

GE NUCLEAR MEDICINE NETWORKING



g

GE Medical Systems



BACKGROUND

Computer networking has become an integral part of doing business in today's environment. People need to move data anywhere in their group, department, or organization, in a seamless and transparent fashion. GE Medical Systems is committed to providing connectivity solutions to customers. There are a variety of modality-specific as well as multi-modality offerings to meet these needs.

NUCLEAR NETWORKING - STARLINK

Today many NM equipment manufacturers still have closed, proprietary networks that do not effectively work cross-modality or cross-vendor. GE is no exception on their existing product line. GE was one of the first companies to offer Nuclear Medicine networking and used the tools and protocols available at the time. These protocols worked well within a modality or family of products, but they did not allow for cross-vendor connectivity.

GE's StarLink product is an example of this type of connectivity solution. StarLink is based on Ethernet, the OSI TP4 transport layer, and StarLink commands and data formats. Though unique to GE, numerous third party companies now offer interface boxes and interface software to talk via StarLink. All StarCam computer products can be outfitted via hardware and software to communicate via StarLink. Two versions exist. StarLink version 2 runs on StarPort systems. StarLink version 4 is the latest version of StarLink, and it runs on all IAP systems. In keeping with GE's commitment to the continuum, even our newer products, such as Genie support StarLink for connectivity to our installed base. Naturally we cannot always upgrade

older equipment to run the latest standards. Since this was the case with StarPort, we developed a transparent gateway to allow these older systems to talk with the latest version of connectivity products, hence our StarLink gateway. Though not based on the most prevalent network protocols of today, GE makes available our data format for anyone to interpret, thus allowing third party and customer interfaces to StarLink data.

Interfile is another format for NM which has gained widespread use. It does not specify a network protocol, but it does specify a data format which can be used to exchange data assuming a network protocol or media format is agreed to between two parties. Though eclipsed by DICOM for future applications, Interfile is none the less an important format to some of our customers. As such, we will include Interfile support on Genie.

NUCLEAR NETWORKING - DICOM

The future direction of medical imaging connectivity is clearly to provide open communication systems based on industry standards. Within the diagnostic medical imaging industry, the one open standard is the DICOM (Digital Imaging and Communications In Medicine) standard. GE was an industry leading working through the ACR-NEMA committee to design and get industry concurrence on this standard over three years ago. We recently have been leaders in re-defining how Nuclear Medicine equipment will utilize DICOM.

The DICOM standard is based on the ISO OSI 7-layer model for network systems. It provides for a variety of physical media (Ethernet, FDDI, ATM, etc.) as well as standard network protocols (TCP/IP, OSI). On top of these readily available industry networking standards



are the DICOM Service Classes (commands) and data formats for each type of modality data.

Most of the DICOM standard is modality-independent. However there is one area where the data elements specific to an imaging modality are defined. These data elements collected together form a modality's Information Object Definition (IOD). The IOD specifies exactly how Nuclear Medicine data, for example, will be formatted and transferred between computers on a network. Now that this format is clearly defined and agreed upon, equipment from multiple vendors or even multiple modalities can communicate and exchange data.

As previously stated, the NM DICOM Working Group recently released, balloted, and had accepted an updated NM DICOM Information Object Definition. This new object includes support for multiple dimensioned data, such as multi-frame, multi-detector, and multi-energy data. Now that the new NM IOD is accepted, GE will be quickly implementing DICOM capabilities on its new products. We will also provide gateways or other connectivity paths between StarLink-based products and newer DICOM-based products.

GE Medical Systems Nuclear Medicine will continue to provide leadership products in connectivity. Our newest product, GENIE, is based on a client/server architecture supporting full networking and Internet access capabilities. It can be networked to the vast installed base of StarLink based systems and will integrate well with DICOM based products, including DICOM peripherals, such as printers/filmers, and archives. In some cases these peripherals will be attached to

a specific computer on the network, while in other cases they will site directly on the network themselves and be shared devices. DICOM also specifies archive media, formatting and IOD encoding. The same data format used across the network can be used across a floppy or optical disk.

In the future, your NM acquisition and processing stations will be but a few nodes on a much larger network infrastructure within the clinic, group or hospital. These backbone networks will move patient, order, and report data around as well as image data. Patient demographics and orders will be pre-staged as work lists at the scanner. Images will automatically be merged with diagnostic reports and delivered to the requesting physician as soon as they're ready. These are but a few of the exciting new applications of networking that GE Medical Systems Nuclear Medicine products are poised to deliver.

ROLE OF GEMS INTEGRATED IMAGING SOLUTIONS

GE Medical Systems has recently chartered a new organization to provide DICOM based network peripherals as well as network configuration, installation, monitoring and maintenance services for both LAN and WAN networks. This group is known as Integrated Imaging Solutions (IIS). This organization will be offering DICOM -based filmers, archives, and multi-modality workstations. In addition they can meet your Local Area (LAN) or Wide Area (WAN) connectivity needs via a full line of services from installation to maintenance. They can assess your data throughput needs and size offerings to meet these requirements.



IIS Specialists have been identified in each region to work with customers to understand their connectivity needs and provide solutions to intra- and inter-modality, facility, and organization communications needs.

GE Medical Systems is committed to open systems and the ability to move your diagnostic imaging data anywhere within your department, facility or the world.