



Healthlink Clinical Systems Interface Specification For TCP

Version History

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1. Introduction

Healthlink is the national messaging broker whose core remit is to provide an electronic messaging service that allows clinical patient information to be securely transferred between GPs, hospitals and other health care agencies.

The purpose of this document is to detail how clinical systems can generate and transmit HL7 message files to Healthlink using the Transmission Control Protocol (TCP) network protocol.

1.1. HL7 (Health Level 7)

Healthlink messaging supports HL7 version 2.4 in XML format only.

This document is **not** an attempt to inform the reader about HL7 standards. Please refer to the relevant HL7 specifications for further detail.

The HL7 Abstract Message Definitions for the permitted message types are included in 'Appendix: Healthlink Message Types' of the [Healthlink Online Message Specification](#). Due to their complexity the schemas are not suitable for inclusion in this document but are available on the Healthlink website.

2. General Messaging Guidelines

Please refer to [Healthlink Online Message Specification](#) for details on HL7 message types and segments.

2.1. Message Variations

Messages may deviate somewhat from the specification laid out in this document, while still being fully compatible with the system.

Additional Elements & Fields: Healthlink Online facilitates clinical systems in transmitting HL7 v2.4 format. Healthlink recommends receiving systems allow for any valid HL7 message to be integrated. If a message contains additional elements and fields that your system may not require, these should not cause an integration error.

Additional Repeating Segments: Generally the only repeating segments expected in Healthlink are the repeating OBR and OBX segments in the Laboratory Results message. Healthlink will however allow for any valid repeating segments.

2.2. CE Data Type Components

Clinical systems are given the following guidelines when filling the CE data types.

The CE Data Type has CE components labelled CE.1 through to CE.6 in the XML Encoding. Clinical systems should use the CE element for the following:

- holding data that is based on defined tables (Healthlink Online Message Specification)
- holding data based on defined and recognised coding systems
- holding data that is not bound to any tables or coding systems, i.e. free text
- holding data that is based on local hospital tables or coding systems

When filling CE data:

- CE.1 must contain the reference to a *value* in the defined table or local clinical system

- CE.2 must contain meaningful descriptive text
- CE.3 must contain a reference, for example:
 - HL7#### (# is a digit [0-9]) for HL7 Defined tables
 - SCT to indicate Snomed
 - LN to indicate LOINC code
 - L to indicate Local

Note: CE.1 and CE.3 should uniquely identify value in CE.2.

2.3.Special Characters and Escape Sequences

Escape sequences are mostly used when messages are encoded in the standard pipe-delimited format, although they are required for certain situations in the XML encoding.

Healthlink will not accept deviations from the suggested special characters:

Delimiter	Suggested Value	Encoding Character Position	Usage
Segment Terminator	<cr> (hex 0D)	-	Terminates a segment record. This value cannot be changed by implementers.
Field Separator		-	Separates two adjacent data fields within a segment. It also separates the segment ID from the first data field in each segment.
Component Separator	^	1	Separates adjacent components of data fields where allowed.
Subcomponent Separator	&	4	Separates adjacent subcomponents of data fields where allowed. If there are no subcomponents, this character may be omitted.
Repetition Separator	~	2	Separates multiple occurrences of a field where allowed.
Escape Character	\	3	Escape character for use with any field represented by an ST, TX or FT data type, or for use with the data (fourth) component of the ED data type. If no escape characters are used in a message, this character may be omitted. However, it must be present if subcomponents are used in the message.

- The above characters should be replaced by the following:
- \E\ Escape character converted to escape character (e.g., '\')
- \F\ Field separator converted to field separator character (e.g., '|')
- \R\ Repetition separator converted to repetition separator character (e.g., '~')
- \S\ Component separator converted to component separator character (e.g., '^')
- \T\ Subcomponent separator converted to subcomponent separator character (e.g., '&')

2.4.Formatted Text

Healthlink Online allows for the following valid HL7 v 2.4 formatting commands in XML encoding only.

Escape character to be used in XML encoding	Meaning
<escape V="".br"/>	Begin new output line. Set the horizontal position to the current left margin and increment the vertical position by 1.

<code><escape V="".inn"/></code> where $n = \text{number}$	Indent <code><number></code> of spaces, where <code><number></code> is a positive integer. This command cannot appear after the first printable character of a line.
---	---

The following five characters cannot be used in XML documents and should be replaced as indicated:

1. `<` replace with `<`;
2. `>` replace with `>`;
3. `&` replace with `&`;
4. `'` replace with `'`;
5. `"` replace with `"`;

NB: Please ensure that a FIXED WIDTH FONT is used for ORU messages that contain a text report in OBX.5. This is to ensure the correct alignment is displayed to the GP in the same way it is displayed in the lab systems.

2.5. Message Format

Healthlink will perform an initial validation of the HL7 message based on the following mandatory segments:

- MSH.3\HD.1 to determine message type being processed.
- MSH.4\HD.2 - Sending Hospital HIPE Code which also corresponds to Sending Application.
- MSH.10 - Message Control ID which uniquely identifies all messages from the sending hospital. Example by using date format for this value: "Lab[yyyyMMddHHmmssfff]"

Note: The value pair of HIPE Code and Message Control ID must be unique.

Example of a Lab Result Message:

```
[prefix]
<ORU_R01>
<MSH>
  <MSH.1>|</MSH.1>
  <MSH.2>^~\&amp;</MSH.2>
  <MSH.3>
    <HD.1>HOSPITALSYSTEM.HEALTHLINK.10</HD.1>
    <HD.2/>
    <HD.3/>
  </MSH.3>
  <MSH.4>
    <HD.1>[Hospital Name]</HD.1>
    <HD.2>[Hospital Hipe[GK1] Code]</HD.2>
    <HD.3>L</HD.3>
  </MSH.4>
  <MSH.5>
    <HD.1/>
    <HD.2/>
    <HD.3/>
  </MSH.5>
  <MSH.6>
    <HD.1>Doctor, Test</HD.1>
    <HD.2>121212.4000</HD.2>
    <HD.3>MCN.HLPracticeID</HD.3>
  </MSH.6>
  <MSH.7>
    <TS.1>202501031100</TS.1>
  </MSH.7>
  <MSH.9>
    <MSG.1>ORU</MSG.1>
    <MSG.2>R01</MSG.2>
  </MSH.9>
  <MSH.10>LAB20250611151819004504</MSH.10>
  <MSH.11>
    <PT.1>P</PT.1>
  </MSH.11>
  <MSH.12>
```

```

<VID.1>2.4</VID.1>
</MSH.12>
<MSH.15/>
</MSH>
...
<ORU_R01/>
[suffix]

```

3. Integration and TCP Service

3.1.VPN

Healthlink can enable site VPNs for non-HSE (NHN) sites via our network provider, who will liaise with site technical personal to determine the appropriate VPN Phase and configuration settings. NHN sites will need to contact NSD to get access to the appropriate server access.

Ports:

From Healthlink to Site

```

Healthlink Inbound Service
  Test Environment
    TCP: 9667
  Live Environment
    TCP: 9669
  Service Support:
    TCP: 9800

```

From Site to Healthlink

```

Healthlink Outbound Service
  Test Environment
    TCP: 6667
  Live Environment
    TCP: 6669
  Service Support:
    TCP: 9800

```

From Site to/from Healthlink

```

MSMQ
  TCP: 1801
  RPC: 135, 2101, 2103, 2105
  UDP: 3527, 1801

```

3.2.HL7 xml Message Prefix and Suffix

Over TCP/IP, every message needs to have an identifier that indicates where it begins and where it ends. For each xml message sent or received a prefix must be included before the message start and a suffix after the message ends. The default hexadecimals are 0xB for prefix and 0x1C 0xD (two bytes) for suffix.

Example in Bytes:

```

0xB = 11
0x1C, 0xD = 28, 13

```

Note: The requirement for a prefix and suffix applies to all messages including Acknowledgements.

3.3.Outbound Listener

The Healthlink Outbound software is a windows service that works as a TCP/IP listener, setup on a specific port, to receive HL7 outbound messages from the source system. With each HL7 Xml message sent a unique connection is created. An acknowledgment message (Ack/NAck) is returned to the source system indicating whether or not the message was successfully processed. Examples of outbound messages from source system include Lab Results, Radiology Results, A&E Notification.

The outbound service will act as a communication link between the source site server and Healthlink. This connection is established through two different TCP/IP ports, one for each of our Test and Live environments.

This windows service will be configured to start automatically and any errors or alerts will be logged and sent to Healthlink.

3.4.Inbound Listener

The Healthlink Inbound service is a windows service that consists of transmitting messages over TCP/IP, over a specific port, from the Healthlink Bridge server to a listener setup in the receiving system.

This service transmits HL7 Xml messages over a single unique connection and always expecting back a successful or unsuccessful Acknowledgment message (Ack/NAck). If no Ack is retrieved during this transmission, by default the same message will *retry indefinitely*, every *10m* until one is returned back.

Examples of inbound messages sent to the clinical system include GP Lab Orders & Referrals.

The inbound service will act as a communication link between Healthlink and the receiving site server. This connection is established through two different TCP/IP ports, one for each of our Test and Live environments.

This windows service will be configured to start automatically and any errors or alerts will be logged and sent to Healthlink.

3.5.Flexibility

Due to the variety of information systems involved in this project, flexibility of the Healthlink Online system has been of utmost importance. The system is flexible in the following respects:

- It allows for messages that may be produced by different information systems within a single hospital. There is no restriction on the location that each Healthlink Message type is transmitted from, other than it being accessible from the bridge machine by TCP/IP. This also means the solution is open to the many operating systems that can provide TCP service.
- It accepts up to 250 simultaneous/asynchronous connections, which can still be increased if required.
- Message transmission was optimized for performance by using compression and other methods, which results in less network bandwidth usage and faster transmissions.

4. Clinical System Requirements

4.1.Acknowledgements

Acknowledgments (ACKs) are an integral part of Healthlink integration process. ACKs work as a mandatory audit/confirmation receipt of message delivery and processing for both Healthlink and

clinical systems. Please refer to ACK_Message_Hospital_Specification_v0_3 or higher for Acknowledge Messages Implementation.

4.2.Procedures for Making Changes to Source System

The procedure for making any required changes to the source system that generates Healthlink messages is as follows:

1. Participating sites must inform Healthlink of their intension to implement a change to the source system.
2. A detailed account of the change must be supplied to Healthlink.
3. Test messages must be generated by the source system in a test environment and not in the live environment.
4. Sample test message structures must be sent to Healthlink for validation.
5. Healthlink must test these new messages in the Healthlink test environment, which encompasses a test message agent, test database, the test Healthlink Online application and testing with each of the GP Practice Management Systems.
6. Once full testing has been completed Healthlink will contact the participating site and schedule an implementation date for the production environment.

A clinical system looking to enable a new service for their site must submit a project proposal, available on the Healthlink website, for review, prioritisation and scheduling purposes.

4.3.Data Protection Agreement

Each clinical provider must enter into a formal data protection agreement with Healthlink prior to enabling integration.

5. Auditing & Reconciliation

Healthlink supports clinical systems in their auditing and reconciliation processing through Acknowledgement (ACK) messages. Receiving systems must use returned ACK message for their own internal auditing and reconciliation processes. In the event where a message failed to be successfully processed the clinical system must correct and resend the failed message to Healthlink.

Sites must have the ability to regenerate messages from the source system, based on the date and time of message creation, for a period of three months.

Healthlink Message Type ID: 13

<u>ACK</u>	<u>General Acknowledgment</u>	<u>Chapter</u>
MSH	Message Header	2
MSA	Message Acknowledgment	2
[ERR]	Error	2

5.1.Sample ACK Message

Values in blue are taken from the originating clinical system message segments.

```
<?xml version="1.0" encoding="UTF-8"?>
<ACK xmlns="urn:h17-org:v2xml">
  <MSH>
    <MSH.1>|</MSH.1>
    <MSH.2>^~\&amp;</MSH.2>
    <MSH.3>
      <HD.1>HLONLINE.HEALTHLINK.13 [FacilityName.HEALTHLINK.13]</HD.1>
    </MSH.3>
    <MSH.4>
```



```

<HD.1>St. James's Hospital [Facility Name MSH.6/HD.1]</HD.1>
<HD.2>904 [Facility Code MSH.6/HD.2] </HD.2>
<HD.3>L</HD.3>
</MSH.4>
<MSH.5>
  <HD.1>HELIXPM</HD.1>
  <HD.2></HD.2>
  <HD.3></HD.3>
</MSH.5>
<MSH.6>
  <HD.1>Dr. Smith, John [GP Name MSH.4/HD.1]</HD.1>
  <HD.2>123564.1234 [GP MCN MSH.4/HD.2]</HD.2>
  <HD.3>MCN.HLPracticeID [MSH.4/HD.3]</HD.3>
</MSH.6>
<MSH.7>
  <TS.1>20150914162235</TS.1>
</MSH.7>
<MSH.9>
  <MSG.1>ACK</MSG.1>
  <MSG.2>R01 [MessageType MSH.9/MSG.2]</MSG.2>
</MSH.9>
<MSH.10>ACK202501141622353564</MSH.10>
<MSH.11>
  <PT.1>P</PT.1>
</MSH.11>
<MSH.12>
  <VID.1>2.4</VID.1>
</MSH.12>
</MSH>
<MSA>
  <MSA.1>AA</MSA.1>
  <MSA.2>ORU20350114162054003564</MSA.2>
</MSA>
</ACK>

```

The values for sending application and sending facility in the acknowledgement message are the same as the values for receiving application and receiving facility in the initiating assessment message and vice versa.

MSH.10 is the unique message control ID of the acknowledgement message and is not related to MSA.2, the message control ID of the assessment message that is being acknowledged. MSH.10 is generated using the format of the current date and time, up to the milliseconds. **Eg:**

ACKyyyyMMddHHmmssfff

The three possible values for MSA.1, Acknowledgement Code are:

- AA Application Acknowledgement
- AE Application Error (details/reasons to be provided by PCRS)
- AR Application Reject

This tells you whether the original assessment message, as identified in MSA.2, has been accepted by the receiving system.

An Application Reject acknowledgement may mean one of two things:

- There is a major problem with the message and it cannot be validated by the receiving system;
- There is a problem with the receiving system and it is unable to process the message, though the message itself is fine;

An Application Error message means there is a problem with the content of the message. This should be diagnosed and corrected by the sending system before resending the message.

The Message Error Segment (ERR) is required where an error is found in a HL7 message. The ERR Segment is used to add error information to acknowledgement messages. Healthlink have added codes to the 'HL7 Table 0357 – Message Error Condition Codes' section in the [Healthlink Online Message](#)

Specification. If an error is not included in this table, the unknown code can be used and new errors can be added to this table accordingly as they occur.

5.2.ACK ERR Segment:

- The ERR segment is optional in an ACK message, but where it does appear the ERR.1 field is required.
- The ERR.1 field is repeatable, allowing for information on multiple errors to be displayed.
- The components of the ERR.1 field are:
 - segment ID, the three letter identifier of the segment in which the error occurred;
 - sequence, the Set ID of the segment if there is more than one segment with the same segment ID in the message;
 - field position, the field number within the segment where the error occurred;
 - code identifying error, taken from HL7 table 0357 Message Error Condition Codes and shown in Section 14 of this document.

Consider an example where an ORU_R01 message is missing the required fields PID.3 Patient Identifier, and PID.5 Patient Name in the MSH Segment. In this case the ERR segment of the acknowledgment message, which would have AE in the MSA.1 field, would look as follows:

```
<ERR>
  <ERR.1>
    <ELD.1>PID</ELD.1>
    <ELD.3>3</ELD.3>
    <ELD.4>
      <CE.1>101</CE.1>
      <CE.2>Required field missing</CE.2>
      <CE.3>HL70357</CE.3>
    </ELD.4>
  </ERR.1>
  <ERR.1>
    <ELD.1>PID</ELD.1>
    <ELD.3>5</ELD.3>
    <ELD.4>
      <CE.1>101</CE.1>
      <CE.2>Required field missing</CE.2>
      <CE.3>HL70357</CE.3>
    </ELD.4>
  </ERR.1>
</ERR>
```