figure 3.2-1 Nu-Link Vendor UI Form

Step3:

Press "LDROM", "APROM" or "Data" buttons to choose bin file from disk.
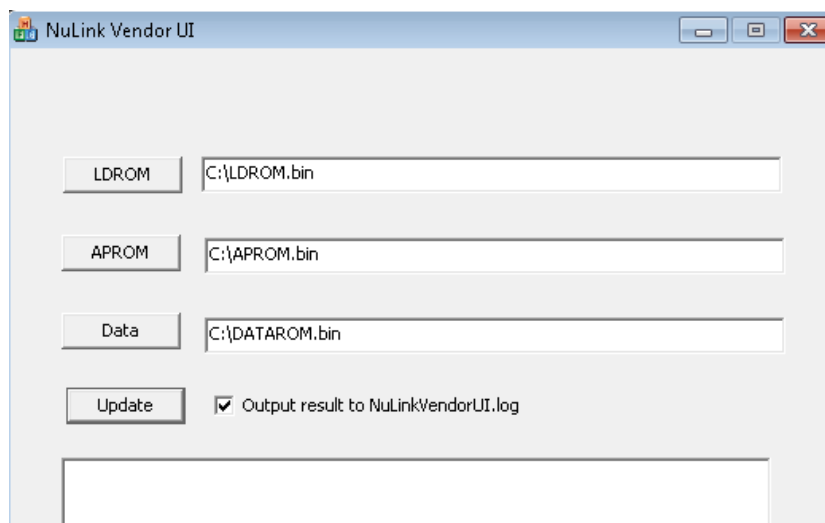

Figure 3.2-2 Select Bin File

The command of cmd.exe has length limit. On computers running Microsoft Windows XP or later, the maximum length of the string that you can use at the command prompt is 8191 characters. On computers running Microsoft Windows 2000 or Windows NT 4.0, the maximum length of the string that you can use at the command prompt is 2047 characters.

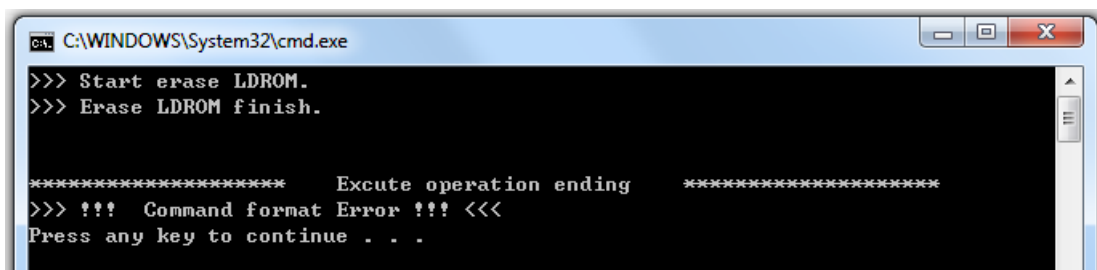E.g. If command length is over the limit, cmd.exe will display "Command format Error!!!" message.

Figure 3.2-3 Display Error Message due to Command Length is too Long

Step 4:

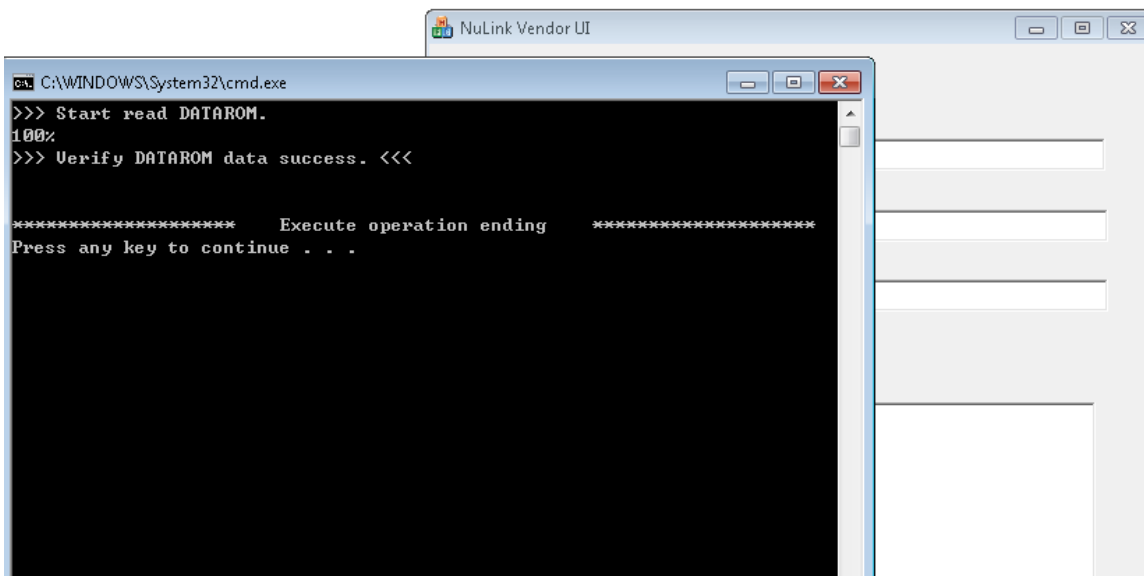Press the "Update" button and start to update program through all connected Nu-Link devices.

Figure 3.2-4 Program Data to Target Chip with Nu-Link Vendor UI

All connected Nu-Link device ID will be listed in the list box below "Update" button.

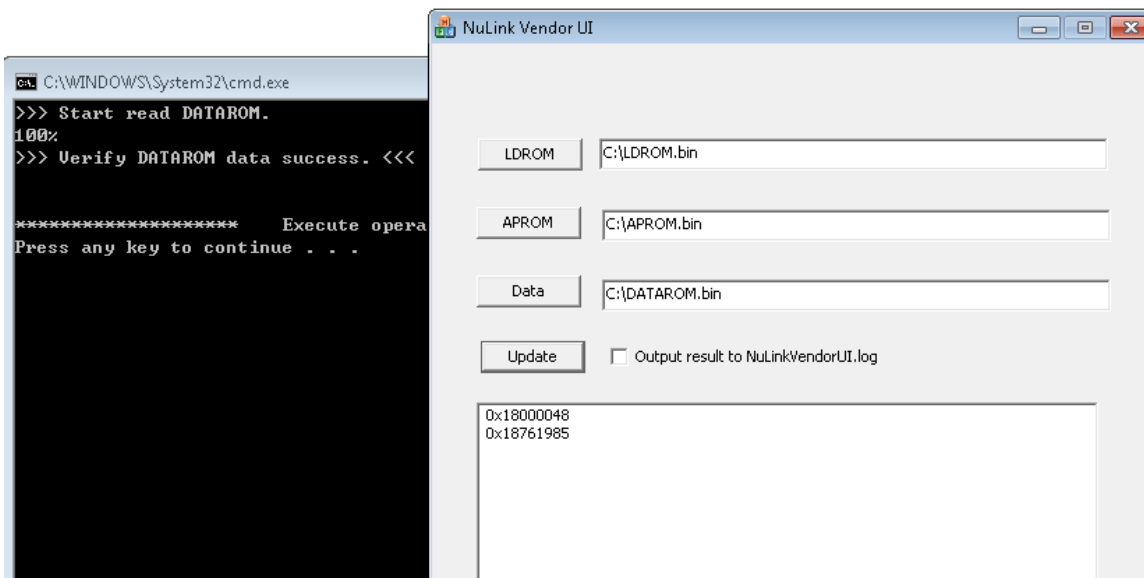Figure 3.2-5 List All Connected Nu-Link Device ID

The update flow for each bin file is erase -> program -> verify.

So, the update flow of above example: erase LDROM -> program LDROM -> verify LDROM -> erase APROM -> program APROM -> verify APROM -> erase DATAROM -> program DATAROM -> verify DATAROM.

Remark:

To record the result message of update flow, it just enable the output result checkbox.

4 SPECIFIC SERIES

4.1 Support for Specific Series

There are some different command format to use Nu-Link command tool for Specific series, please follow instructions to get the usage below.

1. Open a Command Prompt program in Windows and find installation path of Nu-Link command tool.

2. Find the specific file name to execute tool, and show the command format and example.

Execution File Name	Chip Series
NuLink_M2354.exe	M2354 series
NuLink_M2351_M261.exe	M2351 series
NuLink_M2351_M261.exe	M261 series

5 REVISION HISTORY

Date	Revision	Description
2015.07.21	1.30	1. Preliminary version.
2016.03.16	1.31	Added dump bin data command.
2016.07.22	2.00	Added –disconnect command to disconnect from target.
2017.01.13	2.01	Added SPROM, KPROM erasing, programming and verifying.
2017.06.23	2.02	Added SPI flash erasing, programming and verifying.
2018.06.22	2.04	Supported M2351 Series.
2018.07.25	2.05	Updated SPI flash command format content.
2020.04.30	3.02	Added –SN command to write serial number to target.
2020.06.29	3.03	1. Added all_nulink argument to execute same command to each connected target. 2. Updated Nu-Link Vendor UI content.
2020.09.14	3.04	Supported M2354 Series.

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