

THEORY

Before HIS/RIS data can be transferred via DICOM, the requestor must make a connection (i.e., an **association**) with the HIS/RIS, and then the two systems must agree (i.e., **negotiate**) upon the syntax that will be utilized for the transfer of patient information. As an example, a Siemens ESOFTE and a HIS/RIS first make an association, and then the two computers might negotiate that patient information will be sent via Implicit Little Endian syntax.

Little Endian means the least significant byte is sent first.
Big Endian means the most significant byte is sent first.

Implicit means the Value Representation of the attributes is not sent.
Explicit means the Value Representation of the attributes is sent.

In most DICOM applications, Implicit Little Endian is the default transfer syntax.

In DICOM terminology, this process is called **association/negotiation**. In the following example, a Siemens ESOFTE computer is requesting NM studies (nuclear medicine) for the current date (July 15, 2009) from a HIS/RIS server. To begin, the ESOFTE (AET = **AISFSTNM01**) has called the HIS/RIS (AET= **AISMDB2**). The ESOFTE then announced the available transfer syntaxes it could accept. In this example, the ESOFTE can accept...

- JPEG Lossless
- JPEG Baseline
- Implicit Little Endian
- Explicit Little Endian
- Explicit Big Endian

The HIS/RIS server then responded that it would utilize Explicit Little Endian.

Next, the ESOFTE requested NM studies for 07/15/2009 (the current date) using the agreed upon syntax - and then the HIS/RIS acknowledged receiving that request. Lastly, the HIS/RIS replied its status as "out of resources"; therefore, no NM studies were presented to the ESOFTE. In this case, the reason no patient information was received is due to a problem with the HIS/RIS.

To make reading this captured log easier, comments have been added.

START WITH THE ESOFTE AET CALLING THE HIS/RIS AET

```
(1812) 07-15 12:33:38.43 MC3 T3: REQUEST Association Parameters:
(1812) 07-15 12:33:38.43 MC3 T3: | Calling_presentation_address: AISFSTNM01
(1812) 07-15 12:33:38.43 MC3 T3: | Called_presentation_address:
      Worklist:5010
(1812) 07-15 12:33:38.43 MC3 T3: | Called_application_title: AISMDB2
(1812) 07-15 12:33:38.43 MC3 T3: | Calling_application_title: AISFSTNM01
```

HERE IS THE STANDARD ACN

```
(1812) 07-15 12:33:38.43 MC3 T3: | Application_context_name:  
1.2.840.10008.3.1.1.1
```

MAX PROTOCOL DATA UNIT FOR THE ESOFT IS 32768

```
(1812) 07-15 12:33:38.43 MC3 T3: | PDU_maximum_length: 32768
```

THIS IS AN SIEMENS SYNGO IMPLEMENTATION

```
(1812) 07-15 12:33:38.43 MC3 T3: | Implem_class_uid:  
1.3.12.2.1107.5.9.20000101  
(1812) 07-15 12:33:38.43 MC3 T3: | Version_name: SIEMENS_SWFSYNGO  
(1812) 07-15 12:33:38.43 MC3 T3: | Max_operations_invoked: Not Sent  
(1812) 07-15 12:33:38.43 MC3 T3: | Max_operations_performed: Not Sent
```

THE ESOFT TELLS THE HIS/RIS WHICH PRESENTATION SYNTAXES THE ESOFT CAN UTILIZE

```
(1812) 07-15 12:33:38.43 MC3 T3: | PRESENTATION CONTEXTS:  
(1812) 07-15 12:33:38.43 MC3 T3: | (1)Pres_context_id: 1  
(1812) 07-15 12:33:38.43 MC3 T3: | (1)Abstract_syntax:  
1.2.840.10008.5.1.4.31 (MODALITY_WORKLIST_FIND)  
(1812) 07-15 12:33:38.43 MC3 T3: | (1)Proposed Transfer Syntaxes:  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.4.70 (JPEG Lossless  
Hier 14)  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.4.50 (JPEG Baseline)  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2 (Implicit Little  
Endian)  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.1 (Explicit Little  
Endian)  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.2 (Explicit Big  
Endian)  
(1812) 07-15 12:33:38.43 MC3 T3: | (1)SCU Role: Not sent (requestor supports  
SCU)  
(1812) 07-15 12:33:38.43 MC3 T3: | (1)SCP Role: Not sent (requestor supports  
SCP)  
(1812) 07-15 12:33:38.43 MC3 T3: | (1)No extended application info  
(1812) 07-15 12:33:38.43 MC3 T3: | (2)Pres_context_id: 3  
(1812) 07-15 12:33:38.43 MC3 T3: | (2)Abstract_syntax:  
1.2.840.10008.5.1.4.31 (MODALITY_WORKLIST_FIND)  
(1812) 07-15 12:33:38.43 MC3 T3: | (2)Proposed Transfer Syntaxes:  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.4.51 (JPEG Extended 2  
4)  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.4.70 (JPEG Lossless  
Hier 14)  
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2 (Implicit Little
```

Endian)
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.1 (Explicit Little
Endian)
(1812) 07-15 12:33:38.43 MC3 T3: | 1.2.840.10008.1.2.2 (Explicit Big
Endian)
(1812) 07-15 12:33:38.43 MC3 T3: | (2)SCU Role: Not sent (requestor supports
SCU)
(1812) 07-15 12:33:38.43 MC3 T3: | (2)SCP Role: Not sent (requestor supports
SCP)
(1812) 07-15 12:33:38.43 MC3 T3: | (2)No extended application info

THE HIS/RIS RESPONDS

(1812) 07-15 12:33:38.45 MC3 T3: RESPONSE Association Parameters:
(1812) 07-15 12:33:38.45 MC3 T3: | Calling_presentation_address: AISFSTNM01
(1812) 07-15 12:33:38.45 MC3 T3: | Called_presentation_address:
Worklist:5010
(1812) 07-15 12:33:38.45 MC3 T3: | Called_application_title: AISMDB2
(1812) 07-15 12:33:38.45 MC3 T3: | Calling_application_title: AISFSTNM01

HERE IS THE STANDARD ACN

(1812) 07-15 12:33:38.45 MC3 T3: | Application_context_name:
1.2.840.10008.3.1.1.1

MAX PROTOCOL DATA UNIT FOR THE SENDER (ESOFT) IS 16384

(1812) 07-15 12:33:38.45 MC3 T3: | PDU_maximum_length: 16384

THIS IS PACS IMPLEMENTATION

(1812) 07-15 12:33:38.45 MC3 T3: | Implem_class_uid:
1.2.276.0.7230010.3.0.3.5.4
(1812) 07-15 12:33:38.45 MC3 T3: | Version_name: OFFIS_DCMTK_354
(1812) 07-15 12:33:38.45 MC3 T3: | Max_operations_invoked: Not Sent
(1812) 07-15 12:33:38.45 MC3 T3: | Max_operations_performed: Not Sent

THE HIS/RIS TELLS THE ESOFT WHICH OF THE OFFERED PRESENTATION SYNTAXES THE HIS/RIS WILL UTILIZE.

(1812) 07-15 12:33:38.45 MC3 T3: | PRESENTATION CONTEXTS:
(1812) 07-15 12:33:38.45 MC3 T3: | (1)Pres_context_id: 1
(1812) 07-15 12:33:38.45 MC3 T3: | (1)Abstract_syntax:
1.2.840.10008.5.1.4.31 (MODALITY_WORKLIST_FIND)
(1812) 07-15 12:33:38.45 MC3 T3: | (1)Result_transfer_syntax:
1.2.840.10008.1.2.1 (Explicit Little Endian)
(1812) 07-15 12:33:38.45 MC3 T3: | (1)SCU Role: Not sent (remote accepts
requestor SCU role)
(1812) 07-15 12:33:38.45 MC3 T3: | (1)SCP Role: Not sent (remote accepts

```
requestor SCP role)
(1812) 07-15 12:33:38.45 MC3 T3: | (1)No extended application info
(1812) 07-15 12:33:38.45 MC3 T3: | (1)Negotiation Result: Accepted
(1812) 07-15 12:33:38.45 MC3 T3: | (2)Pres_context_id: 3
(1812) 07-15 12:33:38.45 MC3 T3: | (2)Abstract_syntax:
      1.2.840.10008.5.1.4.31 (MODALITY_WORKLIST_FIND)
(1812) 07-15 12:33:38.45 MC3 T3: | (2)Result_transfer_syntax:
      1.2.840.10008.1.2.1 (Explicit Little Endian)
(1812) 07-15 12:33:38.45 MC3 T3: | (2)SCU Role: Not sent (remote accepts
requestor SCU role)
(1812) 07-15 12:33:38.45 MC3 T3: | (2)SCP Role: Not sent (remote accepts
requestor SCP role)
(1812) 07-15 12:33:38.45 MC3 T3: | (2)No extended application info
(1812) 07-15 12:33:38.45 MC3 T3: | (2)Negotiation Result: Accepted
```

THE ESOF REQUESTS A C WORKLIST FIND ON PRESENTATION CONTEXT 1

```
(1812) 07-15 12:33:38.45 MC3 T7: Message (MODALITY_WORKLIST_FIND,C_FIND_RQ)
      sent on context 1
(1812) 07-15 12:33:38.45 MC3 T7: Group 0x0000 Elements:
(1812) 07-15 12:33:38.45 MC3 T7: (0000,0000) Group 0000 Length
(1812) 07-15 12:33:38.45 MC3 T7: (1): 70
```

HERE IS THE SOP CLASS FOR Modality Worklist Information Model - FIND

```
(1812) 07-15 12:33:38.45 MC3 T7: (0000,0002) Affected SOP Class UID
(1812) 07-15 12:33:38.45 MC3 T7: (1): 1.2.840.10008.5.1.4.31
(1812) 07-15 12:33:38.45 MC3 T7: (0000,0100) Command Field
(1812) 07-15 12:33:38.45 MC3 T7: (1): 32
(1812) 07-15 12:33:38.45 MC3 T7: (0000,0110) Message ID
(1812) 07-15 12:33:38.45 MC3 T7: (1): 0
(1812) 07-15 12:33:38.45 MC3 T7: (0000,0700) Priority
(1812) 07-15 12:33:38.45 MC3 T7: (1): 0
(1812) 07-15 12:33:38.45 MC3 T7: (0000,0800) Data Set Type
(1812) 07-15 12:33:38.45 MC3 T7: (1): 0
(1812) 07-15 12:33:38.45 MC3 T2: Message (MODALITY_WORKLIST_FIND,C_FIND_RQ)
      sent on context 1
(1812) =====
(1812) Message ID: 100
(1812) Service Supported: MODALITY_WORKLIST_FIND (0023)
(1812) Command Supported: C_FIND_RQ
(1812) Message Attributes:
(1812) 0000,0000 UL |70| ( 4)Group 0000 Length
(1812) 0000,0002 UI |1.2.840.10008.5.1.4.31| ( 22)Affected SOP Class UID
(1812) 0000,0100 US |32| ( 2)Command Field
(1812) 0000,0110 US |0| ( 2)Message ID
(1812) 0000,0700 US |0| ( 2)Priority
```

(1812)	0000,0800	US	|0|	(	2)Data Set Type
(1812)	0008,0005	CS	<null>	(	0)Specific Character Set
(1812)	0008,0050	SH	<null>	(	0)Accession Number
(1812)	0008,0080	LO	<null>	(	0)Institution Name
(1812)	0008,0081	ST	<null>	(	0)Institution Address
(1812)	0008,0082	SQ	<null>	(	0)Institution Code Sequence
(1812)	0008,0090	PN	<null>	(	0)Referring Physician's Name
(1812)	0008,1080	LO	<null>	(	0)Admitting Diagnosis Description
(1812)	0008,1110	SQ	<null>	(	0)Referenced Study Sequence
(1812)	0008,1120	SQ	<null>	(	0)Referenced Patient Sequence
(1812)	0008,1125	SQ	<null>	(	0)Referenced Visit Sequence
(1812)	0010,0010	PN	<null>	(	0)Patient's Name
(1812)	0010,0020	LO	<null>	(	0)Patient ID
(1812)	0010,0021	LO	<null>	(	0)Issuer of Patient ID
(1812)	0010,0030	DA	<null>	(	0)Patient's Birth Date
(1812)	0010,0032	TM	<null>	(	0)Patient's Birth Time
(1812)	0010,0040	CS	<null>	(	0)Patient's Sex
(1812)	0010,0050	SQ	<null>	(	0)Patient's Insurance Plan Code
			Sequence		
(1812)	0010,1000	LO	<null>	(	0)Other Patient IDs
(1812)	0010,1001	PN	<null>	(	0)Other Patient Names
(1812)	0010,1005	PN	<null>	(	0)Patient's Birth Name
(1812)	0010,1010	AS	<null>	(	0)Patient's Age
(1812)	0010,1020	DS	<null>	(	0)Patient's Size
(1812)	0010,1030	DS	<null>	(	0)Patient's Weight
(1812)	0010,1040	LO	<null>	(	0)Patient's Address
(1812)	0010,1060	PN	<null>	(	0)Patient's Mother's Birth Name
(1812)	0010,1080	LO	<null>	(	0)Military Rank
(1812)	0010,1081	LO	<null>	(	0)Branch of Service
(1812)	0010,1090	LO	<null>	(	0)Medical Record Locator
(1812)	0010,2000	LO	<null>	(	0)Medical Alerts
(1812)	0010,2110	LO	<null>	(	0)Contrast Allergies
(1812)	0010,2150	LO	<null>	(	0)Country of Residence
(1812)	0010,2152	LO	<null>	(	0)Region of Residence
(1812)	0010,2154	SH	<null>	(	0)Patient's Telephone Numbers
(1812)	0010,2160	SH	<null>	(	0)Ethnic Group
(1812)	0010,2180	SH	<null>	(	0)Occupation
(1812)	0010,21A0	CS	<null>	(	0)Smoking Status
(1812)	0010,21B0	LT	<null>	(	0)Additional Patient History
(1812)	0010,21C0	US	<null>	(	0)Pregnancy Status
(1812)	0010,21D0	DA	<null>	(	0)Last Menstrual Date
(1812)	0010,21F0	LO	<null>	(	0)Patient's Religious Preference
(1812)	0010,4000	LT	<null>	(	0)Patient Comments
(1812)	0020,000D	UI	<null>	(	0)Study Instance UID
(1812)	0032,1032	PN	<null>	(	0)Requesting Physician
(1812)	0032,1033	LO	<null>	(	0)Requesting Service
(1812)	0032,1060	LO	<null>	(	0)Requested Procedure Description
(1812)	0032,1064	SQ	<null>	(	0)Requested Procedure Code Sequence
(1812)	0038,0004	SQ	<null>	(	0)Referenced Patient Alias Sequence
(1812)	0038,0008	CS	<null>	(	0)Visit Status ID
(1812)	0038,0010	LO	<null>	(	0)Admission ID
(1812)	0038,0011	LO	<null>	(	0)Issuer of Admission ID
(1812)	0038,0050	LO	<null>	(	0)Special Needs
(1812)	0038,0300	LO	<null>	(	0)Current Patient Location
(1812)	0038,0400	LO	<null>	(	0)Patient's Institution Residence
(1812)	0038,0500	LO	<null>	(	0)Patient State
(1812)	0038,4000	LT	<null>	(	0)Visit Comments

THE ESOFT REQUESTS NM DATA USING DICOM TAG 40,100 SCHEDULED PROCEDURE STEP

```
(1812) 0040,0100 SQ || ( 1)Scheduled Procedure Step Sequence
(1812) =====
(1812) <Sequence: Item 101 of Message 100 (0040,0100)>
(1812) =====
(1812) Item Attributes:
(1812) 0008,0060 CS |NM| ( 2)Modality
(1812) 0032,1070 LO |<null>| ( 0)Requested Contrast Agent
(1812) 0040,0001 AE |<null>| ( 0)Scheduled Station AE Title
```

THE ESOFT REQUESTS DATA SCHEDULED FOR 2009 07 15

```
(1812) 0040,0002 DA |20090715| ( 8)Scheduled Procedure Step
      Start Date
(1812) 0040,0003 TM |000000-235959| ( 13)Scheduled Procedure Step
      Start Time
(1812) 0040,0004 DA |<null>| ( 0)Scheduled Procedure Step End
      Date
(1812) 0040,0005 TM |<null>| ( 0)Scheduled Procedure Step End
      Time
(1812) 0040,0006 PN |<null>| ( 0)Scheduled Performing
      Physician's Name
(1812) 0040,0007 LO |<null>| ( 0)Scheduled Procedure Step
      Description
(1812) 0040,0008 SQ |<null>| ( 0)Scheduled Protocol Code
      Sequence
(1812) 0040,0009 SH |<null>| ( 0)Scheduled Procedure Step ID
(1812) 0040,0010 SH |<null>| ( 0)Scheduled Station Name
(1812) 0040,0011 SH |<null>| ( 0)Scheduled Procedure Step
      Location
(1812) 0040,0012 LO |<null>| ( 0)Pre-Medication
(1812) 0040,0020 CS |<null>| ( 0)Scheduled Procedure Step
      Status
(1812) 0040,0400 LT |<null>| ( 0)Comments on the Scheduled
      Procedure Step
(1812) ===== End of Item ID: 101 =====
(1812) Message ID: 100 (continued)
(1812) 0040,1001 SH |<null>| ( 0)Requested Procedure ID
(1812) 0040,1002 LO |<null>| ( 0)Reason for the Requested
      Procedure
(1812) 0040,1003 SH |<null>| ( 0)Requested Procedure Priority
(1812) 0040,1004 LO |<null>| ( 0)Patient Transport Arrangements
(1812) 0040,1005 LO |<null>| ( 0)Requested Procedure Location
(1812) 0040,1008 LO |<null>| ( 0)Confidentiality Code
```

(1812) 0040,1009 SH |<null>| (0)Reporting Priority
(1812) 0040,1010 PN |<null>| (0)Names of Intended Recipients of
Results
(1812) 0040,1400 LT |<null>| (0)Requested Procedure Comments
(1812) 0040,2004 DA |<null>| (0)Issue Date of Imaging Service
Request
(1812) 0040,2005 TM |<null>| (0)Issue Time of Imaging Service
Request
(1812) 0040,2008 PN |<null>| (0)Order Entered By
(1812) 0040,2009 SH |<null>| (0)Order Enterer's Location
(1812) 0040,2010 SH |<null>| (0)Order Callback Phone Number
(1812) 0040,2016 LO |<null>| (0)Placer Order Number / Imaging
Service Request
(1812) 0040,2017 LO |<null>| (0)Filler Order Number / Imaging
Service Request
(1812) 0040,2400 LT |<null>| (0)Imaging Service Request Comments
(1812) 0040,3001 LO |<null>| (0)Confidentiality Constraint on
Patient Data Descrip
(1812) ===== End of Message ID: 100 =====

**THE HIS/RIS HAS RECEIVED THE
REQUEST**

(1812) 07-15 12:33:38.48 MC3 T7: Message received on context 1
(1812) 07-15 12:33:38.48 MC3 T7: Group 0x0000 Elements:
(1812) 07-15 12:33:38.48 MC3 T7: (0000,0000) Group 0000 Length
(1812) 07-15 12:33:38.48 MC3 T7: (1): 70
(1812) 07-15 12:33:38.48 MC3 T7: (0000,0002) Affected SOP Class UID
(1812) 07-15 12:33:38.48 MC3 T7: (1): 1.2.840.10008.5.1.4.31
(1812) 07-15 12:33:38.48 MC3 T7: (0000,0100) Command Field
(1812) 07-15 12:33:38.48 MC3 T7: (1): 32800
(1812) 07-15 12:33:38.48 MC3 T7: (0000,0120) Message ID Being Responded To
(1812) 07-15 12:33:38.48 MC3 T7: (1): 0
(1812) 07-15 12:33:38.48 MC3 T7: (0000,0800) Data Set Type
(1812) 07-15 12:33:38.48 MC3 T7: (1): 257

**HIS/RIS STATUS IS 42752
OUT OF RESOURCES**

(1812) 07-15 12:33:38.48 MC3 T7: (0000,0900) Status
(1812) 07-15 12:33:38.48 MC3 T7: (1): 42752