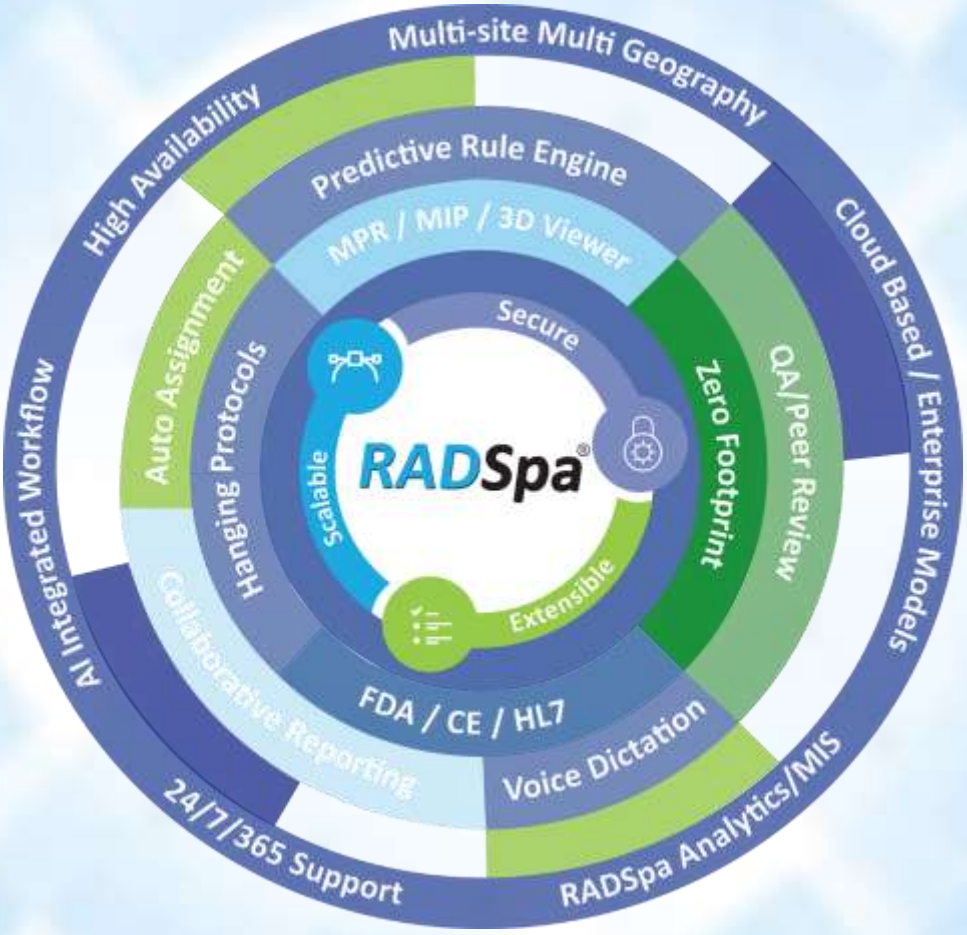
Telerad Tech®
Smarter Healthcare On Demand



RADSpa®
HL7 Conformance Statement

RADSpa® is Telerad Tech's Next Generation AI Integrated Radiology Workflow Platform with an Integrated RIS-PACS, designed to scale from a standalone diagnostics center to Large Scale Multi-Site Multi-Geography radiology centers & hospitals. RADSpa is available in Cloud, Enterprise, and OEM Licensing models

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1. Introduction

This document is the HL7 conformance statement for the RADSpa software developed by Telerad Tech Pvt. Ltd. This document contains details on how various components of the RADSpa software interfaces with other devices and applications that conform to the HL7 2.x (until version 2.5.1) standard. It is understood that the user is familiar with the HL7 standard and related concepts.

RADSpa communicates over TCP/IP communication protocol.

2. Implementation Model

2.1. HL7 Interface Diagram

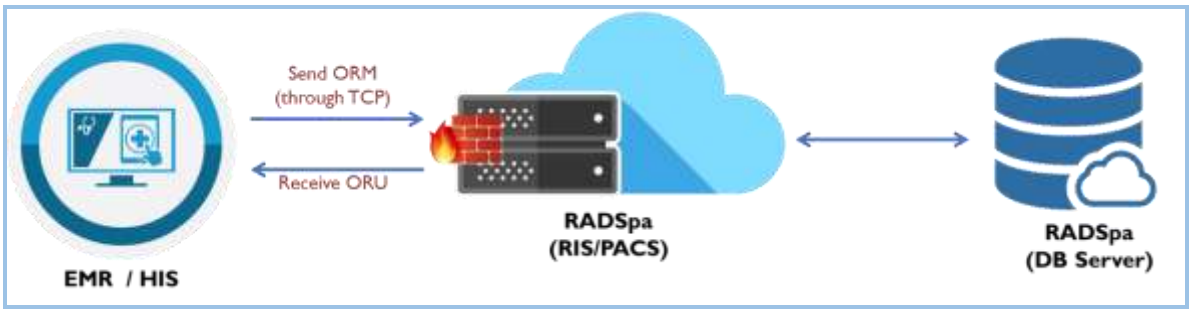

Fig1: Generic HL7 Integration Topology

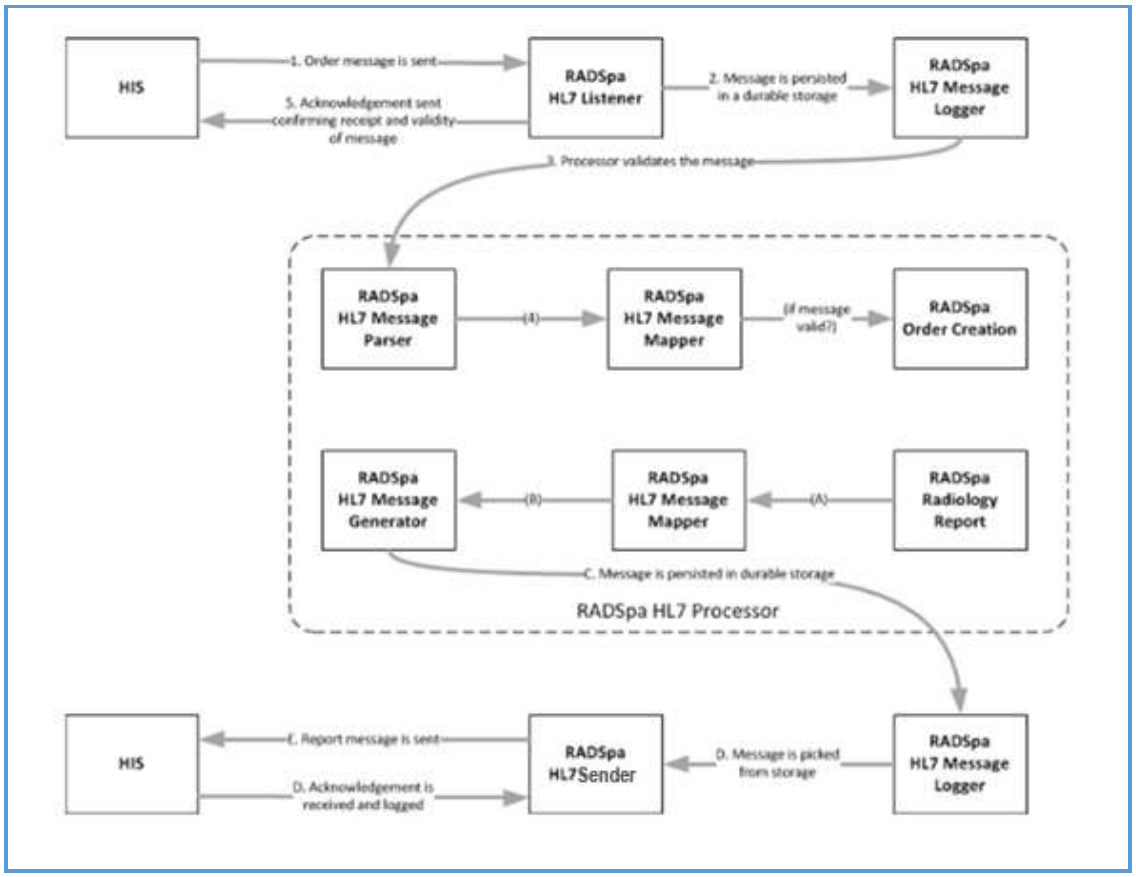

Fig2: RADSpa HL7 message processing

2.2. Sequencing of Real-World Activities

A patient gets registered in a hospital/healthcare facility through the EMR / EHR / HIS (Hospital Information System). If the patient requires any radiology services (CT /MR / X-ray scans etc.) as recommended by the consultant physician, the order is created in HIS and the same order information is transmitted to RADSpa through a HL7 message as ORM. After the order is received in RADSpa and the corresponding DICOM images arrives, the records is ready for further diagnose by the specialized radiology in Radiology department. Radiologist proceed with the diagnosis of the images with the patient demographics captured in the order details send through HL7. A radiology report with the findings and impression gets generated. This final report is sent back to EMR / EHR / HIS through a HL7 ORU message.

3. Message Specifications

3.1. Message Types / events Supported

3.1.1 Inbound Messages

The following inbound message events can be used to create a RIS order in RADSpa. We, at present do not support creating multiple order using one message and updating orders through HL7 message.

Message Type Trigger	Message Description	Comments
ORM_O01	General Order Message	V2.1 onwards
OMG_O19	General Clinical Order Message Status	V2.4 onwards
OMI_O23	Imaging Order Message	V2.5 onwards
ADT_A08	Patient Administration Message (used for Order creation)	V2.1 onwards (As per HL7 standards ADT is not suggestible to be used for Order creation)

In ORM, **ORC1^1** must have **NW** for order creation, **XO** for the update and **CA** for Cancellation

3.1.2 Outbound Messages

The following outbound message event is used to send back the radiology report created in RADSpa.

Message Type Trigger	Message Description	Comments
ORU_R01	Report Message	V2.1 onwards

3.1.2.1 ORU_R01 Sample Messages

The following are the sample ORU sample messages and types created to send radiology report through RADSpa.

Report in Text Format

■ Sample ORU format (Normal Report)

MSH|^~\&||RADSPA||RECEIVING
FACILITY|20170412095247||ORU^R01|20170412095247349578|P|2.4
PID|1||MRN||DOE^JOHN||20030306000000|M
PV1|1
ORC|RE
OBR|1||2820063163532|1002^USTESTICLE|||20170412095247||||||||||||||||||N|||||||72&Mark , MD&Jack
OBX|1|TX|US^USTESTICLE||Sample Test Report: CT Scan of Brain Technique: Spiral CT aquisition of the brain was performed on a 16 slice CT scanner Findings: Ventricular system is normal A large well defined wedge shaped area of hypodensity involving the right caudate nucleus, basal ganglia extending into themiddle frontal gyrus , temporoparietal lobes in the distribution of right middle cerebral artery territory..s/o subacute infarct Few gyriform hyperdensities noted within..likely reperfusion injury.|||||F

■ Sample ORU format (Addendum Report)

MSH|^~\&||RADSPA|| RECEIVING
FACILITY|20170412095247||ORU^R01|20170412095247349578|P|2.4
PID|1||MRN||DOE^JOHN||20030306000000|M
PV1|1
ORC|AD
OBR|1||2820063163532|1002^USTESTICLE|||20170412095247||||||||||||||||||N|||||||72&Mark , MD&Jack
OBX|1|TX|US^USTESTICLE||Sample Addendum Test Report: CT Scan of Brain Technique: Spiral CT aquisition of the brain was performed on a 16 slice CT scanner Findings: Ventricular system is normal A large well defined wedge shaped area of hypodensity involving the right caudate nucleus, basal ganglia extending into the middle frontal gyrus, temporoparietal lobes in the distribution of right middle cerebral artery territory..s/o subacute infarct Few gyriform hyperdensities noted within..likely reperfusion injury./||||||A

Report PDF URL

■ Sample ORU format (Normal Report)

The Report link to be framed in HIS application will be as shown below,

https://<HIS IP or domainname>/Reporting/ViewReport/ViewReportPdf?reportKey=<EncryprtedReportKey>&appKey=<RSWellViewRpt>

http://192.168.0.X/Reporting/ViewReport/ViewReportPdf?reportKey=86iWkWV4gnE=&appKey=RSWellViewRpt

1. reportKey=<EncryprtedReportKey>

This Report key is seen in ORU message and it changes for every report, currently it is mapped to OBR 21.1 (Filler Field 2) as shown in ORU message example below.

2. appKey=RSWellViewRpt

This is a static data.

Example:

Below given is an example of ORU message which has encrypted Report Key (marked in yellow),

MSH|^~\&||RADSPA||RECEIVING
FACILITY|20170412095247||ORU^R01|201704120952472349578|P|2.4
PID|1||MRN||DOE^JOHN||20030306000000|M
PV1|1
OBR|1|||CT^CT ABDOMEN NON
CONTRAST|||20150806114250|||||||||||||**86iWkWV4gnE**||||F|||||||72&Mark, MD&Jack
OBX|1|TX|US^USTESTICLE||Sample Test Report: CT Scan of Brain Technique: Spiral CT aquisition of the brain was performed on a 16 slice CT scanner Findings: Ventricular system is normal A large well defined wedge shaped area of hypodensity involving the right caudate nucleus, basal ganglia extending into themiddle frontal gyrus , temporoparietal lobes in the distribution of right middle cerebral artery territory..s/o subacute infarct Few gyriform hyperdensities noted within..likely reperfusion injury.|||||F

A particular IP or a range of IP's will be allowed to access this link so that RIS server will validate the IP and open the link in browser. If the IP is not present in the config shown below, link will not be opened in the browser.
Error message will be as below,

{"Error":"Unauthorized access!! The IP (106.51.15.158) requesting the report is not registered with RADSpa. Please check with RADSpa admin."}

Report in HTML Text Format

■ Sample ORU format (Normal Report)

MSH|^~\&||RADSPA||RECEIVING
FACILITY|20170412095247||ORU^R01|201704120952472349578|P|2.4
PID|1||MRN||DOE^JOHN||20030306000000|M
PV1|1||EOP
ORC|RE
OBR|1|64783060000400||CTAPW^CT ABD PELVIS
WITH^CT||||20170412095247||8480245||||||||||||||P||||||ABD PAIN - LOOK FOR FREE
FLUID|72&Mark, MD&Jack|||72&Mark, MD&Jack
OBX|1|TX|CT^CT ABD PELVIS WITH||/.br/CT abdomen and pelvis with intravenous contrast./.br//.br/Clinical indication: Abdominal pain, looking for free fluid./.br//.br/Comparison: None/.br//.br/Findings:/.br/The lung bases are clear./.br//.br/The liver, gallbladder, pancreas, spleen and adrenals are unremarkable. Small bilateral renal cysts are noted./.br//.br/There is no bowel obstruction. The appendix is within normal limits. There are a few dilated loops of small bowel, likely due to an ileus. There is no mesenteric or retroperitoneal mass or adenopathy. The abdominal aorta is unremarkable./.br//.br/The urinary bladder is unremarkable. No pelvic mass or fluid collection is seen. There is no free fluid or free air. /.br//.br/Mild degenerative changes are seen throughout the thoracic and lumbar spine./.br//.br/Impression:/.br/No evidence of acute intra-abdominal or pelvic pathology ./.br/Specifically no free fluid./.br/@/.br/ Signed by: Jack Mark,MD

Component ID	Name	Value	ORU Information
MSH-0.1	Segment Name	MSH	
MSH-1.1	Field Separator	|	
MSH-2.1	Encoding Character	^~\&	
MSH-4.1	Sending Facility	RADSPA	
MSH-6.1	Receiving Facility	RECEIVING FACILITY	
MSH-7.1	Date/Time of Message	20170412154553	
MSH-9.1	Message Type-|-Message Code	ORU	
MSH-9.2	Message Type-|-Trigger Event	R01	
MSH-10.1	Message Control ID	0230956208	
MSH 11.1	Processing ID	P	
MSH-12.1	Version ID	2.4	
PID-0.1	Segment Name	PID	
PID-1.1	Set ID-PID	1	
PID-3.1	Patient Identifier List	609749	Patient Medical Record Number
PID-5.1	Patient Name-|-Family Name	DOE	Patient Last Name
PID-5.2	Patient Name-|-Given Name	JOHN	Patient First Name
PID-7.1	Date/Time of Birth	20010521	Patient Date of birth
PID-8.1	Administrative Sex	M(Male)/F(Female)	Gender
PV1-0.1	Segment Name	PV1	
PV1-1.1	Set ID-PV1	1	
PV1-2.1	Patient Class	O	Patient Type
ORC-0.1	Segment Name	ORC	

ORC-1.1	Order Control	RE	RE(Normal Report) AD(Addendum Report)
OBR-0.1	Segment Name	OBR	
OBR-1.1	Set ID-OBR	1	
OBR-3.1	Filler Order Number	2820063163532	Accession Number
OBR-4.1	Universal Service Identifier-|-Identifier	1002	Procedure Code
OBR-4.2	Universal Service Identifier-|-Text	USTESTICLE	Procedure Description
OBR-7.1	Observation date/Time	20170412095247	
OBR-25.1	Result Status	N	
OBR-32.1	Principal Result Interpreter	72&Mark, MD&Jack	Reporting Radiologist ID,Firstname,lastname
OBX-0.1	Segment Name	OBX	
OBX-1.1	Set ID-OBX	1	
OBX-2.1	Value Type	TX	
OBX-3.1	Observation Identifier-|-Identifier	US	Modality Code
OBX-3.2	Observation Identifier	USTESTICLE	Procedure description
OBX-5.1	Observation Value	Report Text	Report Text(Plain Report Text)
OBX-11.1	Observation Result Status	F	F-Normal Report A-Addendum Report

3.2 Segments Supported

3.2.1 Order Messages (ORM, OMG, OMI, ADT)

Segment	Requirement	Comments
MSH	R	
PID	R	
PV1	O	
ORC	R	
OBR	R	
OBX	O	
EVN	R	
PR1	O	

3.2.2 Acknowledgement Message (ACK, ORR)

Segment	Requirement	Comments
MSH	R	
MSA	R	

3.2.3 Report Message (ORU)

Segment	Requirement	Comments
MSH	R	
PID	R	
PV1	O	
PV2	O	
ORC	O	
OBR	R	
OBX	R	

3.2.4 Segment Details

The following are the segment fields which are required for the successful Order Creation in RADSpa. Also the information in other HL7 fields can also be used for augmenting the Order information using the interactive Mapper module.

3.2.4.1 MSH

RADSpa Order Field Name	HL7 Field Name	Seq No.	Len	IsRepeating	IsRequired	Comments
	Field Separator	1	1	N	R	Not needed in order creation but required for parsing the message
	Encoding characters	2	2	N	R	Not needed in order creation, but required for parsing the message
Study Source \ Hospital	Sending Facility	4	227	N	R	Mandatory and the study source need to be registered with RADSpa so that identified correctly during order creation.
Radiology Service Provider	Receiving Facility	6	227	N	R	Mandatory and the targeted RSP also needs to be registered in RADSpa.
Order Request Time	Date\time of Message	7	26	N	R	
	Message Type	8	15	N	R	Required to identify & parse the message
	Message control Id	10	20	N	R	Required while acknowledging the message

3.2.4.2 PID

RADSpa Order Field Name	HL7 Field Name	Seq No.	Len	IsRepeating	IsRequired	Comments
MR Number	Patient Id ^ID Number	2^1	20	N	C	Either Patient Id or Patient Identifier List need to be specified. Patient Identifier List is the suggested field to transmit the MR number
MR Number	Patient Identifier List^ID Number	3^1	250	Y	C	Either Patient Id or Patient Identifier List need to be specified. Patient Identifier List is the suggested field to transmit the MR number
Patient First Name	Patient Name^Given Name	5^2	250	Y	R	
Patient Middle Name	Patient Name^ Second and Further Given Names or Initials Thereof	5^3	O	Patient Middle Name	Patient Name^ Second and Further Given Names or Initials Thereof	
Patient Last Name	Patient Name^Family Name&Surname	5^1&1	R	Patient Last Name	Patient Name^Family Name&Surname	
Patient DOB	Date\Time of Birth	7	26	N	O	
Patient Gender	Administrative Sex	8	1	N	O	Either any one of the Codes M/F/U (Male/Female/Unknown)
Patient Address	Patient Address	11	250	Y	O	

3.2.4.3 PV1

RADSpa Order Field Name	HL7 Field Name	Seq No.	Len	IsRepeating	IsRequired	Comments
Patient Type	Patient Class	2	1	N	R	The field values follow the code table as specified in HL7 Standard. If PV1 is not specified the default value created in the Order is Out Patient.

3.2.4.4 ORC

RADSpa Order Field Name	HL7 Field Name	Seq No.	Len	IsRepeating	IsRequired	Comments
	Order Control	1	2	N	R	Currently only Create Order (value – 'N') is supported.
	Placer Order Number	2	22	N	C	Required to Identify the message order. Also the value specified here is used while sending the report back.
Order Id	Filler Order Number	3	22	N	C	Required to Identify the message order in case of ORM/ Will be sent in the Report message.

3.2.4.5 OBR

RADSpa Order Field Name	HL7 Field Name	Seq No.	Len	IsRepeating	IsRequired	Comments
Modality	Universal Service Identifier^Identifier \ Diagnostic Sect Id	4^1 \ 24	250 \10	N	R	Modality detail needs to be mandatory while creating RIS order

Clinical History	Relevant Clinical Information	13	300	N	O	
Procedure	Universal Service Identifier^Text \ Procedure Code	4^2 \ 44	250		O	If no information about procedure is available, then order is created with a default value of "Unknown" which can be later changed to the appropriate procedure while reporting. Also the list of Procedures should be provided that would be imported in RADSpa repository for proper identification during Order creation.

3.2.4.6 IPC: (available only in OMI message)

RADSpa Order Field Name	HL7 Field Name	Seq No.	Len	IsRepeating	IsRequired	Comments
Modality	Modality	5	16	N	R	Modality is mandatory in creating a RIS order
Procedure	Protocol Code	6	250	Y	O	
Study UID	Study Instance UID	3	70	N	O	Unique UID generated by the modality

3.2.4.7 PR1: (available only in ADT message)

RADSpa Order Field Name	HL7 Field Name	Seq. No.	Len	IsRepeating	IsRequired	Comments
Modality	Procedure Code^Identifier \ Procedure Code^Text	3^1 \ 3^2	16	N	R	Modality is mandatory in creating a RIS order
Procedure	Procedure Code^Text \ Procedure Code^Name of Coding System \ Procedure Description	3^2 \ 3^3 \ 4	250 \ 40	Y	O	
	Set ID	1	4	N	R	Unique Id of the segment as OBX is a repeating segment
	Value Type	2	3	N	R	Specifies the type of HL7 data in OBX-5. In RADSpa ORU it is always “TX”
Modality	Observation Identifier^Identifier	3^1	20	N	R	Modality of the Study reported.
Procedure	Observation Identifier^Text	3^2	60	N	R	Procedure of the Study reported
Findings / Impression	Observation Value	5		N	R	The report observation details. The findings and impression can be split into multiple OBX segments as per the requirement.

4. Communication Profiles

RADSpa uses TCP/IP communication protocol, with the wrapping protocol - HL7 Minimal Lower Layer Protocol (MLLP) to send and receive messages. UTF8 encoding is used to transfer data between the applications.

5. Extended Character Set Support

RADSpa HL7 engine is compatible with the ASCII character set.