



## **MedDream PACS HL7 Interface Specification**

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# 1 Introduction

MedDream PACS is a DICOM 3.0 compliant PACS. Server provides connectivity to all DICOM modalities (CT, MR, CR, DX, US, etc.). Retrieving of DICOM images can be done using MedDream WEB DICOM Viewer or any DICOM enabled third party workstation.

## Features

- Fully compatible with DICOM 3.0 protocol.
- Supported storage(C-STORE), query(C-FIND), retrieval(C-GET), and transfer(C-MOVE) services
- Web-based administration. User access control
- Implicit Little Endian, Explicit Little Endian, JPEG, JPEG-LS and RLE Transfer Syntaxes supported
- Automatic image routing
- Synchronization with Remote Studies
- MedDream WEB Viewer.
- HL7 Interface (optional)
- One-year technical support

MedDream PACS consists of the following components:

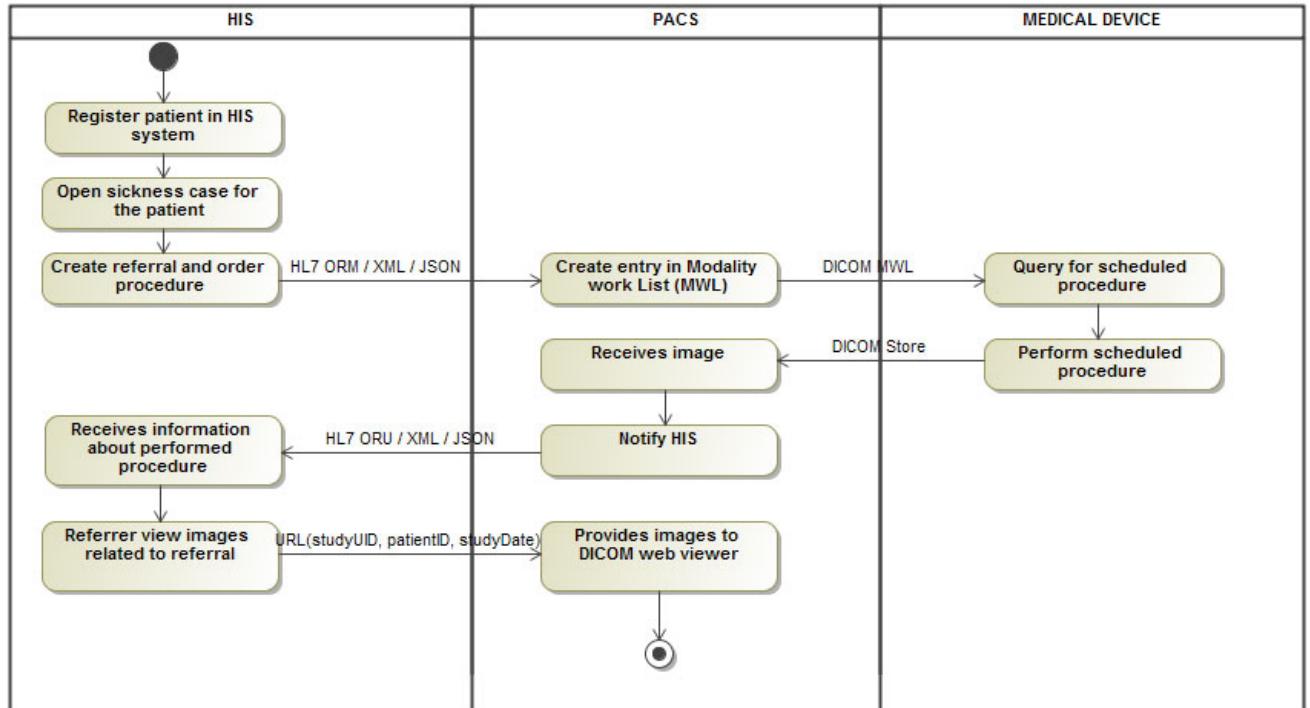
- A DICOM protocol server for servicing requests for image storage, query and retrieval, forwarding, routing, printing images, and Dicom-formatted media interchange through import and export functions.
- MySQL or Oracle databases for managing image records and related patient, study, series information.
- Apache 2.x HTTP server and PHP scripting engine for presenting a web-based user interface for browsing and managing database records.
- ImageMagick PHP module for displaying Dicom images through client's web browsers.
- An optional HL7 Message Listener module for receiving and sending HL7 messages via Lower-Level

Transport Protocol (LLTP) The benefits of MedDream PACS over the traditional PACS servers are:

- It is low cost since it uses open source MySQL database and Apache web servers.
- It makes the life of a PACS administrator a lot easier since there is only ONE instead of multiple servers or boxes to maintain.
- Users can freely choose their favourite server platform or hardware, whether it is a PC, workstation, fully-fledged server with RAID disk arrays or even a laptop, to install and run MedDream PACS software.
- Users can freely choose their favourite operating system software, whether it is Linux, Mac OS X, Windows NT, Windows 2000, Windows XP, Windows 2003 Server or Vista.
- Archiving of the PACS database is just as simple as backing up files on a regular server, which makes MedDream PACS fit seamlessly into the rest of IT infrastructure of the entire organization. A PACS administrator has the freedom to choose their favourite backup solutions, software and/or archive media.

Purpose of this document is to cover message exchange using HL7 Version 2.x standard.

## 2 General Main Workflow



## 3 Radiology Interface description

The following messages may be implemented:

Table 1. Radiology interface message types

HL7 Message	From	TO	Communication
ORM	HIS	PACS	Socket
ORU	PACS	HIS	Socket

### 3.1 HL7 Header Segment Definition

#### 3.1.1 MSH

Table 2. MSH segments

SEQ	LEN	DT	OPT	ITEM# ELEMENT NAME	Description
1.	1	ST	R	Field Separator	
2.	4	ST	R	Encoding characters	^~\&
3.	180	HD	R	Sending application	HIS
4.	180	HD	R	Sending facility	HIS name
5.	180	HD	O	Receiving application	

6.	180	HD	O	Receiving facility	
7.	26	TS	O	Date/Time of message	
8.	40	ST	O	Security	
9.	7	CM	R	Message type	Message Code
10.	20	ST	R	Message control ID	Interface transaction sequence number
11.	3	PT	R	Processing ID	"P"=Production
12.	60	VID	R	Version ID	2.3.1
13.	15	NM	O	Sequence number	
14.	180	ST	O	Continuation pointer	
15.	2	ID	O	Accept acknowledgment type	
16.	2	ID	O	Application acknowledgment type	
17.	2	ID	O	Country code	
18.	10	ID	O	Character set	
19.	60	CE	O	Principal language of message	

**3.1.2 PID**

Table 3. PID segments

SEQ	LEN	DT	OPT	ITEM# ELEMENT NAME	Description
1.	4	SI	O	Set ID - PID	"1"
2.	20	CX	O	Patient ID	Patient National ID
3.	20	CX	R	Patient Identifier List	Patient MRN
4.	20	CX	O	Alternate Patient ID - PID	
5.	48	XPN	R	Patient Name	Last Name^First Name^Second Name^Third Name^Fourth Name^title
6.	48	XPN	O	Mother's Maiden Name	
7.	26	TS	O	Date/Time of Birth	
8.	1	IS	O	Sex	
9.	48	XPN	O	Patient Alias	
10.	80	CE	O	Race	
11.	106	XAD	O	Patient Address	
12.	4	IS	O	County Code	

13.	40	XTN	O	Phone Number	
14.	40	XTN	O	Phone Number - Business	
15.	60	CE	O	Primary Language	
16.	80	CE	O	Marital Status	
17.	80	CE	O	Religion	
18.	20	CX	O	Patient Account Number	
19.	16	ST	O	SSN Number - Patient	
20.	25	DLN	O	Driver's License Number - Patient	
21.	20	CX	O	Mother's Identifier	
22.	80	CE	O	Ethnic Group	
23.	60	ST	R	Birth Place	
24.	1	ID	O	Multiple Birth Indicator	
25.	2	NM	O	Birth Order	
26.	80	CE	O	Citizenship	
27.	60	CE	O	Veterans Military Status	
28.	80	CE	O	Nationality	
29.	26	TS	O	Patient Death Date and Time	
30.	1	ID	O	Patient Death Indicator	

### 3.1.3 PV1

Table 4. PV1 segments

SEQ	LEN	DT	OPT	ITEM# ELEMENT NAME	Description
1.	4	SI	O	Set ID - PV1	
2.	1	ID	R	Patient Class	Refer in Annex A., Annex Table 1. Patient classes
3.	80	PL	O	Assigned Patient Location	
4.	2	ID	O	Admission Type	
5.	20	CX	O	Pre-admit Number	
6.	80	PL	O	Prior Patient Number	
7.	60	XC	O	Attending Doctor	
8.	60	XC	O	Referring Doctor	
9.	60	XC	O	Consulting Doctor	
10.	3	ID	O	Hospital Service	
11.	80	PL	O	Temporary Location	
12.	2	ID	O	Pre-admit Test Indicator	
13.	2	ID	O	Re-admission Indicator	

14.	3	ID	O	Admit Source	
15.	2	ID	O	Ambulatory Status	
16.	2	ID	O	VIP Indicator	
17.	60	XCN	O	Admitting Doctor	
18.	2	ID	O	Patient Type	
19.	20	CX	O	Visit Number	
20.	50	FC	O	Financial Class	
21.	2	ID	O	Charge Price Indicator	
22.	2	ID	O	Courtesy Code	
23.	2	ID	O	Credit Rating	
24.	2	ID	O	Contract Code	
25.	8	DT	O	Contract Effective Date	
26.	12	NM	O	Contract Amount	
27.	3	NM	O	Contract Period	
28.	2	ID	O	Interest Code	
29.	1	ID	O	Transfer to Bad Debt Code	
30.	8	DT	O	Transfer to Bad Debt Date	
31.	10	ID	O	Bad Debt Agency Code	
32.	12	NM	O	Bad Debt Transfer Amount	
33.	12	NM	O	Bad Debt Recovery Amount	
34.	1	ID	O	Delete Account Indicator	
35.	8	DT	O	Delete Account Date	
36.	3	ID	O	Discharge Disposition	
37.	25	CM	O	Discharged to Location	
38.	80	CE	O	Diet Type	
39.	2	ID	O	Servicing Facility	
40.	1	ID	O	Bed Status	
41.	2	ID	O	Account Status	
42.	80	PL	O	Pending Location	
43.	80	PL	O	Prior Temporary Location	
44.	26	TS	O	Admit Date/Time	
45.	26	TS	O	Discharge Date/Time	
46.	12	NM	O	Current Patient Balance	
47.	12	NM	O	Total Charges	
48.	12	NM	O	Total Adjustments	
49.	12	NM	O	Total Payments	
50.	20	CX	O	Alternate Visit ID	
51.	1	ID	O	Visit Indicator	
52.	60	XC	O	Other Healthcare Provider	



### 3.1.4 ORC

Table 5. ORC segments

SEQ	LEN	DT	OPT	ITEM# ELEMENT NAME	Description
1.	2	ID	R	Order control	"NW=New order CA=Cancel order request XO=Change order request SC=Status changed"
2.	22	EI	R	Placer order number	Accession Number
3.	22	EI	O	Filler order number	
4.	22	EI	R	Placer group number	Scheduled AE Station Title
5.	2	ID	O	Order status	
6.	1	ID	O	Response flag	
7.	200	TQ	R	Quantity/timing	Components: <Quantity (CQ)> ^ <Interval (RI)> ^ <Duration (ST)> ^ <Start Date/Time (DTM)> ^ <End Date/Time (DTM)> ^ <Priority (ST)> ^ <Condition (ST)> ^ <Text (TX)> ^ <Conjunction (ID)> ^ <Order Sequencing (OSD)> ^ <Occurrence Duration (CWE)> ^ <Total Occurrences (NM)>
8.	200	CM	O	Parent	
9.	26	TS	O	Date/time of transaction	
10.	120	XCN	O	Entered by	
11.	120	XCN	O	Verified by	
12.	120	XCN	O	Ordering provider	
13.	80	PL	O	Enterer's location	
14.	40	XTN	O	Call back phone number	
15.	26	TS	O	Order effective date/time	
16.	200	CE	O	Order control code reason	
17.	60	CE	O	Entering organization	
18.	60	CE	O	Entering device	
19.	120	XCN	O	Action by	

### 3.1.5 OBR

Table 6. OBR segments

SEQ	LEN	DT	OPT	ITEM# ELEMENT NAME	Description
1.	4	SI	O	Set ID - OBR	
2.	22	EI	O	Placer Order Number	
3.	22	EI	O	Filler Order Number +	
4.	200	CE	R	Universal Service ID	"<entity identifier (ST)> ^ <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)>"

5.	2	ID	O	Priority - OBR	
6.	26	TS	O	Requested Date/Time	
7.	26	TS	O	Observation Date/Time	
8.	26	TS	O	Observation End Date/Time	
9.	20	CQ	O	Collection Volume	
10.	60	XCN	O	Collector Identifier	
11.	1	ID	O	Specimen Action Code	
12.	60	CE	O	Danger Code	
13.	300	ST	O	Relevant Clinical Info.	
14.	26	TS	C	Specimen Received Date/Time	
15.	300	CM	O	Specimen Source *	
16.	120	XCN	O	Ordering Provider	
17.	40	XTN	O	Order Callback Phone Number	
18.	60	ST	O	Placer Field 1	
19.	60	ST	O	Placer Field 2	
20.	60	ST	O	Filler Field 1 +	
21.	60	ST	O	Filler Field 2 +	
22.	26	TS	C	Results Rpt/Status Chng - Date/Time	
23.	40	CM	O	Charge to Practice	
24.	10	ID	O	Diagnostic Serv Sect ID	
25.	1	ID	O	Result Status	
26.	200	CM	O	Parent Result	
27.	200	TQ	O	Quantity/Timing	
28.	150	XCN	O	Result Copies To	
29.	200	CM	O	Parent	
30.	20	ID	O	Transportation Mode	
31.	300	CE	R	Reason for Study	
32.	200	CM	O	Principal Result Interpreter	
33.	200	CM	O	Assistant Result Interpreter	
34.	200	CM	R	Technician	
35.	200	CM	R	Transcriptionist	
36.	26	TS	R	Scheduled Date/Time	Format: YYYYMMDDHHMM
37.	4	NM	O	Number of Sample Containers	
38.	60	CE	O	Transport Logistics of Collected Sample	
39.	200	CE	O	Collector's Comment	
40.	60	CE	O	Transport Arrangement Responsibility	
41.	30	ID	O	Transport Arranged	
42.	1	ID	O	Escort Required	
43.	200	CE	O	Planned Patient Transport Comment	
44.	80	CE	R	Procedure Code	^Modality. Referred in annex A, Annex Table 2. Modality list
45.	80	CE	O	Procedure Code Modifier	

## 4 ORM Message mapping to DICOM Modality Work List

MSH|^~\&|eHealth|MedDream||20200492149150||ORM^001|eHTest.1000025049|1|2.3|||||UTF-8

PID|1|30101011122|30101011149|1049890509|PatientFamilyName^PatientGivenName||197401191030|M||Patient address|LT|+490(698)03-490||U|||||LT|LT

PV1|1|0|4970114|ReferredBy^ReferringDoctorLicense^ReferringDoctorFamilyName^ReferringDoctorFamilyName||H1|||||VisitNumber

ORC|1|ACCN5049||SENDTOPACS||NW|^^202004011030

OBR|1|ACCN5049|ACCN5049|5049^Procedure Description^^6049^Scheduled Procedure Description|||||ACCN5049||SENDTOPACS|||||1^^202004011030|||||202004011030|||||1^CR

No	DMWL field	Required	DICOM Tag	HL7 Item #	ORM segment	
1.	Patient ID	Yes	(0010, 0020)	00106	PID:3	
2.	Patient Name	Yes	(0010, 0010)	00108	PID:5	LastName^FirstName^MiddleName
3.	Patient's Sex		(0010, 0040)	00111	PID:8	Value Description F Female M Male O Other U Unknown
4.	Date of Birth (YYYY-MM-DD)		(0010, 0030)	00110	PID:7	
5.	Additional Patient History					Not applicable in HL7 ORM message
6.	Institution Name					Not applicable in HL7 ORM message
7.	Accession Number	Yes	(0008, 0050)	00216	ORC:2	
8.	Admitting Diagnoses Description:					Not applicable in HL7 ORM message
9.	Referring Physician's Name:		(0008, 0090)	00138	PV1:8	
10.	Requesting Physician's Name		(0032, 1032)	00226	OBR:16	
11.	Requested Procedure ID:	Yes	(0040, 1001)	00238.1	OBR:4.1	
12.	Requested Procedure Description:		(0032, 1060)	00393.2	OBR:4.1	
13.	Requested Procedure Priority:		(0040, 1003)	00221.6	OBR:27.6	
14.	Scheduled AE Station:	Yes	(0040, 0001)	00218	ORC-4	
15.	Modality:	Yes	(0008, 0060)	00393	OBR-44.2	
16.	Scheduled Start Date (YYYY-MM-DD):	Yes	(0040, 0002)	00268	OBR-36	
17.	Scheduled Start Time (HH:mm:ss):	Yes	(0040, 0002)	00268	OBR-36	
18.	Performing Physician:		(0040, 0006)	00266	OBR:34	
19.	Scheduled Procedure ID:		(0040, 0009)	00238.4	OBR:4.4	
20.	Scheduled Procedure Description:		(0040, 0007)	00238.5	OBR:4.5	

21.	Scheduled Procedure Location:					Not applicable in HL7 ORM message
22.	Procedure Code Value:		(0008, 0100)	00393.4	OBR:44.4	Not implemented
23.	Procedure Code Meaning:		(0008, 0104)	00393.5	OBR:44.5	Not implemented
24.	Procedure Code Scheme Designator:		(0008, 0102)	00393.6	OBR:44.6	Not implemented
25.	Procedure Code Scheme Version:					Not implemented
26.	Protocol Code Value:		(0008, 0100)	00246.1	IPC:6.1	Not implemented Available only in 2.5.1
27.	Protocol Code Meaning:		(0008, 0104)	00246.2	IPC:6.2	Not implemented Available only in 2.5.1
28.	Protocol Code Scheme Designator:		(0008, 0102)	00246.3	IPC:6.3	Not implemented Available only in 2.5.1
29.	Protocol Code Scheme Version:					Not implemented

## 5 ORU Message

MSH|^~&|Pacs Server|PACS|MEDDREAM||20160728140514||ORU^R01|2016072814051461543|P|2.3.1

PID|||cr14-147846[8593]||LASTNAME^FISRTNAME||1963-02-06|F

PV1||I|PACS||||

ORC|CN||330

OBR|||330|GALVA||||||||||||||||||R

OBX||RP|1.3.46.670589.50.2.767659698646344.30170698022346940102^GALVA||||||R||20141015112556

No	DMWL field	DICOM Tag	ORM segment	Required	Additional notes
<b>MSH – Message Header</b>					
1.	Field Separator		MSH:1		
2.	Encoding Characters		MSH:2		
3.	Sending Application		MSH:3.1		
4.	Sending Facility		MSH:4.1		
5.	Receiving Application		MSH:5.1		
6.	Date/Time Of Message		MSH:7.1		YYYYMMDDHHmmss
7.	Message type		MSH:9		ORU^R01
8.	Message Control ID		MSH:10		
9.	Processing ID		MSH:11.1		
10.	Version ID		MSH:12.1		2.3.1
<b>PID – Pateint Identification</b>					
11.	Patient ID	(0010, 0020)	PID:3.1		
12.	Patient Name	(0010, 0010)	PID:5		LastName^FirstName^MidleName
13.	Date of Birth (YYYY-MM-DD)	(0010, 0030)	PID:7.1		(YYYY-MM-DD)

14.	Patient's Sex	(0010, 0040)	PID:8		Value Description F Female M Male O Other U Unknown
<b>PV1 – Patient Visit</b>					
15.	Patient Class		PV1:2		I Inpatient O Outpatient E Emergency D Inpatient Daycase
16.	Assigned Patient Location	(0038, 0300)	PV1:3.1		
<b>ORC – Common Order</b>					
17.	Order Control		ORC:1		
18.	Filler Order Number (Accession Number)	(0008,0050)	ORC:3.1		
<b>OBR – Order Detail</b>					
19.	Filler Order Number (Accession Number)	(0008,0050)	OBR:3.1		
20.	Universal Service Identifier (Requested Procedure ID)	(0040,1001)	OBR:4.1		
21.	Result Status	(0040, A491)	OBR:25		
<b>OBX – Observation/Result</b>					
22.	Value Type		OBX:2		
23.	Observation Identifier	(0020,000D)^ (0040,1001)	OBX:3		StudyUID^ Universal Service Identifier
24.	Observation Result Status	(0040, A491)	OBX.11		
25.	Date/Time of the Observation	(0040, 0002)	OBX.14.1		

## 6 Image Access to the PACS

HTTP POST or GET methods can be used to invoke study. Table below describes attribute types for study query.

Table 7. Study query methods

SN	Requirements	Description
1.	Attributes	Accession Number Patient ID Study ID
2.	Format	URL?accnum=ACCESSION_NO URL?patient=PATIENT_UID URL?series=SERIES_UID URL?study=STUDY_UID

## 7 Annex A. Data types lists

Annex Table 1. Patient classes

SN	Code	Value
1.	I	Inpatient
2.	O	Outpatient
3.	E	Emergency
4.	D	Inpatient Daycase

Annex Table 2. Modality list

SN	Value	Description
1.	AU	Audio
2.	BI	Biomagnetic Imaging
3.	CD	Color flow Doppler
4.	CR	Computed radiography
5.	CT	Computed tomography
6.	DD	Duplex Doppler
7.	DG	Diaphanography
8.	DSA	Digital Subtraction Angiography
9.	DX	Digital Radiography
10.	ECG	Electrocardiography
11.	EPS	Cardiac Electrophysiology
12.	ES	Endoscopy
13.	GM	General Microscopy
14.	HC	Hard Copy
15.	HD	Hemodynamic Waveform
16.	IO	Intra-Oral Radiography
17.	IVUS	Intravascular Ultrasound
18.	LS	Laser surface scan
19.	MG	Mammography
20.	MR	Magnetic Resonance
21.	NM	Nuclear Medicine
22.	OCT	Optical Coherence Tomography
23.	OP	Ophthalmic Photography
24.	OPM	Ophthalmic Mapping
25.	OPR	Ophthalmic Refraction
26.	OPV	Ophthalmic Visual Field
27.	OT	Other
28.	PR	Presentation State
29.	PET	Positron Emission Tomography - PET
30.	PX	Panoramic X-Ray
31.	REG	Registration
32.	RF	Radio Fluoroscopy
33.	RG	Radiographic imaging (conventional film/screen)

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34.	RTDOSE	Radiotherapy Dose
35.	RTIMAGE	Radiotherapy Image
36.	RTPLAN	Radiotherapy Plan
37.	RTRECORD	RT Treatment Record
38.	RTSTRUCT	Radiotherapy Structure Set
39.	SEG	Segmentation
40.	SM	Slide Microscopy
41.	SMR	Stereometric Relationship
42.	SR	SR Document
43.	ST	Single-photon emission computed tomography (SPECT)
44.	TG	Thermography
45.	US	Ultrasound
46.	XA	X-Ray Angiography
47.	XC	External-camera photography

## 8 Annex B. Message examples

### ORM Message

```
MSH|^~\&|eHealth|MedDream|20200492149150||ORM^001|eHTest.1000025049|1|2.3|||||UTF-8
PID|1|30101011122|30101011149|1049890509|PatientFamilyName^PatientGivenName|197401191030|M||Patient
address|LT|+490(698)03-490||U|||||||LT|LT
PV1|1|0|4970114||||ReferringDoctorLicense^ReferringDoctorFamilyName^ReferringDoctorFamilyName|H1|||||||VisitNuber
ORC|1|ACCN5049||SENDTOPACS||NW|^^^202004011030
OBR|1|ACCN5049|ACCN5049|5049^Procedure Description^^6049^Scheduled Procedure
Description|||||||ACCN5049||SENDTOPACS|||||1^^^202004011030|||||||202004011030|||||||1^CR
```

### ORU Message

```
MSH|^~&|Pacs Server|PACS|MEDDREAM||20160728140514||ORU^R01|2016072814051461543|P|2.3.1
PID|||cr14-147846[8593]||LASTNAME^FISRTNAME||1963-02-06|F
PV1||I|PACS||||
ORC|CN||330
OBR|||330|GALVA|||||||R
OBX||RP|1.3.46.670589.50.2.767659698646344.30170698022346940102^GALVA|||||R||20141015112556
```