

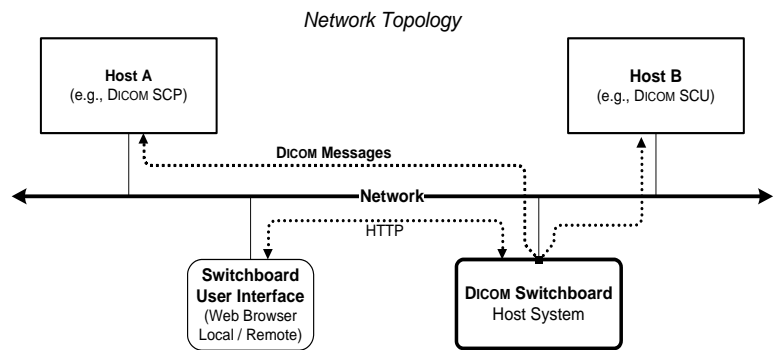
DICOM Message Routing & Dynamic Tag Morphing

Transparently monitor, log, filter, and convert DICOM datasets during DICOM network communications.

Designed primarily for network or PACS administrators, developers, field service engineers, migration specialists, or anyone responsible for integrating DICOM devices, Switchboard facilitates interconnection of otherwise incompatible DICOM devices through rule-based routing and correction of dataset elements in real-time.

When DICOM network devices communicate through Switchboard, it acts as an intermediate node: inspecting, forwarding, filtering, and logging the messages sent by each DICOM Application Entity.

Switchboard performs these functions for all DICOM SOP classes, not just storage.



DICOM Connectivity Problems?

- Frustrated trying to add new DICOM devices to your network?
- Aggravated because you have a DICOM tag that needs to be changed before your PACS will accept the data?
- Irritated that you need to move data from a private DICOM tag to a public DICOM tag so your PACS can accept and use it?
- Discouraged that your modality or PACS won't support compression... and you need it today?
- Under pressure to route certain device data based on hostname or AE-Title?
- Struggling to log or monitor your DICOM connections?
- Exasperated that your network sniffer is dropping packets?
- Overwhelmed by needing to log all the DICOM network traffic, not just yours?

Routing, Filtering, and Monitoring Options:

- Route DICOM Messages and select filter sets based on hostname or AE Titles by using custom mapping rules.
- Alter DICOM message elements in real-time, "fixing" selected DIMSE messages, using configurable filters.
- Interact with non-DICOM systems or perform non-standard alterations using custom filter plugins.
- Record data changes in the Original Attributes Sequence.
- Add, delete, or modify DICOM elements on the fly. Regular expression matching filters select and alter dataset elements in complex ways.
- Look up modifications to apply from a text-based map list.
- Alter the transfer syntax encoding to provide capabilities not supported by one host, e.g., convert a dataset from ELE to JPEG-lossless compression.
- Log all messages by participating in the DICOM association.
- Monitor what you need – just the connection of interest.
- Re-package PDUs into different sizes, if required.
- Configure your log verbosity: association setup, ACSE PDUs, DIMSE reads/writes, PDU contents - summary or a full hexadecimal byte dump - and TCP/IP transactions.
- Display associations and network activity in real-time.

Why choose Switchboard?

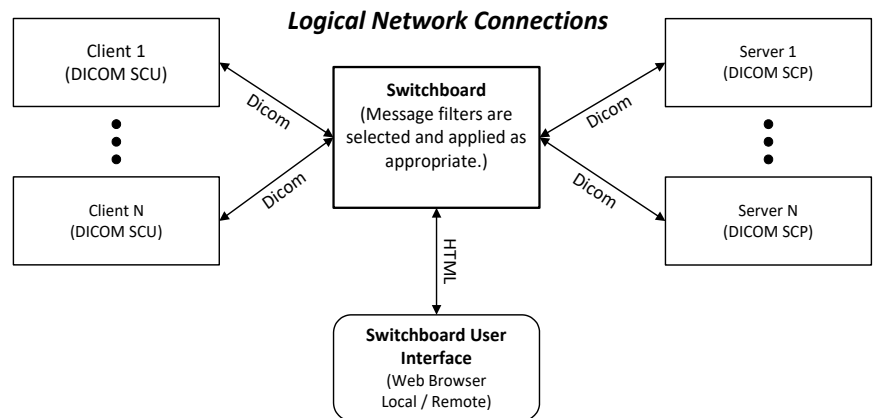
- Selects only transactions of interest
- Flexible filtering choices for all SOP classes
- Dynamic, real-time control
- Supports Dicom compression syntaxes
- Low cost, software-only solution
- Ease of use – convenient web access

Switchboard is an in-line, network-switching device that accepts DICOM associations, then creates a corresponding association to a remote device, the address of which is determined by a set of user-configurable mapping rules based on the host, port, and AE Title of the calling device.

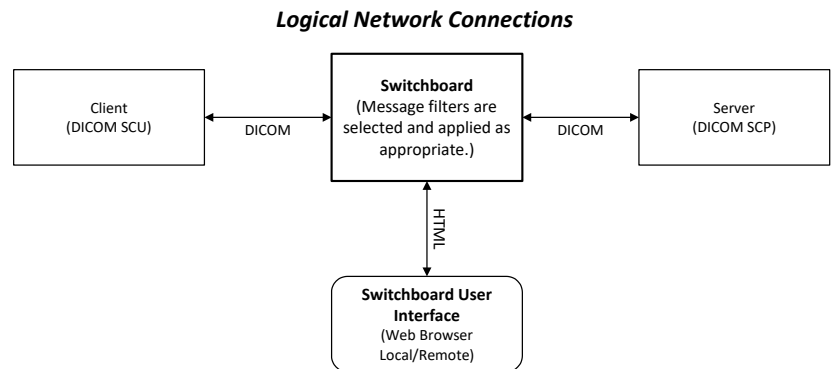
DICOM messages are forwarded bi-directionally between two devices while Switchboard performs optional logging, diagnostic, filtering, and conversion operations. Switchboard handles all DICOM SOP classes, not just storage.

Application Examples:

- **Provide a common interface** – The Switchboard can function similar to an interface engine providing a common interface for a particular DICOM service; all modalities (clients, SCU) connect to a device (server, SCP) via the Switchboard. If a server has to be replaced, serviced, or modified, no modifications to clients are required: only the Switchboard configuration needs to be modified. If a server is replaced, the Switchboard configuration is updated with the new server's identity and subsequent communications from clients are forwarded to the new server, as shown in the illustration to the right.



- **Connect incompatible devices** – The Switchboard may be used to connect two devices that have some incompatibility in their implementation of the DICOM protocol, e.g., certain protocol fields need to have their values provided or altered, see below. The DICOM DIMSE message filtering services in the Switchboard can handle the detection and modification of the appropriate fields without requiring modifications to either the DICOM SCU or SCP (client or server) devices. Once the connection is functioning as desired, the service engineer can leave the Switchboard in place or pursue permanent corrections to the offending device by consulting with the manufacturer.



- **Change transfer syntax** – The Switchboard may be used to alter the encoding (transfer syntax) of messages as they pass from one DICOM system to another. For example, a modality sends the Switchboard implicit-little-endian syntax (ILE) and the Switchboard forwards messages to a remote archive using one of the various DICOM JPEG compression transfer syntaxes.

- **Clean data during migration** – The Switchboard may be used as a supplementary tool to assist in the migration of DICOM data from one archive to another. It is provided as an integrated component feature in our Exodus™ migration controller application or it may be used as a standalone application to support other similar needs. Logically, Switchboard is placed between the source and destination devices and provides the ability to apply user-defined filters to DICOM data sets as they are being moved. Data set elements may be altered in real-time, for instance, tags may be added to the datasets (e.g., the Contributing Equipment Sequence could be set to record the original source archive for a data set), tags may have their values dynamically modified, or unneeded tags may be removed. Switchboard may be configured to automatically add or append to the Original Attributes Sequence to preserve a record of changes that are made.

