

**ELI Electrocardiographs
ELI Link
DICOM Conformance Statement**

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Revision History			
Rev	Date	Revised By	Revision Notes
-	5/18/2006	Barry Brown	Document originated.
1	6/2/2006	Barry Brown	First issue of document.
2	9/26/2007	Tim Doniere	Updated series and instance UID creation. Updated private tags. Updated table 3.2.1.3.1.3-1. Updated Section 3.2.1.3.1.3 to include new private tags. Updated Table 0 with new tags.
3	9/2/2008	Tim Doniere	Fixed Table 3.2.1.3.2.2 "Text description of medication" tag number to (0040,A160). Removed "e.g." from Value for tag (0008,1090) in Table 3.2.1.3.2.2. Added Ethnic Group tag (0010,2160) with list of possible values to the Patient Module in Table 3.2.1.1.2.2. Added list of possible values to "Regular Medication" tag (0040,A160) in Table 3.2.1.1.2.2. Added "5000" as possible value for Number of Waveform Samples Tag (003A,0010) in Table 3.2.1.1.2.2. Added "500" as possible value for Sampling Frequency Tag (003A,001A) in Table 3.2.1.1.2.2. Fixed Value description for Filter Low Frequency Tag (003A, 0220) in Table 3.2.1.1.2.2. Fixed Value description for Filter High Frequency Tag (003A, 0221) in Table 3.2.1.1.2.2.
4	1/19/2009	Tim Doniere	Added Institution Name and User Specified tags to Table 3.2.1.3.1.3-1: Supported Matching Elements as SCU for MWL C-FIND. Added Modality, Time Zone Offset From UTC, Patient's Age, Ethnic Group, Patient's Size, Patient's Weight, Other Patient IDs, Patient's Institution Residence, Visit Comments, Reason For The Requested Procedure, Requesting Physician, Admission ID and Institution Name tags to Table 3.2.1.3.1.3-1: Elements Used from MWL C-FIND. Changed "Secondary ID" to "Patient Second ID" in Table 3.2.1.3.2.2. Removed "or unvalued" and "or not included" from Table 3.2.1.3.2.2. Added "or "15"" to Number of Waveform Channels and Channel definition Sequence" in Table 3.2.1.3.2.2. Added Leads V7, V8, V9, V3R, V4R, E1, E2, E3 to Code Value and Code Meaning tags in the Waveform Sequence in Table 3.2.1.3.2.2. Added "5.4.5-33-1-6" or "5.4.5-33-1-2" to the Code Value and Code Meaning tags in the Acquisition Context in Table 3.2.1.3.2.2. Changed "Automatic" to "Machine" in the Waveform Annotation section in Table 3.2.1.3.2.2. Added "Manual Interpretation Statements" (Group = 4), "Manual Global Measurements" (Group = 5) and "Manual Median Beat Fiducial Markers" (Group = 6) to the Waveform Annotation section in Table 3.2.1.3.2.2. Added "Admission ID", "Order Number", "Machine ID - Acquiring Device", "Machine ID - Analyzing Device", "Acquiring Device Info",

			"Analyzing Device Info", "ECG Lead Definition" and "Pulse Oximetry Data" tags to Additional Attributes section in Table 3.2.1.3.2.2.
5	6/16/2009	Tim Doniere	Changed Manual Interpretation Statements Annotation Group Number to 6. Changed Manual Global Measurements Annotation Group Number to 4. Changed Manual Median Beat Fiducial Markers Annotation Group Number to 5.
6	1/19/2010	Tim Doniere	Added Device Serial Number (0018,1000) to General Equipment Module in Table 3.2.1.3.2.2. Added the Specific Character Set attribute (0008, 0005) to the SOP Common Module in Table 3.2.1.3.2.2.
7	6/14/2010	Tim Doniere	Added note in Table 3.2.1.3.2.2 that the Ethnic Group tag will not be present if the custom ID does not contain the Race field. Added Study Description (0008,1030) tag to Table 3.2.1.3.1.3-2. Added Study Description (0008,1030) tag to the General Study module in Table 3.2.1.3.2.2. Updated ECG Lead Definition (1455,100D) tag in Table 3.2.1.3.2.2 to describe WAM indication bit.
8	2/15/2013	Mark Knudtson	Added value representation definitions. Added Scheduled Procedure Step Location (0040,0011) and Requested Procedure Description (0032,1060) to modality work list and storage. Added Initials (1455,1010), Visit (1455,1011), Demographic Layout (1455,1012), Device Information (1455,1013), Alert Criteria (1455,1014), User List 1 (1455,1015), User List 2 (1455,1016), and User List 3 (1455,1017) to private block storage. Added private block value representations. Added UniPro and UniPro32 only indications for specific private block tags.
9	9/24/2013	Scott Dorsey	Added QTcB (2:15880), QTcF (2:15892) and VRate (5.10.2.5-1)
10	1/24/14	Scott Dorsey, Rich Fronck	Added ELI Link software version (1455,1018)
11	6/30/14	Scott Dorsey, Rich Fronck	Changed ELI Link version to 4.2.0. Added UniPro64 support for (1455,1009_ and (1455,100B). Added alternate V Lead definitions (V2R – V9R) to Code Value (0008,0100) and Code Meaning (0008,0104). Added Sample Status Array (1455,1019). Added DICOM MPPS (Set/Create) section 3.2.1.3.3
12	11/16/2016	Mitchell Wohlk, Sneha Lalit, Jeff Goodall	Updated ELI Link version to V4.7.0. Added section 3.2.1.3.2.3: SOP Specific Conformance for Encapsulated PDF Storage. Updated ECG transmission statements to include General ECG Waveform objects and Encapsulated PDF objects. Updated 'Specific Character Set' in table 3.2.1.3.2.2. Updated/added waveform annotation sequence group numbers 4, 5, 7, 8, 9, and 11 in the ECG Waveform object (sequences created in CardioConfirm, not ELI Link). Added Private Tags for Critical Test Results in the ECG Waveform object.
13	03/15/2017	Sneha Lalit	Updated version to 5.0.0. Added Private Tags for CTR Alert Time (1455,101F) & Acknowledgement Time (1455,1020) in the ECG Waveform object. Removed content related to CardioConfirm

14	29 Jul 2019	Vinod Pandey	Modified the Module: "Encapsulated Document" for the attribute name "Affected SOP Instance UID" for B104223 fix.
R	08-DEC-2020	Gary Powalisz	Update for 5.1.2 Server Test: Updated tags 1455,101F and 1455,1020 (CTR Alert Time and CTR Acknowledgement Time) to include Date Time format. Note: This format complies with the DICOM standard DT Date Time value representation as already present in ES-05-111313-00 ELI Link Software Design Specification as requirement tag 5.2.6.4
S	19-May-2021	Gary Powalisz	Update with v5.2.0 release to remove software version listing on cover sheet (was V5.1.2), no other changes from rev R.
T	28 May 2024	Wenzel Akinboro	Updated Table 3.2.1.3.2.2 to include manual interpretation as annotation group number 6 since this was mistakenly removed in previous revisions.

Approvals			
Approval requirement	Name	Title	Signature and Date
Engineering: Software Manager	Vinod Pandey	Sr. Manager R&D	D*
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QA: Quality Engineer	Pamela Beals	Sr Principal Quality Engineer	D*

See SAP for applicable D* information: Change Number, Approver(s) Name, and Date(s) of Approval.

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1 Conformance Statement Overview

Welch Allyn ELI electrocardiographs with the *DICOM Communications Option* are able to receive ECG orders using DICOM modality worklist and store acquired ECGs as either DICOM 12-lead ECG Waveform objects, General ECG Waveform objects, or Encapsulated PDF objects. The table below gives a list of DICOM services supported by the ELI electrocardiograph.

1.1 Network Services

Table 1.1: ELI DICOM Network Services Supported

DICOM SOP Class Name	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification SOP Class	Yes	No
Transfer		
12-lead ECG Waveform Storage	Yes	No
General ECG Waveform Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Workflow Management		
Modality Worklist Information Model – FIND	Yes	No

1.2 Media Services

The ELI electrocardiograph does not support any DICOM media services.

2 Introduction

2.1 Audience

This document is the DICOM Conformance Statement for the ELI XXX electrocardiographs having the *DICOM Communications Option*. It is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

2.2 Remarks

This document contains the specification of private DICOM tags. Welch Allyn reserves the right to modify or deprecate these private tags. As applicable, Welch Allyn will provide written notice via this DICOM conformance statement for equivalent DICOM tags that have been deprecated.

2.3 Definitions, Terms and Abbreviations

VR – Value Representations

Value Representations Table

Name	Description	Length
DS	Decimal String	16 Bytes Maximum
LO	Long String	64 Bytes Maximum
OB	Other Byte String	Unlimited
OW	Other Word String	Unlimited
SH	Short String	16 Bytes Maximum
US	Unsigned Short	2 Bytes Fixed

2.4 References

None.

3 Networking

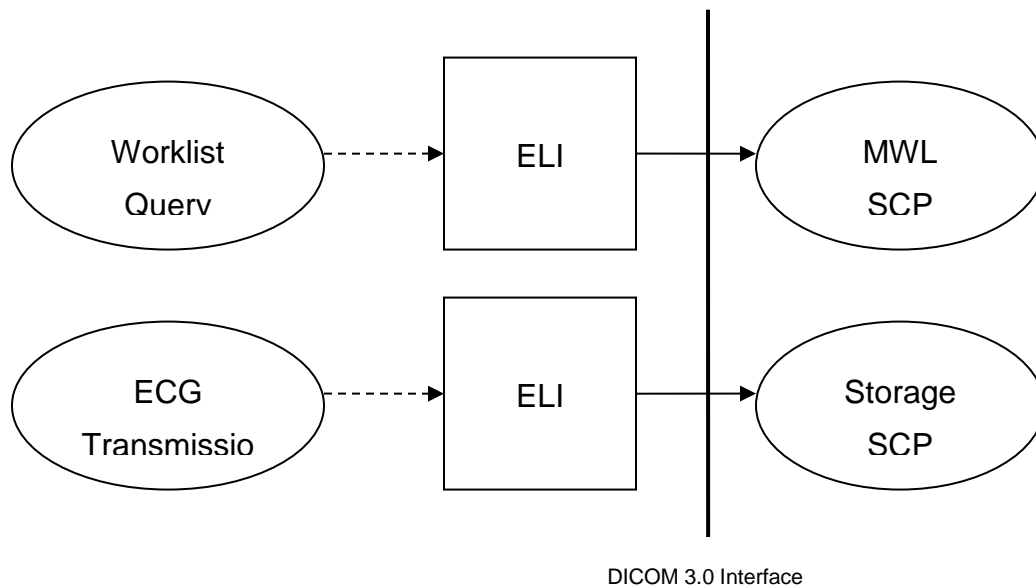
3.1 Implementation Model

3.1.1 Application Dataflow Diagram

The operator of an ELI electrocardiograph initiates a Modality Worklist query when an up-to-date list is needed. This, in turn, causes a Modality Worklist query to the configured Modality Worklist SCP.

When one or more ECGs have been acquired, the operator of an ELI electrocardiograph initiates a single or batch ECG transmission. This, in turn, causes one or more 12-lead ECG Waveform objects, General ECG Waveform objects, or Encapsulated PDF objects to be stored into the configured Storage SCP.

Figure 3.1.1: ELI DICOM Network Dataflow Diagram



3.1.2 Functional Definitions of Application Entities

3.1.2.1 Functional Definition of *ELI* Application Entity

The operator of an ELI electrocardiograph can choose to retrieve an up-to-date worklist to the electrocardiograph. When the operator initiates this function, the electrocardiograph prompts the operator for a query code. This query code can be mapped to any number of Modality Worklist query fields. (Please see the 3.2.1.3.1.3 *SOP* Specific Conformance for Modality Worklist section for a list of available DICOM fields that can be mapped to the query code or configured with fixed values.) After entering the query code, the operator initiates the retrieval, and the Modality Worklist service provider is queried for the Modality Worklist using the query code as a filter. The returned list of work items is cached on the electrocardiograph and can be displayed to the operator when a new ECG recording is initiated.

After acquiring one or more ECGs, the operator can initiate a single or batch transmission of ECGs. This causes the ELI electrocardiograph to store each ECG into the configured storage SCP. Each ECG is stored as a 12-lead ECG Waveform object, General ECG Waveform object, or Encapsulated PDF object. Optionally a Modality Performed Procedure Step (MPPS) “In Progress” and “Complete” messages can be sent to the configured MPPS SCP prior to the storage operation

3.2 AE Specifications

3.2.1 ELI Application Entity

3.2.1.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 3.2.1.1-1: Standard SOP Classes for ELI

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No

This Application Entity provides Standard Extended Conformance to the following SOP Classes:

Table 3.2.1.1-2: Standard Extended SOP Classes for ELI

DICOM SOP Class Name	SOP Class UID	SCU	SCP
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

3.2.1.2 Association Policies

3.2.1.2.1 General

The standard Application Context Name is used:

Table 3.2.1.2.1: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

3.2.1.2.2 Number of Associations

Table 3.2.1.2.2-1: Number of Associations as an Association Initiator for ELI

Maximum number of simultaneous associations	16
---	----

Table 3.2.1.2.2-2: Number of Associations as an Association Acceptor for ELI

Maximum number of simultaneous associations	0
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3.2.1.2.3 Asynchronous Nature

Table 3.2.1.2.3: Asynchronous Nature as an Association Initiator for ELI

Maximum number of outstanding asynchronous transactions	1
---	---

3.2.1.2.4 Implementation Identifying Information

Implementation Class UID	2.16.840.1
Implementation Version Name	MergeCOM3_351

3.2.1.3 Association Initiation Policy

3.2.1.3.1 Real-World Activity: Modality Worklist Query

3.2.1.3.1.1 Description and Sequencing of Activities

See section 3.1.2.1 for a description of the Modality Worklist Query.

3.2.1.3.1.2 Proposed Presentation Contexts

Table 3.2.1.3.1.2: Proposed Presentation Contexts for ELI

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2		

3.2.1.3.1.3 SOP Specific Conformance for Modality Worklist

The following elements can be used as query fields to filter the Modality Worklist. Most fields can be mapped to the 8 character query code entered by the ELI operator or can be set to fixed values in the configuration. A wildcard asterisk character (*) can be configured in any of the fields and can be added to the operator-entered query code.

Table 3.2.1.3.1.3-1: Supported Matching Elements as SCU for MWL C-FIND

Attribute Name	Tag	Comment
Accession Number	(0008,0050)	
Institution Name	(0008,0080)	
Modality	(0008,0060)	Usually set to ECG to query for ECG procedures.
Patient's Name	(0010,0010)	ELI query code can only be mapped to the patient's last (family) name.
Patient ID	(0010,0020)	
Requested Procedure Description	(0032,1060)	
Current Patient Location	(0038,0300)	
Scheduled Station AE Title	(0040,0001)	

Attribute Name	Tag	Comment
Scheduled Procedure Step Start Date	(0040,0002)	ELI query code cannot be mapped to this. This is specified as a range of dates relative to the current date.
Scheduled Procedure Step ID	(0040,0009)	
Scheduled Station Name	(0040,0010)	
Scheduled Procedure Step Location	(0040,0011)	
Requested Procedure ID	(0040,1001)	
Requested Procedure Location	(0040,1005)	
User Specified	(XXXX,XXXX)	Must be string type.

The following elements are used from the returned Modality Worklist.

Table 3.2.1.3.1.3-2: Elements Used from MWL C-FIND

Attribute Name	Tag	Comment
Accession Number	(0008,0050)	Not displayed. It is saved so it can be included in the DICOM object.
Modality	(0008,0060)	Not displayed. It is saved so it can be included in the DICOM object.
Institution Name	(0008,0080)	Not displayed. It is saved so it can be included in the DICOM object.
Referring Physician's Name	(0008,0090)	Custom ID field Referring Physician
Time Zone Offset From UTC	(0008,0201)	
Study Description	(0008,1030)	Not displayed. It is saved so it can be included in the DICOM object.
Patient's Name	(0010,0010)	Custom ID field Patient Last and Patient First Name
Patient ID	(0010,0020)	Custom ID field Patient ID
Patient's Birth Date	(0010,0030)	Custom ID field Patient Birth Date
Patient's Sex	(0010,0040)	Custom ID field Patient Gender
Other Patient IDs	(0010,1000)	Custom ID field Patient Second ID
Patient's Age	(0010,1010)	Custom ID field Patient Age
Patient's Size	(0010,1020)	Custom ID field Patient Height

Attribute Name	Tag	Comment
Patient's Weight	(0010,1030)	Custom ID field Patient Weight
Ethnic Group	(0010,2160)	Custom ID field Patient Race
Study Instance UID	(0020,000D)	Not displayed. It is saved so it can be included in the DICOM object.
Study ID	(0020,0010)	Not displayed. It is saved so it can be included in the DICOM object.
Requesting Physician	(0032,1032)	Custom ID field Requesting Physician
Requested Procedure Description	(0032,1060)	Custom ID field Requested Proc Desc
Admission ID	(0038,0010)	Custom ID field Admission ID
Current Patient Location	(0038,0300)	Custom ID field Patient Location
Patient's Institution Residence	(0038,0400)	Custom ID field Patient Room
Visit Comments	(0038,4000)	Custom ID field Comment
Scheduled Procedure Step Start Date	(0040,0002)	
Scheduled Procedure Step Start Time	(0040,0003)	
Scheduled Procedure Step Location	(0040,0011)	Custom ID field Scheduled Proc Step Loc
Reason For The Requested Procedure	(0040,1002)	Custom ID field Reason For Procedure

All communications failures are reported to the ELI operator as a retrieval failure.

3.2.1.3.2 Real-World Activity: Transmit ECGs

After acquiring one or more ECGs, the operator can initiate a single or batch transmission of ECGs. This causes the ELI electrocardiograph to store each ECG into the configured Storage SCP. Each ECG is stored as either a 12-Lead ECG Waveform object, General ECG Waveform object, or Encapsulated PDF object.

3.2.1.3.2.1 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.2.1.3.2.2 SOP Specific Conformance for 12-lead ECG Waveform Storage and General ECG Waveform Storage

The ELI electrocardiograph creates 12-lead ECG Waveform objects and General ECG Waveform objects with the following DICOM attributes. All attributes conform to the 12 lead ECG Waveform Storage and General ECG Waveform Storage SOP class specification. A private attribute block is included for the ELI's interpretation vector, custom ID format and the following custom ID fields: Social Security Number, Attending Physician, Procedural Diagnosis, Note1, Note2 and Order Request Number. The interpretation vector and custom ID formats are not disclosed.

Table 3.2.1.3.2.2: 12 lead ECG Waveform Storage and General ECG Waveform Storage Attributes

Module	Attribute Name	Tag	Value
SOP Common	Affected SOP Instance UID	(0000,1000)	Same as SOP Instance UID
	Specific Character Set	(0008,0005)	One of the following: ISO_IR 100 ISO_IR 101 ISO 2022 IR 6 ISO 2022 IR 149 ISO_IR 109 ISO_IR 110 ISO_IR 144 ISO_IR 127 ISO_IR 126 ISO_IR 138 ISO_IR 148 ISO 2022 IR 159 GB18030 ISO_IR 192 ISO_IR 166 ISO_IR 13
	Instance Creation Date	(0008,0012)	Date ECG is transmitted
	Instance Creation Time	(0008,0013)	Time ECG is transmitted
	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.9.1.1 12-Lead ECG Waveform Storage 1.2.840.10008.5.1.4.1.1.9.1.2 General ECG Waveform Storage
	SOP Instance UID	(0008,0018)	Created by appending .1 to the Series Instance UID
	General Study	Study Date	(0008,0020)
Study Time		(0008,0030)	ECG acquisition time
Accession Number		(0008,0050)	From MWL
Referring Physician's Name		(0008,0090)	From MWL or Custom ID field Referring Physician

Module	Attribute Name	Tag	Value
	Study Description	(0008,1030)	UNIPRO64: From MWL, Study Description or Requested Procedure Description. UNIPRO32: From MWL, Requested Procedure Description If neither, then one of the following: Resting 12-lead ECG Resting 15-lead ECG
	Name of Physician(s) Reading Study	(0008,1060)	Custom ID field: Overreading Physician
	Study Instance UID	(0020,000D)	From MWL, or generated by ELI using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 ECG acquisition date/time Cart sequence number
	Study ID	(0020,0010)	ECG acquisition date/time
Patient	Patient's Name	(0010,0010)	From MWL or Custom ID fields; Patient Last Name, Patient First Name
	Patient ID	(0010,0020)	From MWL or Custom ID field: Patient ID Number
	Patient's Birth Date	(0010,0030)	From MWL or Custom ID field: Patient Birth Date
	Patient's Sex	(0010,0040)	From MWL or Custom ID field: Patient Gender
	Other Patient IDs	(0010,1000)	From MWL or Custom ID field: Patient Second ID
	Ethnic Group	(0010,2160)	From MWL or Custom ID field: Patient Race
Patient Study	Patient's Age	(0010,1010)	From MWL or Custom ID field: Patient Age
	Patient's Size	(0010,1020)	From MWL or Custom ID field: Patient Height
	Patient's Weight	(0010,1030)	From MWL or Custom ID field: Patient Weight
General Series	Modality	(0008,0060)	From MWL - ECG
	Operator's Name	(0008,1070)	Custom ID field: Technician

Module	Attribute Name	Tag	Value
	Series Instance UID	(0020,000E)	Created using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 ECG acquisition date/time Cart sequence number .1
	Series Number	(0020,0011)	1
	Laterality	(0020,0060)	EMPTY
	Request Attributes Sequence	(0040,0275)	EMPTY
	> Scheduled Procedure Step Description	(0040,0007)	EMPTY
	> Scheduled Protocol Code Sequence	(0040,0008)	EMPTY
	>> Code Value	(0008,0100)	EMPTY
	>> Coding Scheme Designator	(0008,0102)	EMPTY
	>> Code Meaning	(0008,0104)	EMPTY
	> Schedule Procedure Step ID	(0040,0009)	EMPTY
	> Requested Procedure ID	(0040,1001)	EMPTY
General Equipment	Manufacturer	(0008,0070)	Mortara Instrument, Inc.
	Institution Name	(0008,0080)	From MWL or ELI Link Site Name
	Station Name	(0008,1010)	ELI Link or EMPTY
	Manufacturer's Model Name	(0008,1090)	Cart model name
	Device Serial Number	(0018,1000)	Cart serial number
	Software Version	(0018,1020)	Cart software version
Waveform Identification	Content Date	(0008,0023)	ECG acquisition date
	Acquisition Date/Time	(0008,002A)	Date/Time ECG was acquired
	Content Time	(0008,0033)	ECG acquisition time

Module	Attribute Name	Tag	Value	
	Instance Number	(0020,0013)	1	
Waveform	Waveform Sequence	(5400,0100)	Has 2 items, a multiplex group for rhythm data, and another for the median beat.	
	> Multiplex Group Time Offset	(0018,1068)	0	
	> Trigger Time Offset	(0018,1069)	0	
	> Trigger Sample Position	(0018,106E)	Rhythm: not included Median: sample of maximum power between QRS onset and offset	
	> Waveform Originality	(003A,0004)	Rhythm: ORIGINAL Median: DERIVED	
	> Number of Waveform Channels	(003A,0005)	12 or 15	
	> Number of Waveform Samples	(003A,0010)	Rhythm: 5000 or 10000 Median: up to 1200	
	> Sampling Frequency	(003A,001A)	500 or 1000	
	> Multiplex Group Label	(003A,0020)	Rhythm: RHYTHM Median: MEDIAN BEAT	
	> Channel Definition Sequence	(003A,0200)	Has 12 or 15 items, one for each lead	
	>> Channel Source Sequence	(003A,0208)	EMPTY	
	>>> Code Value	(0008,0100)	5.6.3-9-1 5.6.3-9-2 5.6.3-9-61 5.6.3-9-62 5.6.3-9-63 5.6.3-9-64 5.6.3-9-3 5.6.3-9-4 5.6.3-9-5 5.6.3-9-6	Lead I (Einthoven) Lead II Lead III Lead aVR Lead aVL Lead aVF Lead V1 Lead V2 Lead V3 Lead V4

Module	Attribute Name	Tag	Value	
	>>> Code Value	(0008,0100)	5.6.3-9-7 5.6.3-9-8 5.6.3-9-9 5.6.3-9-66 5.6.3-9-67 5.6.3-9-10 5.6.3-9-11 5.6.3-9-12 5.6.3-9-13 5.6.3-9-14 5.6.3-9-15 5.6.3-9-68 5.6.3-9-69 5.6.3-9-75 5.6.3-9-76 5.6.3-9-77	Lead V5 Lead V6 Lead V7 Lead V8 Lead V9 Lead V2R Lead V3R Lead V4R Lead V5R Lead V6R Lead V7R Lead V8R Lead V9R Lead E1 Lead E2 Lead E3
	>>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>>> Code Scheme Version	(0008,0103)	1.3	
	>>> Code Meaning	(0008,0104)	Lead I (Einthoven) Lead II Lead III Lead aVR Lead aVL Lead aVF Lead V1 Lead V2 Lead V3 Lead V4 Lead V5 Lead V6 Lead V7 Lead V8 Lead V9 Lead V2R	5.6.3-9-1 5.6.3-9-2 5.6.3-9-61 5.6.3-9-62 5.6.3-9-63 5.6.3-9-64 5.6.3-9-3 5.6.3-9-4 5.6.3-9-5 5.6.3-9-6 5.6.3-9-7 5.6.3-9-8 5.6.3-9-9 5.6.3-9-66 5.6.3-9-67 5.6.3-9-10

Module	Attribute Name	Tag	Value	
	>>> Code Meaning	(0008,0104)	Lead V3R	5.6.3-9-11
			Lead V4R	5.6.3-9-12
			Lead V5R	5.6.3-9-13
			Lead V6R	5.6.3-9-14
			Lead V7R	5.6.3-9-15
			Lead V8R	5.6.3-9-68
			Lead V9R	5.6.3-9-69
			Lead E1	5.6.3-9-75
			Lead E2	5.6.3-9-76
			Lead E3	5.6.3-9-77
	>> Channel Sensitivity	(003A,0210)	ECG sensitivity, e.g. 1.25	
	>> Channel Sensitivity Units	(003A,0211)	EMPTY	
	>>> Code Value	(0008,0100)	uV	
	>>> Coding Scheme Designator	(0008,0102)	UCUM	
	>>> Code Scheme Version	(0008,0103)	1.4	
	>>> Code Meaning	(0008,0104)	microvolt	
	>> Channel Sensitivity Correction Factor	(003A,0212)	1	
	>> Channel Baseline	(003A,0213)	0	
	>> Channel Sample Skew	(003A,0215)	0	
	>> Waveform Bits Stored	(003A,021A)	16	
	>> Filter Low Frequency	(003A,0220)	Cutoff frequency of the high-pass baseline roll filter in Hertz, e.g. 0.050	
	>> Filter High Frequency	(003A,0221)	Cutoff frequency of the low pass filter in Hertz, e.g. 300	
	>> Notch Filter Frequency	(003A,0222)	ECG AC filter, e.g. 60 in United States	
	> Waveform Bits Allocated	(5400,1004)	16	
	> Waveform Sample Interpretation	(5400,1006)	SS	
	> Waveform Data	(5400,1010)	ECG multiplexed samples	

Module	Attribute Name	Tag	Value
Acquisition Context	Acquisition Context Sequence	(0040,0555)	EMPTY
	> Concept Code Name Sequence	(0040,A043)	EMPTY
	>> Code Value	(0008,0100)	5.4.5-33-1
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	Electrode Placement
	> Concept Code Sequence	(0040,A168)	EMPTY
	>> Code Value	(0008,0100)	5.4.5-33-1-1, 5.4.5-33-1-6 or 5.4.5-33-1-2
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	Standard 12-lead positions: limb leads placed at extremities 12-lead ECG derived from non-standard leads (pediatric) Mason-Likar positions: limb leads placed on the torso
	>Measurement Units Code Sequence	(0040,08EA)	Present if systolic blood pressure is included in the custom ID
	>>Code Value	(0008,0100)	mmHg
	>>Coding Scheme Designator	(0008,0102)	UCUM
	>>Code Meaning	(0008,0104)	millimeters Hg
	>>Coding Scheme Version	(0008,0103)	1.4
	>Concept Name Code Sequence	(0040,A043)	EMPTY
>>Code Value	(0008,0100)	F-008EC	
>>Coding Scheme Designator	(0008,0102)	SRT	
>>Code Meaning	(0008,0104)	Systolic Blood Pressure	

Module	Attribute Name	Tag	Value
	>Numeric Value	(0040,A30A)	Systolic Blood Pressure Value
	>Value Type	(0040,A040)	NUM
	>Measurement Units Code Sequence	(0040,08EA)	Present if diastolic blood pressure is included in the custom ID
	>>Code Value	(0008,0100)	mmHg
	>>Coding Scheme Designator	(0008,0102)	UCUM
	>>Code Meaning	(0008,0104)	millimeters Hg
	>>Coding Scheme Version	(0008,0103)	1.4
	>Concept Name Code Sequence	(0040,A043)	EMPTY
	>>Code Value	(0008,0100)	F-008ED
	>>Coding Scheme Designator	(0008,0102)	SRT
	>>Code Meaning	(0008,0104)	Diastolic Blood Pressure
	>Numeric Value	(0040,A30A)	Diastolic Blood Pressure Value
	>Value Type	(0040,A040)	NUM
	>Concept Name Code Sequence	(0040,A043)	Present if medication is included in Custom ID. One item for each medication.
	>>Code Value	(0008,0100)	G-02D0
	>>Coding Scheme Designator	(0008,0102)	SRT
	>>Code Meaning	(0008,0104)	Regular Medication
	>Text Value	(0040,A160)	Text description of medication. One of the following: BLANK, Digitalis, Beta blocker, Quinidine/Norpace, Diuretic, Calcium antagonist, Proc/Lido/Tocainide, Other antiarrhythmic, Psychotropic, Unknown
Waveform Annotation	Waveform Annotation Sequence	(0040,B020)	EMPTY
	<i>Machine Interpretation Statements</i> Annotation Group Number = 0 One item per interpretation statement		

Module	Attribute Name	Tag	Value
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000 Shown as 1\0
	> Annotation Group Number	(0040,A180)	0
	> Unformatted Text Value	(0070,0006)	Interpretation statement text
<p><i>Machine Global Measurements</i></p> <p>Annotation Group Number = 1</p> <p>One item per measurement</p>			
	> Measurement Units Code Sequence	(0040,08EA)	EMPTY
	>> Code Value	(0008,0100)	ms ms ms ms ms ms deg deg deg ms ms BPM
	>> Coding Scheme Designator	(0008,0102)	UCUM
	>> Code Scheme Version	(0008,0103)	1.4
	>> Code Meaning	(0008,0104)	millisecond millisecond millisecond millisecond millisecond millisecond degree degree degree millisecond millisecond beats/min

Module	Attribute Name	Tag	Value	
	> Concept Code Name Sequence	(0040,A043)	EMPTY	
	>> Code Value	(0008,0100)	5.10.2.1-3 5.10.2.1-5 5.13.5-7 5.13.5-9 5.13.5-11 5.10.2.5-5 5.10.3-11 5.10.3-13 5.10.3-15 2:15880 2:15892 5.10.2.5-1	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis QTc Bazett QTc Fredericia Ventricular Heart Rate
	>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>> Code Scheme Version	(0008,0103)	1.3	
	>> Code Meaning	(0008,0104)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis QTc Bazett QTc Fredericia Ventricular Heart Rate	5.10.2.1-3 5.10.2.1-5 5.13.5-7 5.13.5-9 5.13.5-11 5.10.2.5-5 5.10.3-11 5.10.3-13 5.10.3-15 2:15880 2:15892 5.10.2.5-1
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000 Shown as 1\0	
	> Annotation Group Number	(0040,A180)	1	
	> Numeric Value	(0040,A30A)	Measurement value	

Module	Attribute Name	Tag	Value
	<i>Machine Median Beat Fiducial Markers</i> Annotation Group Number = 2 One item per marker		
	> Concept Code Name Sequence	(0040,A043)	EMPTY
	>> Code Value	(0008,0100)	5.10.3-1 P Onset 5.10.3-2 P Offset 5.10.3-3 QRS Onset 5.7.1-3 Fiducial Point 5.10.3-4 QRS Offset 5.10.3-5 T Offset
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	P Onset 5.10.3-1 P Offset 5.10.3-2 QRS Onset 5.10.3-3 Fiducial Point 5.7.1-3 QRS Offset 5.10.3-4 T Offset 5.10.3-5
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000 Shown as 1\0
	>Temporal Range Type	(0040,A130)	POINT
	> Referenced Sample Positions	(0040,A132)	Sample position of fiducial marker
	> Annotation Group Number	(0040,A180)	2
	<i>Pacemaker Spike Markers</i> Annotation Group Number = 3 One item per marker		
	> Concept Code Name Sequence	(0040,A043)	EMPTY
	>> Code Value	(0008,0100)	5.10.1.2
	>> Coding Scheme Designator	(0008,0102)	SCPECG

Module	Attribute Name	Tag	Value
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	Pacemaker spike
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000 Shown as 1\0
	> Referenced Sample Positions	(0040,A132)	Sample position of detected pacemaker spike
	> Annotation Group Number	(0040,A180)	3
	Manual Interpretation Statements Annotation Group Number = 6 One item per interpretation statement		
	> Referenced Waveform Channels	(0040,A0B0)	"0001 0000"
	> Annotation Group Number	(0040,A180)	"6"
	> Unformatted Text Value	(0070,0006)	Interpretation statement text
	<i>Rhythm Beat Fiducial Markers</i> Annotation Group Number = 100 through 163, one for each beat up to 64 beats One item per marker		
	> Concept Code Name Sequence	(0040,A043)	EMPTY
	>> Code Value	(0008,0100)	5.10.3-1 P Onset 5.10.3-2 P Offset 5.10.3-3 QRS Onset 5.7.1-3 Fiducial Point 5.10.3-4 QRS Offset 5.10.3-5 T Offset
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3

Module	Attribute Name	Tag	Value												
	>> Code Meaning	(0008,0104)	<table border="1"> <tr> <td>P Onset</td> <td>5.10.3-1</td> </tr> <tr> <td>P Offset</td> <td>5.10.3-2</td> </tr> <tr> <td>QRS Onset</td> <td>5.10.3-3</td> </tr> <tr> <td>Fiducial Point</td> <td>5.7.1-3</td> </tr> <tr> <td>QRS Offset</td> <td>5.10.3-4</td> </tr> <tr> <td>T Offset</td> <td>5.10.3-5</td> </tr> </table>	P Onset	5.10.3-1	P Offset	5.10.3-2	QRS Onset	5.10.3-3	Fiducial Point	5.7.1-3	QRS Offset	5.10.3-4	T Offset	5.10.3-5
P Onset	5.10.3-1														
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QRS Onset	5.10.3-3														
Fiducial Point	5.7.1-3														
QRS Offset	5.10.3-4														
T Offset	5.10.3-5														
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000 Shown as 1\0												
	>Temporal Range Type	(0040,A130)	POINT												
	> Referenced Sample Positions	(0040,A132)	Sample position of fiducial marker												
	> Annotation Group Number	(0040,A180)	100 for 1 st beat 101 for 2 nd beat ... 163 for 64 th beat												
Additional Attributes	Reason for Study	(0032,1030)	Custom ID field Diagnosis												
	Requesting Physician	(0032,1032)	From MWL or Custom ID field: Requesting Physician												
	Requested Procedure Description	(0032, 1060)	From MWL or Custom ID field: Requested Proc Desc												
	Admission ID	(0038,0010)	From MWL or Custom ID field: Admission ID												
	Current Patient Location	(0038,0300)	From MWL or Custom ID field: Patient Location												
	Patient's Institution Residence	(0038,0400)	From MWL or Custom ID field: Patient Room												
	Visit Comments	(0038,4000)	From MWL or Custom ID field: Comment												
	Scheduled Procedure Step Location	(0040, 0011)	From MWL or Custom ID field: Scheduled Proc Step Loc												
	Reason for the Requested Procedure	(0040,1002)	From MWL or Custom ID field: Reason For Procedure												
Private Attributes	Manufacturer Name	(1455,0010)	Mortara Instrument, Inc.												
	ELI Interpretation Vector	(1455,1000)	ELI interpretation Vector												
	Custom ID	(1455,1001)	The custom ID format (UniPro32 only)												

Module	Attribute Name	Tag	Value																
	Social Security Number	(1455,1003)	Custom ID field: Soc Sec Number VR Type - LO																
	Attending Physician	(1455,1004)	Custom ID field: Attending Physician VR Type - LO																
	Note1	(1455,1006)	Custom ID field: Note1 VR Type - LO																
	Note2	(1455,1007)	Custom ID field: Note2 VR Type - LO																
	Order Number	(1455,1008)	Custom ID field: Order Number VR Type - LO																
	Machine ID - Acquiring Device	(1455,1009)	UNIPRO Tag 14 VR Type - OB <table border="0"> <thead> <tr> <th><u>Byte</u></th> <th><u>Contents</u></th> </tr> </thead> <tbody> <tr><td>1</td><td>Institution number Binary - Low byte</td></tr> <tr><td>2</td><td>Institution number Binary - High byte</td></tr> <tr><td>3</td><td>Department number Binary - Low byte</td></tr> <tr><td>4</td><td>Department number Binary - High byte</td></tr> <tr><td>5</td><td>Cart ID: Binary - Low byte</td></tr> <tr><td>6</td><td>Cart ID: Binary - High byte</td></tr> <tr><td>7</td><td>Device type-ASCII "C" = Cart "S" = System</td></tr> </tbody> </table>	<u>Byte</u>	<u>Contents</u>	1	Institution number Binary - Low byte	2	Institution number Binary - High byte	3	Department number Binary - Low byte	4	Department number Binary - High byte	5	Cart ID: Binary - Low byte	6	Cart ID: Binary - High byte	7	Device type-ASCII "C" = Cart "S" = System
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7	Device type-ASCII "C" = Cart "S" = System																		
	Machine ID - Acquiring Device	(1455,1009)	<table border="0"> <thead> <tr> <th><u>Byte</u></th> <th><u>Contents</u></th> </tr> </thead> <tbody> <tr><td>8</td><td>Manufacturer code binary. 0 - Unknown 1 - Burdick 2 - Cambridge 3 - Compumed 4 - Datamed 5 - Fukuda 6 - Hewlett Packard 7 - Marquette Electronics 8 - Mortara Instruments 9 - Ninon Konden 10 - Mortara Instruments 11 - Quinton 12 - Siemens 13 - Spacelabs 14 - Teleded</td></tr> <tr><td>9-13</td><td>ASCII model description</td></tr> </tbody> </table>	<u>Byte</u>	<u>Contents</u>	8	Manufacturer code binary. 0 - Unknown 1 - Burdick 2 - Cambridge 3 - Compumed 4 - Datamed 5 - Fukuda 6 - Hewlett Packard 7 - Marquette Electronics 8 - Mortara Instruments 9 - Ninon Konden 10 - Mortara Instruments 11 - Quinton 12 - Siemens 13 - Spacelabs 14 - Teleded	9-13	ASCII model description										
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9-13	ASCII model description																		
	Machine ID - Analyzing Device	(1455,100A)	UNIPRO Tag 15 (formatted the same as UNIPRO Tag 14) (UniPro32 only) VR Type - OB																
	Acquiring Device Info	(1455,100B)	UNIPRO Tag 32 VR Type - OB																

Module	Attribute Name	Tag	Value																																										
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	12 - Chinese																																												
	13 - Japanese																																												
	14 - Russian																																												
	Analyzing Device Info	(1455,100C)	UNIPRO Tag 33 (formatted the same as UNIPRO Tag 32) (UniPro32 only) VR Type – OB																																										
	ECG Lead Definition	(1455,100D)	UNIPRO Tag 34 (UniPro32 only) The 7 LSBs of this field indicate which ECG lead set has been used. The definitions are: 0 - Standard 1 - Pediatric V3R 2 - Mason-Likar The MSB of this field indicates if the data were acquired with a WAM: 0 - Normal Front End 1 WAM VR Type – US																																										
	Pulse Oximetry Data	(1455,100E)	UNIPRO Tag 35 (UniPro32 only) <table border="1"> <thead> <tr> <th>Byte</th> <th>Contents</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>SpO2 value in % units</td> </tr> <tr> <td>2</td> <td>Pulse Rate in ppm units</td> </tr> </tbody> </table> VR Type – OB	Byte	Contents	1	SpO2 value in % units	2	Pulse Rate in ppm units																																				
Byte	Contents																																												
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2	Pulse Rate in ppm units																																												
	Print Filter	(1455,100F)	The print filter setting (in Hz) on the cardiograph VR Type – DS																																										

Module	Attribute Name	Tag	Value
	Initials	(1455,1010)	Custom ID field Initials VR Type – SH
	Visit	(1455,1011)	Custom ID field Visit VR Type – LO
	Demographic Layout	(1455,1012)	XML data representing the demographic layout (UniPro64 only) VR Type – OB
	Device Information	(1455,1013)	XML data representing the device information (UniPro64 only) VR Type - OB
	Alert Criteria	(1455,1014)	Unsigned short representing interpretation condition per the following: 1 – Normal ECG 2 – Atypical ECG 3 – Borderline ECG 4 – Abnormal Rhythm ECG 5 – Abnormal ECG 6 – ***ACUTE MI*** 7 – No Further Interpretation Possible 8 – ***CRITICAL TEST RESULT*** 99 – Unknown VR Type – US
	User List 1 Value	(1455,1015)	Custom ID field User List 1 Value (UniPro64 only) VR Type – LO
	User List 2 Value	(1455,1016)	Custom ID field User List 2 Value (UniPro64 only) VR Type – LO
	User List 3 Value	(1455,1017)	Custom ID field User List 3 Value (UniPro64 only) VR Type – LO
	ELI Link Software Version	(1455,1018)	VR Type – SH
	Sample Status Array	(1455,1019)	Rhythm sample data (UniPro64 only) VR Type – OB
	Has Critical Test Result?	(1455,101A)	One of the following (UniPro64 only): True (CTR present) False (CTR not present) Blank (CTR could not be determined, or device is not capable) VR Type – LO

Module	Attribute Name	Tag	Value
	Critical Test Result Conditions	(1455,101B)	One of the following (UniPro64 only): Integer (proprietary bit flags indicating which CTR conditions are present) Blank (N/A - no CTR present or device not capable) VR Type – IS
	Critical Test Result Alert Given?	(1455,101C)	One of the following (UniPro64 only): True (CTR present and alert given) False (CTR present, but alert not given) Blank (no CTR present, or device not capable) VR Type – LO
	Critical Test Result Alert Acknowledged?	(1455,101D)	One of the following (UniPro64 only): True (alert given and acknowledged) False (alert given but not acknowledged) Blank (no alert given) VR Type – LO
	Critical Test Result Acknowledged By	(1455,101E)	One of the following (UniPro64 only): String (name of person who acknowledged the CTR) Blank (N/A) VR Type – LT
	Critical Test Result Alert Time	(1455, 101F)	One of the following (Unipro64 only): DateTime String (Date/Time when the CTR alert was given on a cardiograph. Format: YYYYMMDDHHMMSS Blank (Value not available or N/A)
	Critical Test Result Acknowledgement Time	(1455, 1020)	One of the following (Unipro64 only): DateTime String (Date/Time when the CTR was acknowledged on a cardiograph. Format: YYYYMMDDHHMMSS Blank (Value not available or N/A)

All communications exceptions are reported to the ELI operator as a transmission failure.

3.2.1.3.2.3 SOP Specific Conformance for Encapsulated PDF Storage

The ELI electrocardiograph creates Encapsulated PDF objects with the following DICOM attributes. All attributes conform to the Encapsulated PDF Storage SOP class specification.

Table 3.2.1.3.2.3: Encapsulated PDF Storage Attributes

Module	Attribute Name	Tag	Value
Patient	Patient's Name	(0010,0010)	From MWL or Custom ID fields; Patient Last Name, Patient First Name
	Patient ID	(0010,0020)	From MWL or Custom ID field: Patient ID Number
	Patient's Birth Date	(0010,0030)	From MWL or Custom ID field: Patient Birth Date
	Patient's Sex	(0010,0040)	From MWL or Custom ID field: Patient Gender
	Other Patient IDs	(0010,1000)	From MWL or Custom ID field: Patient Second ID
	Ethnic Group	(0010,2160)	From MWL or Custom ID field: Patient Race
	Patient Comments	(0010,4000)	Custom ID field: Note 1
General Study	Study Date	(0008,0020)	ECG acquisition date
	Study Time	(0008,0030)	ECG acquisition time
	Accession Number	(0008,0050)	From MWL
	Referring Physician's Name	(0008,0090)	From MWL or Custom ID field: Referring Physician
	Study Description	(0008,1030)	UNIPRO64: From MWL, Study Description or Requested Procedure Description. UNIPRO32: From MWL, Requested Procedure Description If neither, then one of the following Resting 12-lead ECG Resting 15-lead ECG
	Name of Physician(s) Reading Study	(0008,1060)	Custom ID field: Overreading Physician
	Study Instance UID	(0020,000D)	From MWL, or generated by ELI using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 ECG acquisition date/time Cart sequence number
	Study ID	(0020,0010)	ECG acquisition date/time
Patient Study	Patient's Age	(0010,1010)	From MWL or Custom ID field: Patient Age

Module	Attribute Name	Tag	Value
	Patient's Size	(0010,1020)	From MWL or Custom ID field: Patient Height
	Patient's Weight	(0010,1030)	From MWL or Custom ID field: Patient Weight
General Series	Modality	(0008,0060)	From MWL - ECG
	Operator's Name	(0008,1070)	Custom ID field: Technician
	Referenced Performed Procedure Step Sequence	(0008,1111)	EMPTY
	> Referenced SOP Class UID	(0008,1150)	1.2.840.10008.3.1.2.3.3
	> Referenced SOP Instance UID	(0008,1155)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 Transmission date/time
	Series Instance UID	(0020,000E)	Created using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 ECG acquisition date/time Cart sequence number .1
	Series Number	(0020,0011)	1
	Laterality	(0020,0060)	EMPTY
	Request Attributes Sequence	(0040,0275)	EMPTY
	> Scheduled Procedure Step Description	(0040,0007)	EMPTY
	> Scheduled Protocol Code Sequence	(0040,0008)	EMPTY
	>> Code Value	(0008,0100)	EMPTY
	>> Coding Scheme Designator	(0008,0102)	EMPTY
>> Code Meaning	(0008,0104)	EMPTY	
> Schedule Procedure Step ID	(0040,0009)	EMPTY	

Module	Attribute Name	Tag	Value
	> Requested Procedure ID	(0040,1001)	EMPTY
General Equipment	Manufacturer	(0008,0070)	Mortara Instrument, Inc.
	Institution Name	(0008,0080)	From MWL or ELI Link Site Name
	Station Name	(0008,1010)	ELI Link or EMPTY
	Manufacturer's Model Name	(0008,1090)	Cart model name
	Device Serial Number	(0018,1000)	Cart serial number
	Software Version	(0018,1020)	Cart software version
SC Equipment	Conversion Type	(0008,0064)	SYN
Encapsulated Document	Affected SOP Instance UID	(0000,1000)	Same as SOP Instance UID
	Content Date	(0008,0023)	ECG acquisition date
	Acquisition Date/Time	(0008,002A)	Date/Time ECG was acquired
	Content Time	(0008,0033)	ECG acquisition time
	Instance Number	(0020,0013)	1
	Burned In Annotation	(0028,0301)	YES
	Concept Name Code Sequence	(0040,A043)	EMPTY
	> Code Value	(0008,0100)	Product code for ELI: 40
	> Coding Scheme Designator	(0008,0102)	LN
	> Code Meaning	(0008,0104)	Resting ECG Report
	Verification Flag	(0040,A493)	UNVERIFIED - all the other cases (including delivery prior signature)
	Document Title	(0042,0010)	PDF Report
	Encapsulated Document	(0042,0011)	Path to PDF file
	MIME Type of Encapsulated Document	(0042,0012)	application/pdf

Module	Attribute Name	Tag	Value
SOP Common	Specific Character Set	(0008,0005)	One of the following: ISO_IR 100 ISO_IR 101 ISO 2022 IR 6 ISO 2022 IR 149 ISO_IR 109 ISO_IR 110 ISO_IR 144 ISO_IR 127 ISO_IR 126 ISO_IR 138 ISO_IR 148 ISO 2022 IR 159 GB18030 ISO_IR 192 ISO_IR 166 ISO_IR 13
	Instance Creation Date	(0008,0012)	Date ECG is transmitted
	Instance Creation Time	(0008,0013)	Time ECG is transmitted
	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.104.1
	SOP Instance UID	(0008,0018)	Created by appending .1 to the Series Instance UID
Additional Attributes	Reason for Study	(0032,1030)	Custom ID field: Diagnosis
	Requesting Physician	(0032,1032)	From MWL or Custom ID field: Requesting Physician
	Requested Procedure Description	(0032,1060)	Custom ID field: Requested Proc Desc
	Admission ID	(0038,0010)	From MWL or Custom ID field: Admission ID
	Current Patient Location	(0038,0300)	From MWL or Custom ID field: Patient Location
	Patient Institution Residence	(0038,0400)	From MWL or Custom ID field: Patient Room
	Visit Comments	(0038,4000)	From MWL or Custom ID field: Comment

Module	Attribute Name	Tag	Value
	Schedule Procedure Step Location	(0040,0011)	From MWL or Custom ID field: Scheduled Proc Step Loc
	Reason for the Requested Procedure	(0040,1002)	From MWL or Custom ID field: Reason For Procedure
Private Attributes	Manufacturer Name	(1455,0010)	Mortara Instrument, Inc.

All communications exceptions are reported to the ELI operator as a transmission failure.

3.2.1.3.3 *Real-World Activity: Start/End Procedure*

ELI electrocardiograph can send a NCREATE (“In Progress”) Modality Performed Procedure Step message to a remote system when a procedure is started. ELI electrocardiograph can send an N-SET (“Completed”) Modality Performed Procedure Step message to a remote system when the procedure is run to completion.

3.2.1.3.3.1 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2		

3.2.1.3.3.2 SOP Specific Conformance for Modality Performed Procedure Step

The following keys are supported for the Modality Performed Procedure Step N-CREATE:

Module	Attribute Name	Tag	Value
Performed Procedure Step Relationship	Patient's Name	(0010,0010)	Patient first and last names
	Patient ID	(0010,0020)	Patient ID
	Patient's Birth Date	(0010,0030)	Birth date
	Patient's Sex	(0010,0040)	Patient gender
	Scheduled Step Attribute Sequence	(0040,0270)	EMPTY

Module	Attribute Name	Tag	Value
	>Study Instance UID	(0020,000D)	From MWL, or generated by ELI using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 Exam acquisition date/time Exam sequence number
	>Requested Procedure ID	(0040,1001)	EMPTY
	>Requested Procedure Description	(0032,1060)	MWL or Resting ECG
	>Scheduled Procedure Step ID	(0040,0009)	EMPTY
	>Scheduled Procedure Step Description	(0040,0007)	Requested Procedure Description
	>Accession Number	(0008,0050)	MWL or EMPTY
	>Referenced Study Sequence	(0008,1110)	EMPTY
	>Scheduled Action Item Code Sequence	(0040,0008)	EMPTY
	Referenced Patient Sequence	(0008,1120)	EMPTY
Performed Procedure Step Information	Performed Procedure Step ID	(0040,0253)	Exam sequence number
	Performed Station AE Title	(0040,0241)	ELI Link configured AE Title
	Performed Procedure Step Start Date	(0040,0244)	Test performed date, else current date
	Performed Procedure Step Start Time	(0040,0245)	Test performed time date, else current time
	Performed Procedure Step Status	(0040,0252)	IN PROGRESS

Module	Attribute Name	Tag	Value
	Affected SOP Instance UID	(0000,1000)	Generated by ELI using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 Exam acquisition date/time Exam sequence number .1 .1
	Performed Station Name	(0040,0242)	ELI Link configured station name
	Performed Location	(0040,0243)	EMPTY
	Performed Procedure Step Description	(0040,0254)	EMPTY
	Performed Procedure Type Description	(0040,0255)	EMPTY
	Performed Procedure Step End Date	(0040,0250)	EMPTY
	Performed Procedure Step End Time	(0040,0251)	EMPTY
	Procedure Code Sequence	(0008,1032)	EMPTY
	>Code Value	(0008,0100)	EMPTY
	>Coding Scheme Designator	(0008,0102)	EMPTY
	>Code Meaning	(0008,0104)	EMPTY
Image Acquisition Results	Performed Action Item Sequence	(0040,0260)	EMPTY
	>Code Value	(0008,0100)	EMPTY
	>Coding Scheme Designator	(0008,0102)	EMPTY
	>Code Meaning	(0008,0104)	EMPTY
	Performed Series Sequence	(0040,0340)	EMPTY
	Modality	(0008,0060)	ECG
	Study ID	(0020,0010)	EMPTY

The following keys are supported for the Modality Performed Procedure Step N-SET :

Module	Attribute Name	Tag	Value
Performed Procedure Step Information	Requested SOP Instance UID	(0000,1001)	Generated by ELI using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 Exam acquisition date/time Exam sequence number .1 .1
	Performed Procedure Step End Date	(0040,0250)	Date test is transmitted to SCP; current date
	Performed Procedure Step End Time	(0040,0251)	Time test is transmitted to SCP; current time
	Performed Procedure Step Status	(0040,0252)	COMPLETED
Image Acquisition Results	Performed Series Sequence	(0040,0340)	EMPTY
	>Performing Physician's Name	(0008,1050)	EMPTY
	>Operator's Name	(0008,1070)	EMPTY
	>Series Instance UID	(0020,000E)	Generated by ELI using the following components: Mortara prefix: 1.3.6.1.4.1.20029 Product code for ELI: 40 Exam acquisition date/time Exam sequence number .1
	>Series Description	(0008,103E)	EMPTY
	>Retrieve AE Title	(0008,0054)	ELI configured AE Title
	>Referenced Image Sequence	(0008,1140)	EMPTY
	>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	EMPTY
>Protocol Name	(0018,1030)	Resting ECG	

3.2.1.4 Association Acceptance Policy

The ELI electrocardiographs do not accept any associations. All associations are initiated by the electrocardiograph.

3.3 Network Interfaces

3.3.1.1 Physical Network Interface

The ELI can use 10/100 Mbps Ethernet and 802.11b/g wireless LAN.

3.3.1.2 Additional Protocols

None.

3.4 Configuration

ELI supports the following configuration parameters:

Parameter	Configurable	Default Value
General		
The number of seconds to use as a timeout waiting for association request or waiting for the peer to shut down an association.	No	30
The number of seconds to wait for reply to associate request.	No	15
The number of seconds to wait for reply to associate release.	No	15
The number of seconds to wait for a network write to be accepted.	No	15
The number of seconds to wait for a network connect to be accepted.	No	15
The number of seconds to wait for data between TCP/IP packets on a call to	No	15
Modality Worklist		
Modality Worklist SCU AE Title (AE Title of ELI as seen by MWL SCP)	Yes	(none)
Modality Worklist SCP AE Title (AE Title of MWL SCP seen by ELI)	Yes	(none)
Modality Worklist SCP IP Address	Yes	(none)
Modality Worklist SCP Port Number	Yes	(none)
12-lead ECG Waveform, General ECG Waveform, or Encapsulated PDF Storage		
Storage SCU AE Title (AE Title of ELI seen by Storage SCP)	Yes	(none)
Storage SCP AE Title (AE Title of Storage SCP seen by ELI)	Yes	(none)
Storage SCP IP Address	Yes	(none)
Storage SCP Port Number	Yes	(none)