How to Deal with Frame Loss in GigE Vision Cameras

When using the GigE Vision Interface, a general purpose LAN card (NIC) is often used on the PC side. However, since the NIC card does not have built-in image processing functions, the CPU on host PC performs the processing tasks. As a result, image processing capability depends on the PC's performance. If the PC's performance is not robust enough, frame loss (dropped frames) could occur.

To avoid frame loss, a frame grabber board with dedicated image processing is recommended.

However, in this document, some tips are provided for how to minimize frame loss with a general purpose NIC card.

1. Basic Settings:

Refer to another Technical Note #TN-2016I28-00 "How to use Packet Size and Packet Delay" and apply the basic settings suggested for GigE Vision.

2. Dealing with Frame Loss

While adjusting the packet size and packet delay will help, it probably won't prevent all dropped frames. Here are some tips to deal with any frame loss you might experience:

2.1 In case of multiple NIC cards – Setting the Subnet Mask:

In case of multiple NIC cards installed in one PC, subnet mask must be set appropriately.
If the subnet mask is not appropriate, the following warning will appear:

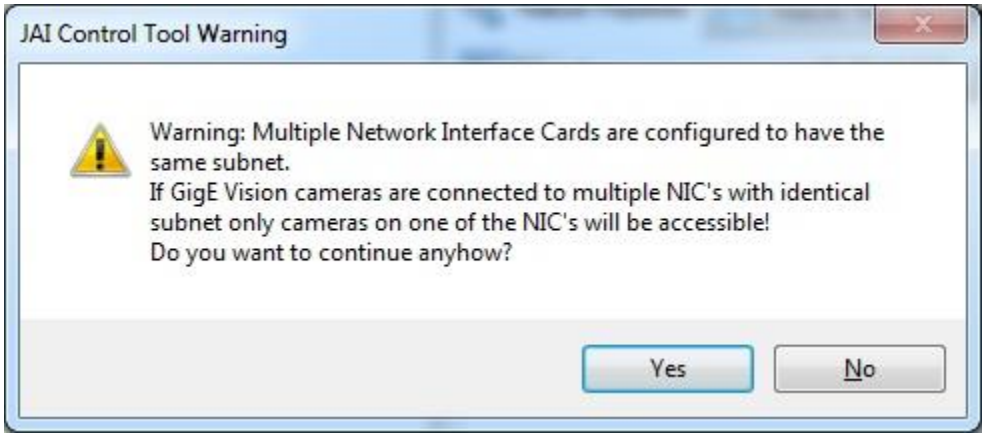

Fig. 1: Warning message in case of inappropriate subnet mask:

In this case, the following subnet masks should be set:
1st card: IP Address 192.168.11.10, subnet mask 255.255.255.0

2nd card: IP Address 192.168.12.10, subnet mask 255.255.255.0
3rd card: IP Address 192.168.13.10, subnet mask 255.255.255.0

2.2 In case of newly installing a JAI GigE Vision camera onto a system on which another vendor's camera was used - Enable JAI Filter Driver:

When using the JAI SDK, enable (put a check mark onto) "JAI GigE Vision Filter Driver" only and remove/disable other filter drivers.

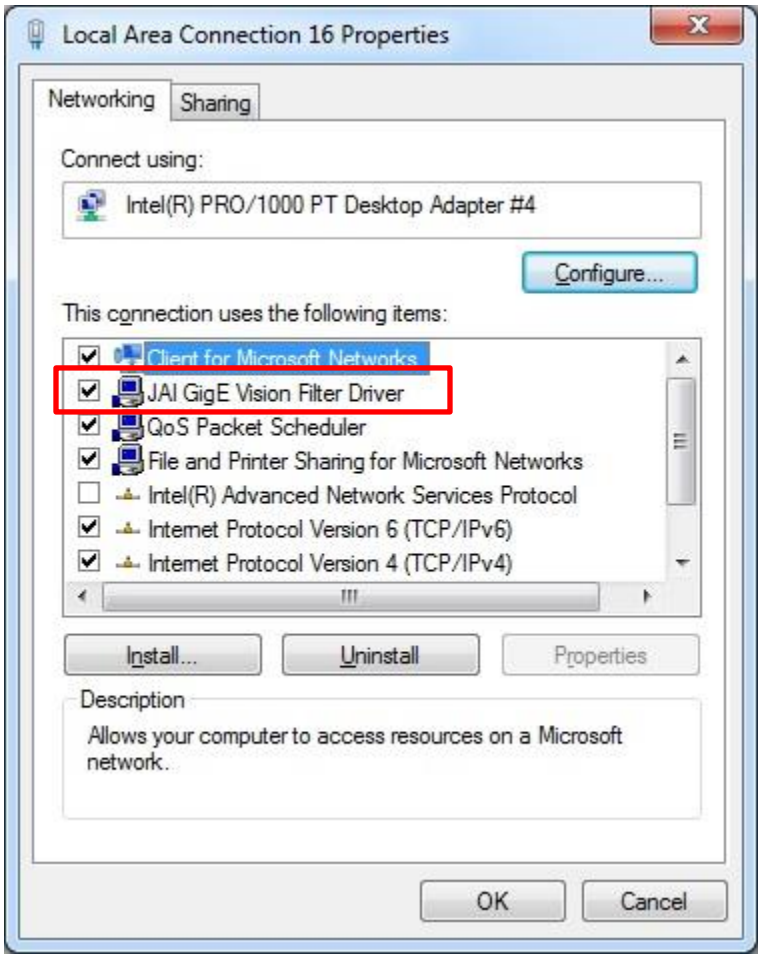

Fig. 2: Filter Driver

2.3 Adapting your settings to PC performance:

Basic settings are typically as follows:

- Receive Buffers: 2048
- Jumbo Packet: 9014
- Interrupt Moderation Rate: Extreme
- Camera Packet Size: 8000

However, these basic settings can be adjusted to work better with the PC's specific performance capabilities.

Receive Buffers: Basically, larger buffers can receive more packets without taxing the driver's capability. On the other hand, more memory resources are required; i.e, number of receiving buffers x buffer size = memory allocation. Therefore, if memory resources are small, reducing the receiving buffers to 1024 or 512 would be appropriate.

Jumbo Packets: In data transfer, one frame image is divided into multiple packets. If the packet size is small, the number of packets becomes greater and the frequency of CPU interrupts becomes high. To decrease the interrupt frequency, the packet size should be large. Jumbo packets are an effective way to achieve this. As a result, the CPU load becomes lower and the likelihood of dropped frames goes down.

Interrupt Moderation Rate: This setting determines the priority of handling data received from the camera. If the priority is low, data handling of images might be postponed by other host tasks and frame loss could occur. Therefore, the maximum moderation rate is recommended in most cases. However, if CPU performance is extremely high, the interrupt moderation priority can be reduced or even turned off. Furthermore, in some cases, when packet size is set to be small, a high interrupt moderation rate can actually make the total performance worse. In this case, a lower interrupt moderation rate can help make the total performance higher.

2.4 Other settings:

Here are some other tips to reduce frame loss:

2.4.1 Update drivers on the PC to the latest ones. Software tools such as Driver Booster, for example, are available for free and can update all drivers in one click.

2.4.2 Disable all anti-virus software.

2.4.3 Check the load on hard disk by opening the Task Manager and clicking on the Resource Monitor button.

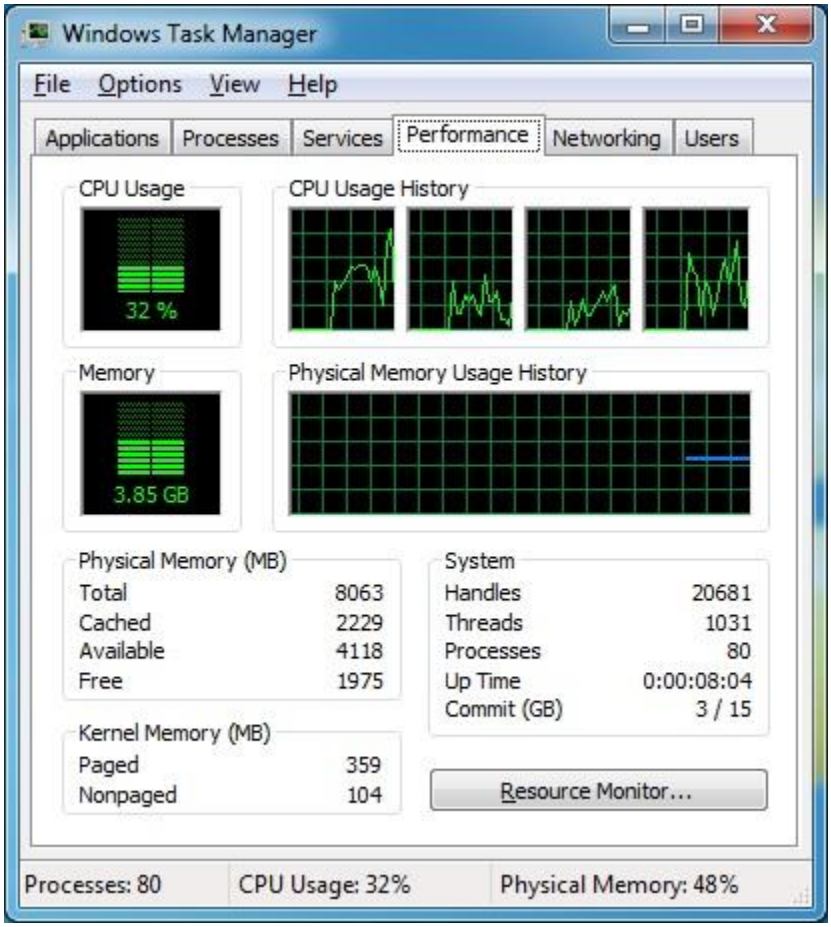

Fig. 3: Task Manager

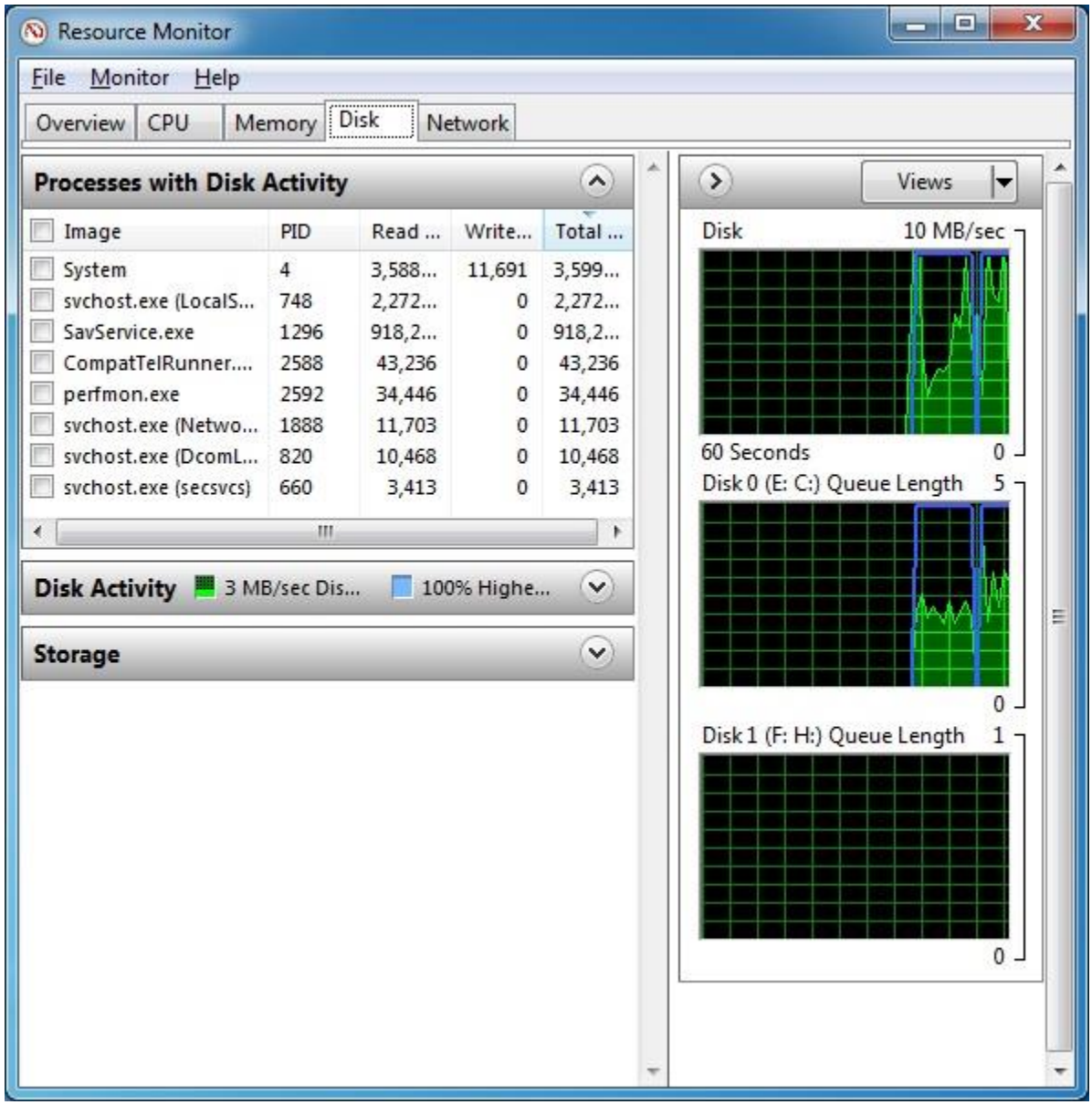

Fig. 4: Resource Monitor

If the load on the hard disk is high, background programs/processes are likely affecting the whole system's performance. In this case, find the particular program(s)/process(es) with high read/write activity and stop them. Then, try capturing images with the camera.

End.