

Gemini User Guide



Version	Date	Author	Rationale
0.1	31 January 2020	Michael Thot	Initial draft.
0.2	7 February 2020	Michael Thot	Added info on boot modes, buttons/switches, LED states, USB connection guidelines.
0.3	10 February 2020	Michael Thot	Updated link to Gemini Client tool to most recent version.
0.4	14 February 2020	Michael Thot	Revised based on suggestions from legal.
0.5	21 February 2020	Michael Thot	Adding section for boot instructions (QFIL & Flashboot).
0.6	25 February 2020	Michael Thot	Split Gemini Client content to separate doc. Revised based on suggestions/comments from Renzo.
0.61	2 March 2020	Michael Thot	Added note on Workplace group, device tracking in Tasks, boot mode identification.
0.7	24 March 2020	Michael Thot	Changed QFIL instructions link. Added final Health & Safety Information.
0.8	31 July 2020	Michael Thot	Removed Gemini Client info. Added explicit QFIL, WiFi connection, sensor recording, Companion App pairing, and recording verification instructions.
0.9	28 August 2020	Michael Thot	Re-ordering document - migrating technical content into appendix

Health and Safety Information

❏ **WARNING** To reduce the risk of personal injury, discomfort, or property damage, please read and follow the health and safety information below before using the Glasses.

Intended uses & users

- **For ages 18+ only.** The Glasses are intended only for use by adults aged 18 and older. Do not allow anyone under 18 to use the Glasses.
- **Non-consumer use only.** The Glasses are intended for limited distribution only for purposes of testing and data collection and are for use by the authorized user only. As prototype equipment, the Glasses are designed and tested to reduce the risk of injury during authorized use, but they have not been subject to the testing and certification required for consumer use. There are known and unknown risks of personal injury, death, sickness, and property damage associated with your use of the Glasses.
- **Read instructions.** Follow all instructions provided to you with the Glasses, and read all materials accompanying the Glasses before using them. Follow all instructions and alerts provided through the companion app.

Vision

- **Prescription lenses.** If your glasses have prescription lenses, they are intended only for use by the prescribed user. The Glasses may provide other users with inadequate vision correction or vision that is worse than normal. The Glasses are not intended for users whose vision cannot be corrected with standard corrective lenses.
- **Do not use if Glasses are damaged.** To avoid injury to your eyes, do not use the Glasses if they are damaged.
- **Sensors.** Do not examine sensors with magnifying or optical equipment. Do not tamper with, attempt to repair, or disassemble sensors. Do not attempt to modify or override the sensors' programming. Altering or impairing the sensors could cause injury or property damage.

Proper handling & cleaning

- **Handle the Glasses with care & avoid damage.** The Glasses are sensitive electronic equipment and should be handled with care.
- **Do not try to bend the temples (earpieces or arms).** The Glasses' temples are not intended to be folded in.
 - Do not drop, strike, or shake your Glasses excessively. Do not use the Glasses if they are damaged.
 - The Glasses are not intended for use as safety glasses or eye protection.

- Do not use with other head mounted displays, such as virtual reality headsets or other glasses.
- **Storage.** Store the Glasses in a clean, dry, temperature-controlled environment. Do not leave in an unattended vehicle where temperatures may reach hot or cold extremes.
- **Water & liquids.** Your Glasses are resistant to water splashes but are not designed for submersion in water or extended exposure to water or other liquids. If water exposure occurs, dry your Glasses thoroughly and clear the charging areas of residue or other debris.
- **Cleaning.** Clean using a microfiber cloth or a lens cleaning wipe. Do not soak, rinse, or submerge.

Driving & flying

- **Driving.** Do not use the companion app while driving. Follow local laws and requirements applicable to mobile phone operation. Do not manually operate any buttons on the Glasses while driving.
- **Flying.** Check applicable aviation security restrictions on personal electronics before flying with the Glasses. The Glasses contain lithium ion batteries and should not be placed in checked luggage.
- **Distraction.** Do not allow use of the Glasses to distract you from your surroundings.

Charging, electrical & heat

- **Charging.** Use only the provided charging cable and power adapter to charge your Glasses. Keep the charging port clear and clean of debris and residue.
 - Do not charge while wearing.
 - Periodically inspect your Glasses, charging port, charging cable, and power adapter for damage or signs of wear. Do not use if any part is damaged, cracked, or if any internal components are exposed.
- **Temperature & overheating.** Your Glasses shouldn't overheat or cause thermal discomfort during normal use. If they do, stop using them and contact the Glasses provider. Keep the Glasses away from fire and heat sources.
 - Do not use in temperatures above 45°C (113°F) or below –10°C (14°F).
 - Do not charge in temperatures above 45°C (113°F) or below 0°C (32°F).
 - Do not store in temperatures above 48°C (120°F) or below –20°C (–4°F).
 - **Low-temperature burns.** To prevent potential low-temperature burns from prolonged direct contact, do not allow extended direct skin contact with your power adapter while charging.
- **Battery.** The Glasses contain a lithium-ion battery that is not user-replaceable. **Do not attempt to remove or replace the battery.** The battery may present a fire or chemical burn hazard if misused. Do not disassemble, expose to heat, crush, puncture, short

external contacts, or incinerate. Dispose of the Glasses consistent with instructions and local requirements for battery disposal.

- **Accessories.** Only use the Glasses with the provided charging cable and power adapter or other authorized accessories. Use with unauthorized accessories may damage the Glasses and increase the risk of injury or damage to other property.

Discomfort & other conditions

- **Discomfort.** The Glasses are intended to be worn for extended periods (as with other glasses). If you feel any discomfort (for example, headaches, eye strain, eye/muscle twitching, altered vision or other abnormalities, etc.), take a break. If discomfort persists, stop using and consult a medical professional.
- **Skin sensitivity.** If you have skin sensitivities, be careful before and while wearing the Glasses. Keep the Glasses clean and dry to reduce the possibility of skin irritation.
- **Contagious conditions.** To avoid the possibility of transferring a contagious condition, keep your Glasses clean and do not share your Glasses. Follow the cleaning and care instructions provided with the Glasses.
- **Interference with personal medical devices.** The Glasses contain magnetic material and components that emit radio waves, which could affect the operation of medical devices such as pacemakers or other implantable devices, hearing aids, or insulin pumps. If you have an electronic medical device, consult your doctor or the medical device manufacturer before using Glasses. Stop using the Glasses if you notice any interference with your medical device.

General Device Information

Device Logs & Points of Contact

Contact [Renzo De Nardi](#), [Naj Sarfraz](#) or [Rob Walker](#) if you have any questions. Contact LSO (Laser Safety Officer) [John Flores-McLaughlin](#) or [EHS](#) if there are any suspected injuries or if you have questions about eye safety.

Conditions of Use

The Gemini EVT headset is only to be used by FTEs and contingent workers for research and engineering purposes only. Use of the device for user studies requires specific approval.

Components

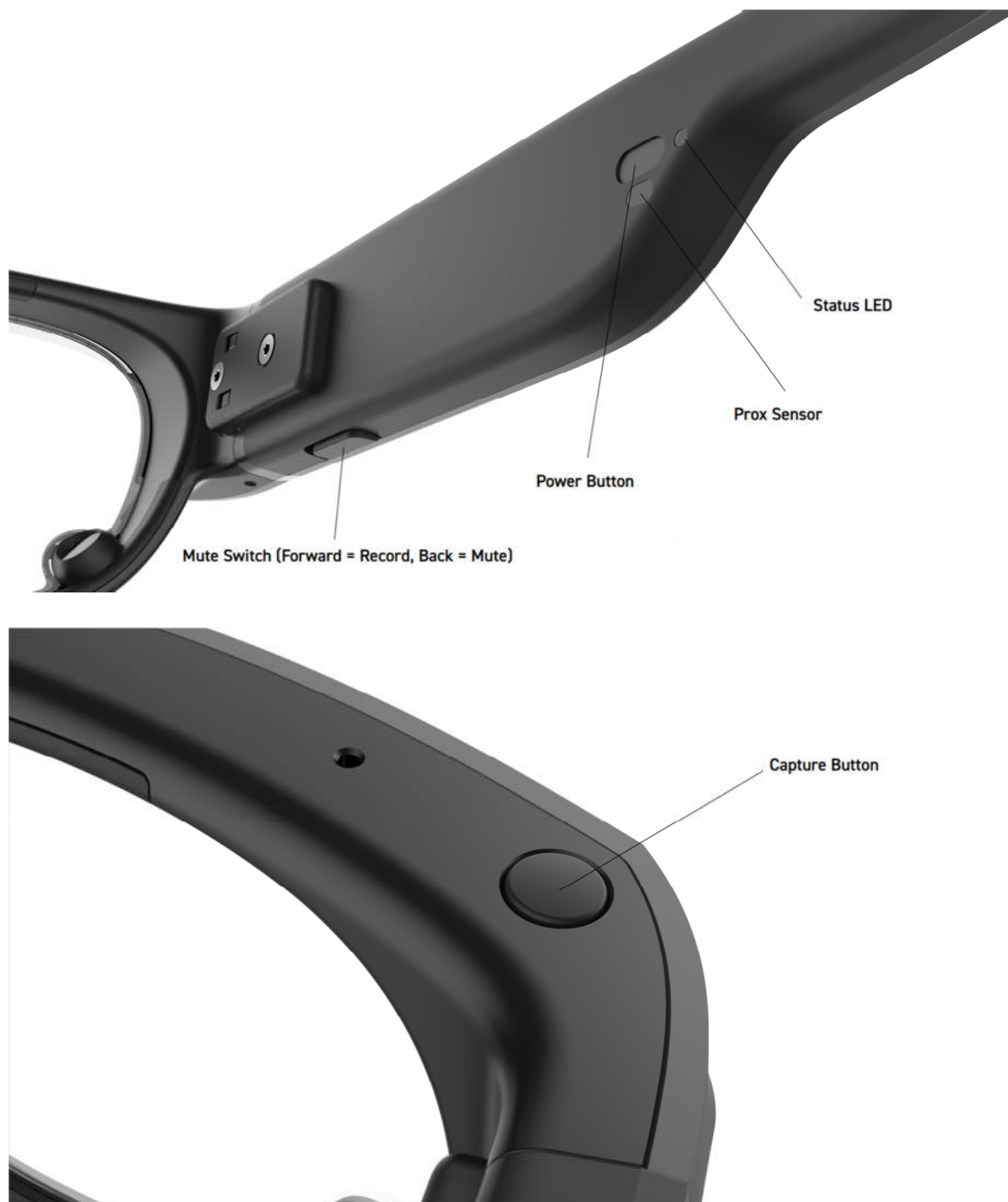


The EVT device will arrive with:

- The EVT glasses device
- Power supply
- USB charging/data cable
- Microfiber cloth

Switches/Buttons

The device has 3 physical points of interaction: a toggle switch and 2 buttons.



- **Mute Switch:** Toggles privacy mode on/off. Privacy mode is enabled when red is visible.

- **Capture Button:** Take a picture/video.
 - Currently used to power off the device.
 - This button may not have much tactile feedback, but should still operate correctly when pressed.
- **Power Button:** Power unit on/off
 - Currently powers the device on, but does not power off the device.

Power & Charging

Charging

The device comes with a charger and a cable. The cable can be used for charging and connecting the device to a computer. Polarized magnets will repel the cable when it's not in the correct orientation.

When you first connect the device to a charging source, there may be red flashing LEDs on the inside of the right arm. The red LEDs indicate that the battery is depleted but is charging. Most devices will exit this state and turn on within 30 seconds - 2 minutes. Some have been observed taking as long as 15 minutes. Please be patient if your device is taking longer than normal; it may turn on later than you expect.

Powering On

Once the device has charged sufficiently, the LED will turn blue and the device will power on. There is no additional interaction needed.

After shutting the device down, you can power it back on by connecting it to a charging source or a computer, or pressing the power button. Once the blue LED indicator turns on, you can disconnect the device and it will remain powered on.

Powering Off

To power off the device, disconnect the cable and hold down the PoE button. The PoE button may not have significant tactile feedback. It should still operate correctly when pressed.

Shutting the device down through adb commands is possible, but the device will immediately power back on since it is connected to USB power. Hold down the PoE button rather than using adb shutdown.

Connection Sensitivity

The device's magnetic connection for charging/data connection is sensitive. Try connecting the magnetic end to the glasses from back-to-front. You may have to physically hold it together momentarily for the device to be enumerated and/or initiate charging.



It is advised that you connect the magnetic device end of the USB cable before connecting the other end to your computer.

↪ See [USB Is Connected, But Device Does Not Enumerate](#) for more details.

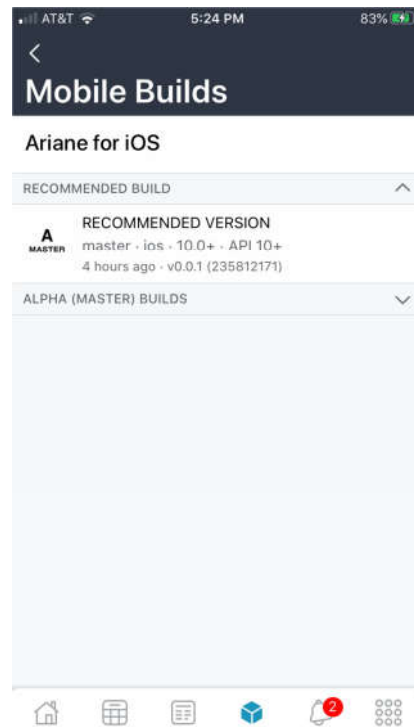
The Companion App

Profile Beta Mode

Before trying to download the app, make sure your Workplace profile is set to beta mode. *If your profile is not set to beta mode, you will not be able to see the app in the app center.*

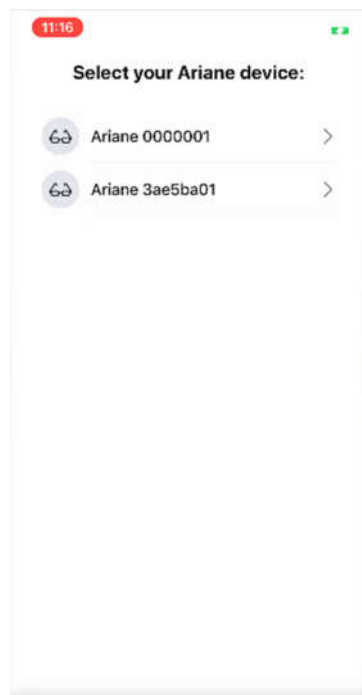
Installation & Pairing

The companion app is available through the **Mobile Home App Center**. Search for “Ariane” in the app center to locate the app. Install the **Recommended Version**:

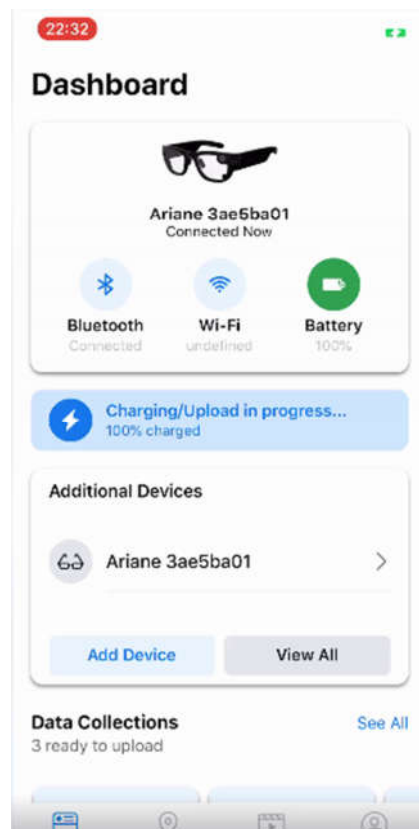


Make sure your device is powered-on and tap the **Add Device** button and the app will begin to look for nearby Gemini devices.

The app will display a list of devices found nearby. Tap the name associated with your device to continue.



The app will then prompt you to join a WiFi network and input the associated password. After connecting to WiFi, the app will return to its home page and display device information, such as the battery level and storage capacity.



Troubleshooting

LED States

Status LED

- **Low Battery:** Flashing red LED (.5 seconds on, .5 seconds off).
- **Recovery Mode:** Alternating blue and red (may appear as violet because the LEDs alternate very quickly).
- **Offline Crash Mode:** Off
- **Powering On:** Green
- **Power Off:** Off
- **Power On/Android OS Mode:** Bright Blue
- **In UEFI Boot Mode:** Dark Blue
- **EDL/QFIL Mode:** Off
- **Fastboot:** Orange
- **Charge Loop:** Red

User Facing LED

- **Steady On:** Recording video and/or audio for the duration of illumination.
- **Flashing On (3x pulses):** Taking a still image.

Observer Facing LED

- **Flashing On (5x pulses):** Upcoming recording session is about to start.
- **Flashing On (Continuous, 5 second intervals):** While still image or video capture is in progress.

Issues and Solutions

A. USB Is Connected, But Device Is Not Recognized

Suggested Solution: First, attach the magnetic USB connector to the device. Then, plug the USB end into your computer.

The magnetic USB connection is known to be somewhat flaky on the EVT model. If the magnetic connector attaches from front to back, it will violate specs regarding USB pin-connection ordering. This in turn will lead to the device not being enumerated correctly by your connected computer.

B. No Tactile Feedback on Capture Button

Suggested Solution: N/A

Unfortunately, this is a fact-of-life for some EVT devices. Even without sufficient feedback, the button should be operating normally. Press the button with the normal amount of pressure you would use; pressing too forcefully may break the button.

Reporting Issues

Each device has an associated logbook within Tasks:

[Ariane] Logbook P0, G3-85 (SN 1WM090300A9521)

T60914890 Add progress Michael Thot Low Public

Log book instructions:

Log all usage, issues, configuration changes, modifications, repairs, dis-assembly, firmware changes, etc. Link, to this Task, dependent Tasks for specific issue or activity tracking. Use "Owner" to indicate current possession of the device.

Notes:

- If you need to transport your device between buildings go to [Secure Ship - Hand Carry Request Form](#) or reach out to Rob Walker or Robbie Pennington .
- SN 1WM090300A9521
- Last Functional Test: 1/21/2020
- Current OS Version: msm8998-userdebug 7.1.1 NGI77B eng.cep.20191216.195056 test-keys
- Current MCU Firmware: 2.19
- Recent Upgrades:
- Known issues: none
- Other Milestones (repair, RMA, etc...): Factory Build Data: Log all usage, issues, configuration changes, modifications, repairs, dis-assembly, firmware changes, etc. Link, to this Task, dependent Tasks for specific issue or activity tracking. Use "Owner" to indicate current possession of the HMD.

Please utilize your device's corresponding logbook to keep account of any issues you encounter while using the device. The glasses will arrive with a unique label already adhered to it.

Help Improve This User Guide!

If you believe something needs to be addressed immediately, you can also assign a Task to [Michael Thot](#) through this [Task template](#).

Appendix

Useful Links

- [RecordingService Demo Instructions](#)
- [VRS Binaries](#)
- [WiFi, Sensor Recording, and Data Verification \(w/o Companion App\)](#)

ADB

Here is a complete list of [adb commands](#).

adb is more convenient to use if you add it to your system's PATH variable. You can find instructions for how to do this [here](#).

Questions? Feedback? Please contact [Michael Thot](#) or assign him a Task using [this template](#).

↪ You can download adb tooling [here](#).

On Windows version 29.0.5 works. Version 30.0.4 gives [this](#) error.

Drivers

You will also have to download Qualcomm's drivers to interface with the device.

↪ Qualcomm drivers can be downloaded [here](#).

If your computer is running Windows, you will also need to download Oculus ADB Drivers.

↪ Oculus ADB drivers can be downloaded [here](#).

Connecting to a Computer

Connection order matters, as your device may not be recognized if the magnetic end is connected last.

First, connect the magnetic end of the USB cable to your device. Then, connect the USB end to your computer. The device should be recognized within seconds by your computer if everything is working correctly.

If you are having issues with your computer recognizing the device, ensure you are connecting the magnetic device end of the cable first!

Verifying and Viewing Recordings

The Companion App does not have playback capabilities.

In order to view your recordings, you'll need to pull them off the device onto a computer with adb. Then, we'll use **VRSPlayer** to view the recording.

Copying Recording Files

1. Connect your device to your computer.
2. Pull the VRS file from your device to your computer:
 - a. `$ adb pull /data/test.vrs`
3. Pull the metadata file associated with your recording:
 - a. `$ adb pull /data/test.vrs.json`

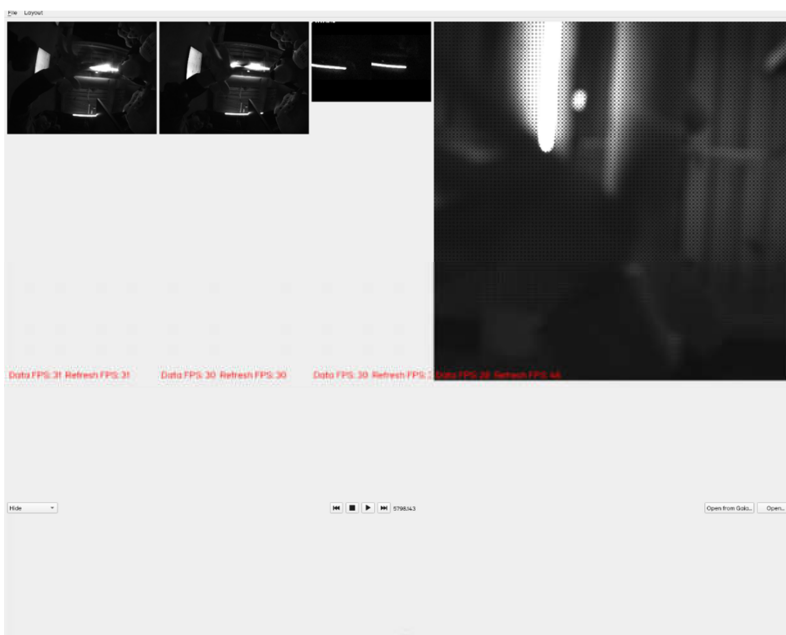
Viewing VRS Files

VRSPlayer can playback VRS files. There are two ways you can get the binary:

- *If you have ovrsource locally cloned;*
 - Run the following command to build the VRSPlayer binary: `$ buck run @mode/linux/dev-release vrsplayer` (replace "linux" with "mac" or "win" for other systems)
- *If you don't not have a clone of ovrsource;*
 - You can download pre-built binaries [from this folder](#).

Once you have the tool built or downloaded, simply

1. Run **VRSPlayer.exe** to launch the program.
2. After VRSPlayer launches, click **File** (upper-left corner) and then **Open**.
3. Select the VRS file you pulled.
4. Press the play button.
5. You should see all four camera streams:



Normal and Specialty Boot Modes

- **Power On:** Apply USB power, or hold the power button for 3 seconds.
- **Power Off (Software Shutdown):** Hold PoE button for 3 seconds.

- **Power Off (PMIC shutdown - emergency):** Hold power button for 20 seconds.
- **Enter Offline Crash Mode:** Hold power button for 10 seconds.
 - *Not used by FRL engineering at this time.*
- **Exit Offline Crash/Diag. Mode:** Hold PoE button for 3 seconds to reboot the device.

Identifying the Device's Boot Mode

Device Boot Mode	Associated Hardware ID (HWID)
Android / ADB	Gemini - USB\VID_2833&PID_0086&REV_0404
EDL	Qualcomm HS-USB QDLoader 9008 - USB\VID_05C6&PID_9008&REV_0000
Fastboot - Recovery	USB\VID_18D1&PID_D001&REV_0404
Fastboot - Bootloader	Android Bootloader Interface - USB\VID_18D1&PID_D00D&REV_0100
Diagnostics	Qualcomm HS-USB Diagnostics 900E - USB\VID_05C6&PID_900E&REV_0000

Windows

On a Windows system, you can use the **Device Manager** tool to display the device's hardware ID. You can reference the table above to determine the current mode of your device.

Linux

On a Linux system, you can use a terminal with the command `dmesg | grep -i usb` to display the hardware IDs of all connected USB devices. You can reference the table above to determine the current mode of your device based on the enumerated hardware IDs.

Updating Device OS/Firmware

Qualcomm Flash Image Loader (QFIL)

QFIL is only required when switching from a factory image to a FRL image, after this is done once the fastboot method is the preferred way to reflash. The sections below walkthrough the process of updating the device through QFIL.

Preparation

Qualcomm Software

Install [Qualcomm's USB driver](#) (if you have not done so already) and the [QPST package](#) (contains QFIL) on your PC.

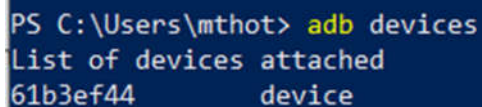
Charge the Device

Make sure the device is charged. To do, so connect it to its power adapter. If the LED next to the power button is red or off, leave the device charging. The same LED will turn blue when the device is sufficiently charged.

Backup Persist Partition

Currently, the QFIL process will delete the **persist** partition on the device. This will create MAC address inconsistencies. Before beginning the QFIL process, use the `adb pull` command to backup your **persist** partition by following these instructions:

1. Check that adb can communicate with your device with the adb devices command.
 - a. You should see the following if adb is working correctly:



```
PS C:\Users\mthot> adb devices
List of devices attached
61b3ef44      device
```

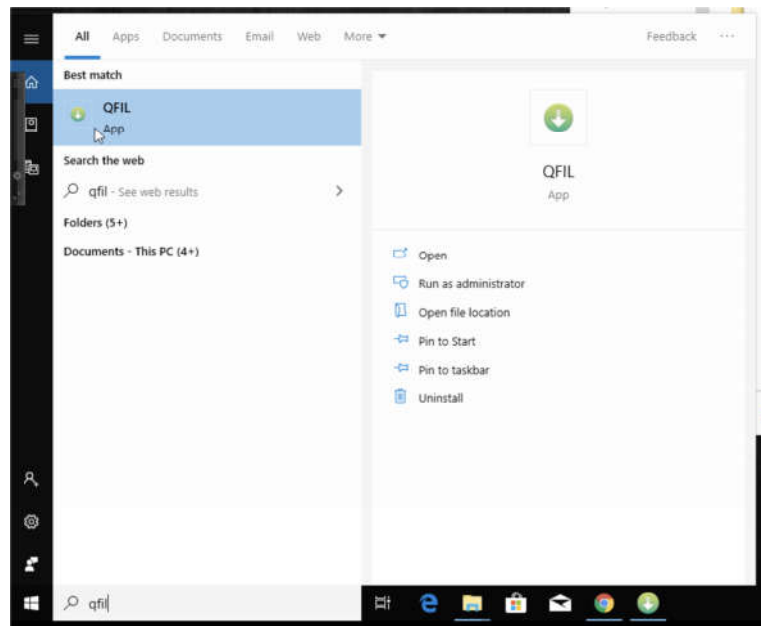
2. After confirming that adb and your device are communicating, use `adb pull persist` to backup the **persist** partition. The command will copy **persist** to your user folder:

Name	Date modified	Type	Size
.android	7/29/2020 10:49 AM	File folder	
.chef	5/20/2020 6:56 AM	File folder	
.cisco	5/19/2020 12:41 PM	File folder	
.osquery	5/19/2020 12:43 PM	File folder	
.ssh	7/31/2020 10:19 AM	File folder	
.vscode	6/30/2020 10:07 AM	File folder	
.vscode-ftb	6/15/2020 2:51 PM	File folder	
3D Objects	7/21/2020 9:12 AM	File folder	
ansel	6/7/2020 3:06 PM	File folder	
Contacts	7/21/2020 9:12 AM	File folder	
Creative Cloud Files	5/28/2020 11:05 AM	File folder	
Desktop	7/31/2020 10:38 AM	File folder	
Documents	7/24/2020 3:18 PM	File folder	
Downloads	7/31/2020 10:28 AM	File folder	
Dropbox (Facebook)	7/21/2020 2:21 PM	File folder	
Favorites	7/21/2020 9:12 AM	File folder	
Links	7/21/2020 9:12 AM	File folder	
Music	7/24/2020 11:20 AM	File folder	
OneDrive	7/31/2020 10:20 AM	File folder	
OneDrive - Facebook	7/31/2020 10:20 AM	File folder	
persist	7/31/2020 10:42 AM	File folder	
Pictures	7/21/2020 9:12 AM	File folder	
Saved Games	7/21/2020 9:12 AM	File folder	
Searches	7/21/2020 9:12 AM	File folder	
Videos	7/27/2020 9:32 AM	File folder	
.acm.sqlite	7/21/2020 12:39 PM	SQLite File	4 KB
testvrs	7/29/2020 1:33 PM	VRS File	11,671 KB
testvrs	7/29/2020 1:34 PM	JSON Source File	1 KB

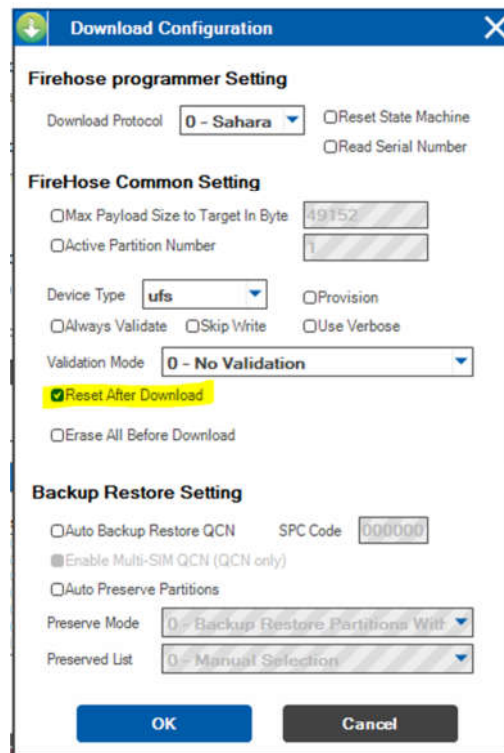
Update Process

QFIL Download

1. Once charged unplug the device from the USB cable. Then, turn it off by pressing the capture button for 5 seconds.
2. Go to gemini.com/arianestu and download the latest QFIL package (click the arrow in the QFIL column to download).
3. Launch QFIL.



4. Put your device in QDL mode by following these steps:
 - a. Plug the device's USB cable into your computer, but DO NOT connect the magnetic end to your device yet.
 - b. Ensure the device is turned off (hold down the capture button for 5 seconds)
 - c. Move the device's mute switch to the forward position. The red area beneath the switch should not be visible.
 - d. Hold down the capture button *and continue to do so until instructed otherwise*.
 - e. Connect the magnetic end of the USB cable to the device.
 - f. The device should be recognized by your computer almost immediately.
 - g. The QFIL program should not display that it's connected to a **Qualcomm HS-USB QDLoader 9008** device. This confirms that your device has successfully been placed in QDL mode.
5. In **Select Build Type**, select **Flat Build**.
6. Change the **Programmer Path** in QFIL to point to the **prog_firehose_ddr** file within the QFIL package you downloaded previously.
 - a. The **Search Path** field will automatically update to match this path.
7. Click **Load XML** and select *all* packages with the name rawprogram<n>.xml (there should be 6 total packages; rawprogram0 - rawprogram5).
8. Also select all patch<n>.xml files in the same manner (there should also be 6 patch files; path0.xml - patch5.xml).
9. In the bottom right of the QFIL window, change the **Storage Type** to **ufs**.
10. Click the Configuration tab and check the box next to Reset After Download.



11. In the QFIL main menu, click Download to begin loading the packages onto the device.
12. After download is successful, the unit should power cycle automatically.
 - a. After 1 minute or so, the device should enumerate in the **Device Manager** tool as **Gemini** (under **Universal Serial Bus devices**), and the power LED should be blue.
 - i. If the device does not enumerate as **Gemini** press the capture button for 5 second. This should reboot the device and prompt it to communicate with your computer.
13. If all of the above worked, your device should show up in adb if you run the `adb devices` command:

```
PS C:\Users\mthot> adb devices
List of devices attached
61b3ef44    device
```

Firmware Update (**no longer needed in images newer than 07/17**)

If the `adb devices` command displays your device correctly, you are ready to update the MCU FW with following commands:

1. `adb root`

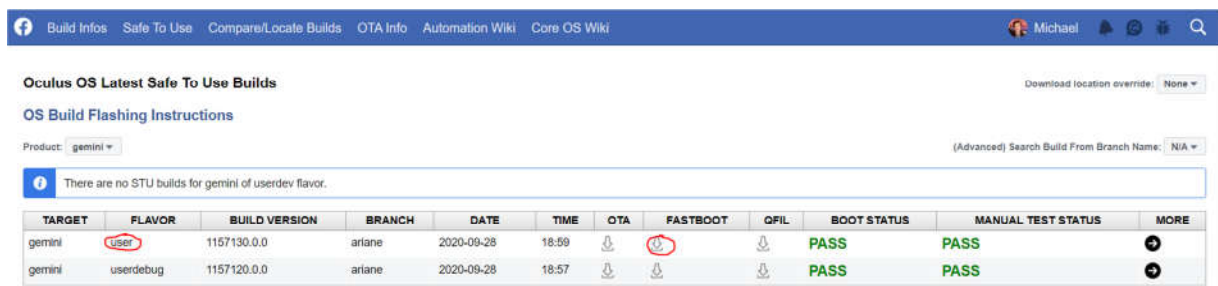
2. `adb shell "sh /etc/update_firmware.sh"`
3. when the update is finished reboot device using: `adb reboot`

STU (Safe to Use) Fastboot/Baseline Builds

↪ You can download STU builds at

www.geminil.com/arianestu.

First, simply download a package marked as **Fastboot**:



TARGET	FLAVOR	BUILD VERSION	BRANCH	DATE	TIME	OTA	FASTBOOT	QFIL	BOOT STATUS	MANUAL TEST STATUS	MORE
geminil	user	1157130.0.0	ariane	2020-09-28	18:59	⬇	⚙	⬇	PASS	PASS	⋮
geminil	userdebug	1157120.0.0	ariane	2020-09-28	18:57	⬇	⬇	⬇	PASS	PASS	⋮

If you have downloaded the correct package, it will contain “fastboot” in its name. Extract the package, It will contain a python file named **flash_all.py**.

Ensure that your device is plugged into and recognized by your computer.

Open a command prompt or powershell terminal. Navigate to the build’s folder in your terminal. If you are changing build flavors (i.e., from userdebug to user) you will need to run the command with the flag -w (e.g., `python flash_all.py -w`). Otherwise, run the command `python flash_all.py` to flash the OS build to your device.

FCC Regulations:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiated radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the

equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC RF Exposure Information (SAR)

This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the United States.

During SAR testing, this device is set to transmit at its highest certified power level in all tested frequency bands, and placed in positions that simulate RF exposure in usage near the body. Although the SAR is determined at the highest certified power level, the actual SAR level of the while operating can be well below the maximum value. This is because the device is designed to operate at multiple power levels so as to use only the power required to reach the network. In general, the closer you are to a wireless base station antenna, the lower the power output.

The exposure standard for wireless employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit set by the FCC is 1.6W/kg.

The FCC has granted an Equipment Authorization for this model device with all reported SAR levels evaluated as in compliance with the FCC RF exposure guidelines.

For this device, the highest reported SAR value for usage near the head is 1.13 W/kg.

While there may be differences between the SAR levels of various devices and at various positions, they all meet the government requirement.