

User Guide

Lyra 24P USB Dongle

Laird Part # 450-00184

Version 1.1

REVISION HISTORY

Version	Date	Notes	Contributor(s)	Approver
1.0	24 May 2023	Initial version	Erik Lins	Jonathan Kaye
1.1	23 Oct 2023	Added links to documents and firmware/tools, updated screenshot	Erik Lins	Jonathan Kaye

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1 OVERVIEW

The Laird Lyra 24P USB dongle (Laird part # 450-00184) is a packaged USB Adapter version of the integrated antenna Lyra 24P module with +20dBm TX power. It uses an FTDI virtual COM port implementation to enable full Bluetooth 5 operation into the widest range of Operating System backed devices with a USB interface.

The Laird Lyra 24P series of BLE modules feature:

- Bluetooth v5.4 Bluetooth Low Energy
- Widest range of MCU peripherals: UART, I2C, SPI, ADC, GPIO, PWM, Counter, Timer, Watchdog, PRS
- Bluetooth Low Energy
 - Support - Peripheral/Central Roles
 - Support for 2 Mbps, 1Mbps, and 125 kbps coded
 - Support for AoA / AoD, Bluetooth LE Mesh (C code path only)
- Based on Silicon Labs EFR32BG24 chipset
- Extended Industrial Temp Rating (-40° to +105 °C)
- Hostless & Hosted operation – Internal MCU reduces BOM
 - AT Command Set
 - C Development with Simplicity Studio
- Powerful Core Cortex-M33
 - 1,536 kB Flash
 - 256 K RAM

More information regarding this product series, including a detailed module data sheet and application notes, are available on Laird's [Lyra 24 product page](#).

1.1 Part Numbers

Part Number	Product Description
450-00184	USB dongle containing 453-00145 Lyra 24P module (+20dBm TX Power, Integrated antenna)

2 ABOUT THE LYRA 24P USB DONGLE

This section describes the Lyra 24P USB dongle hardware. The Lyra 24P USB dongle is delivered with the Lyra 24P series module loaded with Laird's AT Command Interface firmware. It starts up in AT command mode by default.

The USB dongle allows the Lyra 24P series module to physically connect to a PC via a USB port which provides USB-to-Virtual COM port conversion through an FTDI chip – part number FT232R. Any Windows PC (XP or later), Linux PC (Kernel 3.x or newer with an x86, x86_64 or ARMv7 CPU) or Mac (10.11 or newer), should auto-install the necessary drivers; if your PC cannot locate the drivers, you can download them from <http://www.ftdichip.com/Drivers/VCP.htm>.

2.1 Key Features

The Lyra 24P USB dongle has the following features:

- Lyra 24P series module soldered onto the board
- Self-powered by USB port, running the module at a regulated 3.3V
- USB to UART bridge (FTDI chip)
- Lyra 24P UART can be interfaced to a PC via USB using the USB-UART bridge (FTDI chip)
- One LED for status indication
- AT Interface firmware via UART (using the FTDI USB-UART)
- Application firmware upgrade capability via UART (bootloader using the FTDI USB-UART)

3 UNDERSTANDING THE DONGLE

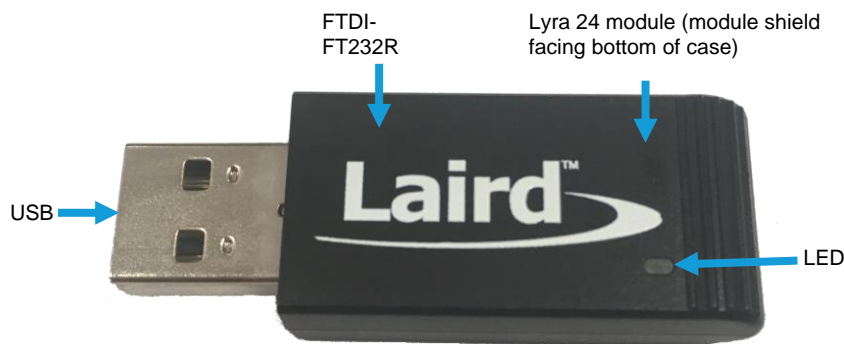


Figure 1: Lyra 24P dongle

3.1 Four-wire UART Serial Interface

The USB dongle provides access to the Lyra 24 module four-wire UART interface (TX, RX, CTS, RTS) through USB (via an FTDI USB-UART convertor chip). The UART connection on the Lyra 24P series module and the FTDI IC are shown in [Table 1](#).

Table 1: GPIO/UART connections

Lyra 24P GPIO	Default Function	FTDI IC UART
PA00	UART_TX (output)	USB_RX
PA07	UART_RX (input)	USB_TX
PA04	UART_RTS (output)	USB_CTS
PA05	UART_CTS (input)	USB_RTS

3.2 Hidden Special Function Pins

The FTDI IC inside the Lyra 24P USB dongle has I/O routed to various control lines of the Lyra 24P module which are listed in [Table 2](#).

Table 2: Special function GPIO connections

Lyra 24P Function	FTDI IC UART	Comments
nRESET	USB_DCD	
nBOOT (PC07)	USB_RI	Connected through inverter
PB00 (SIO 2)	USB_DSR	Connected through inverter
PA06 (SIO 0)	USB_DTR	

These pins can be manipulated by host PC applications to bring the module into bootloader mode. To create a custom application which controls the functionality of these pins, you will require the [FTDI D2xx drivers](#) if targeting Windows, or [libusb](#) and [libftdi](#) if targeting Linux. Please refer to the documentation of each driver and the code in [UwTerminalX](#) for details of how to use this functionality.

3.3 Additional Peripherals

The Lyra 24P USB dongle has one LED, the details of pin mapping are listed in [Table 3](#).

Table 3: LED to Lyra 24P SIO signal mapping

Part	Lyra 24P SIO	Comments
LED1	1 (PA08)	Set high to turn LED on

4 SOFTWARE

The USB dongle connects the Lyra 24P module to a virtual COM port of a PC or other device. From a PC, you can communicate with the module using [Laird's UwTerminalX](#) (cross platform software available for Windows, Mac, and Linux). This utility allows connections to serial devices using any combination of the communications parameters listed in [Table 4](#).

Table 4: UwTerminalX communication parameters for Lyra 24P

Port (Windows)	1 to 255
Port (Mac/Linux)	Any/dev/tty device
Baud Rate	1200 to 1000000 Note: Baud rate default is 115200 for Lyra 24P
Parity	None
Data Bits	8
Stop Bits	1
Flow Control	None (with AT Interface) Hardware (CTS/RTS, with own applications)

Note: Baud rates higher than 115200 depend on the port and driver capabilities of the host PC.

The benefits of using UwTerminalX include the following:

- Continually displayed status of DSR, CTS, DCD, and RI
- Direct control of DTR on the host PC via a check box
- Direct control of RTS, if CTS / RTS Handshaking is disabled when UwTerminalX is launched

5 AT COMMAND INTERFACE

The Lyra 24P USB dongle comes preloaded with an industry standard AT command/response protocol. This protocol instructs the module to advertise, scan, connect, and pair. In addition, the application exposes AT commands that enable the creation of a GATT server table on-the-fly and, conversely, enables it to be a GATT client to interact with remote GATT servers. It also provides commands to read and write to GPIO pins.

The module may also operate as a single connection virtual serial port device for the transparent relay of data between a remote device and the module's UART. This occurs in a similar manner as AT modems used for data communications on telephone lines.

The latest version of the AT Interface application is available in the software section of the [Lyra 24 product page](#) or directly on [github](#).

5.1 Using the AT Command Interface

As indicated above, we recommend using [Laird's UwTerminalX](#) as terminal application for AT Command Interface.

Open up UwTerminalX and accept the license agreement as below.

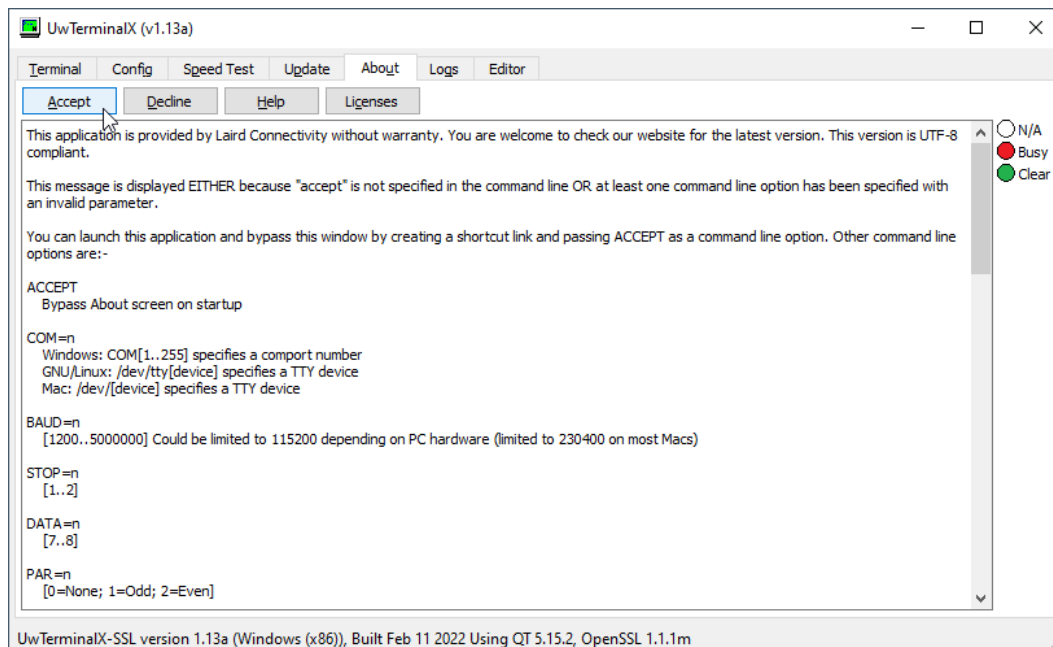


Figure 2: Accept License Agreement

On the Config tab select “Lyra” as device, select the proper COM port and apply the below serial port configuration settings.

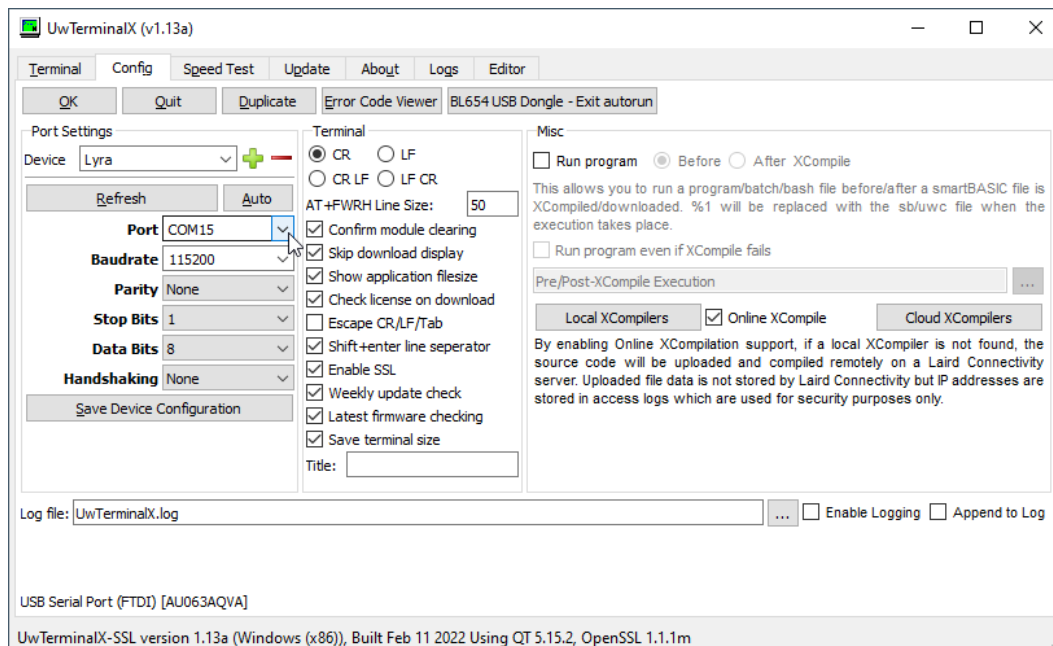


Figure 3: Select Lyra Device

After pressing the “OK” button you will see the main terminal window. Pressing <enter> will return “OK” and indicates that the AT Command Interface is up and running. You might want to try the ATi command for retrieving some internal read-only parameters of the AT Interface as a quick test:

- ATi 0 returns the device name
- ATi 3 shows the currently installed firmware version
- ATi 4 displays the Bluetooth MAC address of the device

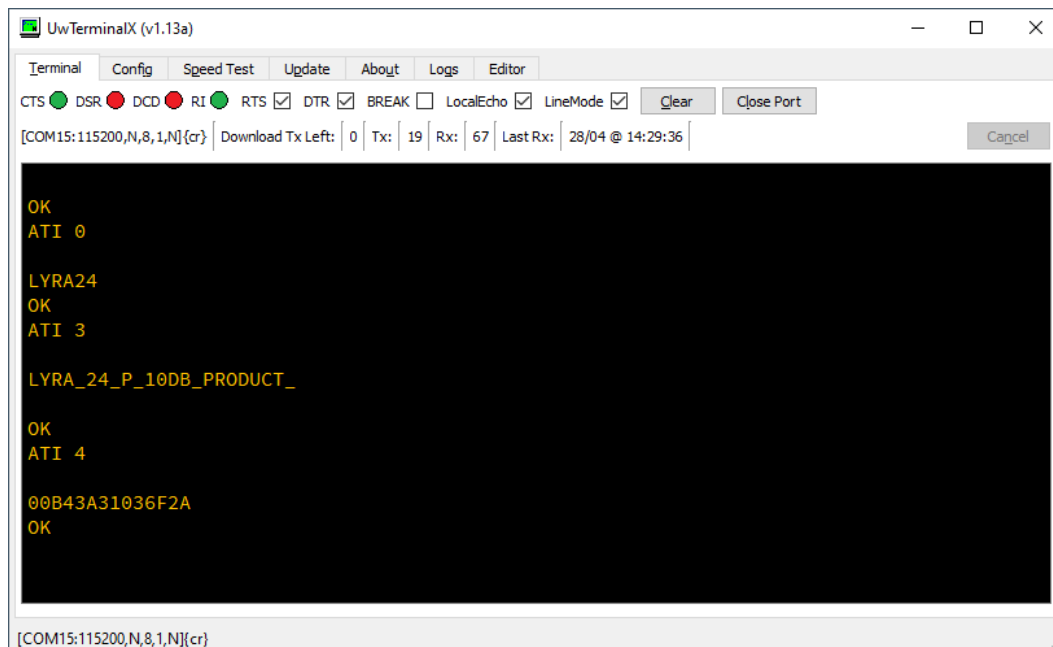


Figure 4: Using AT Commands with Lyra24 USB

5.2 Further AT Command Interface Documentation

For a full description of all available AT commands please refer to the following documents on the [Lyra24 product page](#):

- [Lyra AT Interface Quick Start Guide](#)
- [Lyra AT Interface Application User Guide](#)
- [How To Set Up vSP Connection with AT Commands](#)

5.3 Using the Dongle LED with AT Commands

The AT Interface provides commands to control GPIO signals of the Lyra 24P module. For a detailed description see above Lyra 24 AT Interface User Guide. The below commands can be used to configure the GPIO, which is connected to the LED.

- AT+SIOC 1,2,0 sets SIO 1 to output
- AT+SIOW 1,1 turns LED on
- AT+SIOW 1,0 turns LED off

6 BOOTLOADER

The Lyra 24P USB dongle comes preloaded with a UART DFU bootloader for application firmware upgrade over the USB-UART interface.

You can use the ATI 3 command to query the currently installed firmware version and check whether a later version is available. The latest version of the AT Interface application is available on our github repository:

- [Lyra24 Firmware on github](#)

Click the Release tab button on the right-hand side of the GitHub repository page to see a list of all published firmware image releases. For downloading a specific firmware release, tap Assets and download the individual firmware image files for Lyra. For UART DFU update with the bootloader, the file ending in **..._UART.gbl** must be used.

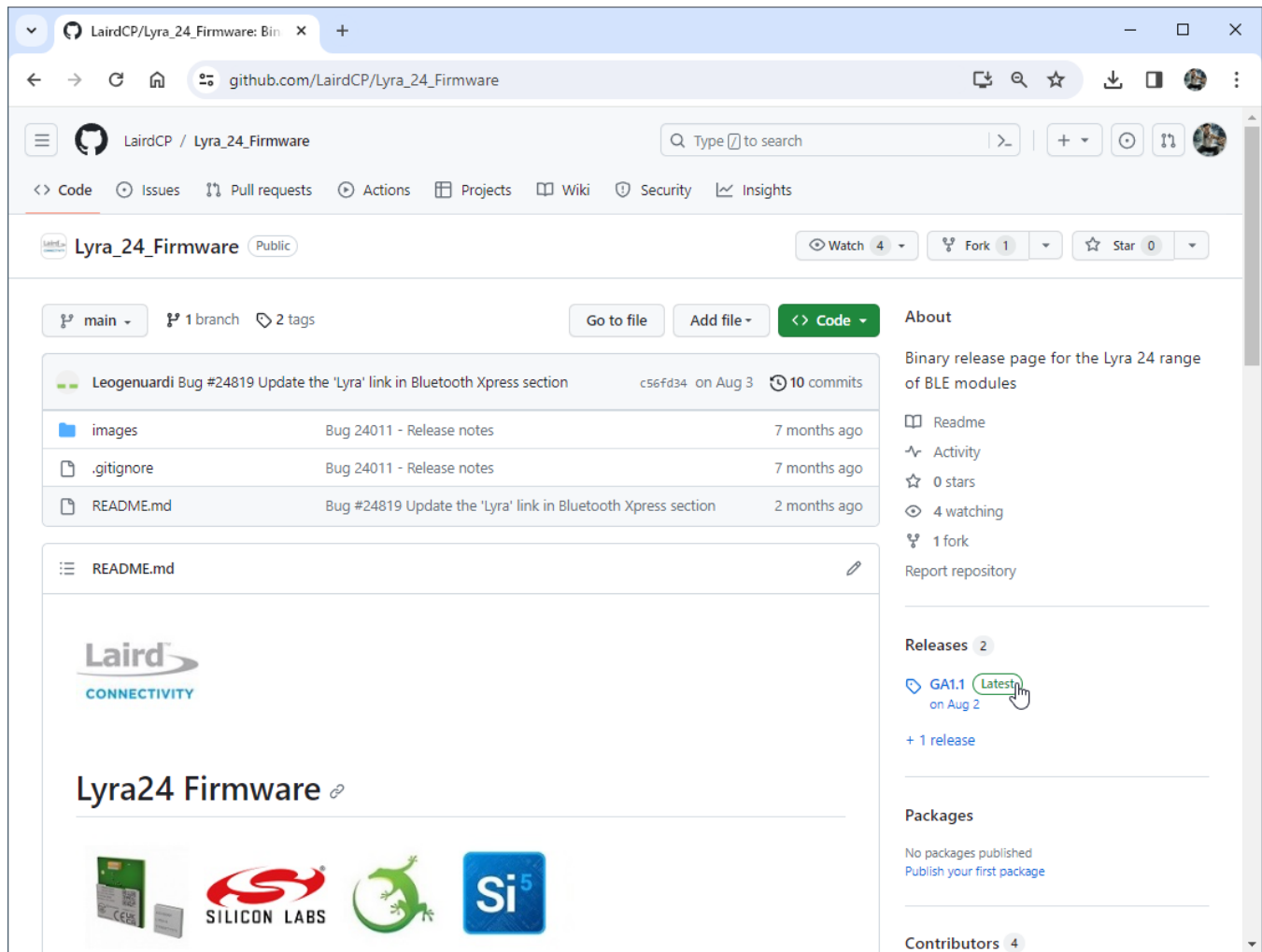


Figure 5: Lyra firmware repository with "Releases" tab in sidebar

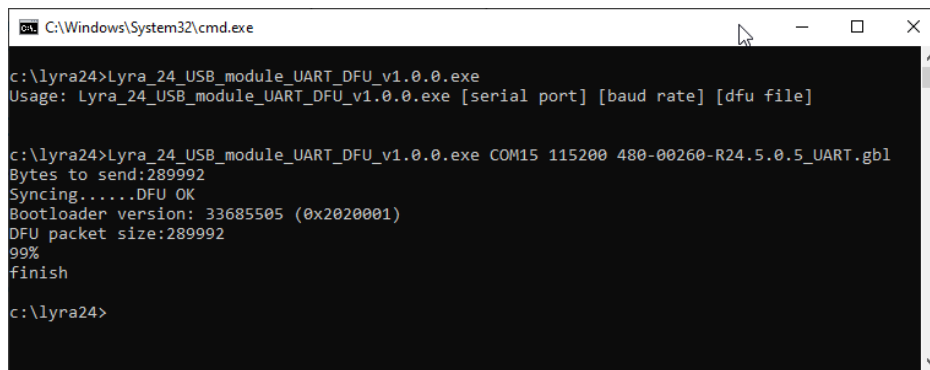
Laird Connectivity provides a Windows command line tool to communicate with the Lyra 24P USB dongle bootloader, which can be downloaded from GitHub as well.

- https://github.com/LairdCP/Lyra_24_Firmware/releases
(You might need to select "Show all xx assets" to see the uart_dfu tool towards the end of the list.)

Open a Windows command shell (cmd.exe) and issue the below command to update the USB dongle firmware:

```
Lyra_24_USB_module_UART_DFU_v1.0.0.exe COM15 115200 480-00260-R24.5.0.5_UART.gb1
```

Make sure to enter the proper COM port number (same as used with UwTerminalX), baud rate and file name of the previously downloaded firmware image. The below screenshot shows a successful update sequence. The update process takes about 1½ minutes to complete.



```
C:\Windows\System32\cmd.exe

c:\lyra24>Lyra_24_USB_module_UART_DFU_v1.0.0.exe
Usage: Lyra_24_USB_module_UART_DFU_v1.0.0.exe [serial port] [baud rate] [dfu file]

c:\lyra24>Lyra_24_USB_module_UART_DFU_v1.0.0.exe COM15 115200 480-00260-R24.5.0.5_UART.gb1
Bytes to send:289992
Syncing.....DFU OK
Bootloader version: 33685505 (0x2020001)
DFU packet size:289992
99%
finish

c:\lyra24>
```

Figure 6: Updating firmware on the Lyra24 USB

When done, you can reconnect with UwTerminalX and use the AT! 3 command to check whether the new firmware is up and running.

7 RUNNING YOUR OWN APPLICATIONS ON THE LYRA 24P USB

Beyond using our AT Command Interface it is possible to load and run own applications on the Lyra 24P USB Dongle.

Simplicity Studio is the unified development environment for all Silicon Labs SoCs and modules. It provides you with access to the target device-specific web and SDK resources, software and hardware configuration tools, and an integrated development environment (IDE) featuring industry-standard code editors, compilers, and debuggers.

We recommend to start Lyra 24 firmware development with our [Lyra 24 DVK](#) (order number 453-00145-K1). The DVK gives more flexibility during firmware development than the USB dongle does since it includes a Segger J-Link programmer/debugger as well as LEDs, push-buttons and access to GPIOs for testing. A USB UART interface is included as well.

After implementation and adequate testing, the application can be loaded to the Lyra 24P USB Dongle in the same way as the firmware is being updated (see previous section).

7.1 Sample Applications

Laird Connectivity provides free firmware sample code at github, which can be used as a starting point for own firmware application development.

- Lyra 24 Firmware Samples ([coming soon](#))

7.2 Lyra 24P Integrated DCDC Converter

The Lyra 24P module leverages different integrated power supply options (LDO or DCDC converter), which can be selected to achieve lowest power consumption depending on the application/use-case. However, in our preloaded AT Command Interface firmware the DCDC converter option is enabled permanently. Since the dongle's regulatory certification has been done based on this firmware and hence this power supply option, customers shall also permanently enable the DCDC power supply option in their own application firmware.

8 ADDITIONAL INFORMATION

Please contact your local sales representative or our support team for further assistance:

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