Software Installation and Ethernet Settings

Shad-o-Box HS

1. Operating Systems Support

The current released GigE Vision framework supports up to Windows 7.

For Windows 8.0 a Beta framework is available.
Windows 8.1 is currently not supported.

For Linux the Teledyne DALSA GigE Vision Application Programmers Interface (API) for Linux is available.

For Windows 8 and Linux support please contact our support team for the software and the latest status.

2. Obtain software

2.1 Website

Visit the Shad-o-Box HS product page to download the latest documentation and software for your specific operating system:

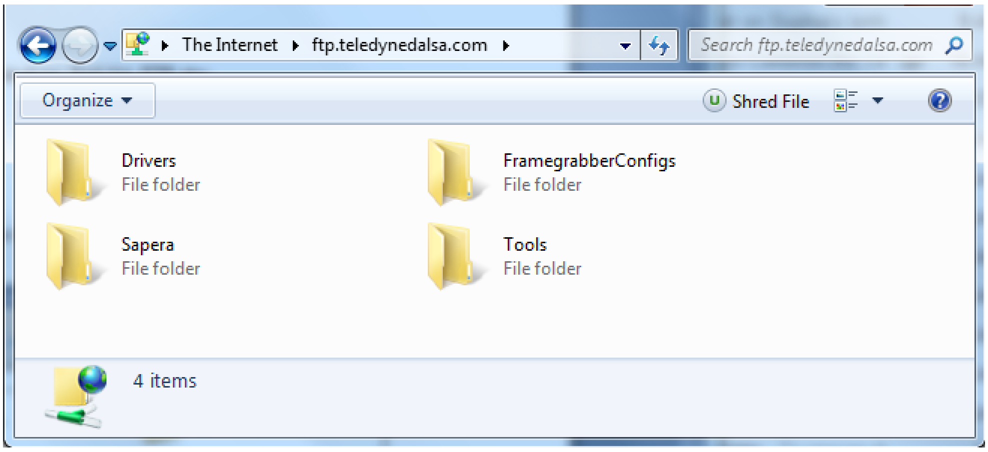
http://www.teledynedalsa.com/imaging/products/x-ray/dynamic-flat/shad-o-box-hs/

2.2 FTP-server

The software required for the Rad-icon detector is available at the following ftp-server:

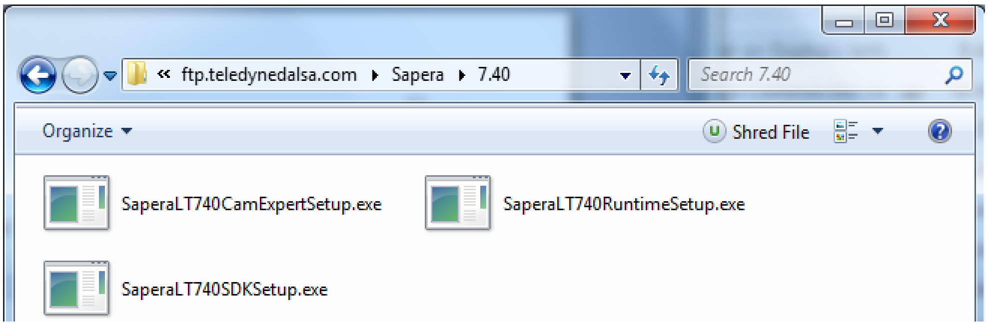
ftp.teledynedalsa.com
username: xineosuser
password: xray03

If you log in correctly you should see the following:



2.3 Sapera LT and CamExpert Installation

Open the *Sapera* folder, and then open the folder with the latest version (e.g. *7.40*):



If you are evaluating the Product, you should download and run the installation file "SaperaLT7xxCamExpertSetup.exe". This will install a free copy of CamExpert.

If you are evaluating and developing your own software for the Product you should download "SaperaLT7xxSDKSetup.exe". This will install a 60-day evaluation copy of the Sapera LT SDK, including CamExpert. Purchase of a license is required to continue using the Sapera LT SDK beyond the 60-day free trial period.

CamExpert is evaluation software. The Sapera SDK is a set of development tools and documentation for creating your own software for interfacing to the product. Please download the appropriate materials and follow the instructions that are part of that download.

2.4 GigE Vision framework for Sapera LT installation

Download and install the latest GigE Vision driver located in the *Drivers* folder. The GigE Vision framework installs the GigE Vision Module for Sapera and includes the Network Imaging package which is required to access a GigE Vision detector.

Please refer to the "GigE Vision Module for Sapera" user manual and "Network Imaging Module for Sapera LT" user manual which are included in the installation.

3. Optimizing Settings

3.1 Packet Size

For a good Gigabit Ethernet connection with minimal packet resend conditions, host computer performance can generally be improved by increasing the data packet size. Each streaming video packet causes an interrupt in the host computer. Therefore increasing the packet size reduces the CPU overhead required to handle video data from the GigE Vision detectors.

A standard packet can have a size up to 1500 bytes. Many network cards support a jumbo packet mode that can extend that size up to 16Kbytes. In theory, a packet could be as large as 16 KB, but the CRC (cycle redundancy check) containing the checksum of each packet is not as efficient when the packet size grows larger than 9000 bytes. For this reason **we advise to set the packet size to 9014 bytes** (jumbo packet enabled).

3.2 Interrupt Moderation

Normally, each time a packet is received by the network card, the associated driver will receive an interrupt. Obviously, when the packet rate is very high (that is, at high transfer rate which is common for GigE Vision systems), this represents significant overhead. Most network cards have introduced an interrupt moderation mode where the card waits to have received a certain number of packets over a maximum period of time before issuing the interrupt. This helps reduce the burden on the CPU as it can process multiple packets during the same interruption.

The Intel Gigabit CT Network adapter provides a configuration parameter to manually adjust the NIC interrupt moderation rate. By default, the NIC driver sets this to Adaptive where the interrupt rate automatically balances packet transmission interrupts and host CPU performance. In most cases no manual optimization of the Interrupt Moderation Rate parameter is required.

In some conditions, video frames from the GigE Vision detector may be transferred to the host display or memory buffer as data bursts instead of a smooth continuous stream. The NIC may be over-moderating acquisition interrupts to avoid over-loading the host CPU with interrupts. If priority is required for acquisition transfers (i.e. a more real-time system response to the detector transfer) then the moderation rate should be reduced by manually adjusting the NIC parameter.

In the end, this is a compromise:

1. Enable interrupt moderation to minimize CPU usage, at the expense of a slight increase in latency (**recommended**).

2. Disable interrupt moderation to favor responsiveness of real-time system with a drawback in CPU usage.

In most situations, extra latency introduced by interrupt moderation is very low and thus the gain on CPU performance becomes more beneficial.

3.3 Receive Buffers

Under certain conditions, the host PC system CPU may be busy with tasks other than the imaging application. Incoming image packets remain in the PC memory allocated to store packets instead of immediately being copied into the image buffer. By increasing the number of NIC (network interface card) receive buffers, more incoming image packets can be stored by the NIC before it must start discarding them. This provides more time for the PC to switch tasks and move image packets to the image buffer.

Not all network boards allow increases to their receive buffer count. Among those that do, different versions will have different maximum receive descriptor values.

We recommend **increasing the receive buffer size to the maximum permitted** by the network card, in order to provide more buffering capacity when needed.

3.4 Flow Control

The GigE Vision standard defines an inter-packet delay that can be used to manage flow control (i.e. the speed at which stream packet can be output to the network). This is useful when connecting multiple detectors to the same port of the network card, or when the network card/Ethernet switch (if used) is simply too slow to process those packets. A careful selection of equipment will ensure that the network equipment is fast enough to handle data transmitted to the wire-speed of 1 Gigabit per second. Therefore, inter-packet delay is typically only used when multiple detectors are connected to the same port of the network card, through an Ethernet switch.

It is important to consider that inter-packet delay inserts a minimum delay between image packets to spread packet transmission over a longer period of time. This can directly impact system latency as more time than could be necessary is put in between those packets. The best approach for real-time imaging is to dedicate a different network port to each detector. This way, the inter-packet delay can be eliminated in many cases.

Some network equipment also supports the optional IEEE802.3 PAUSE mechanism. This is a low-level handshake to ensure the receiver of the packets is not overwhelmed by the amount of data. It can propagate a pause signal back to the transmitter, asking to momentarily stop the data transmission (with a possible impact on the overall system latency). Again, by combining network equipment that can operate at wire-speed and allocating a different network interface port for each detector in the system, we can ensure these pause requests will not be used.