

Frequently Asked Questions

Q: Since Clarity™ Server software runs processing reconstruction subsequent to modality scanning and reconstruction, the OEM image acquisition is not affected. From the testing SCP AB has conducted, it has determined that it is possible to reduce the imaging dose levels by 20%-80% when Clarity™ Server processing is applied. However, never having scanned a particular patient before, how does one know whether you should reduce the scan current by 20% or 80% to get the image quality you want?

A: Starting with a given acquisition protocol SCP AB found that it can create a new protocol that uses a lower tube current while retaining image quality. By how much lower the dose can be lowered depends on the anatomy and the acquisition settings used; such as slice thickness and so forth.

Q: In general, the SCP AB algorithms based on non-linear filtering; such as edge enhancement, adaptive noise filtering, and so on? In the SCP AB PowerPoint hand-out what is meant by "tissue adaptation; provides tissue-specific processing" and "scale adaptation; structures are treated according to size"

A: Yes, our processing is based on non-linear filtering that adapts itself to a number of data characteristics:

- "Tissue adaptation" implies that the processing automatically takes different pre-defined characteristics depending on the type of tissue that is determined locally.
- "Scale adaptation" on the other hand refers to an adaptation to the spatial size of structures in the neighboring area of each pixel. The relevant spatial size is determined by scale space analysis.

Q: The SCP AB website discusses Clarity™ Server software improvements in scanning for lung tumors. Have you worked on head images, and if so, do you see improvements there as well?

A: We have used our software on head images as well; unfortunately, the amount of possible dose reduction is typically lower for the head - in the range of 20-30%. For lung tissue, on the other hand we were able to lower the dose by as much as 80%.

Q: The SCP AB website states how Clarity™ Server software improves spatial resolution for low dose images. Spatial resolution does not change with dose by itself. Therefore, what is meant by that statement, i.e. are you talking about noise obscuring the contrast for small objects?

A: Correct, spatial resolution does not change with our processing. What is implied is that the visibility of small spatial structures is increased which results in a perceived increase of resolution.

Q: Most scanners now offer dose reduction by tube current modulation, selection of appropriate hardware filters and adaptive filtering during reconstruction. CT manufacturers have claimed up to 60 percent dose reduction with these features. What impact does Clarity™ Server software have on these images?

A: By non-linear analysis of spatial neighborhoods, relevant structures can be separated from the embedding noise, which can always be used to increase image quality regardless of other acquisition parameters. Hence, our software can be seen as a complement to the methods you mentioned.



Q: How does SCP AB integrate Clarity™ Server software with existing systems for dose reduction purpose?

A: At the moment, Clarity™ Server provides two means by which to integrate our its processing:

- a. A DICOM server that receives DICOM data over the network chooses the appropriate processing settings based on the header and sends the processed (and original if desired) data via the DICOM network to a specified destination and,
- b. An image processing library written for Microsoft Windows XP running on a PIV, currently we have a C and C++ interface.

SCP AB is planning to implement an FPGA version of Clarity™ Server technology.

Q: As a refurbishing provider of medical devices, how do we consider integrating the Clarity™ Server technology platform with OEM modalities?

A: Clarity™ Serve Technology Platform, in this case, acts as a black box, server solution. There is no need for programming and any configuration needed for the device is managed in the same manner you currently do when installing a scanner.

Q: SCP AB claims that PACS, Systems Integrators and refurbishing providers will access more post processing capabilities by routing acquired image data through Clarity™ Server solution and that, the solution is more powerful and provides more information in terms of 2D and more detail for volumetric rendering images. Is it not true the OEM's possess their own acquisition and processing tools that they offer at this point and have good acceptability in the market?

A: SCP AB is an independent advanced imaging processing software company developing and marketing highly specific and flexible technology platform. Based on current market data, none of the CT vendors have added image post-processing technology allowing for the lowering of the dose for image acquisition; with the exception of Toshiba - to a limited extent. SCP AB speculates that most likely, medical modality OEM vendors offer similar capabilities in the future; however, will only be available for their latest models and will be difficult [if not impossible] to request retrofits for earlier device generations.

Q: What about software packages delivered by the OEM or refurbishing providers; as an example, a customer has not purchased a BMD package with their 40-slice CT scanner? Is it possible that customer can do a BMD with Clarity™ Server platform offering?

A: Clarity™ Server platform provides enhanced image capability and superior quality; any other add-on packages will need to be installed on the workstation.

As a Systems Integrator, Refurbishing, or PACS provider, I understand that there will be some modifications needed to the acquisition setting at the medical device scanners/workstation at the CT scanner. Discussing with our clients, we will inform them that we will need to set the protocols for specific application as well. The message will be that with Clarity™ Server technology, the customer will receive better image quality with optimal/minimal dose. Based on this statement, please answer the following questions:

Q: How do we both approach and prove to the customer that Clarity™ Server technology processing will reduce the overall dose exposure to the patient?

A: SCP AB will provide you with marketing material including clinical results from tests conducted at our installations throughout the world, including a list of current reference sites.

Q: Defining protocols is [in itself] an important clinical subject for CT modality and every OEM possesses their own application specialist. Therefore, how do providers of services present that what we are delivering is superior?

A: As a refurbishing provider, when you sell a refurbished CT, you are responsible for setting up the protocols, correct. Simply, modify some protocols, or add a few more, that use lower dose (i.e. adjust the mAs value) and configure our processing to match these protocols. Clarity™ Server is not a replacement, rather a complement that yields an improved quality/dose ratio.

Q: Is there any reason why a provider of services needs to discuss protocol adjustments to the medical device with the OEM prior to incorporating Clarity™ Server at the customer's site?

A: From purely a technical point of view, SCP AB feels there is no need to discuss this with the OEM; the customer is ultimately imposing its medical rules and practice towards the manner in which they acquire images.

Q: As a provider of services, we use a DICOM platform for the purpose of acquiring images from the system host. With the introduction of Clarity™ Server, the customer will experience better image quality at the workstation; however, the image quality at the system host workstation (connected to the CT scanner) will present a poor quality image due to the lower dose protocol, is it correct?

A: Yes; however, usually the data on the host computer is only viewed by a technician to make sure the examination has been carried out correctly. Diagnostic evaluation/determination typically performed at a separate workstation – the diagnostic workstation can be in close proximity to the scanner.

Q: If we as providers of services to our users of medical devices state that, our method [utilizing Clarity™ Server] is better than only using the OEM's image processing, our customers will definitely ask why don't the OEMs provide such a type of alternative for reducing dose for their image quality? Under these circumstances, is there not always a possibility that there will be a conflict between OEMs and us?

A: As stated above the OEMs are probably working on similar processing; however, they may not have realized the potential so far and have been focusing on hardware improvements instead. Again, this is more of a marketing issue. We state that our software for image enhancement in CT is so far superior to all other manufactures.

Q: As a refurbishing provider, let us take the following example; we utilize Clarity™ Server and something happens to go wrong with the X-ray tube and the OEM claims that because of utilizing lower dose protocols the tube or detector failed. How do we represent ourselves under these conditions?

A: First, lowering the dose is less demanding on the hardware; tubes/detectors. Secondly, any responsible clinician must acknowledge every protocol in any case. Lastly, you as the service provider, already set up the scanner with many different protocols, this should be any different.

Q: As a service provider utilizing Clarity™ Server, how do we reduce the dosages for image acquisition? Is this accomplished by simply altering the route of the data path? Will this be done by working with each of the protocols configured at the workstation of the CT scanner

system; which controls the X-ray generation in gantry?

A: Yes, you will need to modify the acquisition settings at the CT scanner system console. It is only that you will be able to access more post-processing capabilities by routing the acquired image data through Clarity™ Server platform. The acquisition has to be matched to the processing settings in order to get best results and, by combining lower dose acquisitions with post-processing; you will end up with a complete low-dose system.

Q: Which models or medical modalities has SCP AB tested Clarity™ Server processing? Has Clarity™ Server been tested on Multislice CTs?

A: We have used Clarity™ Server processing on CT scanners from GE, Siemens, Toshiba and Philips with examples ranging from (2) to (64) slice machines.

SCP AB has concentrated on CT modality as its primary modality. However, enhanced image processing has been worked on in a number of CR, DR and Mammography modalities and the results are very promising. SCP AB plans to add more functionality tailored towards MR later this year, '07.

Q: Few of the OEMs use Windows XP. In that case, how can we use Clarity™ Server solution, which is currently Windows XP compatible?

A: If the OEM does not support Windows XP, you will probably need to install Clarity™ Server solution on a separate computer; all communication is via DICOM anyway.

Q: How do service providers integrate Clarity™ Server software with existing system for dose reduction purpose?

A: If you want to integrate Clarity™ Server processing with an existing modality, one will need to install an instance of Clarity™ Server on either, the host computer (assuming Windows XP) or, a separate computer.

Then one configures those acquisition protocols you want to have processed in such a way that the images are sent, or routed, to the Clarity™ Server instead of the normal destination, PACS or Workstation. The Clarity™ Server will be configured to send the processed images to the final destination.

Following this setup, will appear to the end-user, sitting at a Workstation, as if you had added some more processing functionality to the existing system. However, in actuality, all you did was route the data through a different path that included Clarity™ Server post-processing capability.

That is unless you have the possibility to recompile the code of the console application and place a call to our library there.

Q: What benefits do the end-users realize when Clarity™ Server technology platform is utilized?

A:

- Improved image quality (lower noise, more contrast and better defined edges)
- Opportunity to lower the radiation dose while keeping the image quality
- Opportunity to adjust the characteristics of the images to the likes of each clinic
- SCP AB provides the necessary field service personnel with the Clarity™ Tuning Tool allowing you to configure the processing to the specific needs; type of examination etc., at each location (where needed.)

Q: Why is it that the CT manufacturers have not come up with a similar solution to Clarity™ Server solution?

A: Most of the OEMs already have similar enhancement packages and are available as part of an upgrade. However, this is not something the OEMs have singled out as important, they are of the 'hardware' mindset rather than software (heavy iron manufactures); there are dose reduction procedures from GE, Philips, and Siemens

All major CT manufactures will have similar post-processing functionality on their systems in the near future. However, they have not yet fully understood the potential and are notoriously slow to introduce new concepts. SCP AB's team have been working on these issues for four years and thus have a considerable head start; bare in mind that building such a processing scheme is not trivial.

Furthermore SCP AB is providing added advanced functionality to existing installations while the manufacturers will probably only equip their latest machines with such new functionality.

Q: Since the software runs post-reconstruction, the scanning and reconstruction are not affected. From your testing, you have determined a possible 20%-80% dose reduction to give the same image quality (as by not using your software). But, never having scanned a particular patient before, how do you know whether you should reduce the scan current by 20% or 80% to get the image quality you want?

A: Starting with a given acquisition protocol we found that we can create a new protocol that uses a lower tube current while retaining image quality. By how much, the dose can be lowered, depends on the anatomy and the used acquisition settings such as slice thickness and so forth.

Q: Are the algorithms in general based on non-linear filtering, such as edge enhancement, adaptive noise filtering, and so on? In your hand-out, what do you mean by,

- "tissue adaptation; provides tissue-specific processing"
- "scale adaptation; structures are treated according to size"

A: Yes, SCP AB's processing is based on non-linear filtering that adapts itself to a number of data characteristics.

- "Tissue adaptation" implies that the processing automatically takes different pre-defined characteristics depending on the type of tissue that is determined locally.
- "Scale adaptation" on the other hand refers to an adaptation to the spatial size of structures in the neighboring area of each pixel. The relevant spatial size is determined by scale space analysis.

Q: Your website discusses improvements in scanning for lung tumors. Have you worked on head images and if so, do you see improvements there as well?

A: We have used Clarity™ Server technology on head images as well; unfortunately, the amount of possible dose reduction is typically lower for the head - in the range of 20-30%. For lung tissue, on the other hand, we were able to lower the dose by as much as 80%.

Q: Your website states that Clarity™ Server technology improves spatial resolution for low dose images. Spatial resolution does not change with dose by itself. So what is meant by that statement, i.e. are you talking about noise obscuring the contrast for small objects?



A: As you correctly stated, "Spatial resolution does not change with dose by itself", nor does the spatial resolution change with our processing. What is implied is that the visibility of small spatial structures is increased which results in a perceived increase of resolution.

Q: Most scanners now offer dose reduction by tube current modulation, selection of appropriate hardware filters and adaptive filtering during reconstruction. CT manufacturers have claimed up to 60 percent dose reduction with these features. What impact does your software have on these images?

A: By non-linear analysis of spatial neighborhoods, relevant structures can be separated from the embedding noise, which can always be used to increase image quality regardless of other acquisition parameters. Hence, our software is seen as a complement to the methods you stated above.