

GPU-enabled **GPURconServer**, a quick installation guide

The Graphics Processing Unit (GPU) accelerated reconstruction is available as **GPURconServer** from version 1.6.5.0 (beta release).

How to install:

Simply download and copy all files into the folder where **NRecon** is located. **GPURconServer** is supplied together with a few DLL's which should stay in the same folder as the executable itself.

The **GPURconServer** requires CUDA-enabled NVidia GPU's. You can find a recent list of these GPU's on NVidia website <http://www.nvidia.com/>. A number of these GPU's has been tested at SkyScan and we can advise you for suitable models. If you intend to upgrade your computer for fastest reconstruction by more powerful graphic card with two GPUs (like GTX590), check with computer producer that capacity of power supply is enough for such graphical card and that your power supply unit has compatible power connectors (dual-GPU card requires two special 8-way power connectors). Single GPU graphical cards (like GTX580) can be installed in most computers in proper slot with enough space around for graphical card. If connectors and space allow, two (identical) graphical cards can be installed in your PC.

The current version **GPURconServer** makes use of all CUDA-enabled graphical cards found on the PC, if a license for GPU-cluster is available (otherwise maximum 2 cards). However, it is not suitable to use if the GPU devices have different computation power. If you do have different GPU devices on one PC, it is advisable to remove the less powerful devices from the list in **GPURconServer**. You do not have to remove the device physically.

Before running **GPURconServer**, it is advisable to update your GPU driver. A not up-to-date GPU driver may cause program failure: unable to find a proper device or the program simply cannot be started.

To allow the program to function correctly, you need to disable the automatic time-out of the display device by modifying the registry. This can be done by double-clicking on the supplied program **gpu_reg.reg** and allows it to perform the modification in the registry of your computer (this step creates a new entry (TdrLevel) with value 0 at registry section

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\GraphicsDrivers). You might need to restart your computer. If this time-out is not disabled, you can experience black screens and failures during some reconstructions.

How to use:

This server works in the same way as the CPU version **NReconServer**: it has a local version and a cluster version. However, the GPU server is only provided in 64-bit. The usage of this server is thus straightforward for users who are already familiar with **NRecon/NReconServer**.

GPUReconServer makes use of GPU to accelerate the core part of reconstruction. Although it is the GPU counterpart of SkyScan's **NReconServer** on CPU, very small image differences do exist between the CPU and GPU version. The differences come mainly from 2 sources: **NReconServer** does the convolution in space domain, while GPU does the convolution in Fourier frequency space; **NReconServer** has slight approximation to accelerate back-projection, while **GPUReconServer** does exact back-projection. Mainly due to this reason, the **GPUReconServer** and **NReconServer** should not be mixed in a cluster configuration: if this does happen, only the GPU server will be used.

For ease of comparison, it is possible to run **GPUReconServer**, **NReconServer** or **InstaReconServer** on the same PC by using different communication port, but they can not be connected simultaneously. You can switch between the different server types via menu "Options->Network configuration ...", as shown in the "server configuration" window below. By selecting a server type (in the example, the GPUReconServer is selected), the given port (3 in the example) is used by NRecon to connect to the server. You can change the port numbers here using button "Modify" after having highlighted the line. It is important to make sure that the servers are running and listening at the correct port. Using the example below, the GPUReconServer should be running at port 3, the InstaRecon server should be running at port 2, while the normal NReconServer should be running at port 1. If this is the case and all servers are running, then you can easily switch between the CPU server and GPU server (or InstaRecon server) by selecting the current server type in the "server configuration" window.

Server configuration

NRecon(local) server: the one and only one local server

GPUReconServer

| Server | On/Off | Port(NR) | Port(IR) | Port(GPU) |
|-----------|--------|----------|----------|-----------|
| SKY-PC016 | ON | 1 | 2 | 3 |

Modify

OK

Cancel