Appendix 13 - HL7 Conformance Statement

Novarad HL7 Interface Specifications

1. Introduction.

1.1 Purpose.

This document is designed to provide information necessary for the proper implementation of an HL7 interface with Novarad.

1.2 Abbreviations & Notational Conventions.

HIS	Hospital Information System
Novarad	Any Novarad product
LLP	Lower Level Protocol
[]	Brackets indicate that a segment is optional
{}	Curly braces indicate that a segment can repeat

1.3 Theory of Operation (Overview).

Novarad has the ability to receive patient, procedure, report, and billing information from other information systems via HL7 interface. Novarad can also send patient, procedure, and billing messages when actions are taken in a Novarad product. How this is accomplished can vary depending on various options chosen by the customer. The following is a fairly typical scenario. Although simple, it should provide a "big picture" view of how an interface with Novarad would work.

1. An event (such as patient arrival) triggers an order message to be sent to Novarad
2. Novarad responds to the message by recording information about the procedure being ordered such as the type of procedure and procedure number. Additionally Novarad updates or adds the patient to the Novarad patient list. The procedure is put on a list so that it can be processed by a Novarad user. Also a requisition may be printed at this time.
3. The scan is taken by a technologist and is read by a radiologist. Information about the procedure may be directly input into a Novarad product.
4. The radiologist electronically signs the procedure report within a Novarad product.

1.4 Implementation Details.

The big picture in the previous section can be filled in by considering the following items.

1. TCP/IP communications
2. Messages Structure and Content
3. Glossary

TCP/IP Communications

Novarad uses the socket-stream protocol for communicating over TCP/IP networks. For each interface, the sending interface will act as a client, and the receiving interface will act as a server. Novarad uses port number 5007 for its receiver. If this port number is already in use, an alternative may be configured.

Typically, the sender will attempt to keep the connection open at all times, but this is not necessary. It is necessary that the receiver be waiting for connections at all times, and it is necessary that the sender attempt to reconnect the interfaces if the connection is down and the sender has data to send. When the sender has no more data to send, the sender can either leave the connection open - but idle - or close the connection until it has additional data to send.

HL7 Lower Level Protocol

When sending HL7 data over TCP/IP sockets, Novarad uses the HL7 Lower Layer Protocol (LLP) as outlined in the HL7 Implementation Guide.

This protocol specifies that an ASCII 11 will be transmitted before each message or acknowledgment, and an ASCII 28 and 13 will be transmitted after each message or acknowledgment. The sender will wait for an acknowledgment for each message before sending the next message.

HL7 Structure & Content.

Within the HL7 protocol, data is broken up into groups called messages. Each HL7 message can be thought of as an event. Examples of events include new procedure orders or patient admissions.

Each message is broken up further into segments. HL7 segments group the data according to the type of information. For example, the message header (MSH) segment contains information specific to the message. It contains information like the sending facility, sending application, receiving facility, receiving application, and message type. Each segment is broken up even further into fields. HL7 fields are what actually contain data.

Message, segment and field definitions used by this interface are based on the HL7 2.31 standard and IHE 2006 and where possible match those specifications. However, differences exist and thus the reader is cautioned: where the specifications differ between the HL7 standard and this document, the specifications in this document take precedence.

For general information on HL7 messages, please consult the HL7 Version 2.3 Standard available through:

Health Level Seven 3300
Washtenaw, Suite 227 Ann
Arbor, MI 48104-4250 (313)
677-7777

For general information on IHE (Integrating the Healthcare Enterprise), visit the IHE website at http://www.ihe.net

I. Incoming Messages to Novarad.

Novarad can accept incoming messages of type "ADT", "ORM", "ORU", "BAR", and "DFT".

ADT	Patient Administration Message	Chapter in HL7 2.3.1
MSH	Message Header	2
EVN	Event Type	3
PID	Patient Identification	3
PV1	Patient Visit	3
[{GT1}]	Guarantor	6
[{IN1}]	Insurance	6
[{OBX}]	Observation/Result	7
[{MRG}]	Merge Patient Info	3
[{AL1}]	Allergy Information	3

ORM	Structured Report Export	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
PV1	Patient Visit	3
{ORC	Common Order	4
OBR}	Order Detail	4
[{GT1}]	Guarantor	6
[{IN1}]	Insurance	6
[{NTE}]	Note	2
{[DGI]}	Diagnosis	6
ZDS	Additional identification information (Custom for IHE)	

ORU	Structured Report Export	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
[PV1]	Patient Visit	3
[ORC]	Common Order	4
{OBR}	Order Detail	4
{OBX}	Observation/Result	7

BAR	Billing Account	Chapter in HL7 2.3.1
MSH	Message Header	2
EVN	Event Type	3
PID	Patient Identification	3
[PV1]	Patient Visit	3
{[DGI]}	Diagnosis	6
[{GT1}]	Guarantor	6
[{IN1}]	Insurance	6

DFT	Detailed Financial Transaction	Chapter in HL7 2.3.1
MSH	Message Header	2
EVN	Event Type	3
PID	Patient Identification	3
[PV1]	Patient Visit	3
{FT1}	Financial Transaction	6
[{PR1}]	Procedure	6
[{GT1}]	Guarantor	6
[{IN1}]	Insurance	6

The following sections describe each of the segments used for messages sent to Novarad. Input and output data mappings are summarized later on in this document. In the following tables, the column Len refers to the maximum length of this field, and R/S/O refers to whether or not this field is Required, Sometimes Required, or Optional. Note that when a field is not being used it should exist in the message, but be empty or filled with the null string. Mapping of each segment may be customized using the Novarad Admin Console.

1.1 MSH Segment - Message Header.

Supported message types (MSH [9]) include:

ADT -

A01 - Admit a Patient
A04 - Register a Patient
A05 - Pre-Admit a Patient
A08 - Update Patient Information
A18 - Merge Patient
A31 - Update Person Information

ORM

O01 - General Order Message Control Code
(ORC [1]) :
NW - New Order CA, OC
- Cancel Order SC -
Status Change DC - Stop
Ongoing Order XO, XX -

Change Order

ORU

R01 - Transmission of Observation

R05 - Proprietary Novarad Dictation Message

BAR

P01 - New Account P05 - Update Account

DFT

P03 - Post Detail Financial Transaction

Transaction Type (FT1 [6])

CG - Charge CD -

Credit PY -

Payment AJ -

Adjustment

MSH Segment - Message Header				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"MSH"
1	Field Separator	1	R	" |" or field separator used by sending application
2	Encoding Characters	4	R	"^~\&" or encoding characters used by sending application
3	Sending Application	180	R	This field uniquely identifies the sending application among all other applications within the network enterprise. The network enterprise consists of all those applications that participate in the exchange of HL7 messages within the enterprise. Entirely site-defined.
4	Sending Facility	180	R	This field contains the address of one of several occurrences of the same application within the sending system. Entirely user-defined.
5	Receiving Application	180	R	

MSH Segment - Message Header				
	HL7 Field Name	Len	R/S/O	Description
6	Receiving Facility	180	R	
7	Date/Time of Message	26	R	Date/time message was produced
8	Security	40	O	
9	Message Type	7	R	"ORM^A^O01" or other valid message type
10	Message Control ID	20	R	Unique id for this message
11	Processing ID	3	R	This field is used to decide whether to process the message as defined in HL7 Application (level 7) Processing rules, above. Default to "P" for production.
12	Version ID	60	R	"2.3.1"
13	Sequence Number	15	O	
14	Continuation Pointer	180	O	
15	Accept Acknowledgment Type	2	O	
16	Application Acknowledgment Type	2	O	
17	Country Code	2	O	
18	Character Set	6	O	
19	Principal Language	60	O	

1.2 EVN Segment - Event Type Segment

EVN Segment - Event				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"EVN"
1	Event Type Code	3	S	If present, its value shall be equal to the second component of the field MSH [9] - Message Type
2	Recorded Date/Time	26	R	Most systems will default to the system date/time when the transaction was entered.
3	Date/Time Planned Event	26	O	
4	Event Reason Code	3	O	
5	Operator ID	60	O	
6	Event Occurred	26	O	

1.3 PID Segment - Patient Identification Definition.

PID Segment - Patient Identification Definition				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"PID"
1	Set ID	4	O	

PID Segment - Patient Identification Definition				
	HL7 Field Name	Len	R/S/O	Description
2	Patient ID External	20	S	When the patient is from another institution, outside office, etc., the identifier used by that institution can be shown in this field.
3	Patient ID Internal	20	R	Medical Record Number or Other Patient Level Number / Novarad Unique Patient ID.
4	Alternate Patient ID	20	O	
5	Patient Name	48	R	Last^{A}First^{A}MI^{A}
6	Mother Maiden Name	48	S	Last^{A}First^{A}MI^{A}
7	Date/Time Of Birth	26	R	DOB
8	Sex	1	R	Sex (M/F)
9	Patient Alias	48	O	
10	Race	80	O	
11	Patient Address	106	S	Street1AStreet2ACityAStateAZip
12	County Code	4	S	ACR country code.
13	Home Phone	40	S	(Area code)PhoneAAAe-Mail
14	Business Phone	40	S	(Area code)PhoneXExtensionAAAe-Mail
15	Patient Language	60	O	
16	Marital Status	1	S	D - Divorced, Married - M, S - Single
17	Religion	80	O	
18	Patient Account Number	20	S	
19	Patient SSN	16	S	Social Security Number or Other Patient Level Number
20	Drivers License Number	25	O	
21	Mother ID	20	O	
22	Ethnic Group	80	O	
23	Birth Place	60	O	
24	Multiple Birth Indicator	1	O	
25	Birth Order	2	O	
2	Citizenship	80	O	

PID Segment - Patient Identification Definition				
	HL7 Field Name	Len	R/S/O	Description
6				
27	Veteran's Military Status	60	O	
28	Nationality	80	O	
29	Patient Death Date/Time	26	O	
30	Patient Death Indicator	1	O	

1.4 PV1 Segment - Patient Visit Information.

PV1 Segment - Patient Visit Information				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"PV1"
1	Set ID	4	O	
2	Patient Class	1	O	This field is used by systems to categorize patients by site. I - Inpatient O - Outpatient
3	Assigned Patient Location	80	O	
4	Admission Type	2	O	
5	Pre-admit Number	20	O	
6	Prior Patient Location	80	O	
7	Attending Doctor	60	O	
8	Referring Doctor	60	S	ID Number^{A}Last^{A}First^{A}MI^{AA}Title
9	Constulting Doctor	60	O	
10	Hospital Service	3	O	
11	Temporary Location	80	O	
12	Pre-admit Test Indicator	2	O	
13	Readmission Indicator	2	O	
14	Admit Source	3	O	
15	Ambulatory Status	2	O	
16	VIP Indicator	2	O	
17	Admitting Doctor	60	O	
18	Patient Type	2	O	
19	Visit Number	20	O	The unique number assigned to each patient visit.
20	Financal Class	50	O	
21	Charge Price Indicator	2	O	
	Fields 22-43 are not used			
44	Admit Date/Time	26	O	Reflects and will update the last visit date for the patient.
	Fields 44-52 are not used			

1.5 AL1 Segment - Allergy Information Segment

AL1 Segment - Changing Patient Identification				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"AL1"
1	Set ID	4	R	
2	Allergy Type	2	O	
3	Allergy Code/Mnemonic/Description	60	O	ID^A^Text
4	Allergy Severity	2	O	
5	Allergy Reaction	15	O	
6	Identification Date	8	O	

1.6 ORC Segment - Common Order Segment.

ORC Segment - Common Order Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"ORC"
1	Order Control	2	R	"NW" - new "XO" - change "CA" - cancel "SC" - Status Change
2	Placer Order Number	22	R	
3	Filler Order Number	22	O	If provided, must match the Novarad order #.
4	Placer Group Number	22	O	
5	Order Status	2	O	(required only if ORC-1 is "SC")
6	Response Flag	1	O	
7	Quantity/Timing	200	R	The quantity/timing must contain a start date and either duration or end date.
8	Parent	200	O	
9	Date/Time of Transaction	26	R	
10	Entered By	120	S	
11	Verified By	120	O	
12	Ordering Provider	120	O	
13	Enterer's Location	80	O	
14	Call Back Phone	40	O	
15	Order Effective Date/Time	26	O	
16	Order Control Code Reason	200	O	
17	Entering Organization	60	O	
18	Entering Device	60	O	
19	Action By	120	O	

1.6 OBR Segment - Observation Request.

	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"OBR"
1	Set ID	4	O	
2	Placer Order Number	75	R	
3	Filler Order Number	75	O	If provided, must match the Novarad order #.
4	Universal Service ID	200	R	
5	Priority	2	O	Use 'S' for Stat.
6	Requested Date/Time	26	O	
7	Observation Date/Time	26	O	Required for ORU - Transcribed Date/Time
8	Observation End Date	26	O	
9	Collection Volume	20	O	
10	Collector ID	60	O	
11	Specimen Action Code	1	O	
12	Danger Code	60	O	
13	Relevant Clinical Info	300	O	
14	Specimen Rcv'd Date	26	O	
15	Specimen Source	300	O	
16	Ordering Provider	80	O	
17	Order Call Back Phone	40	O	
18	Placer Field 1	60	S	Sometimes used for other site-defined procedure fields.
19	Placer Field 2	60	S	
20	Filler Field 1	60	S	
21	Filler Field 2	60	S	
22	Report Status Change Date/Time	26	O	
23	Charge To Practice	40	O	
24	Diagnostic Service Sect ID	10	R	Modality (i.e. 'MR', 'CT')
25	Results Status	1	S	For ORU - Report Status (P = Transcribed, R = Signed, F = Final)
26	Parent Result	400	O	
27	Quantity Timing	200	R	^{AA}duration^{A}start date/time^{A}end date/time^{A}priority^{AAAA}
28	Result Copies To	150	O	
29	Parent	150	O	
30	Transportation Mode	20	O	
31	Reason For Study	300	S	Reason for procedure
32	Principle Result Interpreter	200	S	For ORU - Reporting Physician Last Name^{A}First Name
33	Assistant Result Interpreter	200	O	
34	Technician	200	O	
35	Transcriptionist	200	O	
36	Scheduled Date	26	O	
37	# of Sample Containers	4	O	
38	Transport Logistics of	60	O	

OBR Segment - Observation Request				
	HL7 Field Name	Len	R/S/O	Description
	Collected Sample			
39	Collector's Comment	200	O	
40	Transport Arrangement Responsibility	60	O	
41	Transport Arranged	30	O	
42	Escort Required	1	O	
43	Planned Patient Trans Comment	200	O	
44	Procedure Code	80	S	Code ID^A^Code Description^AAA^Procedure Description
45	Procedure Code Modifier	80	S	

1.8 OBX Segment - Observation/Result Segment.

While the Novarad HL7 product supports Single and Multiple (Aggregate) OBX Segments making up a single report, the default is IHE compliant. The IHE implementation calls for multiple OBX segments each containing a different piece of report information. Each IHE OBX segment is listed below:

OBX Segment 1 - Report Instance UID OBX				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"OBX"
1	Set ID - OBX	1	R	OBX Sequence Number - 1
2	Value Type	3	R	'HD'
3	Observation Identifier	80	R	'^ASR Instance UID'
4	Observation Sub-ID	20	S	
5	Observation Value	64K	R	Report Instance UID
11	Observation Result Status	1	S	'F'

OBX Segment 2 - Study Instance UID OBX				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"OBX"
1	Set ID - OBX	1	R	OBX Sequence Number - 2
2	Value Type	3	R	'HD'
3	Observation Identifier	80	R	'AStudy Instance UID'
4	Observation Sub-ID	20	S	
5	Observation Value	64K	R	The Study Instance UID
11	Observation Result Status	1	S	'F'

OBX Segment 3 - Report Text OBX				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"OBX"
1	Set ID - OBX	1	R	OBX Sequence Number - 3
2	Value Type	3	R	'TX'
3	Observation Identifier	80	R	'ASR Text'
4	Observation Sub-ID	20	S	

OBX Segment 3 - Report Text OBX				
	HL7 Field Name	Len	R/S/O	Description
5	Observation Value	64K	R	The entire report text.
11	Observation Result Status	1	S	'F'

1.9 FT1 Segment - Financial Transaction Segment

FT1 Segment - Financial Transaction				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"FT1"
1	Set ID - FT1	4		
2	Transaction ID	12	S	
3	Transaction Batch ID	10	S	
4	Transaction Date	26	R	
5	Transaction Posting Date	26	R	
6	Transaction Type	8	R	'CG' - Charge, 'CD' - Credit, 'PY' - Payment, 'AJ' - Adjustment
7	Transaction Code	80	S	
8	Transaction Description	40	S	
9	Transaction Descr. Alt	40	O	
10	Transaction Quantity	6	S	
11	Transaction Amount - Extended	12	R	The total transaction amount for this transaction.
12	Transaction Amount - Unit	12	S	
13	Department Code	60	O	
14	Insurance Plan ID	60	S	Novarad Unique Identifier for the Insurance Plan
15	Insurance Amount	12	S	The allowed cost by this insurance.
16	Assigned Patient Location	80	O	
17	Fee Schedule	1	O	
18	Patient Type	2	O	
19	Diagnosis Code - FT1	60	S	The ICD Code referenced by this transaction.
20	Performed By Code	120	O	
21	Order By Code	120	O	
22	Unit Cost	12	S	
23	Filler Order Number	22	R	The Order Number provided by Novarad
24	Entered By Code	120	O	
25	Procedure Code	80	R	The procedure code (CPT) to be posted to by this transaction.
26	Procedure Code Modifier	80	S	This will usually be the HCFA code for the technical or professional cost. (i.e. 'TC', '26')

1.10 PR1 Segment - Procedures Segment

	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"PR1"
1	Set ID - PR1	4	R	Sequence number.
2	Procedure Coding Method	2	O	
3	Procedure Code	80	R	Code^{AAA}Alternate Code
4	Procedure Description	40	S	
5	Procedure Date/Time	26	S	
6	Procedure Funtional Type	2	S	
7	Procedure Minutes	4	O	
8	Anesthesiologist	120	O	
9	Anesthesia Code	2	O	
10	Anesthesia Minutes	4	O	
11	Surgeon	120	O	
12	Procedure Practitioner	230	O	
13	Consent Code	60	O	
14	Procedure Priority	2	O	
15	Associated Diagnosis Code	80	S	
16	Procedure Code Modifier	80	S	

1.11 IN1 Segment - Insurance Segment

IN1 Segment - Insurance				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"IN 1"
1	Set ID - IN1	4	R	
2	Insurance Plan ID	60	R	
3	Insurance Co ID	59	R	
4	Insurance Co Name	130	O	
5	Insurance Co Address	106	O	
6	Insurance Co Contact Person	48	O	
7	Insurance Co Ph Num	40	O	
8	Group Number	12	O	
9	Group Name	130	O	
12	Plan Effective Date	8	O	
13	Plan Expiration Date	8	O	
14	Authorization Info	55	O	
16	Name of Insured	48	O	
17	Insured's Relationship to Patient	2	O	
18	Insured's Date of Birth	26	O	
19	Insured's Address	106	O	
22	Coord. of Ben. Priority	2	O	
35	Company Plan Code	8	O	

IN1 Segment - Insurance				
	HL7 Field Name	Len	R/S/O	Description
36	Policy Number	15	O	
42	Insured's Employment Status	60	O	
43	Insured's Sex	1	O	
46	Prior Insurance Plan ID	8	O	
49	Insured's ID Number	12	O	

1.12 GT1 Segment - Guarantor Segment

GT1 Segment - Guarantor				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"GT1"
1	Set ID - GT1	4	R	
2	Guarantor Number	59	O	
3	Guarantor Name	48	R	Last^{A}First^{A}MI^{A}
5	Guarantor Address	106	O	
6	Guarantor Ph Num-Home	40	O	
7	Guarantor Ph Num-Business	40	O	
8	Guarantor Date/Time of Birth	26	O	
9	Guarantor Sex	1	O	
11	Guarantor Relationship	50	O	
12	Guarantor SSN	11	O	
20	Guarantor Employment Status	2	O	
22	Guarantor Billing Hold Flag	1	O	
30	Guarantor Marital Status	1	O	

1.13 MRG Segment - Patient Merge Segment

MRG Segment - Patient Merge Info				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"MRG"
1	Prior Patient ID - Internal	20	R	
2	Prior Alternate Patient ID	16	O	
3	Prior Patient Account Number	20	O	
4	Prior Patient ID - External	16	O	
5	Prior Visit Number	15	O	
6	Prior Alternate Visit ID	20	O	
7	Prior Patient Name	48	O	

1.14 DG1 Segment - Diagnosis Segment

DG1 Segment - Dia(gnosis Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"DG1"
1	Set ID	4	O	
3	Diagnosis Code	60	O	
4	Diagnosis Description	40	O	
5	Diagnosis Date/Time	26	O	
6	Diagnosis Type	2	O	
7	Major Diagnostic Category	60	O	
8	Diagnostic Related Group	4	O	
16	Diagnostic Clinician	60	O	[A]Last Name[A]First Name[A]Middle Initial

1.15 NTE Segment - Notes Segment

NTE Segment - Notes Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"NTE"
1	Set ID	4	O	
2		8	O	
3	Procedure Notes	64K	O	Comments

2. Outgoing Messages from Novarad.

Novarad sends the following message types (MSH [9]):

ADT -

A01 - Admit a Patient
A08 - Update Patient Information
A47 - Change Patient ID

ORM

O01 - General Order Message
Control Code (ORC [1]) :
NW - New Order
CA - Cancel Order
SC - Status Change
XO - Change Order

BAR

P01 - New Account P05 - Update Account

DFT

P03 - Post Detail Financial Transaction
Transaction Type (FT1 [6])
CG - Charge
CD - Credit PY -
Payment AJ -
Adjustment

MDM

T01 - Original Document Notification
T02 - Original Document Notification and Content
T09 - Document Replacement Notification

T10 - Document Replacement Notification and Content

ORU

R01 - Transmission of Observation

R05 - Proprietary Novarad Dictation Message

The following sections describe each of the segments expected in outgoing HL7 from Novarad. Input and output data mappings are summarized later on in this document. In the following tables, the column Len refers to the maximum length of this field, and R/S/O refers to whether or not this field is Required, Sometimes used, or Optional. Note that when a field is optional it should exist in the message, but be empty or filled with the null string.

2.1 MSH Segment - Message Header

MSH Segment - Message Header				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"MSH"
1	Field Separator	1	R	" |" or field separator used by sending application
2	Encoding Characters	4	R	"^~\&" or encoding characters used by sending application
3	Sending Application	180	R	This field uniquely identifies the sending application among all other applications within the network enterprise. The network enterprise consists of all those applications that participate in the exchange of HL7 messages within the enterprise. Entirely site-defined.
4	Sending Facility	180	R	This field contains the address of one of several occurrences of the same application within the sending system. Entirely user-defined.
5	Receiving Application	180	R	
6	Receiving Facility	180	R	
7	Date/Time of Message	26	R	Date/time message was produced
8	Security	40	O	
9	Message Type	7	R	"ORM^O01" or other valid message type
10	Message Control ID	20	R	Unique id for this message
11	Processing ID	3	R	This field is used to decide whether to process the message as defined in HL7 Application (level 7) Processing rules, above. Default to "P" for production.
12	Version ID	60	R	"2.3.1"
13	Sequence Number	15	O	

MSH Segment - Message Header				
	HL7 Field Name	Len	R/S/O	Description
14	Continuation Pointer	180	O	
15	Accept Acknowledgment Type	2	O	
16	Application Acknowledgment Type	2	O	
17	Country Code	2	O	
18	Character Set	6	O	
19	Principal Language	60	O	

2.2 EVN Segment - Event Type Segment

EVN Segment - Event				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"EVN"
1	Event Type Code	3	S	If present, its value shall be equal to the second component of the field MSH [9] - Message Type
2	Recorded Date/Time	26	R	Most systems will default to the system date/time when the transaction was entered.
3	Date/Time Planned Event	26	O	
4	Event Reason Code	3	O	
5	Operator ID	60	O	
6	Event Occurred	26	O	

2.3 PID Segment - Patient Identification Definition.

PID Segment - Patient Identification Definition				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"PID"
1	Set ID	4	O	
2	Patient ID External	20	S	When the patient is from another institution, outside office, etc., the identifier used by that institution can be shown in this field.
3	Patient ID Internal	20	R	Novarad Unique Patient ID.
4	Alternate Patient ID	20	O	
5	Patient Name	48	R	Last^{A}First^{A}MI^{A}
6	Mother Maiden Name	48	S	Last^{A}First^{A}MI^{A}
7	Date/Time Of Birth	26	R	DOB
8	Sex	1	R	Sex (M/F)
9	Patient Alias	48	O	

PID Segment - Patient Identification Definition				
	HL7 Field Name	Len	R/S/O	Description
10	Race	80	O	
11	Patient Address	106	S	Street1^A^Street2^A^City^A^State^A^Zip
12	County Code	4	S	ACR country code.
13	Home Phone	40	S	(Area code)Phone^AAA^e-Mail
14	Business Phone	40	S	(Area code)PhoneXExtensionAAAe-Mail
15	Patient Language	60	O	
16	Marital Status	1	S	D - Divorced, Married - M, S - Single
17	Religion	80	O	
18	Patient Account Number	20	S	
19	Patient SSN	16	S	Social Security Number or Other Patient Level Number
20	Drivers License Number	25	O	
21	Mother ID	20	O	
22	Ethnic Group	80	O	
23	Birth Place	60	O	
24	Multiple Birth Indicator	1	O	
25	Birth Order	2	O	
26	Citizenship	80	O	
27	Veteran's Military Status	60	O	
28	Nationality	80	O	
29	Patient Death Date/Time	26	O	
30	Patient Death Indicator	1	O	

2.4 PV1 Segment - Patient Visit Information.

PV1 Segment - Patient Visit Information				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"PV1"
1	Set ID	4	O	
2	Patient Class	1	O	This field is used by systems to categorize patients by site. I - Inpatient O - Outpatient
3	Assigned Patient Location	80	O	
4	Admission Type	2	O	
5	Pre-admit Number	20	O	
6	Prior Patient Location	80	O	
7	Attending Doctor	60	O	
8	Referring Doctor	60	S	ID NumberALastAFirstAMIAATitle
9	Constulting Doctor	60	O	
10	Hospital Service	3	O	
11	Temporary Location	80	O	
12	Pre-admit Test Indicator	2	O	
13	Readmission Indicator	2	O	

PV1 Segment - Patient Visit Information				
	HL7 Field Name	Len	R/S/O	Description
14	Admit Source	3	O	
15	Ambulatory Status	2	O	
16	VIP Indicator	2	O	
17	Admitting Doctor	60	O	
18	Patient Type	2	O	
19	Visit Number	20	O	The unique number assigned to each patient visit.
20	Financal Class	50	O	
21	Charge Price Indicator	2	O	
	Fields 22-43 are not used			
44	Admit Date/Time	26	O	Reflects the last visit date for the patient.
	Fields 44-52 are not used			

2.5 AL1 Segment - Allergy Information Segment

AL1 Segment - Changing Patient Identification				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"AL1"
1	Set ID	4	R	
2	Allergy Type	2	O	
3	Allergy Code/Mnemonic/Description	60	O	ID^A^Text
4	Allergy Severity	2	O	
5	Allergy Reaction	15	O	
6	Identification Date	8	O	

2.6 ORC Segment - Common Order Segment.

ORC Segment - Common Order Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"ORC"
1	Order Control	2	R	"NW" - new "XO" - change "CA" - cancel "SC" - Status Change
2	Placer Order Number	22	R	The Novarad Order #.
3	Filler Order Number	22	O	
4	Placer Group Number	22	O	
5	Order Status	2	O	
6	Response Flag	1	O	
7	Quantity/Timing	200	R	
8	Parent	200	O	
9	Date/Time of Transaction	26	R	

ORC Segment - Common Order Segment				
	HL7 Field Name	Len	R/S/O	Description
10	Entered By	120	S	
11	Verified By	120	O	
12	Ordering Provider	120	O	
13	Enterer's Location	80	O	
14	Call Back Phone	40	O	
15	Order Effective Date/Time	26	O	
16	Order Control Code Reason	200	O	
17	Entering Organization	60	O	
18	Entering Device	60	O	
19	Action By	120	O	

2.7 OBR Segment - Observation Request.

OBR Segment - Observation Request				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"OBR"
1	Set ID	4	O	
2	Placer Order Number	75	R	Novarad order #.
3	Filler Order Number	75	O	
4	Universal Service ID	200	R	
5	Priority	2	O	'S' for Stat.
6	Requested Date/Time	26	O	
7	Observation Date/Time	26	O	
8	Observation End Date	26	O	
9	Collection Volume	20	O	
10	Collector ID	60	O	
11	Specimen Action Code	1	O	
12	Danger Code	60	O	
13	Relevant Clinical Info	300	O	
14	Specimen Rcv'd Date	26	O	
15	Specimen Source	300	O	
16	Ordering Provider	80	O	
17	Order Call Back Phone	40	O	
18	Placer Field 1	60	S	Sometimes used for other site-defined procedure fields.
19	Placer Field 2	60	S	
20	Filler Field 1	60	S	
21	Filler Field 2	60	S	
22	Report Status Change Date/Time	26	O	
23	Charge To Practice	40	O	
24	Diagnostic Service Sect ID	10	R	Modality (i.e. 'MR', 'CT')
25	Results Status	1	S	

OBR Segment - Observation Request				
	HL7 Field Name	Len	R/S/O	Description
26	Parent Result	400	O	
27	Quantity Timing	200	R	^^^duration^start date/time^end date/time^priority^^^^
28	Result Copies To	150	O	
29	Parent	150	O	
30	Transportation Mode	20	O	
31	Reason For Study	300	S	Reason for procedure
32	Principle Result Interpreter	200	S	
33	Assistant Result Interpreter	200	O	
34	Technician	200	O	
35	Transcriptionist	200	O	
36	Scheduled Date	26	O	
37	# of Sample Containers	4	O	
38	Transport Logistics of Collected Sample	60	O	
39	Collector's Comment	200	O	
40	Transport Arrangement Responsibility	60	O	
41	Transport Arranged	30	O	
42	Escort Required	1	O	
43	Planned Patient Trans Comment	200	O	
44	Procedure Code	80	S	Code IDACode DescriptionAAAProcedure Description
45	Procedure Code Modifier	80	S	

2.8 FT1 Segment - Financial Transaction Segment

FT1 Segment - Financial Transaction				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"FT1"
1	Set ID - FT1	4		
2	Transaction ID	12	S	
3	Transaction Batch ID	10	S	
4	Transaction Date	26	R	
5	Transaction Posting Date	26	R	
6	Transaction Type	8	R	'CG' - Charge, 'CD' - Credit, 'PY' - Payment, 'AJ' - Adjustment
7	Transaction Code	80	S	
8	Transaction Description	40	S	
9	Transaction Descr. Alt	40	O	
10	Transaction Quantity	6	S	

FT1 Segment - Financial Transaction				
	HL7 Field Name	Len	R/S/O	Description
11	Transaction Amount - Extended	12	R	The total transaction amount for this transaction.
12	Transaction Amount - Unit	12	S	
13	Department Code	60	O	
14	Insurance Plan ID	60	S	Novarad Unique Identifier for the Insurance Plan
15	Insurance Amount	12	S	The allowed cost by this insurance.
16	Assigned Patient Location	80	O	
17	Fee Schedule	1	O	
18	Patient Type	2	O	
19	Diagnosis Code - FT1	60	S	The ICD Code referenced by this transaction.
20	Performed By Code	120	O	
21	Order By Code	120	O	
22	Unit Cost	12	S	
23	Filler Order Number	22	R	The Order Number provided by Novarad
24	Entered By Code	120	O	
25	Procedure Code	80	R	The procedure code (CPT) to be posted to by this transaction.
26	Procedure Code Modifier	80	S	This will usually be the HCFA code for the technical or professional cost. (i.e. 'TC', '26')

2.9 PR1 Segment - Procedures Segment

PR1 Segment - Procedures				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"PR1"
1	Set ID - PR1	4	R	Sequence number.
2	Procedure Coding Method	2	O	
3	Procedure Code	80	R	Code^{AAA}Alternate Code
4	Procedure Description	40	S	
5	Procedure Date/Time	26	S	
6	Procedure Funtional Type	2	S	
7	Procedure Minutes	4	O	
8	Anesthesiologist	120	O	
9	Anesthesia Code	2	O	
10	Anesthesia Minutes	4	O	
11	Surgeon	120	O	
12	Procedure Practitioner	230	O	
13	Consent Code	60	O	
14	Procedure Priority	2	O	
15	Associated Diagnosis Code	80	S	
16	Procedure Code Modifier	80	S	

2.10 IN1 Segment - Insurance Segment

IN1 Segment - Insurance				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"IN1"
1	Set ID - IN1	4	R	
2	Insurance Plan ID	60	R	
3	Insurance Co ID	59	R	
4	Insurance Co Name	130	O	
5	Insurance Co Address	106	O	
6	Insurance Co Contact Person	48	O	
7	Insurance Co Ph Num	40	O	
8	Group Number	12	O	
9	Group Name	130	O	
12	Plan Effective Date	8	O	
13	Plan Expiration Date	8	O	
14	Authorization Info	55	O	
16	Name of Insured	48	O	
17	Insured's Relationship to Patient	2	O	
18	Insured's Date of Birth	26	O	
19	Insured's Address	106	O	
22	Coord. of Ben. Priority	2	O	
35	Company Plan Code	8	O	
36	Policy Number	15	O	
42	Insured's Employment Status	60	O	
43	Insured's Sex	1	O	
46	Prior Insurance Plan ID	8	O	
49	Insured's ID Number	12	O	

2.11 GT1 Segment - Guarantor Segment

GT1 Segment - Guarantor				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"GT1"
1	Set ID - GT1	4	R	
2	Guarantor Number	59	O	
3	Guarantor Name	48	R	
5	Guarantor Address	106	O	
6	Guarantor Ph Num-Home	40	O	
7	Guarantor Ph Num-Business	40	O	

GT1 Segment - Guarantor				
	HL7 Field Name	Len	R/S/O	Description
8	Guarantor Date/Time of Birth	26	O	
9	Guarantor Sex	1	O	
11	Guarantor Relationship	50	O	Guardian, Parent, Self, Spouse, Other
12	Guarantor SSN	11	O	
20	Guarantor Employment Status	2	O	
22	Guarantor Billing Hold Flag	1	O	
30	Guarantor Marital Status	1	O	

2.12 NTE Segment - Notes Segment

NTE Segment - Notes Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"NTE"
1	Set ID	4	O	
2		8	O	
3	Procedure Notes	64K	O	Comments

2.13 OBX Segment - Report Text Segment

Most of our ORU processors are IHE compliant and will only send out an ORU with a single OBX segment, but we also have a Fixed Length OBX processor that will send the ORU out with multiple OBX segments, each with a configurable fixed length.

OBX Segment - Report Text Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"OBX"
1	Set ID - OBX	1	R	OBX Sequence Number
2	Value Type	3	R	'TX' or 'HTML'
3	Observation Identifier	80	R	'ASR Text'
4	Observation Sub-ID	20	S	
5	Observation Value	64K	R	The entire report text.
11	Observation Result Status	1	S	'F'

2.14 TXA Segment - Transcription Document Header Segment

TXA Segment - Transcription Document Header Segment				
	HL7 Field Name	Len	R/S/O	Description
	Segment ID	3	R	"TXA"
1	Set ID - OBX	4	O	
2	Document Type	3	R	
3	Document Content Type	2	S	

TXA Segment - Transcription Document Header Segment				
	HL7 Field Name	Len	R/S/O	Description
4	Activity Date/Time	26	O	Procedure Date
5	Primary Activity Provider Code/Name	60	S	Assigned Physician
6	Origination Date/Time	26	O	
7	Transcription Date/Time	26	S	
8	Edit Date/Time	26	O	
9	Originator Code/Name	60	O	Reporting Physician
10	Assigned Document Authenticator	60	O	Assigned Signing Physician
11	Transcriptionist Code/Name	48	S	Transcriptionist
12	Unique Document Number	30	R	
13	Parent Document Number	30	S	
14	Placer Order Number	22	O	
15	Filler Order Number	22	O	
16	Unique Document File Name	30	O	
17	Document Completion Status	2	R	
18	Document Confidentiality Status	2	O	
19	Document Availability Status	2	O	
20	Document Storage Status	2	O	
21	Document Change Reason	30	S	
22	Authentication Person, Time Stamp	60	S	Signing Physician
23	Distributed Copies (Code and Name of Recipients)	60	O	

2.15 Batching

Outbound HL7 messages can be sent in real time over a socket (default), or they can be set up to be sent out in batches (with either a single message per file or with multiple messages per file). Files will be named using the following naming convention:

<IP>\<Port>-<Date/Time>-<Message Type>

The 'Date/Time' part of the file name will be in one of the following formats: single message per file:

<yyyyMMddHHmmssffff> multiple messages per file: <yyyyMMdd>

3. Triggers

In this section is a description of what triggers each type of message NovaRIS sends outbound.

ADT -

A01 - A patient record is created in the RIS.
A08 - A patient record is altered in the RIS A18
- A patient is merged with another patient A47

- A patient's ID is changed in the RIS

ORM

O01 - General Order Message Control Code

(ORC [1]) :

NW - A new Order/Procedure has been created CA - An Order/Procedure has been cancelled SC - The status of an Order/Procedure has changed XO - An Order/Procedure has been altered

BAR

P01 - A new Patient Account has been created

P05 - A Patient Account has been altered

DFT

P03 - Post Detail Financial Transaction

Transaction Type (FT1 [6])

CG - A charge to the account has been submitted

CD - A credit to the account has been submitted

PY - A payment to the account has been made AJ - An adjustment to the account has been made

MDM

T01 - A report has been created T02 - A report has been created

T09 - A report has been signed, altered, finalized or distributed

T10 - A report has been signed, altered, finalized or distributed

ORU

R01 - A report has been created, signed, altered, finalized or distributed

R05 - A dictation has been created

4. URLs for Viewing Images in the PACS.

NovaRIS has the ability to specify a URL for viewing of images in the PACS. Since the ampersand (&) is normally used as a delimiter in HL7, we escape them using '\T\'. So the resulting URL will look something like this:

http://IPADDRESS/NovaWeb/Webviewer/Account/ValidateUserFromURL?Guid=xxxxx\T\Salt=xxxx

The recipient system of these messages will need to translate the '\T\' escape sequences back into ampersands.

5. Acknowledgement Messages.

For each outgoing Novarad message, an acknowledgment message should be generated. Per the HL7 specification, three acknowledgement codes are supported:

AA - Application Accept, the message was processed successfully.
AR - Application Reject, means specifically that the MSH segment was not valid, the message type is not acceptable, or there was a failure to process (reject) the message for reasons unrelated to its content or format (system down, internal error, etc.).

AE - Application Error, all other errors. This includes non-MSH segment errors, processing errors, invalid data errors, etc.

An acknowledgment message consists of:

MSH

MSA

Acknowledgements are based on physical messages. On all 'AR' or 'AE' ACK messages, the sender must fix the problem and resend the entire logical message.

3.1 MSA Segment - Message Acknowledgment.

MSA Segment - Message Acknowledgment				
	HL7 Field Name	Len	R/S/N	Description
	Segment ID	3	R	"MSA"
1	Acknowledgment Code	2	R	^ ^ ^ ^
2	Message Control ID	20	R	Identifier for the message being acknowledged.
3	Text Message	80	S	If "AE", or "AR", then contains text description of error or reason.
4	Expected Sequence Number	15	S	
5	Delayed Ack Type		N	
6	Error Condition		N	

Glossary

HL7 (Health Level Seven)- A standard protocol that defines how health related information is transferred from one software application to another via messages. A message is just something that one software application is trying to say another. HL7 defines the types of messages that can be sent and their structure. The "Level Seven" in the HL7 refers to the 7th layer (Application Layer)of the OSI network model .

Message - A stream of characters that are interpreted as an atomic unit of data that one system is giving to another. Alternatively a message can be viewed as a piece of information that one system is giving another. Different types of messages contain different types of information for example a patient admission might trigger an ADT^A^A01 message.

IHE - Integrating the Healthcare Enterprise - IHE is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care. Systems developed in accordance with IHE communicate with one another better, are easier to implement, and enable care providers to use information more effectively.