nRF Serial Terminal

v1.0.1

User Guide

4399_019 / 2023-06-21

NORDIC® SEMICONDUCTOR

Contents

Revision history

Date	Description
2023-06-21	First release

1 Introduction

nRF Connect Serial Terminal is a cross-platform terminal emulator for serial port communications with Nordic Semiconductor devices over *Universal Asynchronous Receiver/Transmitter (UART)*.

Serial Terminal allows you to configure, monitor, and communicate with virtual serial ports on Nordic Semiconductor devices. It is useful when programming or debugging applications as you can view logging output and enter console inputs. Terminal window supports shell mode for sending commands to a device running a shell, such as Zephyr™ shell, as well as line mode. It supports ANSI escape code, which makes it easy to find warnings and errors.

Serial Terminal is an alternative to tools such as PuTTY and **`minicom`**. It is designed for Nordic Semiconductor devices to support device auto-detection, auto-reconnect, and persistence of device settings. The terminal input and output persist after device disconnection. Serial Terminal is designed to share access to a connected device's serial port with other compatible nRF Connect for Desktop apps.

> **Note:** All Nordic development kits and prototyping platforms have a USB-to-UART converter onboard to allow serial communication to a computer.

Serial Terminal is installed and updated using nRF Connect for Desktop.

2 Installing Serial Terminal app

Serial Terminal is installed as an app for nRF Connect for Desktop.

Before you can install the app, you must download and install nRF Connect for Desktop (version 4.0 or later).

To install the app:

1. Open nRF Connect for Desktop.
2. Find the Serial Terminal app in the list and click **Install**.

Once the app is installed, you can launch it by clicking **Open**.

For easy access, you can create a desktop shortcut by clicking the **arrow down** button and selecting **Create shortcut**.

If a new version of the app becomes available, an **Update** button is displayed next to the **Open** button. Click this button to install the latest version.

To uninstall the app, click the **arrow down** button and select **Uninstall**.

3 Getting started

Connect the device to your computer using a *Universal Serial Bus (USB)* connector.

1. Click **Select Device**.
   The name and serial number of Nordic Semiconductor devices attached to your computer are displayed.

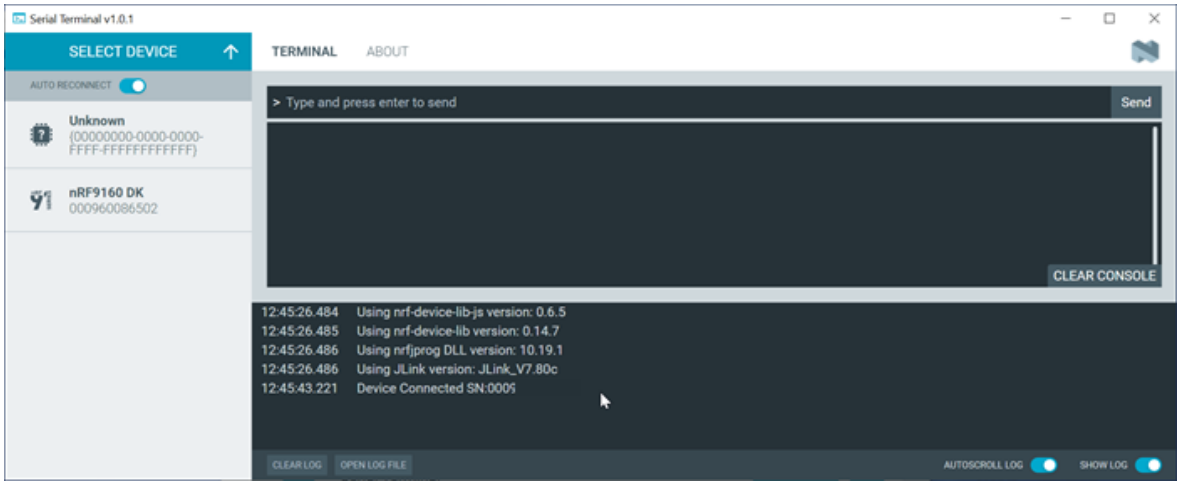

*Figure 1: **Select Device** window*

> **Note:** Depending on the application firmware on the device, you might see **J-Link** in place of the product name.

2. Click the device you want to use.
   If the device has more than one port, Serial Terminal selects the serial port with the lowest virtual serial port index, see Selecting a serial port on page 7. You are free to select another serial port.
3. Click **Connect to port** to connect to the selected serial port and, optionally, reset the device.

   Depending on the application firmware running on the device, you might see logging output.

   You can view information on the device's connection status and settings in the Serial Terminal **LOG** view.

   The next time this device is used, Serial Terminal selects the last connected serial port and attempts to connect to that port again if **AUTO RECONNECT** is enabled.
4. Select **Shell** or **Line** Mode depending on the device's capabilities.
   See Serial Terminal configuration on page 9 for more information.
5. Send a command to the device by typing or pasting it at the top of the terminal window and pressing enter or choosing **Send** when in Line mode

3.1 Configuring serial port and logging

Serial Terminal supports Nordic Semiconductor *Development Kit (DK)*s and prototyping platforms. Your application must enable serial communications and logging over *UART*.

The following sections describe some alternatives for enabling logging to serial port.

Configure serial communications and logging over UART in your nRF Connect SDK application

See DevAcademy Serial communication (UART) for instructions on enabling serial communications over UART and use the following Kconfig option to enable logging over UART.

```
CONFIG_LOG_BACKEND_UART=y
```

See also Logging in nRF Connect SDK.

Use a sample with logging over UART enabled

Alternatively, you can install a sample with logging enabled. See **Working with...** for the device in Device configuration guides for more information. See also Testing and debugging an application.

Use a shell sample

Nordic Semiconductor provides samples to enable shell functionality, such as Modem Shell, Wi-Fi: Shell, and Zigbee® Shell. These are found in nRF Connect SDK documentation

3.2 Selecting a serial port

The number of serial ports available in Serial Terminal depends on the selected device and the onboard application firmware.

Identifying serial ports

See your product's hardware user guide for more information on the device's virtual serial ports and *UART* interface settings. The virtual serial ports on a Nordic Semiconductor *DK* are indexed from zero. Your computer's operating system maps each of the device's virtual serial ports to a unique, persistent serial port identifier for the device and computer. Serial Terminal lists the selected device's serial ports in ascending order of its virtual serial port index.

In the following example, the virtual serial ports indexed 0, 1, and 2 on the nRF9160 DK are mapped to serial ports 9, 12, and 10 respectively on the computer. In the log window of the image, you can see that SERIAL PORT "COM9" is associated with vCOM-0 (index 0) on the DK.

> **Note:** Serial ports are also referred to as **COM** ports on Windows, **ttyACM** devices on Linux, and **/dev/tty** devices on macOS.

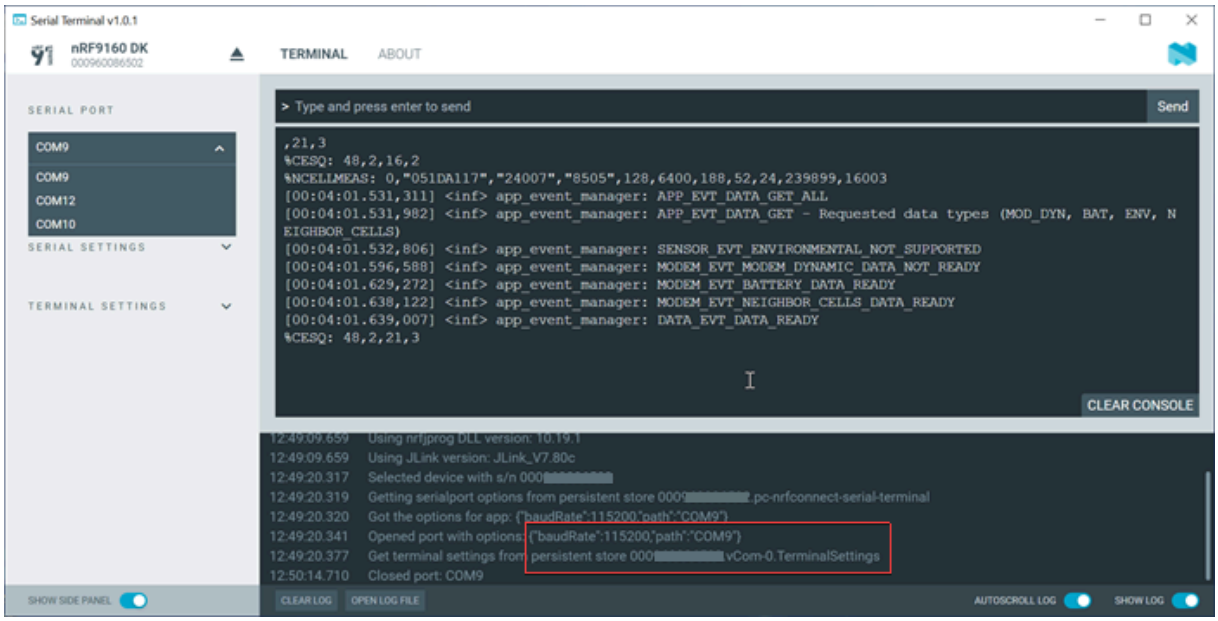

Figure 2: Serial ports listed in Serial Terminal on Windows

4 Serial Terminal configuration

Serial Terminal settings are explained here. Use the default settings unless the onboard application firmware uses other settings. See DevAcademy Serial communication (UART) for more information.

Serial Settings

Setting	Description	Available options
Baud rate	The speed at which data is transmitted between devices. Higher baud rates allow for faster data transfer but might be more prone to errors due to signal distortion. For information on supported baud rates, check the device's hardware user guide. The most commonly used baud rates are 115 200, 38 400, 19 200, and 9 600.	`50` to `115 200`
Data bits	The number of bits that carry data.	`8` (default) `7`
Stop bits	The number of stop bits.	`1` (default) `2`

Parity	An error-checking mechanism to detect errors in the data transmission. For example, even parity means that the number of 1s in the data byte and parity bit combined is even, while odd parity means that the number of 1s is odd.	`none` (default)
		`even`
		`odd`
		`mark` (Windows only)
		`space` (Windows only)

rts/cts	*Request to Send (RTS)* and *Clear to Send (CTS)* use two cross-coupled wires between the devices. If hardware flow control is enabled, each end will use its RTS to indicate that it is ready to send new data and read its CTS to see if it is allowed to send data to the other end.	`off` (default) `on`
xOn	When using software flow control, **xOn** (transmission on) signals that the device is ready to accept data.	`off` (default) `on`
xOff	When using software flow control, **xOff** (transmission off) signals that the device is unable to accept more data.	`off` (default) `on`
xAny	Software flow control setting.	`off` (default) `on`

Table 1: Serial settings

Terminal settings

Line mode

Line mode sends each command to the connected device separately. The device processes each command and returns a response before waiting for the next command. This mode is commonly used for devices that are not running a shell, where each command is a discrete operation that the device can perform independently. For example, you can use it to enter modem AT commands.

Shell mode

Use Shell mode when the device you communicate with is running a shell, such as Zephyr shell. In this mode, the terminal sends the command or command series to the device for execution by the shell. The shell can return output or prompt the user for additional input. Shell mode allows you to execute more complex operations, navigate the file system, or perform other advanced tasks that are not possible in Line mode.

Terminal mode	Setting	Description
Line	**Clear on Send**	When **Clear on Send** is enabled, input text is cleared from the terminal input window after it has been transmitted.
Line	**Line Ending**	Use this to send an optional line ending to the command sent to the connected device. The alternatives are: **None** **LF** sends the newline character **CR** for carriage return **CRLF** sends carriage return and newline
Shell	**Device Controls Echo**	Toggle this on if echo is enabled on the device, and toggle off if not, in which case Serial Terminal echoes the command. In Zephyr shell, run **`shell echo on`** to turn echo on, and **`shell echo off`** to disable echo.

Table 2: Terminal settings

5 Troubleshooting

Here are some basic troubleshooting steps to help you fix issues you might encounter when using Serial Terminal.

There is no response from the device or the response is unexpected.

- Test other commonly used baud rates.
- Ensure the serial settings in the Serial Terminal application match those in the onboard application.
- Try connecting to a different serial port, if available.

Serial Terminal does not display all serial ports listed in the device's hardware user guide.

- Reset the device.
- Reset Serial Terminal using **CTRL+R** on Windows and Linux or **CMD+R** on macOS.
- Check that the onboard application has enabled serial communications and UART logging for at least one UART on the board. See Configuring serial port and logging on page 6 and Selecting a serial port on page 7.
- Check that you have enabled all instances of UART peripheral you require. See DevAcademy device driver model for more information.

Glossary

Clear to Send (CTS)

In flow control, the receiving end is ready and telling the far end to start sending.

Development Kit (DK)

A hardware development platform used for application development.

System in Package (SiP)

Several integrated circuits, often from different technologies, enclosed in a single module that performs as a system or subsystem.

System on Chip (SoC)

A microchip that integrates all the necessary electronic circuits and components of a computer or other electronic systems on a single integrated circuit.

Request to Send (RTS)

In flow control, the transmitting end is ready and requesting the far end for a permission to transfer data.

Universal Asynchronous Receiver/Transmitter (UART)

A hardware device for asynchronous serial communication between devices.

Universal Serial Bus (USB)

An industry standard that establishes specifications for cables and connectors and protocols for connection, communication, and power supply between computers, peripheral devices, and other computers.

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