

# AGFA HEALTHCARE HL7 Specifications



## IMPAX TalkStation - TalkStation Enterprise Gateway

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# 1 INTRODUCTION

## 1.1 Revision Record

Revision Number	Date	Reason for Change
1.0	December 22, 2005	Initial version
1.1	September 4, 2012	Update layout
1.2	May 7, 2013	Updated Segment Definitions in 2.1.1, 2.1.3, 4.1.3, 4.1.4, 4.1.5, 4.1.7
1.3	November 11, 2013	Minor updates from last review
1.4	November 14, 2013	Minor updates from last review
1.5	January 31, 2014	Generalized ICD-9 terminology to Diagnostic Code

## 1.2 Purpose and Intended Audience of this Document

This document is intended for the programmer, technician or system administrator responsible for interfacing TalkStation™ with another “Healthcare Information System” (e.g., RIS, LIS, etc.). Such a system will be generically referred to as an “IS” or “HIS” in this document.

Readers not familiar with HL7 terminology should first read the appropriate parts of the HL7 standard itself, prior to reading these specifications.

Although the use of this conformance statement in conjunction with the HL7 standard is intended to facilitate communication with TalkStation, it is not sufficient to guarantee, by itself, the inter-operation of the connection between TalkStation and the 3rd party HL7-based system.

The integration of any device into a system of interconnected devices goes beyond the scope of the HL7 standard and this conformance statement when interoperability is desired. The responsibility for analyzing the applications requirements and developing a solution that integrates the Agfa equipment with other vendors’ systems is the user’s responsibility and should not be underestimated.

## 1.3 HL7

The HL7 protocol is a simple messaging system, in which all data is transferred as ASCII data, not unlike a simple text file. Each transaction consists of a message unit (file), which consists of segments (lines, or rows), which, in turn, consist of fields. The fields are formatted depending on their HL7 data type. Each message, segment, and field is variable in length, and uses ASCII characters for delimiters. An example portion of a message is included below:

```
MSH|^~/&|Radiology|RDW|Radiology||19960412 |ORU|||||
PID|||0123456||Smith^James^T||19610122|M
```

The first segment is a message header (MSH). It contains the delimiter characters to be used in the message (^~/& |), the message type (ORU), and other message control information. The PID segment contains patient demographics, such as name and date of birth. Notice the format of the DOB. This is an HL7 data type called TS (time stamp). TS is defined as YYMMDDHHMM[SS][=/-ZZZZ]. There are numerous HL7 data types, ranging from tightly restricted format (such as TS) to very loose restrictions

(e.g., ST, which is any string data). Also notice that some fields contain no data. These are optional fields.

**Naming Conventions:** This document describes in detail the sequences that comprise each HL7 segment. Sequences are referred to by the segment abbreviation followed by the sequence (or field) number. For example, **OBX-5** is the Observation Value sequence, where **OBX** denotes the Observation segment, and **5** denotes the sequence (or field) number (that is, it is the fifth field to be found within the OBX segment).

For a more detailed description of HL7 standards, refer to the *Health Level Seven Implementation Support Guide* (Version 2.3 or higher).

## 1.4 TCP/IP Socket Communication

TalkStation Enterprise Gateway communicates over two TCP/IP sockets (ports):

1. **Order port**—TalkStation Enterprise Gateway is the “server” that accepts connections. Orders are sent over this socket, and acknowledgments for those orders are sent back over the same socket.
2. **Report port**—TalkStation Enterprise Gateway is the “client” that connects to the HIS. Reports are sent over this socket, and acknowledgments for those reports are expected over the same socket.

### HL7 LLP

All HL7 messages are transmitted using HL7 Lower Level Protocol, which simply means that each message is preceded with a start block (“\x0B”), and terminated with the end block string (“\x1C\r”).

## 1.5 Acronyms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the HL7 standard. Abbreviations and terms are as follows:

ADT	Admission, Discharge, and Transfer message
AL1	Patient Allergy Information segment
EVN	Event Type segment
HL7	Health Level 7
IHE	Integrating the Healthcare Enterprise
MDM	Medical Document Management
MFN	Master Files Change Notification
MRG	Merge Patient Information segment
MSH	Message Header segment
NTE	Notes and comments segment
OBR	Observation Request segment
OBX	Observation/Result segment
ORC	Common Order segment
ORM	Order Request message
ORU	Observation Results - Unsolicited message
PID	Patient ID segment

PV1	Patient Visit segment
QRD	Query Definition segment
RIS	Radiology Information System

## 1.6 Related Documents

- HL7 Standard v2.3 and higher
- IHE Radiology Technical Framework Revision 10.0 – Final Text
- IHE IT Infrastructure Technical Framework Revision 8.0 – Final Text

## 2 INBOUND ORDERS/RESULTS (HIS → TALKSTATION ENTERPRISE GATEWAY)

### 2.1 Sending Orders

TalkStation Enterprise Gateway expects unsolicited orders and results from the HIS. The order (or result) is sent as an HL7 ORM or ORU message type. TalkStation Enterprise Gateway inspects the message, checking for required fields. If these fields are not present, the message will be rejected. Optional fields will also be extracted and saved in the TalkStation local database. All other segments and fields are allowed (if valid HL7), but will be ignored. For all HL7 segment definitions in this document, the table columns are denoted as follows:

<b>SEQ</b>	Sequence number (field number)
<b>Length</b>	Maximum length of field
<b>Type</b>	HL7 data type
<b>RQ</b>	Required
<b>RP</b>	Repeating field
<b>Name</b>	Field description

#### 2.1.1 MSH – Message Header

SEQ	Len	Type	RQ	RP	Name
1	1	ST	R		Field Separator
2	4	ST	R		Encoding Characters
3	180	HD			Sending Application
4	180	HD			Sending Facility
9	7	ID	R		Message Type (ORU)
10	20	ST	R		Message Control ID
11	3	PT	R		Processing ID
12	8	VID	R		Version ID
14	1	ST			Continuation Indicator

- **MSH-3—Sending Application** is optional for Radiology Systems. **Pathology only:** Pathology (AP) systems must fill this field with a unique system identifier, or with the universal pathology identifier "PATH".
- **MSH-4—Sending Facility** is optional. If specified, this field is used as a "site identifier" in TalkStation. This field **MUST** be specified if multiple IS systems are interfacing with a single TalkStation server.
- **MSH-9—TalkStation Enterprise Gateway** will expect the **Message Type**, to be ORU or ORM. Normally (according to HL7 specifications), an ORU message is interpreted as a result. Unfortunately, in order to remain compatible with older releases of IBM® MedSpeak, orders may be either ORU or ORM messages. The ORC segment (see page 9) is used to designate an order vs. a result.



A trigger event code can be included as a component of the message type, but will be ignored by TalkStation Enterprise Gateway (e.g., ORU^R01).

- **MSH-14**—When the **Continuation Indicator** field is set to “Y”, TalkStation Enterprise Gateway will transmit a continuation to the current message. Results text in the current message will be added to in the next message coming from TalkStation Enterprise Gateway. When this field is empty, the current message is complete, or is the last in a series of continuation messages.

TalkStation Enterprise Gateway fills this field when a single outbound result is to be split up into multiple transmitted message components.

In a series of Continuation Message transmissions, the first message component transmitted and all components that follow, except for the last component, will hold a “Y” in MSH-14. The lack of a “Y” in MSH-14 of the last message component transmitted indicates that the transmission of the message is complete, and that for the current set of outbound results nothing further will be transmitted.

In each outbound message component, the segments that precede OBX are repeated in their entirety: these include the MSH, PID, PV1, ORC and OBR. In all subsequent components, the OBX sequence numbers in OBX-1 start where they left off at the end of the previous transmission (they do not start from 1 in each message).

The IS on the far side must acknowledge the current message transmitted by TalkStation Enterprise Gateway before the next message component will be transmitted by TalkStation Enterprise Gateway.

This feature is controlled by user settings in the HIS\_RIS Device Properties dialog box on the TalkStation Enterprise Gateway Service Tools. The user can set Maximum OBX Segments allowed per outgoing HL7 Message. See the *TalkStation Enterprise Gateway Administrator's Guide*.

#### Continuation Message Example:

The user setting, **Maximum OBX Segments per Message**, is set to 5:

##### Message 1 from TalkStation Enterprise Gateway:

```
MSH|^~\&|||||200211141135470830||ORU|OBR32PRIDOC1001111402112444|P|2.3||Y|
PID|||PID0101|PIDALT0101|PatientLast^PatientFirs^Middle|||||||999-99-0101|| ORC|RE||
OBR|||0101|PRC0101^PROC
DESC|||20021114112444|||||||20021114112444||P|||||PRIDOC||||
OBX|1|TX|PRC0101&BODY^PROC DESC||Report Text Line 1|||||P|||20021114112444|
OBX|2|TX|PRC0101&BODY^PROC DESC||Report Text Line 2|||||P|||20021114112444|
OBX|3|TX|PRC0101&BODY^PROC DESC||Report Text Line 3|||||P|||20021114112444|
OBX|4|TX|PRC0101&BODY^PROC DESC||Report Text Line 4|||||P|||20021114112444|
OBX|5|TX|PRC0101&BODY^PROC DESC||Report Text Line 5|||||P|||20021114112444|
```

##### ACK from RIS:

```
MSH|^~\&|||||ACK|OBR32PRIDOC1001111402112444-a|P|2.1
MSA|AA|OBR32PRIDOC1001111402112444
```

##### Message 2 from TalkStation Enterprise Gateway:

```
MSH|^~\&|||||200211141135470830||ORU|OBR32PRIDOC1001111402112444|P|2.3|||
PID|||PID0101|PIDALT0101|PatientLast^PatientFirs^Middle|||||||999-99-0101|| ORC|RE||
OBR|||0101|PRC0101^PROC
DESC|||20021114112444|||||||20021114112444||P|||||PRIDOC||||
OBX|6|TX|PRC0101&BODY^PROC DESC||Report Text Line 6|||||P|||20021114112444|
OBX|7|TX|PRC0101&BODY^PROC DESC||Report Text Line 7|||||P|||20021114112444|
OBX|8|TX|PRC0101&BODY^PROC DESC||Report Text Line 8|||||P|||20021114112444|
OBX|9|TX|PRC0101&BODY^PROC DESC||Report Text Line 9|||||P|||20021114112444|
OBX|10|TX|PRC0101&BODY^PROC DESC||Report Text Line 10|||||P|||20021114112444|
```

**ACK from RIS:**

```
MSH|^~\&|||||ACK|OBR32PRIDOC1001111402112444-a|P|2.1
MSA|AA|OBR32PRIDOC1001111402112444
```

**2.1.2 PID – Patient Information**

SEQ	Len	Type	RQ	RQ	RP	Name
3	16	CK	R			Patient ID (MRN)
4	16	CK				Alternate Patient ID
5	48	PN	R			Patient Name
7	8	TS				Date of Birth
8	1	ID				Sex (M or F)
11	106	AD				Patient Address
13	40	TN				Phone Number (Home)
14	40	TN				Phone Number (Business)
18	20	CX				Patient Account Number
19	16	ST				Social Security Number - Patient

- **PID-3**—If a **Patient ID** (MRN) is not available, an alternate ID can be specified. Failure to specify either will result in the message being rejected.

**Note:** all characters in the MRN must be alphanumeric. TalkStation Enterprise Gateway will reject other characters and symbols.

- **PID-5**—**Patient Name** must contain the patient's last name (minimally).
- **PID-18**—**Account Number**, if specified, can be read by TalkStation Enterprise Gateway and used as the unique identifier (Encounter ID) for the visit.

TalkStation Enterprise Gateway can be configured to acquire the Encounter ID for incoming orders and results messages from each HL7 message, from either PID-18 (Patient Account Number) or PV1-19 (Visit Number), depending on the setting of user options in the TalkStation Enterprise Gateway Control Panel applet. TalkStation Enterprise Gateway can also be set to ignore these two HL7 fields and generate a unique Encounter ID internally. For instructions please see the *TalkStation Enterprise Gateway Administrator's Guide* (for Version 2.2).

If TalkStation Enterprise Gateway is configured to use this field, and it is not specified in the HL7 message, then TalkStation Enterprise Gateway will generate its own unique Encounter ID based on the patient's MRN and the current date/time.

**2.1.3 PV1 – Patient Visit**

SEQ	Len	Type	RQ	RQ	RP	Name
1	4	SI				Set ID
2	1	IS	R			Patient Class
3	80	PL				Assigned Patient Location
7	60	XCN				Attending Physician (responsible)

SEQ	Len	Type	RQ	RQ	RP	Name
8	60	XCN				Referring Physician
17	60	XCN				Admitting Physician (primary care)
19	16	ST				Visit Number

- **PV1-3—Assigned Patient Location** will be read by TalkStation Enterprise Gateway, but only the following fields will be recognized: point of care (component 1), room (component 2) and facility (component 4).
- **PV1-8—Referring Physician** may be specified here, or in the OBR segment (see below).
- **PV1-19—Visit Number**, if specified, will be used as the unique identifier (account number) for the visit. If it is not specified, TalkStation Enterprise Gateway may use the number specified in PID-18 (Account Number), if configured to do so in the control panel. (See the *TalkStation Enterprise Gateway Administrator's Guide*.) If a number is not specified, then TalkStation Enterprise Gateway will generate its own unique number based on the patient's MRN and the current date/time.

#### 2.1.4 OBR – Observation Request

SEQ	Len	Type	RQ	RP	Name
2	255	ST			Placer Order Number
3	75	CM	R		Filler's Order Number (Accession Number)
4	23, 200	CE	R		Universal Service ID (Consists of two components: Exam code, Exam description. See explanation below)
7	26	TS	R		Observation Date/Time
13	64K	ST		Y	Relevant Clinical Info (order notes)
16	60	CN			Ordering Provider (referring physician)
17	80	TN		Y	Order Callback Phone Number
18	400	CM			Placer Field 1 (user field - three components, see below)
22	26	TS	R		Inbound Results Signoff Date/Time
25	1	ID	R	Y	Result Status (used only for "Results Complete" events)
27	200	TQ		Y	Quantity/Timing (date/time of exam)
31	256	ST*			Reason For Study (Clinical History)
32	60	CN			Principal Result Interpreter (the primary phys., used only for "Results Complete" events and Pathology)
33	60	CN		Y	Assistant Result Interpreter (multiples allowed, used only for "Results Complete" events and Pathology)

- **OBR-2** (same as ORC-2)—**Placer Order Number** is read or not read from inbound orders received, depending on the user setting: "Process ORC-2 Placer Order Number". See the *TalkStation Enterprise Gateway Administrator's Guide* for details.

If ORC-2 / OBR-2 Placer Order Number is read from inbound orders, then OBR-18 Placer User Field number three (third component) is ignored because ORC-2/OBR-2 is stored in the accession table, user data field three in place of OBR-18.3.

- **OBR-4—Universal Service ID** contains multiple components.

TalkStation Enterprise Gateway interprets **OBR-4.1** (the first component) as the **Exam Code** (e.g. CPT-4 code). Its maximum length is 23 characters.

TalkStation Enterprise Gateway interprets **OBR-4.2** (the second component) as the **Exam (procedure) Description**. Its maximum length is 200 characters.

**Notes:**

Extra characters will be truncated.

When TalkStation Enterprise Gateway receives an order it parses OBR-4.1 (component 1, Exam Code) only up to the slash '/'. If no slash exists in OBR-4.1, the entire Exam Code will be read. If the Exam Code contains a slash, only the portion to the left of the slash will be stored as the Exam Code.

**Pathology only:** component 4 should contain the “report type”. Example: “S” for surgical, “CT” for cytology, “A” for autopsy, etc. Report types are defined on a site-by-site basis. See the *TalkStation Administrator’s Guide* for Pathology-specific installation and configuration items.

- **OBR-13—Order Notes** can be specified as multiple repetitions. For each repetition, TalkStation Enterprise Gateway will insert a new-line character into the order notes field in the TalkStation database. In the example below, the clinical history and comment would be “formatted” in the TalkStation database so that each will each appear on its own line:

```
CLINICAL HISTORY: Bladder carcinoma. ~COMMENT: 10mm contrast orally
```

- **OBR-17—Callback Phone Number** is a repeating field, containing the referring clinician’s callback number. The repetitions will be read and interpreted by TalkStation Enterprise Gateway in the following order:
  - o Phone number
  - o Fax number
  - o Alternate phone number (beeper, cell, etc.)
  - o E-mail address.
- **OBR-18—Placer Field 1** will contain up to three components, each designating a site-specific user field. These user fields each have a maximum length of 128 characters. If the user field is longer than the specified maximum, the message will be rejected.
- **OBR-27**—TalkStation Enterprise Gateway will read **Quantity/Timing** for the date/time of the exam. If specified, this field will override OBR-7 (Observation Date/Time). Only the fourth component will be used, the other components will be ignored.
- **OBR-31—Reason For Study Format:** contains two components:
 

```
<ReasonForStudyID>^<ReasonForStudy Text>
```

The ID in the first component can be left blank.

This data is stored in the **talkris2** database, in the clinical\_history column of the encounter table.
- **Pathology only: OBR-32** will contain the **Physician ID** of the TalkStation user responsible for the case (“signing” or “final” pathologist).
- **Pathology only: OBR-33** will contain the **Physician ID** of the TalkStation user responsible for reporting

on the case (usually used to identify the person responsible for entering the gross description).

## 2.1.5 ORC – Order Control (Optional)

SEQ	Len	Type	RQ	RP	Name
1	2	ID	R		Order Control
2	255	ST			Placer Order Number
5	2	ID	R		Order Status

**Radiology only:** This segment is optional. If not included, TalkStation Enterprise Gateway assumes that this order is for a “Complete” exam. That is, “Complete” means the exam has been performed and can be legitimately reported on.

### TalkStation Enterprise Gateway recognizes the following values for Sequence 1: “Order Control”

Control Code	Control Description
NW	New Order
CA	Request to Cancel Order
RE	Observation to Follow
SC	Status Change

**ORC-2** (Same as OBR-2)—**Placer Order Number** is read or not read from inbound orders received, depending on the user setting: “Process ORC-2 Placer Order Number.” See the *TalkStation Enterprise Gateway Administrator’s Guide* for details.

If ORC-2 / OBR-2 Placer Order Number is read from inbound orders, OBR-18 Placer User Field number three (third component) is ignored because ORC-2/OBR-2 is stored in the accession table, user data field three.

### TalkStation Enterprise Gateway recognizes the following values for ORC-5: “Order Status”

Status Code	Status Description
SC	Scheduled Exam
IP	In Progress
CM	Completed Exam
CA	Cancelled Exam

### Order Control and Order Status Combinations

The following chart shows how TalkStation Enterprise Gateway will interpret various combinations of the coding of ORC-1 (Order Control) and ORC-5 (Order Status).

	ORC-1 (Order Control)	ORC-5 (Order Status)
Scheduled Exam	NW	SC
Rescheduled Exam	SC	SC
Complete Exam (option 1)	NW	Anything other than SC
Complete Exam (option 2)	SC	IP or CM*
Cancelled Exam (option 1)	CA	<empty> or CA
Cancelled Exam (option 2)	SC	CA
Results Complete (opt. 1)*	SC	CM
Results Complete (opt. 2)	RE	<empty>

\* If the message type (MSH-9) is “ORM”, then an order status of “CM” means “Complete Exam”. If the message type is “ORU”, then order status “CM” means “Results Complete.”

**NOTE:** When TalkStation Enterprise Gateway receives a “Results Complete” event, it will look for subsequent OBX segments that contain report results. If they are present, it will store these results. For any other event, subsequent OBX segments are treated as order notes.

## 2.2 Changing the Report Status and Contents

If the Order Status Code in ORC Sequence-5 is set to CM “Completed Exam,” then the status of the report itself can also be updated, using Sequence-25 “Result Status” from the OBR Segment (not the ORC segment). Tables are provided in this section below which show how the status of a report in the TalkStation database is updated as a function of the result status “F” or “P” in OBR Sequence-25.

TalkStation Enterprise Gateway also uses the time stamp carried by the inbound results message to determine whether an inbound request for status change will be honored or rejected. OBR Segment - Sequence 22 (OBR-22) “Results Status Change Date/Time” carries the Final Signoff Time of the inbound results, and is now used by TalkStation Enterprise Gateway to determine if the inbound message contains a more current version of the results than what currently resides in the TalkStation database.

Some status changes involve such a complex consideration of numerous factors (outlined in the tables below) that a Time Stamp Comparison is sometimes required. In these situations, TalkStation Enterprise Gateway must verify that the inbound results are indeed more recent than the results in the local database. Such cases are suffixed “CTS” in the tables, indicating that TalkStation Enterprise Gateway will Compare the Time Stamps in the TalkStation database with OBR-22 of the inbound results, to determine if the inbound message contains a more current version of the results than the one currently in the TalkStation database.

Other status changes are less complicated and are made without regard to the sign-off time of the inbound results. For example, a local report in Preliminary status may be changed by the arrival of an inbound report in Final status. In cases such as this, the status change can be made locally in the database without regard to the time-stamp of the inbound results that carry the new report status.

Generally speaking, changes of status to Final will be honored **without** a time stamp comparison. However, inbound results that share the same status as the report in the local database, or any change that would represent a downgrading of status will be verified **with** a time stamp comparison.

Inbound results that attempt to change the status from Final will be either verified with a time stamp comparison or rejected, as determined by a user setting in the TalkStation Enterprise Gateway Control Panel (TalkReport Advanced Settings).

The Time Stamp Comparison will follow this simple rule:

Inbound Results as Compared to Results in Database	Replace Existing Results
More Recent	Accepted
Less Recent	Rejected

The source of the Date/Time stamp for results in the TalkStation database used for comparison is the **report.edit\_time**.

The tables below detail situations that call for a time-stamp comparison.

### 2.2.1 Inbound Gross Results

TalkStation Enterprise Gateway's treatment of the status of inbound gross results (i.e., not an addendum) and results in the TalkStation database adheres to the following table:

TalkStation Enterprise Gateway Report Status Mapping I: Inbound Gross Results Report Status Update when OBX-1 1 = "F", "P" or Empty		
Local TalkStation Report Status	Inbound OBR-25 Result	Status (Internal Code)
	F	P*
	Assigned Report	Status
Temporary	Final	Preliminary
Preliminary	Final	Preliminary - CTS
Pending-Approval	Final	Pending-Approval - CTS
Corrected	Final	Corrected - CTS
Final	Final - CTS	Preliminary - CTS/CDG
Addendum(P)	Final - CTS/CDG	Preliminary - CTS/CDG
Addendum(F)	Final - CTS/CDG	Preliminary - CTS/CDG
Addendum(C)	Final - CTS/CDG	Corrected - CTS/CDG

**CTS = Compare Time Stamp**

**CDG = Check User Setting to Allow Downgrading of Status**

\*Currently any value other than "F" or "P" is treated as "P."

The last three rows involve changes in status from Addendum back to Final or Preliminary, in which the far side sends us a status of Final or Preliminary, while the local status is Addendum



(P). This is considered a status “downgrade”: The TalkStation Enterprise Gateway **user settings** (TalkReport Advanced Settings) determine whether this change is rejected or permitted.

**Note:** An OBX segment does not necessarily need to be included along with the OBR segment within an inbound message sent to TalkStation. TalkStation Enterprise Gateway will update the status of a report within the TalkStation database even if results text is not included in the received message. This can be useful if the external IS transmitting the messages wishes to change the status of a report within TalkStation without changing the results— for example, if the report is signed off within the external IS instead of within TalkStation.

### 2.2.2 Inbound Addendum Results:

Generally speaking, for inbound results, OBR-25 contains the status of each accession, while OBX-1 1 contains the status of the dictated results.

Currently TalkStation Enterprise Gateway recognizes only the HL7 codes “P” or “F” in the inbound OBR-25, and does not provide a method for interpreting inbound results as an Addendum. To remedy this, TalkStation Enterprise Gateway now has the capability to read OBX-1 1 “Observation Results Status” from an inbound message.

Processing of inbound status from HL7 messages can then be summarized as follows:

**OBR-25 (“F” or “P”)**—determines if results have been signed: “F”(Final/Signed) or “P”(Preliminary)

**OBX-1 1: (“C” / Empty / Same as OBR-25)**—determines if the message carries an Addendum.

- “C” (Corrected) will be interpreted by TalkStation Enterprise Gateway as an Addendum.
- Anything other than “C” will be interpreted as original (Gross) Results.

TalkStation Enterprise Gateway’s treatment of values in OBR-25, when inbound results are interpreted as an Addendum (i.e., when OBX-1 1 is set to “C”) is summarized in the following table:

TalkStation Enterprise Gateway Report Status Mapping II: Inbound Addendum Results Report Status Update when OBX-1 1 = “C”		
Local TalkStation Report Status	Inbound OBR-25 Result	Status (Internal Code)
	F	P
	Assigned Report	Status
Temporary	Addendum(F)	Addendum(P)
Preliminary	Addendum(F)	Addendum(P)
Pending-Approval	Addendum(F)	Addendum(P)
Corrected	Addendum(F)	Addendum(P)
Final	Addendum(F)	Addendum(P) *
Addendum(P)	Addendum(F)	Addendum(P) - CTS
Addendum(F)	Addendum(F) - CTS	Addendum(P) - CTS/CDG
Addendum(C)	Addendum(F)	Addendum(C) - CTS

CTS = Compare Time Stamp



**CDG = Check User Setting to Allow Downgrading of Status**

\*A change in local status of Final to a new inbound status of Addendum(P) (unsigned) will be considered an “upgrading” of status, even though a status change from signed (F) to unsigned (P) is allowed.

In this case the inbound results message carries the following encoding combination:

***Inbound Preliminary Addendum***

ORC-1	SC	Results Complete
ORC-5	CM	Results Complete
OBR-25	P	Preliminary/Unsigned
OBX-1 1	C	Addendum

Here, the inbound Addendum(P) results will be accepted without a check of the inbound time stamp.

Once the Addendum has been signed, the external IS should send it to TalkStation Enterprise Gateway with the following encoding combinations:

***Inbound Final Addendum***

ORC-1	SC	Results Complete
ORC-5	CM	Results Complete
OBR-25	F	Final/Signed
OBX-1 1	C	Addendum Results

**Input to Table Implementation: Related HL7 Fields**

The Status Mapping tables listed above are a function of the existing report status in the TalkStation database, and the following incoming HL7 fields:

HL7	Other	Description	Status
OBR-25	Results Status		F Signed P Not Yet Signed
OBX-1 1	Observation Results Status		C Addendum (* ) Gross Results
OBR-22	Results Status Change Date/Time		Inbound Signoff Time
	Database	Local TalkStation Database: Results Time	Local Results Time
	Settings	User Settings Listed Above	

\*Empty (or Same as OBR-25)

Combinations of OBR-25 and OBX-1 1 will determine effective inbound result status:

### 2.2.3 OBX – Observation Results

The OBX message segment is optional.

#### Radiology:

If included, the OBX segment will contain one of the following:

1. The **order notes** (clinical history, procedure info, etc.). Order notes may also be sent in OBR-13.
2. **Report results**, when the ORU message is the result of a “Results Complete” event (see preceding section on ORC segment on page 9).

SEQ	Len	Type	RQ	RP	Name
1	4	SI	R		Set ID (Sequence Number)
2	2	ID	R		Value Type (FT)
3	80	CE	R		Observation Identifier
4	200	ST			Observation Sub-ID
5	64K*	FT	R		Observation Value

\*The maximum allowable size of an OBX-5 “Observation Value” received into TalkStation Enterprise Gateway is 65,535 characters.

#### Pathology:

3. If included, the OBX segment will contain **specimen information** as follows:

SEQ	Len	Type	RQ	RP	Name
1	4	SI	R		Set ID (Sequence Number)
2	2	ID	R		Value Type (ST)
3	80	CE	R		Observation Identifier
4	200	ST			Observation Sub-ID
5	64K*	CE	R		Observation Value

\*The maximum allowable size of an OBX-5 “Observation Value” received into TalkStation Enterprise Gateway is 65,535 characters.

- **OBX-1** is a **Sequence Number**, starting at “1” for the first OBX, incremented thereafter.
- **OBX-2** defines the **Data Type** in OBX-5, below. Only “ST” is allowed.
- **OBX-3** contains the **Specimen Code**, or “short name”. Only component 1 will be used. Example: “LIV” for “liver.”
- **OBX-4** is the **Specimen Identifier**. Usually “A,” “B,” etc...
- **OBX-5** contains the **Specimen Description**. If the inbound observation value contains HL7 reserved characters as part of the results text, they will be misinterpreted as active HL7 delimiters for the message. So, if these characters occur in results transmitted to TalkStation Enterprise Gateway, they must first be replaced with the HL7 Escape Character Sequence as specified below.

Replace the standard HL7 Encoding Characters (| ^ ~ \ &) as follows:

Reserved Character	Replace with HL7 Escape Character Sequence
(pipe)	\
^ (caret)	\^
~ (tilde)	\~
\ (backslash)	\\
& (ampersand)	\&

Also, replace the following non-standard HL7 encoding characters:

Reserved Character	Replace with HL7 Escape Character Sequence
! (exclamation point)	\$\$
@ (at)	\$\$
# (pound)	\$\$
\$ (dollar sign)	\$\$
% (percent)	\$\$

When the results text is saved to the TalkStation database, TalkStation Enterprise Gateway will replace each HL7 Escape Character Sequence with its corresponding reserved character.

## 2.3 Receiving Acknowledgments

TalkStation Enterprise Gateway will send an HL7 ACK message back to the IS following each received ORU message. The ACK will be formatted as follows:

**Table 2-1: MSH — Message Header**

SEQ	Len	Type	RQ	RP	Name
1	1	ST	R		Field Separator
2	4	ST	R		Encoding Characters
9	7	ID			Message Type (ACK)
10	20	ST			Message Control ID

**Table 2-2: MSA — Message Acknowledgment**

SEQ	Len	Type	RQ	RP	Name
1	2	ID	R		Acknowledgment code (see below)
2	20	ST	R		Message control ID (control ID from ORU MSH)
3	80	ST			Text Message

**The Acknowledgment Codes are as follows**

- **AA—Application Accept:** TalkStation Enterprise Gateway has accepted the order.
- **AE—Application Error:** Unable to perform the transaction. MSA-3 contains the error description.
- **AR—Application Reject:** TalkStation Enterprise Gateway has rejected the order. MSA-3 contains the reason for the rejection.

**Notes:**

TalkStation Enterprise Gateway will accept duplicate orders as “replacements” or corrections. That is, TalkStation Enterprise Gateway will simply replace any order that has an accession number (OBR-3) equal to an existing order in the database.

**Example:**

Suppose the IS sends the following message:

```
MSH|^~\&|||||ORU|0123456
PID|||012-345||Doe^John^P||19610122|M|||1 Fairway
Lane|||||012-34-5678
OBR|||9901|26345^Head, left
view|||199604181202|||||1234^Welby^Marcus
```

TalkStation Enterprise Gateway would provide the following acknowledgment:

```
MSH|^~\&|||||ACK|2345678
MSA|AA|0123456
```

**Rejection of Inbound Results**

If for any reason a particular inbound result is rejected by TalkStation Enterprise Gateway, a Negative Acknowledgement or Reject Message is transmitted back to the external IS by TalkStation Enterprise Gateway.

An Acknowledgement Code of “AR” is written to MSA-1 of the outbound acknowledgement. The reason for rejection is written to MSA-3.

**Writing of Error Codes to MSA-6**

In order to avoid forcing the external HIS to parse the text in MSA-3, TalkStation Enterprise Gateway now writes a unique error code to MSA-6 “Error Condition” indicating the specific reason that results have been rejected. If results have been rejected due to their time-stamp the error message will indicate this.

Previously TalkStation Enterprise Gateway did not fill MSA-6. But now unique error codes have been assigned to TalkStation Enterprise Gateway rejection messages. The complete list of error condition codes and corresponding error text messages is given below in the table: **“TalkStation Enterprise Gateway NACK Error Codes.”**

As a special note to HL7 transmission vendors/engineers, it is useful to know that it is possible to avoid having to process MSA-3 or MSA-6 from TalkStation Enterprise Gateway if the external HIS is

programmed to simply remove any message from its transmission queue if TalkStation responds to it with an "AR" Application Reject in MSA-1. This is in contrast to receiving an "AE" from TalkStation Enterprise Gateway, which represents a transmission formatting error, which is grounds for retransmission. "AR" does not force a retransmission, because an "AR" indicates that a portion of the correctly transmitted data is unsuitable for acceptance into the TalkStation database, and will not change in subsequent retransmissions.

### Transmission of Negative Acknowledgements

#### Current Format:

```
MSA|AE|20020409085408031|Internal error occurred filing order.
```

If status is rejected due to date/time we will transmit back the appropriate NACK

```
MSA|AR|<Message Control ID>|Text: Reason for rejection |||Error  
Condition|
```

The following two HL7 message data tables show the negative acknowledgements transmitted by TalkStation Enterprise Gateway when inbound results are rejected due to either the inbound time-stamp in OBR-22 or a rejection due to the new status itself.

**Table 2-3: MSA: Message Acknowledgment: Rejection due to Time Stamp**

SEQ	Len	Type	Name	Value
1	2	ID	Acknowledgment Code	"AR" Application Reject
2	20	ST	Message Control ID	
3	80	ST	Text Message: Reason for Rejection	"Date-Time Stamp on inbound results is prior to current copy in database."
6	100	CE	Error Condition	<ID>^<DateTime Stamp>^<TalkTechnology.TalkStation.Link>

**Table 2-4: MSA: Message Acknowledgment: Rejection due to Results Status Level**

SEQ	Len	Type	Name	Value
1	2	ID	Acknowledgment Code	"AR" Application Reject
2	20	ST	Message Control ID	
3	80	ST	Text Message: Reason for Rejection	"User setting not configured to allow downgrading of Result Status."
6	100	CE	Error Condition	<ID>^<Result Status>^<TalkTechnology.TalkStation.Link>

### TalkStation Enterprise Gateway NACK Error Codes

All TalkStation Enterprise Gateway negative acknowledgement messages have been coded and now follow the above HL7 format. The following table contains a complete list of current error messages:

**Table 2-5: Error messages**

MSA-6.3 Name of Coding System		TalkStation Enterprise Gateway		
MSA-6.1	MSA-1	MSA-6.2	MSA-3	MSA-3
Error Cond ID	Ack Code (Type)	Text Abbreviated Error Description	Text Message Full Reason for Rejection	Additional Parameter Text
101	AE	Internal Error	Internal error occurred filing order	(none)
102	AE	Internal Error	Internal error parsing message:	Windows Error Code
103	AE	Internal Error	Internal software data error occurred in report module	Windows Error Code
104	AE	Internal Error	Internal error comparing date-time stamps	(none)
201	AR	HL7 Protocol	Invalid Segment Tag: Expecting MSH segment but found	Unknown Segment
202	AR	HL7 Protocol	Message type (SEQ9) missing from MSH segment	(none)
203	AR	HL7 Protocol	Message control ID (SEQ10) missing from MSH segment	(none)
204	AR	HL7 Protocol	Invalid ACK message. Missing MSA segment	(none)
205	AR	HL7 Protocol	Invalid Segment Tag: Expecting MSA segment but found	Unknown Segment
206	AR	HL7 Protocol	SEQ1 field missing from MSA segment	(none)
207	AR	HL7 Protocol	MSA segment contains invalid acknowledgement code:	Invalid Code
208	AR	HL7 Protocol	Message control ID (SEQ2) missing from MSA segment	(none)
209	AR	HL7 Protocol	Order control (SEQ1) missing from ORC segment	(none)
210	AR	HL7 Protocol	MSH (SEQ9) contains unknown message type:	Message Type
211	AR	HL7 Data	Patient MRN contains illegal character:	Illegal Character Found
212	AR	HL7 Data	Patient name (SEQ5) missing from PID segment	(none)
213	AR	HL7 Data	Patient ID and Alternate ID missing from PID segment	(none)
214	AR	HL7 Data	Order status (SEQ5) missing from ORC segment	(none)
215	AR	HL7 Data	Accession number (SEQ3) missing from OBR segment	(none)
216	AR	HL7 Data	Universal Service ID (SEQ4) missing from OBR segment	(none)
217	AR	HL7 Data	OBX (SEQ5) Observation Value exceeds maximum allowable size:	Max Character Length
218	AR	HL7 Data	Patient ID missing from PID segment	(none)
219	AR	User Setting	User setting not configured to allow replacement of existing	(none)
220	AR	User Setting: Results Status	User setting not configured to allow changes to Final Results	(none)
221	AR	User Setting: Results Status	User setting not configured to allow downgrading of result status	(none)
222	AR	Results Processing	Date-Time Stamp on inbound results is prior to current copy in database	(none)
223	AR	Application Reject	Internal application problem occurred processing order:	Specific Error Message

**MSA-6 Error Condition HL7 Format: Components**

| <ID> ^ <Text> ^ <Name Of Coding System> |

The first three components of MSA-6, shown above, will be filled by TalkStation Enterprise Gateway:

- 1) <identifier (ID)> ^
- 2) <text (ST)> ^
- 3) <name of coding system (ST)> ^

The last three components of MSA-6 will not be filled by TalkStation Enterprise Gateway

- 4) <alternate identifier (ID)> ^
- 5) <alternate text (ST)> ^
- 6) <name of alternate coding system (ST)>

## Response to Rejection of Results

The transmitting application is responsible for reading MSA-1 of the acknowledgement message transmitted back to TalkStation Enterprise Gateway, and if necessary, the related results message must be removed from its transmission queue. If TalkStation Enterprise Gateway responds to an incoming results message with an "AR" Application Reject, it cannot accept the results, and besides, subsequent re-transmissions of the message will fail. This, of course, will block transmission of other messages. The transmitting application must remove the message that solicited the negative acknowledgement from its transmission queue in order to avoid interference with subsequent results messages.

**It is not necessary to bring down the link in response to an "AR" message from TalkStation Enterprise Gateway, since the "AR" Application Reject indicates that there is a problem with the data in the message received that prevents it from being filed, not that any error occurred in processing of the incoming message which would be represented with an "AE" Application Error.**

## 3 INBOUND ADT (HIS → TALKSTATION ENTERPRISE GATEWAY)

### 3.1 Sending Admission / Discharge / Transfer Messages

TalkStation Enterprise Gateway expects unsolicited messages from the HIS when a patient has been admitted, discharged or transferred to a different location within the healthcare facility. The message is sent as an HL7 ADT message type. TalkStation Enterprise Gateway inspects the message, checking for required fields. If these fields are not present, the message will be rejected. Optional fields will also be extracted and saved in the TalkStation local database. All other segments and fields are allowed (if valid HL7), but will be ignored.

For all HL7 segment definitions in this document, the table columns are denoted as follows:

<b>SEQ</b>	Sequence number (field number)
<b>Len</b>	Maximum length of field
<b>Type</b>	HL7 data type
<b>RQ</b>	Required or optional
<b>RP</b>	Repeating field
<b>Name</b>	Field description

#### 3.1.1 MSH — Message Header

SEQ	Len	Type	RQ	RP	Name
1	1	ST	R		Field Separator
2	4	ST	R		Encoding Characters
3	180	HD			Sending Application
4	180	HD			Sending Facility
9	7	ID	R		Message Type (ADT)
10	20	ST	R		Message Control ID

- **MSH-9**—TalkStation Enterprise Gateway will expect the **Message Type**, to be ADT, and one of the following trigger events: A01 (admit), A02 (transfer), A03 (discharge).
- **MSH-4—Sending Facility** is optional. If specified, this field is used as a “site identifier” in TalkStation. This field **MUST** be specified if multiple HIS systems are interfacing with a single TalkStation server.



### 3.1.2 PID — Patient Information

SEQ	Len	Type	RQ	RQ	RP	Name
3	16	CK	R			Patient ID (MRN)
4	16	CK				Alternate Patient ID
5	48	PN	R			Patient Name
7	8	TS				Date of Birth
8	1	ID				Sex (M or F)
11	106	AD				Patient Address
13	40	TN				Phone Number (Home)
14	40	TN				Phone Number (Business)
18	20	CX				Patient Account Number
19	16	ST				Social Security Number - Patient

- **PID-3—Patient ID** (MRN) is not available, an alternate ID can be specified. Failure to specify either will result in the message being rejected.
- **PID-5—Patient Name** must contain the patient's last name (minimally).
- **PID-18—Account Number** may be used as a unique encounter ID if TalkStation Enterprise Gateway is configured for this (See the *TalkStation Enterprise Gateway Administrator's Guide*). In this case, results that are sent from TalkStation back to the HIS will contain this account number in the PID.

### 3.1.3 PV1 — Patient Visit

SEQ	Len	Type	RQ	RQ	RP	Name
1	4	SI				Set ID
2	1	IS	R			Patient Class
3	80	PL				Assigned Patient Location
7	60	XCN				Attending Physician (responsible)
8	60	XCN				Admitting Physician (primary care)
17	60	XCN				Referring Physician
19	16	ST				Visit Number

- **PV1-3—Assigned Patient Location** will be read by TalkStation Enterprise Gateway, but only the following fields will be recognized: point of care (component 1), room (component 2) and facility (component 4).
- **PV1-19—Visit Number**, if specified, will be used as the unique identifier (account number) for the visit. If not specified, TalkStation Enterprise Gateway may use the number specified in PID-18 (Account Number), if configured to do so in the control panel (See the *TalkStation Enterprise Gateway Administrator's Guide*). If a number is not specified, then TalkStation Enterprise Gateway will generate its own unique number based on the patient's MRN and the current date/time.

### 3.1.4 Receiving Acknowledgments

TalkStation Enterprise Gateway will send an HL7 ACK message back to the HIS following each received ORU message. The ACK will be formatted as follows:

#### MSH — Message Header

SEQ	Len	Type	RQ	RP	Name
1	1	ST	R		Field Separator
2	4	ST	R		Encoding characters
9	7	ID			Message Type (ACK)
10	20	ST			Message Control ID

#### MSA — Message Acknowledgment

SEQ	Len	Type	RQ	RP	Name
1	2	ID	R		Acknowledgment Code (see below)
2	20	ST	R		Message Control ID (control ID from ADT MSH)
3	80	ST			Text Message

#### The Acknowledgment Codes are as follows

Code	Description
AA	<b>Application Accept:</b> TalkStation Enterprise Gateway has accepted the order
AE	<b>Application Error:</b> Unable to perform the transaction. MSA-3 contains the error description
AR	<b>Application Reject:</b> TalkStation Enterprise Gateway has rejected the order. MSA-3 contains the reason for the rejection

#### Example:

Suppose the HIS sends the following message:

```
MSH|^~\&|||||ADT^A01|0123456
PID|||012-345||Doe^John^P||19610122 |M|||1 Fairway
Lane|||||012-34-5678
PV1|1|E|2200^222^^H01||||1234^Welby^Marcus|||||||A001
```

TalkStation Enterprise Gateway would provide the following acknowledgment:

```
MSH|^~\&|||||ACK|2345678
MSA|AA|0123456
```

## **4 OUTBOUND RESULTS (TALKSTATION ENTERPRISE GATEWAY → HIS)**

### **4.1 Steps to Receiving a TalkStation Enterprise Gateway Report**

This chapter reviews the following steps, by which an external IS receives a report from TalkStation Enterprise Gateway:

1. Accept a connection from TalkStation Enterprise Gateway client port.
2. Wait for messages from the client.
3. Read and process the message.
4. Send an acknowledgment back to TalkStation Enterprise Gateway.

#### **4.1.1 Accepting Client Connections**

The HIS Server should accept the client connection over a standard TCP/IP port. TalkStation Enterprise Gateway must be configured with the appropriate port number.

#### **4.1.2 Waiting for TalkStation Enterprise Gateway Reports**

TalkStation Enterprise Gateway will send the HIS a report at the following times:

- A report has just been accepted and signed by the radiologist.
- The radiologist has just saved a report, and wishes all preliminary reports be sent to the HIS.
- TalkStation Enterprise Gateway has just established a connection with the HIS server, and has one or more reports pending delivery.

### 4.1.3 MSH — Message Header

SEQ	Len	Type	RQ	RP	Name
1	1	ST			Field Separator
2	4	ST			Encoding Characters
3	15	ST			Sending Application
4	20	ST			Sending Facility
5	15	ST			Receiving Application
6	30	ST			Receiving Facility
7	26	TS			Time Stamp
9	7	ID			Message Type
10	20	ST			Message Control ID
11	3	PT			Processing ID
12	8	VID			Version ID
15	2	ID			Accept Acknowledgment Type
16	2	ID			Application Acknowledgment Type
18	6	ID			Character Set

- **MSH-9—Message Type** will, by default, contain only the first component, which is “ORU.” If a trigger event code is desired, the administrator must use the TalkStation Enterprise Gateway control panel applet to configure the Trigger Event (e.g. “R01”).

### 4.1.4 PID — Patient Information

SEQ	Len	Type	RQ	RP	Name
3	30	CX			Patient ID (MRN)
4	30	CX			Alternate Patient ID
5	48	PN			Patient Name
7	8	TS			Date of Birth
8	1	ID			Sex (M or F)
11	106	AD			Patient Address
13	40	TN			Phone Number (Home)
14	40	TN			Phone Number (Business)
18	20	CX			Patient Account Number
19	16	ST			Social Security Number - Patient

- **PID 3 and 4, Patient ID** (Medical Record Number) and Alternate Patient ID, are in the format of the HL7 Data Type “CX”:

Components: <ID (ST)> ^ <check digit (ST)> ^ <code identifying the check digit scheme employed (ID)> ^ <assigning authority (HD)> ^ <identifier type code (IS)> ^ <assigning facility (HD)>

TalkStation Enterprise Gateway only uses the first and fourth components: "ID" and "assigning authority".

If it is configured in the Control Panel applet, TalkStation Enterprise Gateway uses the fourth component "assigning authority" to transmit the Site Code in an outbound PID segment.

Example: MRN9001 ^^Site 1

TalkStation Enterprise Gateway can be configured to read the Patient ID and Alternate Patient ID during reception and write to them during transmission in different ways. See the *TalkStation Enterprise Gateway Administrator's Guide* for instructions.

- **PID-18—Patient Account Number** will only be sent back if TalkStation Enterprise Gateway is configured to do so (See the *TalkStation Enterprise Gateway Administrator's Guide*).

#### 4.1.5 PV1 — Patient Visit

SEQ	Len	Type	RQ	RQ	RP	Name
1	4	SI				Set ID
2	1	IS				Patient Class
3	80	PL				Assigned Patient Location
7	60	XCN				Attending Physician (responsible)
10	3	IS				Hospital Service
17	60	XCN				Admitting Physician (primary care)
44	26	DTM				Admit Date/Time

**Note:** This segment is sent only if the "Send Extended Results" option is selected in the TalkStation Enterprise Gateway control panel.

#### 4.1.6 ORC — Order Control

SEQ	Len	Type	RQ	RP	Name
1	2	ID			Order Control
2	255	ST			Placer Order Number

- **ORC-1—Order Control** will be either "CN" or "RE". This permits "combined results" to be sent back to the HIS. See the Example below for usage.
- **ORC-2 (Same as OBR-2)—Placer Order Number** is filled for transmission of results, depending on the user setting: "Process ORC-2 Placer Order Number." See the *TalkStation Enterprise Gateway Administrator's Guide* for details.

If ORC-2 / OBR-2 Placer Order Number is filled during transmission, OBR-1 8 Placer User Field number three (third component) is not filled because ORC-2/OBR-2 is stored in the accession table, user data field three in place of OBR-1 8.3.

#### 4.1.7 OBR — Observation Request

SEQ	Len	Type	RQ	RP	Name
1	4	SI			Set ID (sequence number)
2	255	ST			Placer Order Number
3	75	CM			Filler's Order Number (Accession Number)
4	200	CE			Universal Service ID
7	26	TS			Observation Date/Time
13	64K	ST		Y	Relevant Clinical Info (order notes)
16	127	CN			Ordering Provider (Clinician)
17	80	TN			Order Callback Phone Number
18	60*	ST			Placer Field 1 (Accession user fields, see below)
20	60*	ST			Filler Field 1 (Report user fields, see below)
22	26	TS			Results/Report Status change (date/time)
25	1	ID		Y	Result Status (Preliminary, Final, or A or C for Addendum)
27	200	TQ		Y	Quantity/Timing (date/time of exam)
31	*	ST*			Reason For Study (Clinical History)
32	127	CN		Y	Resident and Principal Result Interpreter (radiologist)
33	127	CN		Y	Contributing Result Interpreters (radiologists)

- **OBR-1—Set ID:** Incremented for each subsequent OBR segment in the outbound message, if the outbound report contains multiple accessions.
- **OBR-2 (Same as ORC-2)—Placer Order Number** is filled for transmission of results, depending on the user setting: "Process ORC-2 Placer Order Number." See the *TalkStation Enterprise Gateway Administrator's Guide* for details.  
If ORC-2 / OBR-2 Placer Order Number is filled during transmission, OBR-1 8 Placer User Field number three (third component) is not filled because ORC-2/OBR-2 is stored in the accession table, user data field three.
- **OBR-3** limits the maximum number of accessions attached to a transmitted report to 24. If more than 24 accessions point to the same report, TalkStation Enterprise Gateway will attach the first 24 accessions for it in the outbound message (one ORC/OBR set for each accession) and all subsequent accessions numbers (the 25<sup>th</sup> and beyond) will be ignored and not transmitted.
- Three timestamps are sent in the OBR:
  1. **OBR-7—Observation Date/Time** is the time that the report was created.
  2. **OBR-22—Status Change Time** is the date/time that the radiologist signed the report (or last saved it if status is preliminary).
  3. **OBR-27—Quantity/Timing** is the time the exam was performed. Only the fourth component (the time stamp) is sent.
- **OBR-18—Placer Field 1** will contain up to three components, each designating an IS-specific

user field. These user fields each have a maximum length of 128 characters. These fields are returned exactly as they are received by the IS system when an order is sent to TalkStation.

- **OBR-20—Filler Field 1** will contain up to three components, each designating a site-specific “Report User Field”. These user fields each have a maximum length of 128 characters. See the *TalkStation Administrator’s Guide* for more details about configuring user fields. The user fields can also be sent as “result sections” in the OBX. See the following section (**OBX — Observation**) for details.
- **OBR-25** is a repeating field that contains a status letter for each physician listed in OBR-32, according to the **Format:** <AttendingStatus>~<ResidentStatus>

Values will be one of the following:

F	Final (Signed)
P	Preliminary (Not Signed)
A or C*	Addendum

\*The Status Code for Addendum may be set to “A” or “C” in RisHL7 Advanced Settings of the TalkStation Enterprise Gateway Properties dialog box

**Example:** In the following OBR segment, a resident physician (with a physician ID of D12345) “signed” a report that is assigned to an attending physician whose physician ID is D23456. Since the report was signed by the resident and still needs the attending’s approval, it is in “F” status for the resident and “P” status for the attending:

```
OBR|||9901|201A2|||199604201051|||||||199604201055|||P~F|||||
||D12345~D23456
```

- **OBR-31, the Reason For Study** is taken from the Encounter table in the TalkStation database, from the Encounter associated with an order, from the field “Clinical History.”

**OBR-31 Reason For Study Format:**

If only a “Reason For Study” single text string was received in the original order reception in OBR-31, the same string will be transmitted in OBR-31.

If OBR-31 received with the original order included an ID in the form ID^Text, the ID and Text are transmitted back in a string using the same format as it is stored in the database:

ID: Text

If multiple orders were received for a single Encounter and each included a “Reason For Study” in OBR-31, results for a set of orders for such an Encounter will be transmitted in the format:

ID1: Reason For Study 1 Text, ID2: Reason For Study 2 Text, ID3: Reason For Study 3 Text, etc.

- TalkStation allows for multiple physicians to produce a report. However, there will ALWAYS be a primary attending associated with each report. **OBR-32** is a repeating field that will contain the following data:
  - The primary (dictating) resident physician.
  - The primary attending physician.

Any additional physicians (contributors) will be sent in **OBR-33**. This is a repeating field, but the values will not be listed in any specific order. Contributors may be either residents or attendings.

- Physicians are written to OBR-32 and OBR-33 in a repeating field. The TalkStation Enterprise

Gateway RIS HL7 Advanced Settings determines which physicians are written To these repeating fields, as well as the order in which they appear in either sequence 32 or 33. Refer to the *TalkStation Enterprise Gateway Administrator’s Guide*.

Normally physicians are written as follows:

**OBR-32:**

<Primary (Dictating) Resident Physician ID>^<LastName>^<First>^<Middle>^<Suffix>^<Prefix>^<Degree>Repeat Separator  
 <Principal Attending Physician ID>^<LastName>^<First>^<Middle>^<Suffix>^<Prefix>^<Degree>

**OBR-33:**

<Contributing Physician ID>^<LastName>^<First>^<Middle>^<Suffix>^<Prefix>^<Degree>Repeat Separator  
 <Contributing Physician ID>^<LastName>^<First>^<Middle>^<Suffix>^<Prefix>^<Degree>Repeat Separator...

**4.1.8 OBX — Observation**

SEQ	Len	Type	RQ	RP	Name
1	4	SI			Set ID (sequence number)
2	2	ID			Value Type (FT, TX, ZFT, RP)
3	80	CE			Observation Identifier
5	64K*	FT			Observation Value
11	1	ID			Results Status
14	26	TS			Observation Date/Time

\*The maximum allowable size of a transmitted OBX-5 “Observation Value” is 65,535 characters, configured through the TalkStation Enterprise Gateway Control Panel. See the *TalkStation Enterprise Gateway Administrator’s Guide* for instructions.

- **OBX-1**—The **Set ID** (sequence number) is “1” for the first OBX segment and is incremented for each subsequent OBX segment in the outbound message.
- **OBX-3**— The **Observation Identifier** will contain the Universal Service ID, which is composed of up to three components:
  - o Procedure Code.
  - o Modifier: Report Section.
  - o Procedure Description.

The Modifier: Report Section has a value of either “BODY” or “IMP,” each defined as follows:

- o BODY—Record is part of the body of the report.
- o IMP—Record is part of the body of the impression section.
- o ADD—Record is part of the report addendum.

The three components of the Observation Identifier are formatted in Sequence 3 according to the following format:

|<ProcCode>&<ReportSection>^<Description> |

**Example:**

|7216&BODY^CT SCAN CERV SPINE CONTRAST|



The Universal Service ID field will contain ONLY THE FIRST ID when the report contains an observation for multiple exams (accession numbers).

- **OBX-5**—The **Observation Value** for Final or Preliminary results will be the report text. For Gross results it will contain the report text in a section labeled with the section modifier “BODY.”

For Addendum results, OBX-5 (the report text) can be transmitted in one of three ways, depending on configuration settings in the TalkReport tab of the TalkStation Enterprise Gateway Control Panel Applet:

1. (Default) OBX-5 contains the addendum text only. The original report is not re-sent. The addendum is labeled with the section modifier, “BODY”.
2. OBX-5 contains the addendum text appended to the original gross report text and transmitted with the gross report text in the BODY section.
3. OBX-5 contains the addendum text separated from the original gross report text in its own section with the section modifier, “ADD” and is transmitted along with the gross report text, which is included in its own BODY section.

If the results text of OBX-5 Observation Value contains any HL7 reserved characters, then TalkStation Link will make the following substitutions prior to transmission:

Reserved Character	Replace with HL7 Escape Character Sequence
(pipe)	\
^ (caret)	\^
~ (tilde)	\~
\ (backslash)	\\
& (ampersand)	\&

In order to restore the original results text, the RIS must reverse this substitution when it receives results text from TalkStation Enterprise Gateway in OBX-5 Observation Value.

OBX Results will be formatted in one of following ways, depending on how the RisHL7 tab of the TalkStation Enterprise Gateway control panel applet is configured:

- o **Paragraph:** TalkStation Enterprise Gateway generates an OBX for each paragraph (CRLF) contained in the report text. The value type in OBX-2 is **TX**.
- o **Line:** TalkStation Enterprise Gateway will send one line of text per OBX. The maximum length of the line is configurable from within the TalkStation Enterprise Gateway configuration panel applet. The value type is **TX**.
- o **Formatted:** TalkStation Enterprise Gateway generates a single OBX section for each section (BODY and IMP). Paragraphs will be delimited by the HL7 escape sequence “\.br\”. The value type in OBX-2 is **FT**.
- o **FT:** TalkStation Enterprise Gateway generates a single OBX section for each section (BODY and IMP) from RTF (Rich Text Format) results using standard HL7 formatting escape sequences such as “\H\” and “\N\” around formatted text to indicated beginning and end of highlighted text respectively and “\.br\” for new lines and paragraphs. Highlighted text is considered to be bold, italic and underlined or a combination. The value type in OBX-2 is **FT**.

- o **FT Enhanced:** This option is similar to FT except that the formatted message uses special non-standard HL7 escape sequences such as “\B\”, “\I\”, “\U\” to indicate exact formatting of result text as bold, italic or underlined respectively or a combination of all three. Because this option uses non-standard HL7 escape sequences, the application that receives the message must be capable of processing it. The custom (non-standard HL7) value type in SEQ2 is **ZFT**. Note that this is a non-standard HL7 value type.

Examples of transmitted report results using FT and FT Enhanced can be found in the examples section at the end of this document: “Examples: Formatted Reports Using FT and FT Enhanced”.

- o **Separate RTF File:** Report text is written in RTF (Rich Text Format) to a separate file that must be accessible to both the transmitting (TalkStation Enterprise Gateway) and receiving system. When the report message is transmitted, the UNC path to the formatted output file, including the file name, is specified in the outgoing HL7 message in a single OBX segment. Instead of holding the body of the report text itself, OBX-5 holds the full UNC path and filename in HL7 RP Reference Pointer format (See section below). The receiving system should parse OBX-5 and read this path to access the report file. For this option the value type in OBX-2 is set to **RP**.

**Example:**

```
OBX|1|RP|720&BODY^XRAY|
|\E\\E\SERVER\E\talkshr2\E\Reports\E\r2037.rtf^FT^RTF|||||F|||8563|
```

The name of the output file is the Report ID with the file extension “RTF” appended, for example: r120920020037.rtf.

Notice that the file path contains HL7 escape sequences “\E\”. The processing of HL7 escape sequences in these outbound OBX segments for formatted text is described in this section, under the heading: “Formatted Text: HL7 Escape Sequences.”

If the option, **Separate RTF File**, is chosen, the path to the output directory for the report file is set in the TalkStation Enterprise Gateway Control Panel Applet: See the *TalkStation Enterprise Gateway Administrator's Guide*. The path should be stated in Universal Naming Convention (Network) format:

**Example:** [\\SERVER\\_NAME\talkshr2\Reports](#)

- **OBX-11, Results Status**—The results status will be the status of the report as it pertains to the Primary Attending Physician only. Valid status codes are **P** (Preliminary), **F** (Final), and **A** (Addendum).

This field is set to the same value as OBR-25 Attending Status for Gross Results.

For addendum results, OBX-1 1 is filled with “A” if the TalkReport panel user option “**Send addenda with final as ADD**” is chosen.

However, If the TalkReport panel user option “**Send addenda with final in BODY**” is chosen, TalkStation Enterprise Gateway fills OBX-11 with “F” for Addendum results that are included with the outbound Final results, since in this case, the Addendum is appended to the report BODY text.

In the TalkStation Enterprise Gateway RisHL7 Advanced Settings, **Addendum Status Code in OBR-25, OBX-11** allows for the selection of an “A” or “C” radio button option. The use of “A” rather than “C” is not an HL7 standard. This option is retained for customers who, for the sake of backwards compatibility, expect the use of “A.” The “C” radio button enables individual customers to set OBX-1 1 to be filled with the HL7 standard “C” for Addendum results that are transmitted with Final results.

- **OBX-14:** The **Observation Date/Time** will be identical to OBR-22, which is the time when the report was last updated.

TalkStation Enterprise Gateway does not fill **OBX-4**

#### 4.1.8.1 Observation Sub-ID. DG1 — Diagnosis Segment

SEQ	Len	Type	RQ	RP	Name
1	4	SI			Set ID (sequence number)
3	60	CE			Diagnosis Code
6	2	IS			Diagnosis Type

- **DG1-1—Sequence ID:** TalkStation Enterprise Gateway will send a DG1 segment for every diagnostic code associated with the report.
- **DG1-3—Diagnosis Code** is a coded element in the following format:

<identifier> ^ <text> ^ <name of coding system> ^ <alternate ID>

The components are defined below:

- the **identifier** is the diagnostic code (e.g., “801.0”).
- the **text** is the diagnostic code description (e.g., “Close skull base fracture”).
- the **name of coding system** (e.g., “ICD9” or “ICD10”).
- the **alternate ID** is the accession number (e.g., “139080”).

##### Notes:

- The diagnostic code description may not be specified.
- If no accession number is specified, the first (primary) accession should be assumed.
- **DG1-6—Diagnosis Type** will always be “F” (final)

##### Example:

DG1 |1||801 .0^CLOSE SKULL BASE FRACTURE^ICD9^139080^||F

#### 4.1.9 Acknowledging the Report

The HIS should acknowledge TalkStation Enterprise Gateway in the same manner that TalkStation Enterprise Gateway acknowledges the HIS when receiving an order. See the section, “Receiving Acknowledgments” on page 23.

#### 4.1.10 HL7 RP Reference Pointer Format

Reference Pointer format is described in the HL7 standards (in section 2.8.34 of *Health Level Seven, Version 2.3*), which states:

“This data type transmits information about data stored on another system. It contains a reference pointer that uniquely identifies the data on the other system, the identity of the other system, and the type of data.”

The reference pointer components are:

<pointer (ST)> ^ <application ID (HD)> ^ <type of data (ID)> ^ <subtype (ID)>

Currently the only values for <type of data> and <subtype> used by TalkStation Enterprise Gateway are FT and RTF, as demonstrated by the following Reference Pointer to an external RTF File.

[\E\SERVER\E\talkshr2\E\Reports\E\r2037](#) .rtf^FT^RTF

## 4.2 Formatted Text: HL7 Escape Sequences

Three of the OBX Results Format Options (FT, FT Enhanced, and Separate RTF File) will produce outgoing message OBX segments with results (or a file path) that contain formatted text, which can also contain special HL7 escape character sequences. HL7 escape character sequences are used to prevent the receiving system from encountering unmarked HL7 control characters in the formatted report text itself and misinterpreting them as HL7 encoding or delimiter characters.

For example, if OBX-5 were to contain message text for a report in RTF format that contains a pipe symbol "|", the receiving system might accidentally interpret this character as the end of OBX-5 and begin interpreting the rest of the report text as a value in OBX-6.

To avoid this situation, HL7 provides a technique for allowing the same delimiter characters it uses to format messages to appear in message text itself without interfering with the HL7 interface.

According to section 2.9.4 of the HL7 standards, "The special character escape sequences (\F, \S, \R, \T, and \E) allow the corresponding characters to be included in the data in a text field, though the actual characters are reserved."

### HL7 Section 2.9.1 Formatting codes

Sequence	Replaces HL7 Encoding Character
\F	Field separator
\S	Component separator
\T	Subcomponent separator
\R	Repetition separator
\E	Escape character

For transmission of Formatted Text, TalkStation Enterprise Gateway replaces the HL7 encoding characters with an Escape Sequence containing these Formatting Codes. So, HL7 reserved encoding (delimiter) characters are replaced with:

<Escape Character> <Formatting Code> <Escape Character>

...where <Escape Character> is the fourth encoding character and <Formatting Code > is the character in the above table that represents the reserved encoding character to be replaced.

The standard HL7 encoding characters "|^~\&" would be replaced as follows:

HL7 Character	Replaced with the Character Sequence
(pipe)	\F\
^ (caret)	\S\
~ (tilde)	\R\
\ (backslash)	\E\
& (ampersand)	\T\

Likewise, a non-standard set of encoding characters such as "!@#\$%", would require different replacements: here the Escape character "\$" is used rather than "\":

HL7 Character	Replaced with the Character Sequence
! (exclamation point)	\$F\$
@ (at)	\$S\$
# (pound)	\$R\$
\$ (dollar sign)	\$E\$
% (percent)	\$T\$

Recall that for any HL7 message, the encoding characters being used are defined at the start of the message header immediately after the Message Header Sequence ID:

MSH|^~\&|

### Transmission Example:

This example demonstrates how TalkStation Enterprise Gateway inserts formatted text into an outbound OBX Segment: The original formatted text is

```
Patient info: |Site 027||File SERVER\DIR\ID&CODE&01|^CR^
|Cholesterol ~~~ 106 ~~~|Heart Rate ~~ 82 ~~~|
```

The OBX Segment would be transmitted as follows:

```
OBX|1|FT|PC0001&BODY^XRAY||Patient info: \F\Site 027\F\F\File
SERVER\DIR\ ID\T\CODE\T\ 0 1\F\S\CR\S\F\Cholesterol \R\R\R\ 106
\R\R\R\R\F\Heart Rate \R\R\R\ 82 \R\R\R\F|||||F||||20020218155634|
```

### Reception:

Upon receiving an OBX Segment with Formatted Text from TalkStation Enterprise Gateway, the receiving system must reverse the process described so far. It parses the text and replaces each HL7 Escape Sequence it encounters with the correct special characters, in order to reproduce the original text.

Replaced Sequence	With Character
\\F\\	
\\S\\	^
\\R\\	~
\\E\\	\\
\\T\\	&

## 5 EXAMPLES OF HL7 MESSAGES

### 5.1 Sample Reports

The following report is for a single accession:

```

^~\&|||||ORU|2345678
||012-345
RE
|||||199604201055|||F|||||D12345 1|FT|201A2&BODY^PA
& Lat. Chest||FINDINGS: CompaHISON, 03/01/91.
MSH 2|FT|201A2&BODY^PA & Lat. Chest||The patient is status post right
PID mastectomy. The lungs are clear.
ORC OBX|3|FT|201A2&IMP^PA & Lat. Chest ||No active cardiopulmonary disease.
No
OBR 1||9901|201A2|||| interval change since 03/01/91.
OBX DG1|1||174.1^ MALIG NEOPLASM BREAST-CENTRAL^ICD9^^|||F
OBX DG1|2||611.9^ BREAST DISORDER NOS^ICD9^^|||F

```

A report with “combined results” may also be sent. This is a single report for multiple exams, using the “standard” OBX, which contains two user fields (for the diagnostic code and radiologist’s e-mail address):

```

MSH|^~\&||| ||||ORU|2345678
PID|||012- 345
ORC|CN
OBR|1||990 1|201A2|||||741.9^joerad@nyu.edu
|||1996042 01055|||F|||||D12345
ORC|CN
OBR|2||990 2|26545^MRI Thoracic Spine
|||||741.9^joerad@nyu.edu|||199604201055|||F|||||D12345
| ORC|RE
OBR|3||990 3|26546^CT Abdomen|||||741.9^joerad@nyu.edu
|||1996042 01055|||F|||||D12345
OBX|1|FT|2 01A2&BODY ^PA & Lat. Chest ||Lungs are clear. No pleural
effusions. \.br\No evidence of vertebral body collapse.
OBX|2|FT|2 01A2&IMP^PA & Lat. Chest ||Patient’s lungs, abdomen and spine are
normal.

```

Notice the use of the CN ORC segments for the first two exams, followed by a RE ORC, which has the actual observation OBX segments following it. Notice also that when a combined result is sent back to the HIS, only the first (primary) procedure is specified in the OBX, because the TalkStation Enterprise Gateway application does not support the differentiation of procedures within a single report. That is to say, the one observation applies unilaterally to all the exams included in the message.

**Note:** TalkStation Enterprise Gateway will send the OBR segments in the same order that the radiologist included the exams when he created the report. This may be helpful if the receiving system expects a “primary” exam to be distinguished from the other associated exams.

## 5.2 Formatted Reports Using FT and FT (Enhanced) Options

Recall that the FT and FT (Enhanced) options are ways of formatting OBX results. These options are described on page 33.

### 5.2.1 Sample RTF-formatted Report Text:

#### UPPER EXTREMITY CT WITH IV CONTRAST

**CLINICAL INDICATION:** Arm Pain

**FINDINGS:** There is no evidence of gross bone destruction, the possibility of early osteomyelitis cannot be excluded. If clinically warranted, a bone scan or *MRI* can be performed. There is no definite soft tissue abscess collection or definite shoulder joint effusion seen. However, MRI is more sensitive for a small effusion or a small soft tissue fluid collection. If clinically warranted an *MRI* of the left shoulder with intravenous Gadolinium can be performed.

The possibility of "thrombus" of the left brachial vein or partial thrombosis of the left subclavian vein cannot be excluded.

If clinically warranted, a venogram can be performed.

**IMPRESSION:** There is no definite pathology seen on this study, see above for further details.

### 5.2.2 HL7 Message Using the FT Option

```
MSH|^~\&|||||200203121147480159||ORU|d021802155610|P|2.3|<CR>
PID|||PID_3_0001||PatientLast^FIRST^M|||||||111-11-0001||<CR>
ORC |RE |<CR>
OBR|1||OBR_3_OrderNum_0006 |OBR_4_UnServID_0006^OBR 4 Universal Service
Identifier
Proc|||20020218155610|||||||20020218155634|||F|||||Doc0001| |||<CR>
OBX|1|FT|OBR_4_UnServID_0006&BODY^OBR 4 Universal Service Identifier
Proc||\H\UPPEREXTREMITY CT WITH IV CONTRAST\.br\\.br\CLINICAL INDICATION\N\
Arm Pain\.br\\.br\H\FINDINGS:\N\ There is no evidence of gross bone
destruction, the possibility of early osteomyelitis cannot be excluded. If
clinically warranted, a bone scan or \H\MRI\N\ can be performed. There is no
definite soft tissue abscess collection or definite shoulder joint effusion
seen. However, MRI is more sensitive for a small effusion or a small soft
tissue fluid collection. If clinically warranted an \H\MRI\N\ of the left
shoulder with intravenous Gadolinium can be performed.\.br\The possibility of
"thrombus" of the left brachial vein or partial thrombosis of the left
subclavian vein cannot be excluded.\.br\If clinically warranted, a venogram
can be performed.\.br\\.br\|||||F|||20020218155634 |<CR>
OBX|2|FT|OBR_4_UnServID_0006&IMP^OBR 4 Universal Service Identifier
Proc||\H\IMPRESSION\N\: There is no definite pathology seen on this study,
see above for further
details.\.br\\.br\|||||F|||20020218155634|<CR>
```



### 5.2.3 HL7 Message Using the FT (Enhanced) Option

```

MSH|^~\&|||||200203121153320118||ORU|d021802155610|P|2.3|<CR>
PID|||PID_3_0001||PatientLast^FIRST^M|||||||||||||111-11-0001||<CR> ORC |RE
|<CR>
OBR|1||OBR_3_OrderNum_0006 |OBR_4_UnServID_0006^OBR 4 Universal Service
Identifier
Proc|||20020218155610|||||||||||||20020218155634|||F|||||Doc0001| |||<CR>
OBX|1|ZFT|OBR_4_UnServID_0006&BODY^OBR 4 Universal Service Identifier
Proc||\B\UPPER EXTREMITY CT WITH IV
CONTRAST\ .br\ .br\ \N\ \I\ \U\ \B\CLINICAL INDICATION\N\ : Arm
Pain\ .br\ .br\ \B\FINDINGS:\N\ There is no evidence of gross bone destruction,
the possibility of early osteomyelitis cannot be excluded. If clinically
warranted, a bone scan or \I\MRI\N\ can be performed. There is no definite
soft tissue abscess collection or definite shoulder joint effusion seen.
However, MRI is more sensitive for a small effusion or a small soft tissue
fluid collection. If clinically warranted an \I\MRI\N\ of the left shoulder
with intravenous Gadolinium can be performed.\.br\The possibility of
"thrombus" of the left brachial vein or partial thrombosis of the left
subclavian vein cannot be excluded.\.br\If clinically warranted, a venogram
can be performed.\.br\ .br\ |||||F|||20020218155634 |<CR>
OBX|2|ZFT|OBR_4_UnServID_0006&IMP^OBR 4 Universal Service Identifier
Proc||\B\IMPRESSION\N\ : There is no definite pathology seen on this study,
see above for further
details.\.br\ .br\ |||||F|||20020218155634|<CR>

```