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SAP-AN0010 GigE Vision Camera Automatic Firmware Update with Sapera LT

How to Automatically Update GigE Camera Firmware

Sapera LT's Sapera GigE Server supports automatic firmware update for the Teledyne DALSA Genie TS, Genie Nano and Linea GigE camera families.

Overview

To ensure that machine vision systems use client specific certified firmware versions, Teledyne DALSA provides software mechanisms to verify current device firmware and perform updates to the expected firmware versions as required. This guarantees that system configurations use the certified firmware for specific applications or when devices are replaced.

The automatic firmware update process can be performed at:

- **System level** by the Sapera GigE Server (part of the Sapera LT Network Imaging Package)
- **User-application level** using Sapera LT API

Firmware can also be updated manually using the Sapera LT CamExpert tool.

Prerequisites for Automatic Firmware Update (System-level)

The following table lists the required software to support automatic firmware updates.

Software SDK	Supported Device Families
Sapera LT 8.40 or higher	Genie Nano
Sapera LT 8.41 or higher	Genie TS and Linea

Sapera LT SDK (full version), the image acquisition and control software development kit (SDK) for Teledyne DALSA cameras is available for download from the Teledyne DALSA website:

http://teledynedalsa.com/imaging/support/downloads/sdks/

If the required version is not available, contact your Teledyne DALSA representative.

Sapera LT includes the CamExpert application, which provides a graphical user interface to access camera features for configuration and setup.

The latest firmware files for all Genie Nano camera models are available on the Teledyne DALSA support web site:
http://www.teledynedalsa.com/imaging/support/downloads/firmware/

Refer to the Release Notes for supported cameras by firmware.

Automatic Firmware Update (System-level)

The automatic firmware update process applies to GigE devices only.

The Sapera Gige Server automatic firmware update mechanism is run when a Teledyne DALSA GigE camera is discovered. The update process is as follows:

1. A Teledyne DALSA GigE camera is discovered on the network.
2. Sapera GigE Server queries the camera's firmware and compares it to any compatible firmware file for that model found in the designated firmware folder (specific firmware is chosen by the user; by default this directory is empty).
3. If compatible firmware differs, the camera firmware is automatically updated with the firmware file on the host. Firmware updates can be to newer or older versions, as required.
4. When the camera firmware update is completed successfully, the camera reboots, the discovery process is performed again (without firmware update since the versions on the camera and the host are now identical) and the camera becomes available.

Firmware File Naming Convention

A single firmware file can support multiple camera models that use different sensors from the same sensor family.

Camera firmware files use the *.cbf* file extension. Firmware files are updated according to the Firmware ID and Firmware Version number:

`Genie_Nano_OnSemi_Python_0.3M-0.5M-1.3M-2M-5M_Bayer_STD_Firmware_6CA18.xx.cbf`

where

`Sensor Manufacturer_Sensor Family_Supported Sensors_Firmware Design_Firmware ID.xx.cbf`

The Firmware ID is associated with the group of supported sensors, with different Firmware IDs for monochrome, color or other types of sensors.

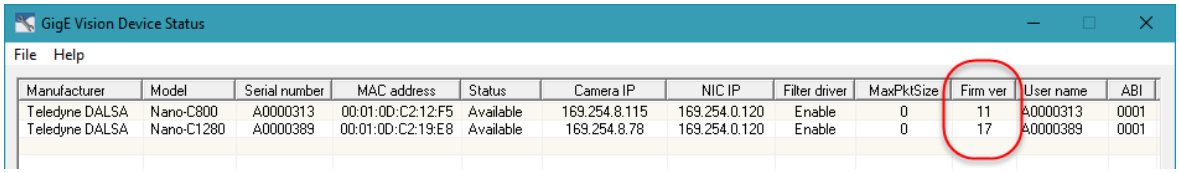
The Firmware Design identifies the feature set, such as:

Firmware Design	Feature Set
Bayer_STD_Firmware	Outputs RAW Bayer data with TurboDrive Feature
RGB_Output_Firmware	In-camera Bayer to RGB convertion with Color correction
Laser_Profiler_Firmware	Special processing of 3D data
Mono_STD_Firmware	Outputs mono data with TurboDrive Feature
Mono_High-Speed_Firmware	Changes sensor timing configuration to increase frames per second (FPS)

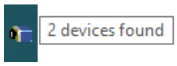
For example, color sensors with the same Firmware ID (for example, 6CA18) can support multiple Firmware Design (for example, Bayer_STD_Firmware or RGB_Output_Firmware).

Refer to the camera documentation for more information on available firmware designs.

The GigE Vision Device Status tool displays the current firmware version for discovered cameras:



The GigE Vision Device Status tool is available from the system tray icon:



Automatic Firmware Update Directory

To automatically update specific GigE cameras, the required firmware must reside in the following directory:

```
<installation directory>\Teledyne DALSA\Network Interface\Firmware
```

By default, this folder resides in the Program Files directory and is empty; to enable automatic firmware updates the specific firmware selected by the user must be placed in this directory. If no firmware is in the directory automatic updates are not performed.

All cameras discovered on the network that support firmware found in the Firmware directory will be updated, if required.

	Note: The firmware directory must only contain one firmware file per Firmware ID; multiple files for the same Firmware ID are not supported. In addition, the firmware filename must not be modified.

Automatic Firmware Update Process

Only the Firmware ID and Firmware Version are considered when checking the designated folder on the host.

For example, for the following camera and host firmware, camera firmware is not updated since the Firmware IDs do not match:

Current Camera Firmware	Genie_Nano_OnSemi_Python_16M-25M_Mono_STD_Firmware_**CCA18.21**.cbf	Firmware Update: **NO**
Firmware in Host update folder	Genie_Nano_OnSemi_Python_16M-25M_Bayer_STD_Firmware_**DCA18.21**.cbf	

Note, the Firmware Type is **NOT** considered.

For example, for the following camera and host firmware:

Current Camera Firmware	Genie_Nano_OnSemi_Python_0.3M-0.5M-1.3M-2M-5M_**Bayer_STD_Firmware_**6CA18.54.cbf	Firmware Update: **YES**
Firmware in Host update folder	Genie_Nano_OnSemi_Python_0.3M-0.5M-1.3M-2M-5M_**RGB_Output_Firmware_**6CA18.16.cbf	

Sapera GigE Server updates the camera with the RGB output firmware since the Firmware ID matches and the versions differ, regardless of the Firmware Type since it is not considered.

The following example results in no firmware update since the Firmware ID and Version are identical, regardless of the Firmware Type:

Current Camera Firmware	Genie_Nano_OnSemi_Python_16M-25M_**Mono_STD_Firmware_CCA18.21**.cbf	Firmware Update: **NO**
Firmware in Host update folder	Genie_Nano_OnSemi_Python_16M-25M_**Mono_HS_Firmware_CCA18.21**.cbf	

This allows different Firmware Design (for example, Bayer_STD_Firmware/ RGB_Output_Firmware or Laser_Profiler_Firmware/Mono_STD_Firmware) to be upgraded if the Firmware ID matches, but version numbers differ.

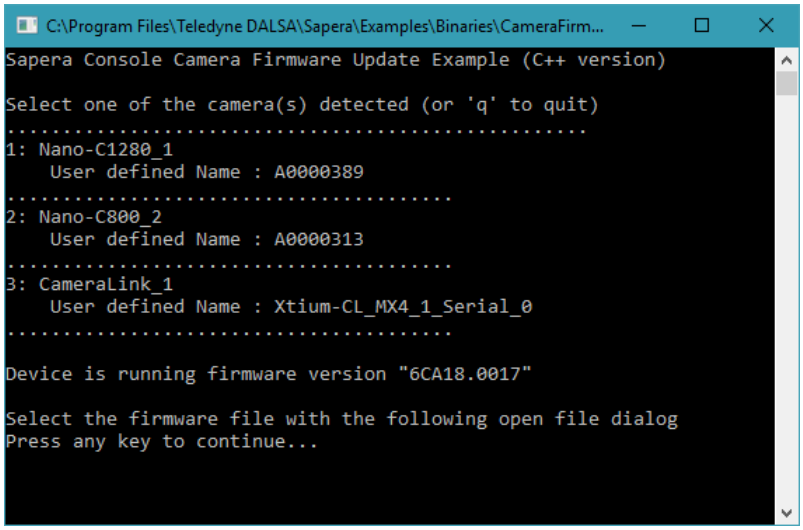
If this update behavior is not wanted, the Sapera LT API can program updates for the required result; refer to following Automatic Firmware Update at User-Application Level section.

Automatic Firmware Update at User-Application Level

The Sapera LT SDK installation includes the CameraFirmwareUpdate example program, with complete source code, that demonstrates how to perform camera firmware updates at the user-application level using the Sapera LT API.

Sapera LT can update GenCP-compliant CL, CLHS, CXP and GigE Vision cameras that support Genicam file access for firmware update.

The *CameraFirmwareUpdate* example is distributed as a compiled binary program, and as Microsoft Visual Studio 2010/12/15/17 solutions, for both C++ and .NET, with complete source code.



File access functions are part of the SapAcqDevice class and include:

- *SapAcqDevice::IsFileAccessAvailable*
- *SapAcqDevice::GetFileCount*
- *SapAcqDevice::GetFileNameByIndex*
- *SapAcqDevice::WriteFile*

Relevant GenICam features for integrating firmware updates in an application include:

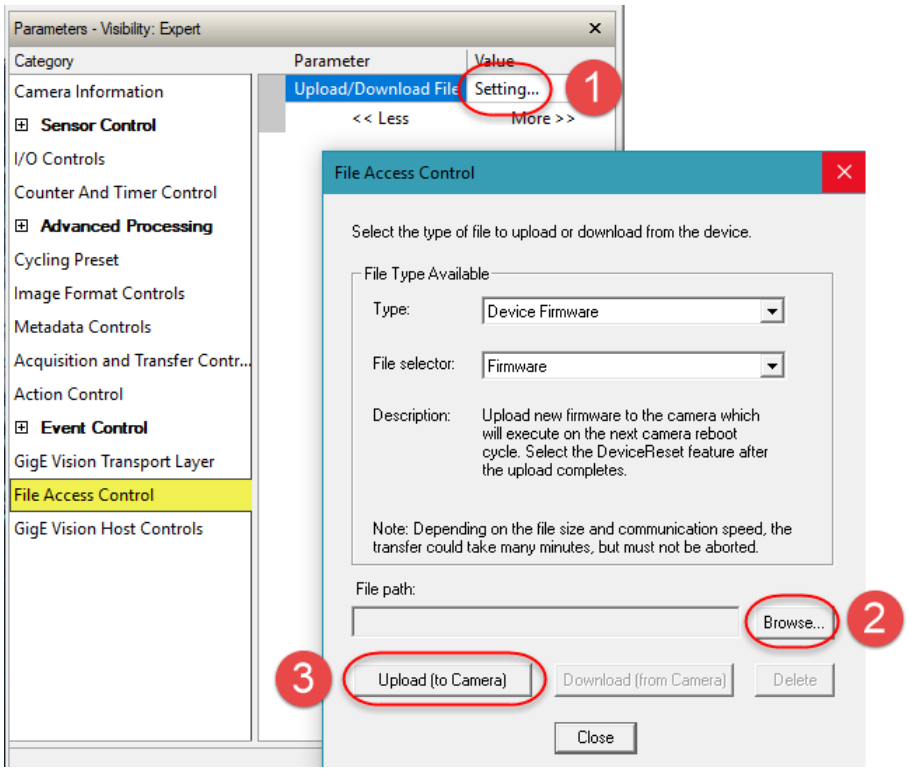
- *DeviceFirmwareVersion*
- *DeviceManufactureInfo*
- *DeviceVersion*

Manually Updating Camera Firmware

The Sapera LT CamExpert tool can manually update camera firmware using the features available in the **File Access Control** category.

To manually update camera firmware using CamExpert:

1. In the File Access Control category, click **Setting** in the Upload/Download File parameter; this opens the File Access Control dialog.
2. Click **Browse...** and select the required firmware file.
3. Click **Upload (to Camera)**.



When the firmware file upload to the camera has successfully completed, a message box is display allowing you to choose to reset the camera now or later. A reset is required to activate the new firmware.