

HL7900 Firmware Update Methods

Revision	Date	Updated	Version	Reference
Rev 1.3	2025/10/22	Mon Oct 20 12:30:12 2025 +0800	Gdd077373	2174366

Document Type	APN Content Level	Confidentiality	Hardware Compatibility
Application Note ✓	Basic ✓	Private	HL7900 Series
Technical Note	Intermediate	Public ✓	
	Advanced		

1 Introduction

This document describes the methods for downloading firmware to HL7900 modules.

1.1 Location of HL7900 Firmware Packages

HL7900 Firmware packages can be downloaded from [The Source](#).

1.2 Supported Modules

This document is applicable to the following modules:

- HL7900

This document does not describe the following:

- Note:**
1. *FOTA (Firmware Over The Air) update through AirVantage*
 2. *Local update method using Piecewise Delta Firmware Package*
-

1.3 Type of HL7900 Firmware Packages

The following types of firmware installation packages are available:

1. Full Firmware Package

The package is a self-extractable file that can be executed in shell or double clicking in Windows/Linux environment to start the firmware download. It is bundled with a download program IBT (Image Burn Tool) and firmware images files. This package runs silently without prompting the user, except when an INI option file is absent (the first time), it will prompt the user to create an INI file.

Separate packages are provided for Windows and Linux.

2. Delta Firmware Package

The package is a firmware binary file with delta compression. It is downloaded over AT command port using X-modem 1K protocol.

X-modem 1K is system-independent protocol that is supported by many tools on Windows (like Tera Term) and Linux (like sx package).

3. Piecewise Delta Firmware Package

The package is a file collection splitted from Delta Firmware Package. The splitted files are downloaded over AT command port using X-modem 1K protocol or raw data transfer mode.

Refer to "2174397 HL7900 Piecewise Download" for more details.

1.4 Firmware Images

HL7900 integrates an ALT1350 chipset. Thus HL7900 Firmware follows the ALT1350 chipset platform which requires the following two *BranFlakes* groups of firmware images.

1. **BranFlakes Core (BF_CORE)**

It contains the LTE modem certified images:

- System Header
- U-Boot
- Flexible Partition Map
- MCU Loader
- Application FW (3GPP Modem)
- SRM
- CATM PHY
- NB IOT PHY
- RF Manager
- SRM Configuration

2. **BranFlakes Application Value Added Services (BF_AVAS)**

It contains the add-on software:

- MCU
- SRD PHY (optional; required for short-range radio functionality)
- SHUB (optional; required for using the SHUB subsystem)

A combination of BF_CORE images and/or BF_AVAS images constitutes a HL7900 Firmware Package (Full or Delta).

Note:

- The HL7900 Firmware Package combines both BF_CORE images and BF_AVAS images.
 - For SDK users, a SDK build generates a Firmware Package of BF_AVAS images to replace the existing ones.
-

Note:

The download method is respective to the types of HL7900 Firmware Packages and does not relate to the bundled Firmware Images.

1.5 Host System Requirements

1. IBT / Full Firmware Package

- Windows 10 OS - x86 32bit or 64bit architecture, or

- Linux x86_64 (or higher) architecture (Debian/ Ubuntu/ Redhat Linux recommended) with the following tools installed
 - bash
 - mono-runtime, mono-runtime-x86_64-installer is provided on [The Source](#)

2. Delta Firmware Package

- A Host software supporting X-modem 1K, regardless of system architecture

2 Installing Host Drivers

HL7900 Firmware can be downloaded over the physical UART port.

Note: *USB is not supported by HL7900 modules.*

2.1 Install Host Driver for Physical UART

The HL7900 development kit uses a “USB to Serial” chip from FTDI and its driver is pre-installed in Windows 10 and Ubuntu 16.04, or later versions, so no driver installation is required.

When necessary, install the “USB to Serial” driver using the installer provided by the chip vendor.

VID/PID of FTDI USB2 Serial port is like 0403:6014 or 0403:6015 depending on the FTDI chipset.

3 Connect the Host to the Development Kit

Note: *Below steps are relevant to the installation of the HL7900 module to the Development Kit board. For other configurations, the steps are substantially the same. See [Development Kit User Guide](#) for details on the development kit board.*

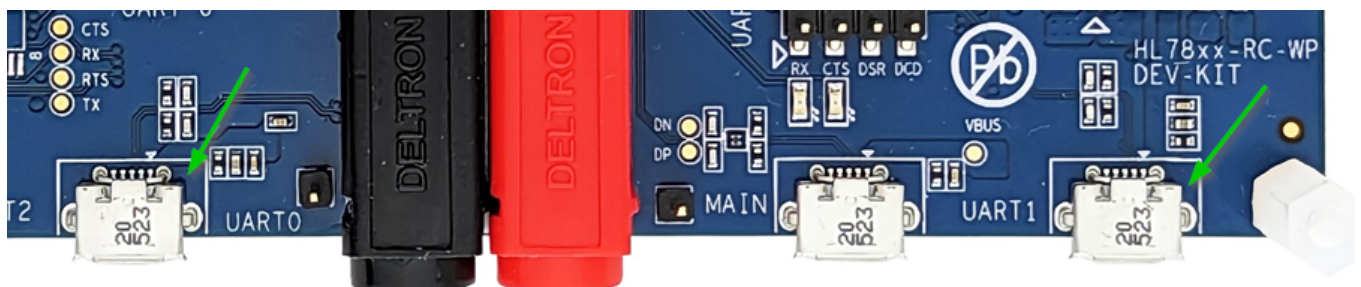


Figure 1: USB-UART1 AT/app port and USB-UART0 debug port

Firmware can be downloaded to the HL7900 module through either UART1 or UART0. A UART port can be connected as below:

1. On Linux, grant read-write access right to the Linux user to access the UART port. On Ubuntu, the following can be done:

```
sudo tee /etc/udev/rules.d/70-persistent-usb.rules <<EOM
# FTDI USB2Serial : 0403:6014 0403:6015
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6014", MODE="0666"
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6015", MODE="0666"
```

EOM

```
sudo udevadm control --reload-rules ; sudo udevadm trigger
```

2. To download Firmware over UART,

1. Connect UART port via a micro-USB cable to PC.
2. On Windows, open Device Manager to identify the "USB Serial Port" which corresponds to the UART port.



3. On Linux, open a terminal and identify the the /dev/ttyUSB* or /dev/ttyACM* port that corresponds to the UART port.

```
e.g. dmesg | grep -i ttyusb | tail
```

```
$ dmesg | grep -i ttyusb | tail
```

```
[ 296.126786] usb 3-2 : FTDI USB Serial Device converter now attached to ttyUSB0
```

4 Download the Full Firmware Package

4.1 One-Click Full Firmware Download

1. For Linux, after downloading the firmware package from Semtech,

1. Download and install the mono runtime if not yet (installed to ~/mono-runtime)

```
chmod a+x mono-runtime-x86_64-installer
./mono-runtime-x86_64-installer
```

2. Ensure the execution bit of the Firmware file is set

```
chmod a+x HL7900.1.0.bin
```

2. Connect the module UART port to the PC. Refer to [Connecting the Host to the Development Kit](#)

3. Start firmware download to module.

You can initiate the firmware download using one of the following two methods:

- Option 1: Using Power cycle (UART1 or UART0)
 - Double-click the firmware file and wait for the download prompt to begin.
 - When the message "Connecting to device ..." appears, re-power the module.
- Option 2: Using a working AT port (UART1)
 - Double-click the firmware file and wait for the download prompt to begin.
 - If the AT port is not working (e.g., due to a boot failure), you must re-power the module to trigger the download.

Note:

*In both methods, the U-Boot firmware will activate during system boot and attempt to detect the host UART connection within a timeout period.
If needed, use the **AT+KBOOCFG** command to check or modify the detection timeout.*

4. IBT (Image Burn tool) will then start downloading the firmware image to the module once attached to U-Boot Firmware:

```
Image Burn Tool for HL79 & HL78
(c) 2021-2023 Semtech Corporation, 2011-2023 SONY Semiconductor. All rights reserved
Version: 510.9.4 | Build: 2023/08/19-08:40:16 | DLL: 2023/07/26-12:30:55
Pre burning preparations ...
Download over UART
Connecting to device ...
Using UART COM14 at Baud 115200
Please reset your device ...
Entered u-boot
Burning first phase ...
Setting baudrate to 3000000
Setting flow control on
Log file's location:
'C:\Users\Xxx\AppData\Local\Temp\HL7900.1.0_11289_dl.log'
Starting burning phase ...
```

5. If the download is completed successfully without any errors, the window will close automatically. Otherwise, errors are displayed in the window.

```
*****
***** Download Completed (11:43:51.07) *****
*****
This prompt will be closed in 5 seconds
```

6. Open an AT port and verify the Firmware version using AT command AT+I3.

4.2 Customized Firmware Download

Users may follow below steps to customize console log file path and INI file path, as well as integrate the Firmware Download process with external applications.

1. Install 7-zip software from <https://www.7-zip.org/> if not yet installed.
2. Extract the One-Click firmware package by 7-zip software into an output directory.
 1. On Windows, right click on the package and an *Extract Files* option is available.
 2. On Linux, execute `7z x -oOutput path/to/package` in a shell.
3. Customize the file `launch_args.bat|.sh` per need.
 1. Modify `LOG_FILE` to point to a desired path for console log.
 2. Create a customized INI file (Refer to [Download Options from INI File](#)).
 3. Modify `INI_FILE` to point to the INI file.

For example, write logs and read INI from the extracted directory (.\) on Windows:

```
set LOG_FILE=.\%LOG_PFX%.log
set INI_FILE=.\HL79xx_download.ini
```

4. Execute `launch.bat|sh` to start the FW download process:
 1. On Windows,
 1. double clicking the file, or
 2. execute `cmd.exe /c launch.bat` from an external process
 2. On Linux, execute `./launch.sh` in a shell
5. The above extracted directory including the customized INI file can be copied and reused in another machine.

4.3 Upgrade IBT in an existing firmware package

When a standalone *ibt* 7-zip upgrade archive file is provided by Semtech, users may follow below steps to upgrade the IBT in an existing firmware package.

1. Install 7-zip software from <https://www.7-zip.org/> if not yet installed.
2. Extract the standalone *ibt* 7-zip upgrade archive file into an output directory.
 1. On Windows, right click on the package and an *Extract Files* option is available.
 2. On Linux, execute `7z x -oIbtFiles path/to/ibt.7z` in a shell.
3. Update the existing firmware package with the extracted *ibt* files.
 1. On Windows, right click on the package and an *Open archive* option is available. Drag all files from *IbtFiles* to the 7-zip archive window to update the files.
 2. On Linux, execute `7z u path/to/package "$PWD/IbtFiles/*"` in a shell.
4. Launch the updated One-Click firmware package and check that IBT version is updated.

4.4 Configuring Download Options

Download options like UART port number and UART baud rate can be specified through an INI file or OS environment. Refer to [Supported UART Baud Rates](#) for the list of supported baud rates.

When INI option file is absent (the first time, or removed by user), the package prompts and guides user to create an INI file within a timeout of 30 seconds.

- Note:**
- *The default settings: Port is COM10 or /dev/ttyUSB0, Baud is 460800 and Hardware Flow is On.*
 - *Adjust Port and Baud to work with your serial port. Some Usb2Serial cables fail at Baud >=921600.*
 - *The option values in INI file takes precedence over the corresponding values in the OS environment.*

4.4.1 Download Options from INI File

1. Create or Open the INI file named `HL79xx_download.ini`

Path on Windows	Path on Linux
<code>%APPDATA%\HL79xx_download.ini</code> Note: <code>%APPDATA%</code> can be entered in Explorer or Run	<code>~/HL79xx_download.ini</code>

2. Open the file using text editor like notepad / gedit, and save the following options into it.

INI content:	On Windows	On Linux
To download over UART with 3M Baud and hardware flow control enabled	[Download] Port=COM7 ComBaud=3000000 HwFlow=1	[Download] Port=ttyUSB0 ComBaud=3000000 HwFlow=1

3. The file HL79xx_download.ini will be loaded when the package is executed:

```

Console Log file's location: "C:\Users\Xxx\AppData\Local\Temp\HL7900.1.0_11289.log"
Download Log file's location: "C:\Users\Xxx\AppData\Local\Temp\HL7900.1.0_11289_dl.log"
Reading INI file %APPDATA%\HL79xx_download.ini...
Use Port: COM14
Use Baud: 3000000
Use HwFlow: 1
*****
***** Download Start (11:43:03.65) *****
*****
    
```

4.4.2 Download Options from the Environment

Open a terminal and execute the package. For example, to download firmware over UART:

On Windows	On Linux
set DL_PORT=COM7 set DL_BAUD=3000000 HL7900.1.0.exe	SFXTERM=0 DL_PORT=ttyUSB0 DL_BAUD=3000000 ./HL7900.1.0.bin

Note: On Linux, SFXTERM=0 reuses the current Terminal window without opening an additional one.

5 Download the Delta Firmware Package

1. Prepare a X-Modem client software on PC host.
2. For Xmodem .zip file like XMODEM_HL7900.2.0.7z. It contains multiple delta firmware files but only one of them is applicable for the download. For instance, a file

HL7900.1.0_to_2.0_allBin.ua

can **only** be downloaded to modules of source Firmware **1.0**, to update to Firmware **2.0**.

Important: Please ensure the source firmware version is the same as the one in your module or else module will reject the update without modifying its firmware.

3. Configure the interim partition map and regenerate TempFS using AT%UPGCMDCMD = "CFGPART", <param>.

The <param> is provided in tempfs_cfgpart.txt.

For instance, when tempfs_cfgpart.txt contains:

```
$ cat tempfs_cfgpart.txt
T;parts=3072k(p0),2888k(p1),512k(p2),1024k(p3);usage=2352k(p0),2192k(p1),512k(p2),1024k(p3)
```

then, the AT command is:

```
AT%UPGCMD="CFGPART", "T;parts=3072k(p0),2888k(p1),512k(p2),1024k(p3);
usage=2352k(p0),2192k(p1),512k(p2),1024k(p3)"
```

Note:

- This CFGPART configuration step is a temporary workaround and will be improved in a future update.
- The above **AT%UPGCMD** line is wrapped for readability, use one line instead.
- The <param> must be wrapped in **double quotes**.

4. Use the AT+WDS= <file_size> write command to download the firmware file file using X-modem 1K protocol via the client software on PC host.

```
AT+WDS=1619072 // ← Send firmware using X-modem 1K
OK // 1K-Xmodem download has completed successfully
+WDSI :3 // indication received – the device has downloaded the package
```

5. Execute the Delta Update by AT%UPGCMD="UPGVRM", "b:/update_local.ua", wait for device reboot and check the update result.

```
AT%UPGCMD="UPGVRM","b:/update_local.ua" // Initiate installation
%UPGCMD: 0
OK
AT%UPGCMD?
%UPGCMD: 6 // No result; could be other value of previous update
OK
AT+CFUN=1,1 // ← Reboot Module to start update
... // Installation starts
AT%UPGCMD?
%UPGCMD: 0 // Update completed successfully
OK
```

6. Verify the Firmware version by ATI3.

6 Appendix

6.1 Download Time of Full Firmware Package

Downloading Full Firmware Package over UART with 3000000 Baud takes approximately 80 seconds.

6.2 Aborting Download

If a firmware download is aborted, the module may be recovered by re-running the same download steps again since only a validated firmware image will be launched during module boot.

However, it is not recommended to abort firmware download as this may risk damaging the hardware and corrupting modem configuration data.

6.3 Supported UART Baud Rates

The following baud rates are supported by IBT:

115200, 230400, 460800, 921600, 3000000

The actual available baud rates depend on the USB to Serial Driver installed on Windows or Linux.

7 Reference Documents

For more details, below references can be consulted.

1. HL7900 Product Technical Specification, reference number: 41114801
2. HL7900 AT Command Reference Guide, reference number: 41114811
3. HL78xx/HL7900 Development Kit User Guide, reference number: 41114645

Legal Notice

Important Notice

Information relating to this product and the application or design described herein is believed to be reliable, however such information is provided as a guide only and Semtech assumes no liability for any errors in this document, or for the application or design described herein. Semtech reserves the right to make changes to the product or this document at any time without notice. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. Semtech warrants performance of its products to the specifications applicable at the time of sale, and all sales are made in accordance with Semtech's standard terms and conditions of sale.

SEMTECH PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS, OR IN NUCLEAR APPLICATIONS IN WHICH THE FAILURE COULD BE REASONABLY EXPECTED TO RESULT IN PERSONAL INJURY, LOSS OF LIFE OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. INCLUSION OF SEMTECH PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK. Should a customer purchase or use Semtech products for any such unauthorized application, the customer shall indemnify and hold Semtech and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs damages and attorney fees which could arise.

The Semtech name and logo are registered trademarks of the Semtech Corporation. All other trademarks and trade names mentioned may be marks and names of Semtech or their respective companies. Semtech reserves the right to make changes to, or discontinue any products described in this document without further notice. Semtech makes no warranty, representation or guarantee, express or implied, regarding the suitability of its products for any particular purpose. All rights reserved.

Wireless Communications

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. The Semtech product should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Semtech accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Semtech product, or for failure of the Semtech product to transmit or receive such data.

Safety

Do not operate the Semtech product in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or near any equipment which may be susceptible to any form of radio interference. In such areas, the Semtech product should be powered off.

Sierra Wireless

Semtech Corporation purchased Sierra Wireless in January 2023. The Sierra Wireless brand is gradually being phased out. During the phase-out period, references to both *Semtech* and *Sierra Wireless* may appear in product documentation.

Qualcomm Licenses

Semtech's cellular modules are sold subject to certain notices and restrictions regarding patent licenses from Qualcomm Incorporated. These notices and restrictions are available at www.sierrawireless.com/qualcomm-notices.

Copyright © 2025 Semtech Corporation. All rights reserved.

Contact Information

Sales information and technical support, including warranty and returns	Web: https://sierrawireless.com/company/contact-us/ Global toll-free number: 1-877-687-7795 6:00 am to 5:00 pm PST
Corporate and product information	Web: Sierra Web

Revision History

Revision	Date	Changes
1.3	Oct 20, 2025	Use HL7900 in place of HL79XX throughout the documentation
1.2	Jun 26, 2025	Update methods about UART0/UART1 and KBOOTCFG Remove spacing in table header definition Update UART port image to include both UART1 and UART0 Formatting changes

Revision	Date	Changes
1.1	Apr 02, 2025	Describe BF_CORE/AVAS and Upgrading IBT
1.0	Sep 20, 2024	Initial creation

END OF DOCUMENT